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Development and Effects of Physical Activity Programs for Elementary School Students

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Abstract

Little is known about the positive effects of physical activity in elementary school students using community children's centers. This study is to apply physical activity programs for elementary school students using local children's centers and to verify their effectiveness.82 elementary school students in grades 1 to 6 who use local children's centers in northern Gyeonggi Province are similar experimental studies of single-group pre-post design to verify their effectiveness after applying physical activity programs. There were statistically significant changes in blood tests, body composition, and all physical fitness measures before and after physical activity in children. The emotional intelligence of the lower grade children was in the emotional expression (p=.019) domain, the upper grade children in the emotional recognition (p=.002), and the thinking promotion ability of emotion (p=.004), the lower grade stress was the personal factor (p= .038), school factors (p = .001), high-grade children showed significant results in the areas of active coping (p = .011), and social support seeking coping (p = .049). In order to improve the health of elementary school students at the community child care centers, efforts are needed to improve the efficiency of developing and applying for more organized physical activity programs.

Keywords: Elementary School Students, Physical Activity Program, Community Child Care Center, The science of nursing.

1. INTRODUCTION

This Par Childhood health is a basic and essential condition for daily life to be maintained without problems. Health is not only a basic requirement for children to continue their long-term school life and achieve cognitive and cognitive achievement, but it is also a major factor that will determine the quality of life of individuals in the future [1]. Childhood health will then continue to affect the overall process of changing into adulthood by determining learning and daily living skills through growth patterns and metabolic processes [2].

Children's health is more vulnerable to the external environment or socioeconomic inequality due to their developmental dependence towards family, and it is necessary to look at it from the perspective of health inequality and make efforts to find equity [3].

Children with lower socioeconomic status are less likely to invest in health during their growth, while exposure to health risks is higher [4], due to lack of access to medical protection due to lack of living costs in the home, which makes it difficult to receive medical help after the disease [5]. Chronic stress caused by low socioeconomic status also negatively affects their health [6]. The community child care center, which has been

recognized as a child welfare facility that provides integrated welfare services since the revision of the Child Welfare Act in 2004, is confirmed as a facility for low-income families and children who need care services after school or during vacation. Recently, social needs and needs for community child care centers have been expanding, and at this point, social roles are needed for the healthy development of low-income children.

Obesity, which has been a serious health problem around the world, has recently expanded to elementary school students as well as teenagers, and has emerged as a major health problem for elementary school students [7]. According to the Ministry of Education's survey, the obesity rate of children has steadily increased, 16.5% of elementary, middle, and high school students identified as obese [8], and the obesity rate has rapidly increased when they become an upper-grade student from the lower-grade student. According to the [9], data, the average height of elementary school students is 152.1cm for boys, 1.7cm higher than five years ago, and the weight has been on a steady rise over the past five years [8].

Child obesity can be divided into simple obesity and symptomatic obesity caused by endocrine or nervous system diseases, which account for 99% of the obesity, such as genetic constitution, lack of exercise, eating patterns, mental and social factors, et all [9].

In terms of developmental time, school-age is a time to learn and act so that one can perceive one's health condition and control one's health behavior by oneself [10], and because habits have not yet stabilized [11]. it is necessary to make the right lifestyle behavior in real life.

They reported inappropriate health activities such as eating habits, sleeping hours, oral care, exercise, watching television, using computers and mobile phones [12], and from a large-scale study of fourth to sixth graders in elementary school, one-third of the subjects had one or more health problems [13] and they focused on smartphones rather than physical activity. According to the 2015 data released by the Gyeonggi Provincial Office of Education, 57.1% of children in the fourth and third grades of elementary school were found to have less than an hour of exercise per week other than school sports [14]. Physical activity means physical movement of daily life in basic human metabolism, and refers to all physical movements that consume energy or physical movements caused by skeletal muscles [15][30]. In order to maintain a healthy lifestyle as the increase in the number of obese elementary school students emerged as a cause of the increase in the social obesity population, in 2020 the Ministry of Health and Welfare set a target for aerobic physical activity from 57.1% to 62.8%, so the elementary students would have more than 1 hour of mid-intensity aerobic exercise, 3days a week [16]. The health promotion lifestyle of the person was found to have effectively increased physical and mental health, including comprehensive health activities such as self-realization, health responsibility, exercise, nutrition, interpersonal support, and stress management.

