

The Effect of Game-Based Volleyball Exercise on Physical Fitness Parameters in Children Aged 10-13

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Keywords

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ABSTRACT

The aim of this study is to investigate the effect of the game-based volleyball exercise program applied outside of physical education classes on the physical fitness abilities of primary school students. A total of 68 students (38 boys and 30 girls) from two classes participated in this study. Boy students, 20 of whom were in experimental group (age = 11.2 ±0.8 years), 18 were in control group (age = 10.8 ±1.2 years), and girl students, 18 of whom were in experimental group (age= 11.5 ±1.2 years) and 12 girl students (age = 10.6 ±0.9 years) were randomly assigned to the control group. Sit-ups, push-ups, bent-arm hang, trunk lift, shuttle run and sit and reach flexibility tests were performed to determine the level of physical fitness. Results from repeated measures analysis of variance showed a significant interaction on all physical fitness test scores in girl students. When girl students were considered, there was a significant interaction apart from the shuttle run and sit and reach test mean scores. It was seen that the service effect of a play-based volleyball exercise program improved the outcomes of both groups in boy and girl students after eight weeks of intervention. The experimental group showed a significant change in percentage in all physical fitness tests, except for the shuttle run and reach-reach test, in girl students compared to the control group. The findings show that although the game-based volleyball exercise program is effective on the physical fitness skills of primary school students, there is an improvement in the physical fitness skills of the children who do not participate in this training program. It is considered that this effect may be due to maturation or the differences in the physical activity levels of children.



1. INTRODUCTION

According to the World Health Organisation, health is defined as physical, physiological, psychological and mental well-being. Physical fitness is the ability to successfully perform occupational, recreational and daily activities in the correct forms without causing fatigue in the individual [1]. According to this definition, physical fitness is the coordinated functioning of elements such as balance, coordination, agility and endurance [2]. People with high physical fitness from the first times of their lives can easily overcome all the work they will do during their lives [3]. It is seen that developed and developing countries start sports at an early age and direct

people to physical activities in order to lead a healthy life [4]. In this context, it has been emphasised that children will participate in sports, physical activities and physical education classes in schools to determine and improve their exercise capacity at an early age [5, 6]. It can be said that physical education classes and sports practices implemented in schools support the physical, mental and cognitive development of children [7, 8].

These data shed light on the importance of sports and physical activity for children to be healthy, to develop motor skill levels, to utilise leisure time in a positive way, and to support their educational and social development [8]. The development of physical skills in early childhood and the steps taken towards specialisation in this

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field form the basis for maintaining increased physical activity in later stages of their lives [9]. For children in this age group, a variety of in-school and out-of-school activities can provide opportunities to develop basic motor skills.

There are some opinions that there are some deficiencies in the quantity and quality of physical education lessons worldwide [10-14], UNESCO's Worldwide Survey of School Physical Education report revealed evidence that national governments are committed to the adequacy of physical education classes through legal regulations, but some countries are slow or inadequate in terms of implementation quality [15]. Demirhan et al. [16], in their research on physical education curricula and their execution in Turkey, identified "inadequacy of facilities - field-area, inadequacy of lesson hours and inadequacy of materials" as the most important problems and deficiencies in the teaching of the lessons. With the initiatives of physical education specialists, physical education lesson plans in terms of in-school activities have shown a positive development and have undergone many changes. Despite all these initiatives and developments, physical education teachers, students and parents still face a number of problems

Due to the insufficient number of hours of physical education lessons at school, a sports branch cannot be fully addressed in all aspects, so the lesson plans focus only on general rules such as game rules, basic and technical movements in relation to team and individual sports. Therefore, out-of-school sports activities can provide a favourable environment for children's physical, cognitive and social development. Among out-of-school sports activities, there are many private centres that provide training for physical fitness development aimed at developing basic movement skills.

