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The Effect of Fitness Training on Cardiorespiratory Fitness (VO_2max) of Elementary School Teacher Education Students: A Quasi-Experimental Study

Anung Probo Ismoko[1)], Yudha Febrianta[2)], Danny Ontario Rusmono [3)], Amri Ikhsanul Amal[4)], Dea Amanda Dwi Kristi Fadila[5)], Yulia Widya Ningsih [6)]

[1,2,3,4,5, 6] Universitas Muhammadiyah Purwokerto, Indonesia

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ABSTRACT

Background: Fitness is a course that emphasizes structured physical exercise to improve students' physical fitness. Objective: To assess the effect of fitness training on cardiorespiratory fitness (VO_2max) in PGSD students at Muhammadiyah University of Purwokerto. Method: Quasi-experimental study with one group pretest–posttest design. A total of 40 students completed the program for 12 sessions (3 times/week). VO_2max was measured using the Multistage Fitness Test (MFT) before and after the intervention. Prerequisite tests included normality and homogeneity, followed by a paired t-test (α=0.05). Results: The mean VO_2max increased from 29.19 to 31.54, the mean increased to 2.34 or 8.0%, with a significant difference ($t(39)=3.923$; $p<0.01$). The distribution of fitness categories shifted towards the better. Conclusion: Fitness training is effective in improving the cardiorespiratory fitness of PGSD students.

Keywords: physical fitness; VO_2max; fitness; PGSD; multistage fitness test.

INTRODUCTION

Physical fitness is the foundation of student health and academic performance, particularly for prospective elementary school teachers who will be responsible for delivering physical education lessons. Empirical evidence suggests that structured physical activity improves cardiorespiratory capacity, while sedentary behavior is correlated with decreased fitness and health outcomes in the college-age population. In a curricular context, physical fitness courses that combine marching, aerobic exercise, calisthenics, agility, and flexibility are feasible strategies for improving fitness in teacher training programs. However, scientific evaluation of the effectiveness of physical fitness courses in primary school teacher education students is still limited. This study aims to analyze the effect of participation in physical fitness courses on cardiorespiratory fitness (VO_2max) and provide recommendations for curricular implementation.

Having a good level of health and physical fitness is very important for every individual (Bile & Suharharjana, 2019). Physical fitness is one of the important aspects of human life in moving to carry out work activities. Physical fitness can be defined as someone who carries out daily work with the body's abilities without causing significant fatigue (Suryadi et al., 2021). Fitness can also be referred to as the body's ability to adjust to the physical needs received by the body in carrying out activities without experiencing health disorders and fatigue factors that are carried out during daily life (Adipurwanto et al., 2022). Physical fitness is one of the important aspects that students must have to carry

✉ *yudhafebrianta@ump.ac.id* **(Correspondence)**

out daily activities in their lectures. Physical fitness is needed by students to enhance their learning abilities and complete other tasks (Soraya et al., 2019). As prospective educators, PGSD students are not only required to have academic competence, but must also have optimal physical fitness. Students with optimal physical fitness will not only support their academic activities but also support teaching activities in the subject of Physical Education, Sports, and Health at the Elementary School level. The Physical Fitness course is one of the compulsory courses that must be taken by PGSD students at Muhammadiyah University of Purwokerto, which has a weight of 2 credits. The Physical Fitness course aims to improve physical fitness, physical endurance, discipline, and marching skills of students through structured and systematic training (Sutrisno, 2017). Training is an activity carried out at a certain time and is carried out repeatedly, programmed in the principles of training loads to create athletes who achieve the highest performance standards (Ismoko & Sukoco, 2013). This course is very important for students, especially those in study programs related to education, leadership, or professions that require prime physical and mental conditions.