Various physical activities are required to solve children's physical and mental problems, which will play an important role in fostering socially intact human beings as well as improving children's physical and mental health. Accordingly, this study aimed to provide basic data on the development of elementary school physical activity programs by applying physical activity programs for 16 weeks to elementary school students.

2. OBJECTIVE

The purpose of this study is to apply a physical activity program for elementary school students in the community child care center and to verify its effectiveness, and the specific purpose is as follows.

1) Identify the general characteristics of elementary school students using the community child care center.

2) Vertify the effectiveness of the physical activity program for elementary school students using the community child care center, on blood tests, body composition tests, and physical strength corresponding to the physical area.

3) Vertify the effectiveness of physical activity programs for elementary school students using the community child care center on emotional intelligence and stress coping corresponding to the mental teritory of elementary school students.

Elementary school students using the community child care center will be provided with a physical activity program. After the program, blood tests corresponding to physical areas will be done, body composition tests, emotional intelligence corresponding to physical and mental areas, and stress handling will be increased.

3. METHOD

3.1 Stduy Design

This study is a field experimental study of pre-post-design of a single group for elementary school students using five community child care centers in northern Gyeonggi Province to verify their effectiveness after applying physical activity programs.

3.2 Subject of Study

The subjects of this study are elementary school students from grades 1 to 6 who use the community child care center in northern Gyeonggi-do that agreed in writing that understood the purpose of this study and participate in the study. In the case of a lower grade students, the main caregiver agreed after being explained. The number of subjects studied was calculated using G*Power 3.1.2 program, and the significance level (a)=.05 (both-sided test), power level(1-β)=.95, effect size (d) = 0.5 calculated the number of samples required for the t-test for a single-group comparison, resulting in a minimum number of 54. The subjects of this study were analyzed with 82 people who agreed to participate in the study and satisfied the number of samples in this study.

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3.3 Research Tools

3.3.1 Physical Area

Body Composition Test

The body composition test was conducted using Inbody 230 to analyze children's height, weight, body water, protein, minerals, body fat, muscle mass, BMI, basic metabolism [17].

Physical Fitness Measurement

Four categories of physical fitness assessment were measured: trunk forward flexion, sit ups, standing long jump, and beep test.

- Trunk forward flexion : It refers to the degree to which the joints of the body bend back and forth well, and if you have good flexibility, you can bend your body freely. Trunk forward flexion measured the point at which the fingertips stopped by allowing the child to bend his upper body in a sitting position with both feet straight for more than two seconds. In particular, the test item that measures the flexibility of the lower body hamstring among flexibility measurement items is a necessary exercise for children who need to grow.

- Sit ups : Situps are performed according to the beeps that sound every three seconds to measure the strength and endurance of the abdomen. It is an event in which the upper body is rolled up to examine muscular strength and muscular endurance with the knees bent and both hands on the front thigh. Children lay their heads and backs on the mat, bent their knees to an angle of 90°, and rolled their upper body up so that they could wrap their knees around their palms by climbing their hands on the wide legs to the beeps once every three seconds.

- Standing long jump : Standing long jump is an event to identify the agility of the whole body. Agility means the ability to exert maximum power in minimal time, and agility is a physical factor that can affect later development without development in school, children, and adolescents. Standing long jump measurements measure distance with a white line of 5cm wide on the indoor floor.

- Beep test : Beep test refers to the ability to exercise for a long time without getting tired due to the functions of the heart and lungs being well developed. If you have good cardiopulmonary endurance, you can

run a long distance without exhaustion. Due to the limited space, the beep test measures the ability to run a set distance (15 m for elementary students, 20 m for middle and high school) repetatively, and evaluates that the first two travel require a travel time of less than 9 seconds, and the time interval is gradually reduced from the next travel.

3.3.2 Mental Area

Emotional Intelligence

Emotional intelligence is the ability to evaluate and express emotions of oneself and others, and to effectively control emotions of oneself and others, lower-grade students and upper-grade students were evaluated differently using different tools.