Team sports require a high level of ability, including cognitive, technical, physical and tactical aspects. Players' physical abilities significantly influence the rapid adaptation to cognitive processes in the game and team tactics, because games with the ball require repeated maximum effort. Therefore, players should have skills such as body muscle endurance, functional strength, speed and coordination to expand their aerobic and anaerobic capacities to perform strong, hard and quick movements and to ensure long-term offensive and defensive continuity [17]. Volleyball, as a medium intensity physical activity, is a performance sport in which these skills are continuous and at the same time rest and loading are together. Volleyball sport strengthens the muscles in the arms, shoulders, thighs and legs

[18-20], it also contributes positively to volleyball-specific flexibility, sprint, balance and conditioning skills for performance [17, 21, 22].

In addition, sports activities consisting of team sports such as volleyball reduce the risk of anxiety and depression and reduce the risk of cardiovascular diseases and diabetes [23-25]. Volleyball is a fun sport that people from all countries and all age groups play with pleasure outdoors and in indoor halls. The fact that it is as exciting to watch as it is to play increases the interest in volleyball day by day. Physical requirements such as speed and agility, high jumping ability for dunking and blocking, wrist and finger strength for volleyball are needed for movements in the field-court, which are various components of volleyball sport [26]. Considering the necessity of warm-up, sprint, endurance, balance and flexibility in the stages of children's preparation for physical activity, performance and mental preparation for competition, volleyball is an important sport in terms of developing motor and performance skills in children in general in sports sciences. In the light of this information, the aim of our study was to determine the effect of extracurricular game-based volleyball exercise on physical fitness parameters in children aged 10-13 years.

2. MATERIALS AND METHODS

2.1. Participants

A total of 80 students (40 girls and 40 boys) between the ages of 10 and 13 who had not participated in any extracurricular activities other than Physical Education classes at school in Erdemli district of Mersin province were included in our study. The sample group was randomly divided into two groups as experimental group of all students (n=20) and control group (n=20) for both genders. The experimental group was subjected to an 8-week game-based volleyball training program in addition to physical education classes. The control group was excluded from the volleyball training program and continued their physical education classes. While the students who participated in our study were included in the study according to criteria such as voluntarily accepting to participate in the research and obtaining family approval, being between the ages of 10-13, being an active student in a school affiliated to the Ministry of National Education, not participating in any extracurricular activities other than physical education classes at school, and not having any health problems, criteria such as encountering health problems during the research process and not participating regularly in exercise

programs were used for exclusion. Due to the exclusion criteria, at the end of the research, the sample group for girl students was determined as 30 (Experiment:18-Control:12) and 38 (Experiment:20-Control:18) for boy students.