The Physical Fitness course is designed to improve physical fitness and shape the character of students who are disciplined, resilient, and ready to face various academic and professional challenges. By taking this course, students will not only become physically healthier but also better prepared in leadership and teamwork. Physical fitness courses can also be considered an effective form of physical training to improve physical fitness. In addition to marching training, physical fitness courses include training in various physical aspects such as cardiovascular endurance, muscle strength, agility, flexibility, and balance, which contribute to optimal physical development. Physical fitness is an important foundation in supporting students' daily activities and academic productivity as future educators. Students, in the final stages of their education, should be encouraged to view physical activity as an important component of their health (Whitehead, in G Kukuh Ikhsanto et al., 2023). Elementary school teacher (PGSD) students, as future teachers, are required not only to master the learning material but also to possess the physical capacity to support their teaching activities. Based on initial observations, many PGSD students at Muhammadiyah University of Purwokerto have not demonstrated a good and optimal level of physical fitness. This is largely due to the students' sedentary lifestyle and lack of physical activity. This is largely due to several factors such as lifestyle, lack of awareness of the importance of physical fitness, a curriculum that does not emphasize physical aspects, and minimal student participation in structured and systematic physical training programs. Some people are still unaware of the importance of physical fitness; they should be able to understand the impact of being unable to manage their fitness (Monzera, 2023).

Physical unpreparedness can negatively impact the quality of learning in the classroom. Physical fitness courses are one of the strategic solutions in improving the physical fitness of PGSD students through systematic training such as marching exercises, cardiovascular endurance, muscle strength, flexibility and coordination. Physical fitness courses have not been thoroughly evaluated in the context of improving student physical fitness. Therefore, this study aims to analyze the effect of physical fitness training on the physical fitness of PGSD UMP students in 2025. In addition, this study can provide a reference in developing the Semester Learning Plan for the Physical Fitness course.

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The problem-solving approach in this study used a quantitative experimental approach, comparing pre-test and post-test results of physical fitness after completing physical fitness training. This experimental method aims to reveal cause and effect through a method involving a conventional group and an experimental group (Ismoko & Putro, 2021).

Physical fitness training is physical exercise aimed at improving physical fitness. Research on physical fitness among PGSD students has progressed along with increasing attention to the physical readiness and professionalism of prospective teachers. Recent studies demonstrate the urgency of integrating physical fitness improvement programs into higher education curricula, particularly in PGSD study programs. Previous research has largely focused on evaluating student fitness levels during the COVID-19 pandemic. Widodo et al., 2020, stated that the majority of PGSD students experienced decreased physical fitness due to online learning and minimal physical activity. This research is still descriptive in nature and has not systematically examined the effects of exercise interventions.

The lack of focus on physical development in Physical Education Teacher Education (PETE) has not fully integrated physical fitness as a pedagogical prerequisite. (Hilda Ilmawati, 2024), underlined that teacher education programs (PETE) still tend to emphasize theoretical and pedagogical aspects, with a suboptimal portion of physical training. Physical fitness training is rarely studied academically to measure its impact on the physical fitness components of PGSD students. Other studies also suggest that alternative explorations for improving fitness are still based on game development and have not focused on PGSD students, (Pungky Triyanto1, n.d.).

However, although research on physical fitness is quite extensive, there are still few studies that specifically evaluate the impact of physical fitness training on the physical fitness of PGSD students, which has an important role in forming active physical habits for students. Research gaps found in the study include: there has been no research that specifically examines the effect of physical fitness courses on PGSD students and there has been no systematic evaluation regarding the contribution of physical fitness courses to physical fitness and physical readiness of students.

This research offers a new contribution to the field of physical education and fitness with several novelties, as follows:

a. Focus on Elementary School Teacher Education Students; This research focuses on Elementary School Teacher Education students in the Physical Fitness course as a strategy for improving physical fitness within the Elementary School Teacher Education student environment.
b. The Physical Fitness Training Model, adapted to the conditions of Elementary School Teacher Education students, provides contextual empirical data for developing curriculum and learning strategies in the Physical Fitness course.
c. The results of this research are expected to serve as the basis for recommendations for developing a Semester Learning Plan for the Physical Fitness course in the Elementary School Teacher Education study program at Muhammadiyah University of

Purwokwerto, to improve students' physical readiness as active and healthy future educators.