The lower-grade student emotional intelligence test tool developed by [18], and produced by the Daekyo Institute of Education and Science, used the modified elementary school low-grade emotional intelligence test tool for lower-grade students. Each subregion consisted of a total of 22 questions, including 5 questions of emotional recognition, 5 questions of emotional expression, 5 questions of empathy, and 7 questions of emotional control. The score range for each area will be distributed between 0~10 points for emotional recognition, 0~10 points for emotional expression, 0~10 points for empathy, and 0~14 points for emotional control, and the higher the score, the higher the emotional intelligence. upper-grade student emotional intelligence : The upper-grade student emotional intelligence inspection tool used the youth emotional intelligence test produced by by [18], based on the recent model of by [19]. Each sub-area of this tool consists of 40 questions in total, eight questions in each area, including emotional recognition and expression (hereinafter referred to as emotional intelligence), emotional empathy, emotional thought promotion, emotional knowledge utilization, and emotional control. Each question has a five-point Likert scale, meaning that the higher the score, the higher the emotional intelligence.

Stress Degree/Stress Handling

Stress is a response to the disruption or change in physical, physiological, emotional, and behavioral equilibrium, and is measured differently in recognition of the differences between the lower and upper grades of elementary school because it refers to the various coping behaviors that children face.

The degree of stress (lower-grade student): In order to understand the stress level of the lower-grade student, the questionnaire modified and supplemented by [20], was modified and supplemented to meet the lower-grade student of elementary school. Each sub-area of this tool is composed of 5 personal factors, 5 hypothetical factors, 5 school factors, and 5 social factors, which means that the higher the score, the higher the stress.

Coping with stress (upper-grade student): To measure the stress response of used a tool developed by [21], [22], Upper-grade students [22], which modified and supplemented the daily stress scale of children. It consists of a total of 20 questions, consisting of four sub-domain-aggression questions, five active questions, five social support questions, and five passive/evasive questions, and the higher the score, the higher the stress response score.

3.3.3 Data Collection and Research Process

The physical activity program lasted for 16 weeks from April 16 to August 4, 2017. The program to strengthen physical activities includes "well-being health exercise" and [23], and the Seoul Metropolitan Government's four categories of strategic development research and fitness assessment were applied: trunk forward flexion, sit ups, standing long jump, and beep test.

All researchers and instructors operating physical activity programs participating in this study were executed after receiving a handwritten signature on a written pledge prior to the study to maintain and protect the personal information of subjects. Children selected to participate in this study visited the hospital designated by the person in charge of the relevant institution to conduct physical examinations, blood tests, and body composition tests, and physical strength measurements were conducted directly by the instructor at each physical

activity program.

In addition, for emotional intelligence, stress level, and stress response, the questionnaire was answered with the help of research assistants. This physical activity program was implemented twice a week for a total of 16 weeks, 40 minutes, and each physical activity program was run by one professional instructor and one assistant instructor at five relevant institutions. After 16 weeks of completion of the physical activity program, children visited the designated hospital under the supervisor to conduct blood tests and body composition tests, and the instructor directly conducted the physical activity program. In addition, for emotional intelligence, stress level, and stress response, the questionnaire was answered with the help of research assistants.

3.3.4 Data Analysis Method

The collected data were analyzed using the SPSS WIN 21.0 program. The normal distribution verification of the dependent variable is analyzed with Shapiro-Wilk test. The prior homogeneity verification of the general characteristics and dependencies of experimental and comparators was analyzed with Chi-square test, Fisher's effect test and Mann-Whitney U-test, a nonparametric method, if normality is not satisfied. The hypothesis test was done with Mann Whitney U-test.

3.3.5 Ethical Consideration

The content and methods of this study have been approved by the Shinhan University Clinical Research Review Board (40525-201511-HR-87-02).

Considering the ethical aspects of the study subjects, the purpose and methods of study, the advantages and disadvantages of participating in the study, and the instructions and precautions for filling out the questionnaire were fully explained before the training.