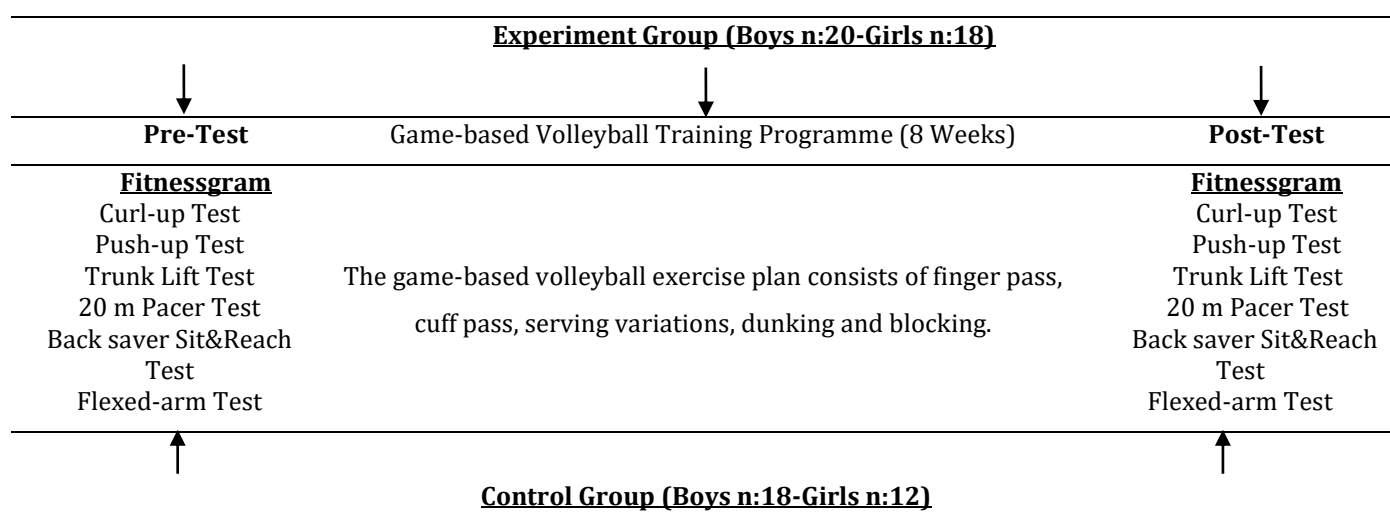
2.2. Research Model and Procedures

In our study, experimental method with pretest-posttest design and control group was used. Pre-test measurements of both groups were performed before the training period started. After the 8-week volleyball training period, post-test measurements were performed at the same time

as the pre-test measurements. In our study, the experimental and control groups attended the physical education classes in the course programmes of the week, and the experimental group received volleyball training outside the class. After the training practice was finished, 48 hours rest was given and post-test measurements were taken.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Table 1. Research Model



2.3. Physical Fitness Assessment

In the measurement of physical fitness, Sit-up Test, Push-up Test, Flexed-arm Hang, Trunk Lift and 20 metre Pacer aerobic capacity test were applied within the scope of fitnessgram test battery. Protocols were created in accordance with the test procedures by using the Fitnessgram practitioner book.

2.4. Game Based Volleyball Exercise Programme

The game-based volleyball exercise to be performed for the experimental group will last for 8 weeks, 3 days a week at the end of the school day, students will stay at the school and start the exercise with 10 minutes of volleyball-specific warm-up movements and a total of 2 hours of volleyball exercise programme will be applied as 60+60 and at the end of the exercise, they will complete the exercise by stretching for 10 minutes.

2.5. Statistical Analysis

Statistical analysis was performed with SPSS statistical software version 22 (SPSS Inc., Chicago, IL, USA). Results are presented as mean values ± standard deviation (SD). Kolmogorov Smirnov test was used to show that the data were normally distributed ($p > 0.05$). Equality of variances for all test variables was also tested by Levene's test. Two-way analysis of variance was used to test the effect of group (Exp. vs. Con) and the effect of time (pretest vs. posttest) and the interaction of group time for physical fitness test results. The Bonferroni test was applied to observe whether the groups changed over time separately, and group and time changes were compared. The magnitude of Cohen's d effect (ES) for within-group changes was categorised as follows: "insignificant" <0.2 ; "small" $0.2-0.6$; "moderate" $0.6-1.2$; "large" $1.2-2.0$; "very large" >2.0 and "extremely large" >4.0 . Partial eta squared (η^2) was calculated to control for differences between groups, where 0.01 was designated as a small effect, 0.06 as a medium effect and 0.14 as a large

effect. Statistical significance was determined at a significance level of $p \leq 0.05$.

3. RESULTS

In the pre and post test mean values of body weight, which is one of the body composition characteristics of boys participants, the two groups

differed at low values. Body weight decreased in the experimental group and increased in the control group. Depending on the changes between the mean values of height and body weight, it is seen that the body mass index decreased in the experimental group at low values and increased in the control group.

Table 2. Body composition characteristics of boys participants

Variables	Experimental Group		Control Group	
	Pre-Test	Post-Test	Pre-Test	Post-Test
Body Weight (kg)	39,3 ±2,3	38,9±2,2	39,1 ±3,3	40,0±3,4
Height (cm)	144,90±2,1	147,2±2,3	141,8±1,5	143,1±1,6
Body Mass Index (kg/m ²)	18,9±0,6	18,0±0,5	19,4±0,7	19,6±0,7

In the pre and post-test mean values of body weight, which is one of the body composition characteristics of the girl participants, both groups showed an increase at low values. The mean values of height increased between the tests in both

groups. It is seen that body mass index increased at low values in both groups due to the changes between the mean values of height and bodyweight.