MATERIAL AND METHODS

Methods

The research design used is quantitative with a quasi-experimental method with a pretest posttest control group design on the Effect of Physical Fitness Training on Physical Fitness of PGSD UMP Students in 2025. Data obtained from tests and measurements before and after treatment of physical fitness training conducted. The data obtained were analyzed using the T Test through the prerequisite test of normality and homogeneity. The variables in this study are physical fitness training as the x variable and physical fitness as the y variable. The population and sample of the study were PGSD students of Muhammadiyah University of Purwokerto who took the Physical Fitness course.

Instrument

The research instrument used a multistage fitness test. The results of this study are expected to provide a scientific overview of the effects of fitness training on the physical fitness of PGSD students and provide a reference in developing the Semester Learning Plan for the Fitness course.

Procedures

The following is a descriptive description of the research stages in sequence. In the first stage, activities focused on preparation and problem identification through initial observations of students' fitness levels and a review of the Semester Learning Plan (RPS) for the Physical Fitness course.

The result of this stage was a sharp problem formulation and a valid theoretical framework as a basis for the research design. The second stage included a literature review from reputable journals to map recent findings and develop a physical fitness test instrument; the instrument was then tested for validity and reliability to ensure its suitability for use. The third stage was experimental design and sample selection: the researcher determined the design, developed an implementation schedule, established inclusion and exclusion criteria, and formed experimental groups according to the study's needs. The fourth stage was a pretest to capture the initial state of students' physical fitness as baseline data before the intervention. Next, the fifth stage involved implementing the physical fitness program, a series of marching physical exercises combined with core fitness elements in a structured and gradual manner to encourage cardiorespiratory adaptation. The sixth stage conducted a posttest using the same measurement procedures, thus obtaining quantitative post-intervention data ready for analysis of its effectiveness. The seventh stage focuses on data analysis: starting with data cleaning and prerequisite tests (normality/homogeneity), then testing pre-post differences to obtain statistical evidence regarding the effect of training (in a one-group pretest-posttest design, the appropriate test is a paired t-test). The eighth stage is the evaluation of the results and the preparation of applicable recommendations for strengthening the RPS Kesamaptaan and its integration into the PGSD curriculum.

Data Analysis

The data analysis technique used in this study is by using the t-test. Before the t-test, a normality test was first carried out using the homogeneity test. The t-test can be used to compare the average value of the initial and final test results before and after treatment with the same sample.

1. Results of descriptive analysis of pretest data before treatment.

Table 1. Frequency Distribution of Pretest Group Data Class Interval Category Frequency Percentage

Class	Category	Frequency	Percentage
26.0-28.0	Very Low	5	12.5
28.0-30.0	Low	30	75.0
30.0-32.0	Moderate	0	0.0
32.0-34.0	Sufficient	5	12.5
34.0-36.0	Good	0	0.0