The researcher explained to the subjects that the study could be discontinued at any time during the study and that there would be no disadvantages. To ensure the confidentiality of the data, the questionnaire was retrieved immediately after the survey and stored in a locked place. After the study, institution informed that participants could contact them by phone or SNS whenever they have any questions or need counseling. Since the subjects are minors, the authors should have obtained the written consent or permission from the legal guardians of the subjects. Given the nature of this research, I believe that parental consent is a reasonable requirement. Obtaining the assent from the subjects may be insufficient. In addition, elementary school students themselves consented to participate in the study.

4. RESULT

4.1 Stduy Design

In the general characteristics of children participating in the 16-week physical activity program, 35 male students (42.0%), 47 female students (58.0%), 7 first graders (8.5%), 2 second graders (2.5%), 13 third graders (16.0%), 23 fourth graders (28%), 18 sixth graders (22%), and 19 sixth graders (23%). Family types were 62 adoptive parents (75.6 percent), 20 single parents (24.4 percent), 5 grandparents (6.0 percent), and 5 relatives (6.0 percent). According to the children's frequent weekly intake of food, 1~2 times a week, carbonated drinks 82 people (100%), fast food(pizza, hamburger, chicken et all.) 61 people (74.4%), ramen/cup noodles 82 people (100%), snacks 48 people (58.5%), 'chocolate, candy, icecream 45 people (54.8%,) processed food(pork cutlet, ham, frozen dumplings) 49 people (59.7%) showed high frequency. The number of physical activities (exercise) of children per week was 26 people (31.7%) higher than once a week, and 56 people (68.2%) said they did not engage in physical activities.

4.2 Changes in the Body Composition Before and After Physical Activity of Children

Blood tests before and after physical activity by children participating in physical activity for 16 weeks analyzed the changes in blood characteristics and showed statistically significant changes in total protein (p=.000), total cholesterol (p=.002), and white blood cells (p=.008). The analysis of body components before and after physical activity in children showed statistical significant differences in items such as kidney (p=.000),

body water (p=.000), body fat (p=.021), body fat (p=.001), obesity (p=.000), and basic metabolism (p=.000). The changes in the body composition of the top 5% and bottom 5% groups were observed by analyzing the changes before and after 16 weeks of physical activity. The highest change in body composition before and after physical activity of 82 children, i.e., body water, body fat, and basal metabolism, were selected as variables that had the greatest impact on body composition change, and the results of each variable were divided into the top 5% (4 people) and bottom 5% (4 people).

The overall average of shows that children in the top 5 percent group are obese or overweight, while those in the lower 5 percent group are relatively normal. Among 82 children, the first child with the highest change showed change in body water from 25kg to 27.1kg, the body fat rate from 32.6% to 27.5% and the basal metabolism increased from 1,104kcal to 1,167kcal, and the second child with second highest change showed a big change in body water from 25.1㎏ to 27.8㎏, the body fat rate from 45.4% to 39.9% and the basal metabolism increased from 1,110kcal to 1,186kcal. On the other hand, 82nd-ranked children with the lowest change or decrease, had body water decreased from 14.4kg to 14.1kg, body fat increased from 26.7% to 27.5% and basic metabolism decreased from 791kcal to 785kcal.

In addition, 81st-ranked "D" children did not change from 18.3kg to 18.3kg in body water, and their body fat rate increased by 10.5% to 14.5% and their basal metabolism did not change by 906kcal, showing a significant difference between the top 1st, 2nd, and lower 1st and 2nd-ranked children in Table 1.

Table 1 .Changes in the Body Composition Before and After Physical Activity of Children N=82