Table 3. Body composition characteristics of girls participants

Variables	Experimental Group		Control Group	
	Pre-Test	Post-Test	Pre-Test	Post-Test
Body Weight (kg)	39,1 ±3,3	40,0±3,4	39,4 ±3,3	40,9±2,2
Height (cm)	141,80±1,5	143,1±1,5	144,4±2,2	146,4±2,3
Body Mass Index (kg/m ²)	19,4±0,6	19,6±1,7	18,8±0,9	19,6±0,7

When the table is analysed, the decisions related to the previously mentioned three experiments of the research (Group, time, group*time) are as follows.

There is no significant difference between the pre-test and post-test physical fitness test variables scores of the experimental and control groups (Sit-up, $F_{1, 36} = 3,577$, $p = 0,067$, $\text{Partial}\eta^2 = 0,090$, Push-up $F_{1, 36} = 0,443$, $p = 0,510$, $\text{Partial}\eta^2 = 0,012$, Bent-arm hanging $F_{1, 36} = 0,242$, $p = 0,626$, $\text{Partial}\eta^2 = 0,083$, Trunk lift $F_{1, 36} = 0,737$, $p = 0,396$, $\text{Partial}\eta^2 = 0,020$, Shuttle run $F_{1, 36} = 0,782$, $p = 0,382$, $\text{Partial}\eta^2 = 0,021$, Reach-reach $F_{1, 36} = 0,890$, $p = 0,352$, $\text{Partial}\eta^2 = 0,024$). It was observed that the differences between the groups did not change in terms of total scores regardless of pretest-posttest distinction. Physical fitness parameters were not affected in terms of the group receiving different treatments.

There is a significant difference between the pre-test post-test mean physical fitness test scores of the participants in terms of time (Shuttle, $F_{1, 36} = 81,360$, $p = 0,000$, $\text{Partial}\eta^2 = 0,693$, Push-up $F_{1, 36} = 95,342$, $p = 0,000$, $\text{Partial}\eta^2 = 0,726$ Bent-arm hang $F_{1, 36} = 28,388$, $p = 0,000$, $\text{Partial}\eta^2 = 0,441$, Trunk lift $F_{1, 36} = 93,127$, $p = 0,000$, $\text{Partial}\eta^2 = 0,721$, Shuttle run $F_{1, 36} = 83,927$, $p = 0,000$,

$\text{Partial}\eta^2 = 0,700$, Reach-and-reach $F_{1, 36} = 164,623$, $p = 0,000$, $\text{Partial}\eta^2 = 0,821$). It shows that the time-dependent physical fitness scores of the participants changed without group distinction. Time had an effect on physical fitness. When the effect size values of the differences for changes over time were examined, all physical fitness test score averages showed a large effect.

The interaction between being in different groups and the factors indicating measurements at different times on the physical fitness test scores of the participants was found to be significant (Sit-up, $F_{1, 36} = 17,988$, $p = 0,000$, $\text{Partial}\eta^2 = 0,333$, Push-up $F_{1, 36} = 8,039$, $p = 0,007$, $\text{Partial}\eta^2 = 0,183$, Bent-arm hanging $F_{1, 36} = 9,663$, $p = 0,004$, $\text{Partial}\eta^2 = 0,212$, Trunk lifting $F_{1, 36} = 8,346$, $p = 0,007$, $\text{Partial}\eta^2 = 0,188$, shuttle run $F_{1, 36} = 8,517$, $p = 0,006$, $\text{Partial}\eta^2 = 0,191$, reach-reach $F_{1, 36} = 7,574$, $p = 0,009$, $\text{Partial}\eta^2 = 0,174$). The participant groups improved the physical fitness test parameters depending on the intervention and time. When the effect size values of the differences between the group*time interaction were examined, the effect size of the mean test scores of push-ups, bent arm hanging trunk lifting, shuttle run and reach and reach test scores showed a large effect.