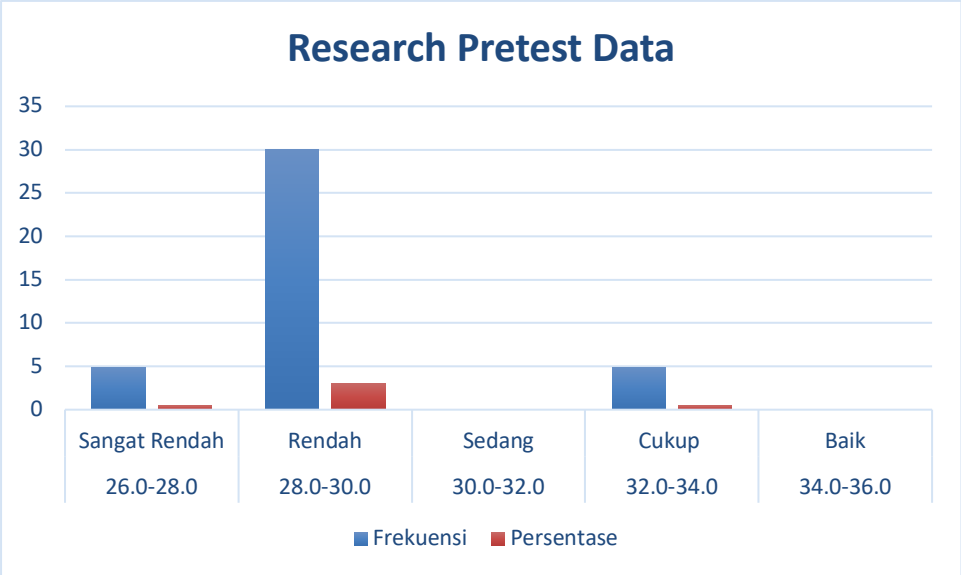

Figure 1. Histogram of Pre-Test Group Data

2. Results of descriptive analysis of postest data before treatment.

Tab Table 2. Frequency Distribution of Postest Group Data Class Interval Category Frequency Percentage

Class	Category	Frequency	Percentage
26.0-28.0	Very Low	2	5
28.0-30.0	Low	13	32.5
30.0-32.0	Moderate	0	0.0
32.0-34.0	Sufficient	23	57.5
34.0-36.0	Good	2	5.0