Category	**M±SD**		***t***	***p***	
	pre	**post**			
Total protein	7.36±.28	7.02±.28	9.960	.000	
Albumin	4.60±.22	4.53±.16	1.000	.341	
GOT	25.27±5.55	24.81±7.23	.506	.624	
GPT	22.27±14.12	22.63±15.47	-.130	.899	
Total cholesterol	194.02±25.55	172.59±25.64	4.054	.002	
Neutral fat	217.63±163.66	202.85±168.43	-.147	.886	
Empty stomach blood sugar	101.27±18.76	96.1±13.30	-.385	.708	
White blood cells	9.97±1.99	8.73±1.65	3.323	.008	
Red blood cells	4.78±.23	4.80±.17	-.555	.591	
Hemoglobin	13.63±.79	13.64±.53	-.073	.943	
Hematocrit	40.41±2.20	39.98±1.46	-1.525	.158	
Height(㎝)	138.79±12.11	141.17±12.06	-12.083	.000	
Weight(㎏)	38.26±12.62	38.70±13.35	-.981	.329	
Body water(㎏)	20.19±5.26	21.22±5.42	-5.216	.000	
Protein(㎏)	5.40±1.45	6.19±4.79	-1.479	.143	
Mineral(㎏)	1.93±.55	26.60±222.517	-1.004	.318	
Body fat(㎏)	10.64±6.97	10.12±7.20	2.353	.021	
Muscle mass(㎏)	14.06±4.53	25.99±98.03	-1.096	.276	
BMI(㎏/m^2)	20.89±13.94	19.20±4.171	1.152	.253	
Body fat percentage(%)	25.78±10.08	23.33±9.99	3.524	.001	
Obesity(%)	106.90±19.86	103.34±19.72	3.910	.000	
BMR(kcal)	967.17±155.190	994.38±159.84	-5.785	.000	
Body water(㎏)	Top 5% group	23.88±1.72	26.05±2.07	-10.576	.002
	Bottom 5%group	15.85±2.02	15.82±2.08	.264	.809
Body fat percentage(%)	Top 5% group	39.63±5.29	35.25±5.37	8.092	.004

	Bottom 5%group	23.48±9.58	25.53±8.76	-2.766	.070
BMR(kcal)	Top 5% group	1073.25±51.17	1137.25±59.89	-13.019	.001
	Bottom 5%group	835.25±58.32	834.25±60.19	.577	.604
-Top 5% Group: Female Students(N=3) -Bottom 5% Group: Female Students(N=3), Male Students(N=1)					

4.3 Changes in Physical Fitness of Children Participating in Physical Activity Programs for 16 Weeks

An analysis of children's physical strength before and after physical activity showed statistical significant changes in all physical fitness measures, indicating that 16 weeks of physical activity programs are effective for children's flexibility, muscular endurance, agility, and cardiopulmonary endurance. Changes in the physical strength measurement of the top 5% group and the bottom 5% group were observed before and after 16 weeks of physical activity.

In the changes in physical activity before and after physical activity of 89 children, the ranking of all variables (flexibility, muscular endurance, agility, and cardiopulmonary endurance) was converted into scores, added together, and divided into the top 5% group (4 people) and the bottom 5% group (4 people). When comparing the overall average value, children in the top 5% group showed a statistical significant increase in all categories, while children in the bottom 5% group showed a decrease in all categories.

Among 89 people, the number 1 child who showed the highest change increased in trunk forward flexion from 12cm to 18cm, the situps increased from 55 to 63 times, standing long jump 135.3cm to 168cm, the beep test from 42 times to 80 times, the second-ranked child B showed a significant change in trunk forward flexion from 15.5cm to 19cm, situps from 35 to 54 times, standing long jump from 133.5cm to 170.3cm, and beep tests from 35 to 67 times. On the other hand, child C in 89th place who showed the lowest change or decrease, had reduced results, trunk forward flexion from 12cm to 9cm, sit ups from 34 to 27 times, standing long jump from 130cm to 125cm, and beep test from 45 to 36 times, also the 88th-ranked child D decreased from 10cm to 5cm in trunk forward flexion, sit ups decreased from 33 to 30 times, standing long jump 167cm to 155cm, and beep tests from 40 times to 37 times, showing conflicting results compared to 1st and 2nd ranked child in Table 2.

Table 2. Change in Physical Fitness N=82

Category		M±SD		*t*	*p*
		pre	post		
Flexibility	Trunk forward flexion (㎝)	7.72±7.32	10.42±7.69	-6.439	.000
Muscular endurance	Sit ups(repitition)	23.04±15.16	28.57±18.81	-6.046	.000
Agility	Standing long jump(㎝)	129.94±30.48	140.34±31.56	-5.635	.000
Cardiopulmonary endurance	Beep test(repitition)	39.47±24.87	51.04±28.65	-7.004	.000