Table 4. The effect of Game-Based Volleyball Training (GBVT) on physical fitness parameters of boys participants

Variables	Group	Pre-test	Post-Test	ES	Δ%	p-value, η^2 p
Sit-up	Exp (n:20)	11,80±6,00	17,35±5,48	+0,97	+47,0%	Group: p= 0,067 , η^2 p :0,090 Time:p=0,000, η^2 p :0,693
	Con (n:18)	10,06±5,37	12,06±6,58	+0,33	+19,9%	Group*Time:p=0,000, η^2 p:0,333
Push-up	Exp (n:20)	6,35±3,33	11,30±5,22	+1,16	+78,0%	Group: p=0,510 , η^2 p :0,012 Time: p=0,000 , η^2 p :0,726
	Con (n:18)	6,72±2,70	9,44±2,43	+1,06	+40,5%	Group*Time:p=0,007, η^2 p:0,183
Bent-arm hanging	Exp (n:20)	30,67±24,95	36,98±24,65	+0,25	+20,6%	Group: p=0,626 , η^2 p :0,007 Time: p=0,000 , η^2 p :0,441
	Con (n:18)	29,69±15,45	31,35±14,83	+0,11	+5,6%	Group*Time:p=0,004, η^2 p:0,212
Trunk Lift	Exp (n:20)	24,35±7,29	31,15±6,41	+0,99	+27,9%	Group: p=0,396 , η^2 p :0,020 Time: p=0,000 , η^2 p :0,721
	Con (n:18)	24,22±5,98	27,89±5,21	+0,66	+15,2%	Group*Time:p=0,007, η^2 p:0,188
Shuttle run	Exp (n:20)	32,00±11,75	38,45±11,48	+0,56	+20,2%	Group: p=0,382 , η^2 p :0,021 Time: p=0,000 , η^2 p :0,700
	Con (n:18)	30,44±9,58	33,78±10,74	+6,32	+11,0%	Group*Time:p=0,006, η^2 p:0,191
Reach-reach	Exp (n:20)	14,40±5,50	17,75±4,77	+6,26	+23,3%	Group: p=0,352 , η^2 p :0,024 Time: p=0,000 , η^2 p :0,821
	Con (n:18)	13,72±2,49	15,89±3,01	+10,77	+15,8%	Group*Time:p=0,009, η^2 p:0,174

Exp: Experimental; Con: Control; ES: Effect Size; Δ%: percentage of change

As a result of Cohen's d effect size calculations for the changes within the group, both group scores showed an extremely large effect on the mean shuttle run scores of the control group and the mean reach and reach test scores. In order to observe separately whether the groups changed

over time, which is one of the research objectives, the Bonferroni test was applied and the group and time change was compared. Changes over time for each group in the relevant analysis are shown in the graphs below.

Table 5. The effect of Game-Based Volleyball Training (GBVT) on physical fitness parameters of girls participants

Variables	Group	Pre-test	Post-Test	ES	Δ%	p-value, η^2 p
Sit-up	Exp (n:18)	9,28±5,15	18,11±6,02	1,58	95,2%	Group: p=0,888 , η^2 p :0,001 Time: p=0,000, η^2 p :0,939
	Con (n:12)	12,00±9,46	14,58±10,50	0,26	21,5%	Group*Time:p=0,000, η^2 p:0,821
Push-up	Exp (n:18)	5,83±2,83	13,67±3,58	2,45	134,5%	Group: p=0,023 , η^2 p :0,170 Time: p=0,000 , η^2 p :0,936
	Con (n:12)	6,58±1,44	8,17±1,90	0,95	24,2%	Group*Time:p=0,000, η^2 p:0,866
Bent-arm hanging	Exp (n:18)	27,33±19,35	34,29±20,45	0,35	25,5%	Group: p=0,146 , η^2 p :0,0074 Time: p=0,001 , η^2 p :0,339
	Con (n:12)	21,22±7,25	22,76±6,48	0,22	7,3%	Group*Time:p=0,022, η^2 p:0,172
Trunk Lift	Exp (n:18)	24,44±5,66	32,78±5,66	1,47	34,1%	Group: p=0,002 , η^2 p :0,296 Time: p=0,000 , η^2 p :0,888
	Con (n:12)	20,00±6,08	22,17±6,07	0,36	10,9%	Group*Time:p=0,000, η^2 p:0,733