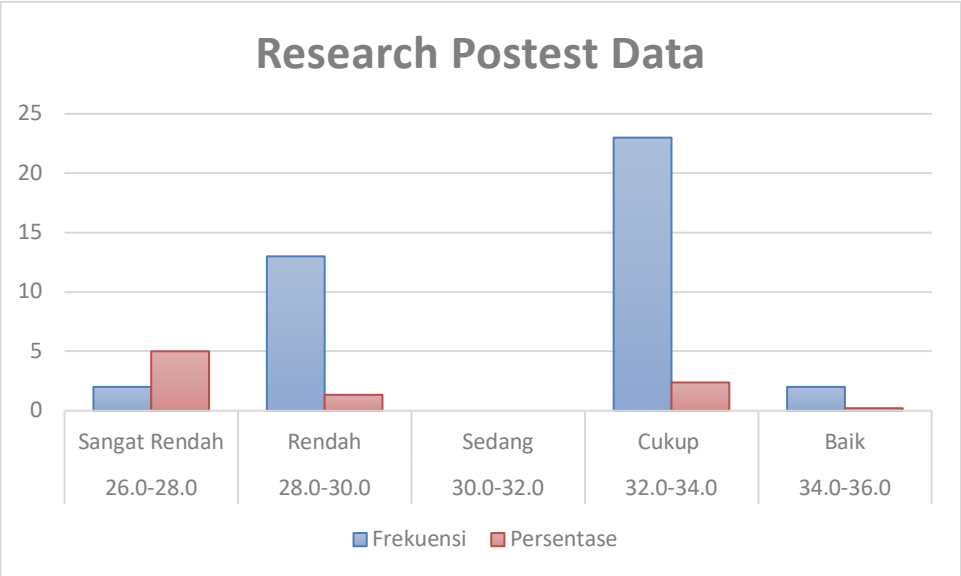

Figure 2. Histogram of Pre-Test Group Data

3. Normality Test
   The normality test uses the Kolmogorov-Smirnov test. This test examines the hypothesis that the sample comes from a normally distributed population. The hypothesis is accepted or rejected by comparing the Asymp.Sig value with 0.05. The normality test yielded an Asymp.Sig value for the pretest variable of 0.949 and a value for the posttest of 0.774. Because the Asymp.Sig values for both variables are all greater than 0.05, the hypothesis that the sample is based on a normally distributed population is accepted.
4. Homogeneity Test
   The homogeneity test uses the F-test. This test examines the hypothesis that the variances of the variables are equal. Accepting or rejecting the hypothesis is done by comparing the calculated F-value (F-count) with the F-value from the table (F-table) at a significance level of α = 0.05 and the degrees of freedom used. The calculation yields an F-value of 1.189 (>0.05). Therefore, it can be concluded that the population variance is homogeneous.
5. T-Test Results
   Data analysis was performed using a t-test on the pretest and posttest data. This test tested the hypothesis that physical fitness training affects the physical fitness of PGSD UMP students in 2025. To accept or reject the hypothesis, the calculated t-value was compared with the t-table value. The t-test results showed a calculated t-value of 3.923 and a t-table value at dk (0.05) (39) of 2.023, with a significance level of 0.001. Because the calculated t-value is greater than the t-table (3.923 > 2.023), it can be concluded that physical fitness training affects the physical fitness of PGSD UMP students in 2025. The average pretest Vo2max value was 29.19, while the average posttest Vo2max value was 31.54, a difference of 2.34 between the posttest and pretest averages. From the average difference, it can be seen that the percentage increase is 8.03%.

RESULTS AND DISCUSSION

The research results indicate that fitness training has an impact on the physical fitness of elementary school teacher education students at UMP in 2025. The average VO_2max of 29.19

ml/kg/minute indicates that many rarely exercise, which is normal given the busy schedule of lectures and other activities. After participating in structured fitness training, the average increased to 31.54 ml/kg/minute. This represents an increase of approximately 2.34 ml/kg/minute, or 8.03%, which is a commendable step forward. Statistically, this change is not coincidental. A paired t-test showed $t(39)=3.923$; $p=0.0003$. It can be concluded that fitness training on student physical fitness does bring about real changes, and the magnitude of these changes is quite significant for bodies previously unaccustomed to movement.

The most important message of the research is that everyone grows at their own pace. Some progress quickly, others slowly, and both are equally valid. What makes the difference is consistency: little by little, it becomes a habit. Start with realistic goals, maintain a comfortable intensity, give your body time to rest, and, if possible, train in a group to encourage each other.

CONCLUSION

The conclusion of this study confirms that the participation of PGSD students in physical fitness courses can significantly improve cardiorespiratory fitness. The average VO_2max increased from 29.19 to 31.54, an average increase of 2.34 or 8.0%, with a statistically significant difference ($t(39)=3.923$; $p<0.01$). The shift in the distribution of fitness categories showed a decrease in the proportion of the very low and low categories and an increase in the sufficient and good categories, which indicates a practical impact in addition to statistical significance.

Substantively, these findings demonstrate that structured fitness-based training combining aerobics, calisthenics, agility, and flexibility is effective as a short-term curricular intervention for a college student population. This increase in cardiorespiratory capacity not only has implications for individual health and physical fitness but is also relevant to the professional competency of prospective elementary school teachers in modeling an active lifestyle and managing physical education (PJOK) learning more effectively.

Practical implications: Study programs are advised to integrate fitness modules into their curriculum (RPS) with a frequency of 2–3 sessions per week, each lasting 30–45 minutes, using the principle of safe load progression and supporting lifestyle education (sleep, hydration, nutrition, and daily activity). Standardized measurements using the Multistage Fitness Test before and after the program, along with monitoring exercise adherence, will assist in evaluating the quality of implementation and the sustainability of fitness improvements.

However, the limitations of a single-group pretest–posttest design limit the strength of causality and the generalizability of the findings. Future research should include a control group or randomized design, extend the intervention duration (8–12 weeks), and incorporate other fitness indicators (strength, agility, flexibility) and academic outcomes. Controlling for external factors (activity), follow-up testing, and analyzing long-term effects are also important to strengthen curriculum policy recommendations.

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