Trunk forward flexion -Flexibility(㎝)	Top 5% group	11.13±4.40	16.63±2.63	-5.618	.011
	Bottom 5%group	5.00±9.02	2.50±7.80	2.611	.080
Sit ups -Muscular endurance (repitition)	Top 5% group	41.75±13.60	53.25±9.64	-3.683	.035
	Bottom 5%group	25.50±13.77	22.25±12.23	2.472	.090
Standing long jump -Agility(㎝)	Top 5% group	138.20±7.90	162.08±14.75	-3.436	.041
	Bottom 5%group	148.25±16.80	135.13±13.55	3.099	.053
Beep test	Top 5% group	38.50±16.98	71.50±10.34	-7.473	.005

-Cardiopulmonary endurance(repitition)	Bottom 5%group	40.25±5.25	34.00±4.08	4.539	.020
-Top 5% Group: Female Students(N=3), Male Students생(N=1) -Bottom 5% Group: Female Students(N=1), Male Students(N=3)					

4.4 Changes in Physical Fitness of Children Participating in Physical Activity Programs for 16 Weeks

The analysis of emotional intelligence before and after physical activity by lower-grade students showed significant results in only emotional expression (p=.019) among the four sub-regions, but the average and standard deviation in each region showed improved scores in emotional recognition (3.38±1.72), empathy (4.29±2.83), and emotional control (6.14±2.82).

An analysis of emotional intelligence before and after physical activity by upper-grade students showed significant results in the emotional awareness (p=.002) and emotional thought promotion (p=.004) areas, but no significant results in empathy, emotional knowledge, and emotional control areas. However, before and after physical activity scores were improved in the areas of empathy (26.8±4.66) and emotional knowledge utilization (25.52±4.83).

4.5 Changes in Stress and Stress Response of Children Participating in Physical Activity Programs for 16 Weeks

Analysis of the stress before and after physical activity of lower-grade students showed significant results in the areas of personal factors (p=.038), school factors (p=.001), and no significant results in domestic and social factors.

An analysis of the stress coping skills of upper-grade students before and after physical activity showed significant results in the areas of active response (p=.011) and social support seeking response (p=.049), and there were no statistically significant differences in aggressive coping and passive avoidance coping.

5. DISCUSSION

This study was conducted to verify the effectiveness of physical changes in body composition test, emotional intelligence and stress response corresponding to physical changes in elementary school students after applying physical activity program for 16 weeks.

The main content of the obesity management program for children and adolescents is that programs that include exercise, a mixture of exercise and nutrition, and exercise and nutrition and behavioral modification are effective in managing obesity [24].

In this study, a health promotion program applied with exercise therapy was developed, applied and vertify the significant results of physical and mental aspects of elementary school students [25]. These results show that a new perspective is needed to manage and overcome obesity by [26] applying various obesity management programs presented in [26], as well as the operational therapy applied in this study.

In addition, it is very important for elementary school students to recover their physical and brain growth, especially for adolescents, the growth of musculoskeletal system, and development of secondary sexual character is rapid, and the management of proper weight is very important.

In this study, physical activity program was implemented on elementary students to lead to conclusion, which might cause generalisation, so various research subjects and research methods are needed to provide elementary school students with basic data on the direction and composition of appropriate weight management programs.

In the first area of the study, physical aspect, blood tests before and after physical activity of children participating in physical activity for 16 weeks were analyzed to show statistically significant changes in total protein (p=.000), total cholesterol (p=.002).

The study in (Sim, 2011), identified statistically significant differences in total cholesterol (TC) and

HDL-C in changes in hematopoietic variables through participation in physical activity programs by obese elementary school students ($p<.05$). In addition [27], it's study of obese male middle school students found that physical activity conducted three times a week over 16 weeks resulted in an increase in total cholesterol and HDL-C in obese children which showed similar results with this experiment. Analysis of changes by analyzing body components showed statistical significant changes in height, body water, body fat, body fat rate, obesity, and basic metabolic rate. It was confirmed that the study in [26], showed statistically significant differences in body fat volume, body fat rate, and obesity ($p<05$) consistent with the results of this study.

Considering that the physical activity program has a significant difference in the results of the body composition test of elementary school students, in order to increase the participation of the elementary school students in the program, it is necessary to educate the correct knowledge and effect of the change in blood composition after physical activity, and not restricting students for participation, but self-driven participation is needed and it is suggested to seek and proceed with measures to increase the participation of the students.