Shuttle run	Exp (n:18)	30,06±12,10	33,39±14,77	0,25	11,1%	Group: p=0,224 , η^2 p :0,052 Time: p=0,000 , η^2 p :0,166 Group*Time:p=0,795, η^2 p:0,002
	Con (n:12)	24,92±3,75	29,08±6,60	10,43	16,7%	
Reach-reach	Exp (n:18)	16,50±4,16	19,28±4,52	8,24	16,8%	Group: p=0,185 , η^2 p :0,062 Time: p=0,000 , η^2 p :0,394 Group*Time:p=0,627, η^2 p:0,009
	Con (n:12)	13,72±2,49	15,89±3,01	+10,77	+15,8%	

Exp: Experimental; Con: Control; ES: Effect Size; $\Delta\%$: percentage of change

There is a significant difference between the pre-test and post-test physical fitness test variables scores of the experimental and control groups in the mean scores of push-ups and trunk lifts (Push-up F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, Trunk lift F 1, 36 = 5.273, p = 0.025, Partial η = 0.083.). There was no statistically significant difference between the scores of other pre-test post-test physical fitness test variables (Shuttle, F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, bent arm hang F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, shuttle run F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, reach-reach F 1, 36 = 5.273, p = 0.025, Partial η = 0.083). There is a significant difference between the pre-test post-test mean physical fitness test scores of the participants in terms of time (Sit-up, F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, Push-up F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, Bullet arm hang F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, Trunk lift F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, Shuttle run F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, Reach-and-reach F 1, 36 = 5.273, p = 0.025, Partial η = 0.083). It is seen that the time-dependent physical fitness scores of the participants change and time has an effect on physical fitness. The interaction between being in different groups and the factors indicating measurements at different times on the physical fitness test scores of the participants was found to be significant except for the shuttle run and reach and reach test mean scores (Shuttle, F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, Push-ups F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, Bullet arm hang F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, Trunk lift F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, Shuttle running F 1, 36 = 5.273, p = 0.025, Partial η = 0.083, Reach-reach F 1, 36 = 5.273, p = 0.025, Partial η = 0.083). The participant groups improved the physical fitness test parameters except for the shuttle run and reach-and-reach variables in a treatment- and time-dependent manner. As a result of the Cohen's d effect size calculations for the changes within the group, the scores of the control group in the shuttle run and the scores of both groups in the reach and reach test scores showed an extremely large effect.

In order to observe separately whether the groups changed over time, which is one of the

research objectives, the Bonferroni test was applied and group and time change were compared. Changes over time for each group in the relevant analysis are shown in the graphs below.

4. Discussion

In this study, the effects of game-based volleyball exercise programme on the components of static and dynamic muscular endurance, flexibility, and aerobic capacity in different regions were investigated. The results of two-way analysis of variance in repeated measures in boys showed that the interaction was significant on physical fitness test scores (Table 4). Participant groups showed improvement in all physical fitness test parameters depending on application and time. Bonferroni test results showed statistically significant changes between control and experimental groups over time in all physical fitness parameters except for the ability to hang a bent arm.

The results of two-way analysis of variance in repeated measures in girls showed that the common interaction on physical fitness test scores was significant except for shuttle run and reach-reach test mean scores. The participant groups improved the physical fitness test parameters except shuttle run and reach and reach variables depending on the application and time. As a result of the Bonferroni test, there was no statistically significant change in the shuttle run, that is, aerobic endurance ability parameters of the groups over time. In addition, the control group did not show a statistically significant change over time in the bent arm hanging test. As a result of the Bonferroni test, all other physical fitness parameters of the control and experimental groups show a statistically significant change over time (Table 5).

To date, research has not revealed the effects of the game-based volleyball exercise programme applied outside of physical education and sports lessons in schools on the physical fitness parameters of middle childhood students, whereas there are studies that reveal the effects of different game-based exercise practices on physical fitness [27-30].

Cocca et al. [27] evaluated the effects of a 30-minute game-based exercise programme for 6 months on physical fitness and psychological health in school children aged 10-12 years and found that physical fitness increased in the post-test in the experimental and control groups, while cardiovascular endurance did not improve. Mayorga-Vega et al. [30] applied a 60-minute circular exercise programme two days a week for eight weeks in boys and girls aged 10-12 years and reported a significant increase in cardiovascular endurance at the end of the experimental period and no change in the control group. Lopez et al. [29] found that at the end of a 10-month game-based programme, cardiorespiratory fitness significantly improved along with fat percentage. A similar study found that an eight-month game-based football exercise programme had a significant effect on cardiorespiratory fitness and other health-related fitness components [28]. It is seen that our study and other similar studies reveal different findings within themselves.

In all studies except one, the duration of the programme was longer than our programme and exercise intensities within the programme were not monitored. In addition, the lack of follow-up of the out-of-school physical activity levels of the children participating in the study, which is a limitation of other studies, may be a reason for these variable results. In our study, while there was a significant difference in group-time interaction except for all physical fitness test score averages in boys students, a statistically significant difference was observed in both experimental and control groups in all physical fitness parameters except bent arm hanging at the source of this difference (Table 4). When we look at the percentage change rates, we see that all physical fitness parameters in the experimental groups showed more change than the control groups in boys. In girl students, there was a significant difference in all physical fitness values except shuttle run and reach and reach test mean scores in group-time interaction. The shuttle run and reach and reach test mean scores of girl students showed a significant difference depending on time.

This finding shows that the change is time-dependent rather than practice-dependent. We think that this difference may develop due to the maturation of children in this age group. The shuttle run is a field test that measures cardiovascular fitness and attempts to provide an estimated MaxVO₂ value. Rowland [31] reported that the MaxVO₂ difference between 6- and 12-year-old boys was more than doubled and that girls developed at approximately the same rate as their male peers. According to these research

results, cardiovascular endurance may increase between these ages due to maturation. The National Child and Youth Physical Fitness Study [32] and the American Association for Health, Physical Education, Recreation and Dance's Health-Related Physical Fitness Test norms (AAHPERD, 1980) [33], which put forward norm values that support this situation, showed that boys had higher performance than girls at all ages according to the results of the 1-mile walk/run test and that development continued in both gender groups between the ages of 10 and 14. Beunen and Thomis [34] reported that muscular strength and endurance gains in boys and girls follow the typical growth curve of height. Similarly, Faigenbaum [35] reported that strength development of both boys and girls follows the increase in height. In our research findings, it is seen that the mean of pre and post-test height increased in both groups. It can be said that the increase in muscular strength and endurance parameters in both boys and girls in the experimental and control groups was also influenced by this change in body composition. The increase in the control group, which did not receive any treatment, may be related to this growth feature.

5. Conclusion

As a result, all physical fitness parameters of both boys and girls improved in the experimental and control groups. It can be thought that this development may be affected by maturation and daily activity levels with the application. Because of this situation, it is seen that daily physical activity follow-up is important in determining the physical fitness levels of children in the developmental period. In many studies, this limitation may affect the results of the research. Establishing current norm values in terms of revealing the effect of heredity and environment on physical fitness in children will contribute to these researches and practitioners. In particular, it is necessary to establish and compare the parameters of children in different geographies. More research is needed in terms of different teaching methods and different exercise variables in terms of training science in order to evaluate continuous physical fitness in terms of revealing the effectiveness of Physical Education and Sports lessons in children and to determine the effects of recreational activities other than these lessons.

Conflict of Interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

The study protocol was approved by the Ethics committee approval was obtained from Mersin University Sports Sciences Ethics Committee.

Author Contributions

Study Design, HÜ, YE; Data Collection, HÜ, YE; Statistical Analysis, HÜ, YE; Data Interpretation, HÜ, YE; Manuscript Preparation, HÜ, YE; Literature Search, HÜ, YE. All authors have read and agreed to the published version of the manuscript.

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