In the study, secondary area of physical aspect, resulting from analyzing a child's physical strength before and after physical activity, all aspect from physical test showed statistically significant results from 16 weeks of physical activity program, students showed improvements in flexibility, muscular endurance, agility, cardiopulmonary endurance [27], Studies have identified statistically significant differences in grip, muscular strength and equilibrium in physical activity fitness-related variables [28].

The flexibility and endurance consistent with the results of this study are confirmed to be effective, indicating that physical activity affects children's physical fitness. Studies in [29], report that flexibility increased significantly after the training period due to elementary school students' participation in after-school sports activities. In the study of cardiopulmonary endurance, muscular strength, muscular endurance, flexibility, body fat, agility, et all. were significantly increased after physical activity. With these results, physical activity has had a positive effect on the exercise of efficient movements after the activity. In future studies, various physical activity programs should be developed that can positively affect the health-related physical strength of elementary school students.

In the first mental area of the the study, the analysis of emotional intelligence before and after physical activity of elementary school students showed significant results in the emotional recognition ($p=.002$) and emotional thought promotion ($p=.004$) areas, and no significant results in the remaining empathy, emotional knowledge, and emotional control areas.

However from emotional intelligence subregion empathy(26.08 ± 4.66), ability to utilize emotional knowledge(25.52 ± 4.83) showed improvment , so it can be said that there was a positive effect before and after physical activity in all areas except the ability to control emotions. It was difficult to compare with direct research results because no similar studies were conducted. However, it has been confirmed that it is an important study to manage mental areas by applying health programs to elementary school students. Since elementary school students are an important period of developmental characteristics and their athletic ability can be improved during the growth process, physical activity of elementary school students is very important for children's health. Therefore, the physical activity program developed and applied in this study is thought to be a useful mediation strategy for changing children's emotional areas and an effective strategy for improving the health care performance of elementary school students.

In the second area of this study, which is the mental area, the analysis of elementary school students' ability to cope with stress before and after physical activity showed significant results in active response ($p=.011$) and social supportive response ($p=.049$) areas. Although there was no statistically significant difference from aggressive and passive avoidance, the results of the before and after physical activity showed that the post-physical results were decreased from aggressive response (10.47 ± 3.59) and passive response (11.15 ± 2.73), the results showed a positive stress response after 16 weeks of physical activity. ased on the results of this study, it is necessary not only to select elementary school students who are at high risk of health in advance, but also to develop and verify their effectiveness by applying effective physical activity programs for children and parents of obese elementary school students.

In addition, parents' health promotion education programs should be developed as teaching parents with high stress in advance can have a greater effect. The basic content of the program should include emotional intelligence which is emotional areas and ways to increase stress response through stress resolution. In addition, health teachers and elementary school teachers for the management of stress response skills shall be educated about physical activity programs during health education of elementary school students.

6. CONCLUSION

This study applied physical activity program to elementary school students who use community child care center for 16 weeks and verified the effectiveness of physical changes in body composition test, emotional intelligence and stress response corresponding to physical and mental areas.

Through this research, the following suggestions are made: First, the survey was conducted on elementary schools to manage and prevent obesity among elementary school students due to changes in diet, but it is difficult to generalize because it is not actually studied on elementary school students across the country. Combined with the findings of this study, it is thought that the ongoing application of the physical activity program to various subjects will produce positive results, and regular physical activity is thought to be effective in the health care of elementary school students. Second, as variables applied to elementary school students are difficult to compare with prior studies, continuous exploration of various variables is needed, and specific strategies for various arbitration programs for each elementary school student group or individual need to be considered.

Based on these findings, efforts should be made to improve the health of elementary school students to improve the efficiency of developing and applying more organized physical activity programs. In addition, it is necessary to identify the health characteristics of elementary school students first and then apply customized physical activity programs.

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Authors' contributions
All authors contributed toward data analysis, drafting and revising the paper and agreed to be responsible for all the aspects of this work.

Declaration of Conflicts of Interests
Authors declare that they have no conflict of interest.

Declarations
Author(s) declare that all works are original and this manuscript has not been published in any other journal.

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