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Comparative Analysis of the Impact of Volleyball on Physical Fitness Improvement in Male and Female Students of the Communication Science Program at UPN Veteran Yogyakarta

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ABSTRACT
Research objectives the effect of volleyball games on improving the physical fitness of male students. The effect of volleyball games on improving the physical fitness of female students. The difference in the effect of volleyball games between male and female students on improving physical fitness. This research an uses experimental method. The population of this research were students of the Communication Science Study Program of UPN "Veteran" Yogyakarta in the academic year 2023/2024 who were taking the Sports II course in volleyball. The data analysis method of this study uses the t-test. Test your data analysis requirements using normality and homogeneity tests. Research Results: 1) The average effect of volleyball games on increasing the physical fitness of male students is 2.431666667. 2) The average effect of volleyball games on the physical fitness of female students is 3.001666667. 3) The difference in the effect of volleyball games on improving physical fitness between male and female students is an average difference of 0.57.

Introduction

As technology develops, people have less and less opportunity to do physical activities, which leads to a decrease in physical fitness. Intensive learning activities, especially those that involve sitting in front of a computer, need to be balanced with physical activity to maintain fitness (Bonnet & Cheval, 2023; Genin et al., 2018).

Sports education at UPN "Veteran" Yogyakarta includes various sports such as gymnastics, volleyball, basketball, basketball and soccer. The importance of sports in the formation of knowledge, attitudes and physical fitness is explained by Dini Rosdiani (2012). The purpose of this study was to clarify the differences in the effect of increasing the physical fitness of male students and female students who attended volleyball lectures, as well as a comparison of effectiveness in improving students' physical fitness.

The characteristics of sports education include several important aspects that distinguish it from other areas of education. Here are some of its key characteristics: (Siedentop et al., 2019)

a. Physical Activity at the Core of Learning. Sport education focuses on physical activities that aim to develop fitness, motor skills, and an understanding of the importance of physical health. It involves exercises, games and sports to improve the physical quality of students.
b. Motor skill development. Sport education helps students develop basic motor skills, such as coordination, balance, strength, agility and flexibility. Mastery of these skills is essential for participation in a variety of physical activities.
c. Character and social value building through sport, students are taught values such as sportsmanship, cooperation, discipline, honesty, responsibility, and respect for others. These values help in building character and positive attitudes outside the sporting context.
d. A holistic approach to health and wellness, sports education includes an understanding of the physical, mental and emotional aspects of health. Through sport, students learn about the importance of a healthy lifestyle, a balanced diet, and the benefits of physical activity for mental health.
e. Encouraging active participation sports education is designed to engage all students in fun and challenging physical activities, and motivate them to be physically active throughout life. It emphasizes active participation over competition.
f. Process-based teaching and self-improvement. Sport education often emphasizes the process of learning and individual improvement, rather than focusing solely on results or winning. This encourages students to train and develop according to their own abilities and limits.
g. Integration of theory and practice. Sport education combines theory, such as anatomy, physiology and training principles, with practical experience in the field. An understanding of this basic theory helps students to understand the reasoning behind certain exercises and movements.

Adaptation to individual differences. Sport education should consider physical, psychological and social differences among learners (Bessa et al., 2021). These characteristics make sports education a learning tool that not only emphasizes physical development, but also mental, emotional and social development, which are essential for the formation of healthy and characterful individuals.

The nature of physical fitness, a person's physical condition that reflects the body's ability to perform daily activities efficiently without experiencing excessive fatigue, and still have energy reserves for additional or emergency activities. Physical fitness is the foundation for optimal physical health and includes various interconnected aspects. Here are the main components of physical fitness: (Tafuri et al., 2024)

a. Muscle strength (Strength). Muscle strength is the ability of a muscle to provide maximum power in a single effort, for example in weight lifting or sprinting. Muscle strength is important to support activities that require power and improve physical performance.
b. Muscular Endurance. Muscular endurance is the ability of muscles to perform repetitive movements or stay in a certain position for a long time without excessive fatigue. This endurance is important for daily activities and sports that require long duration.
c. Cardiovascular endurance. The ability of the heart, lungs and blood vessel system to efficiently supply oxygen to the entire body during long-term physical activity. This endurance is important for maintaining a healthy heart and efficient body function.

d. Flexibility. Flexibility is the ability of joints and muscles to move freely and painlessly within an optimal range of motion. It is important for preventing injuries, improving posture, and facilitating body movement.
e. Body Composition. Body composition is the ratio between fat mass and fat-free mass in the body. A healthy body composition is the foundation of physical fitness as it affects overall health, such as the risk of heart disease, diabetes and metabolic problems.
f. Agility and Balance. The ability to change body position quickly and control body movement in various positions. This is especially important in sports that require fast and complex movements.
g. Coordination. Coordination is the ability to combine multiple body movements efficiently and in a timely manner. This is important for activities that require the integration of multiple body parts, such as in sports, martial arts, or dancing.

Overall, physical fitness is a balance of all these components, which together form an excellent physical condition. Physical fitness is important not only to support physical activity but also to improve quality of life, prevent various diseases, and extend one's healthy life.

Increasing VO2 Max capacity is difficult and takes a long time. Therefore, increasing VO2 Max capacity requires a lot of free time, not only during extracurricular activities (Prakoso & Sugiyanto, 2017).

Health and fitness are basic human needs, and achieving them requires enjoyable and sustained physical activity. Health and fitness is not something that can be achieved in a short time. It takes patience and perseverance to keep the program running well and consistently (Pranata & Kumaat, 2022).

Benefits of exercise on physical fitness

Exercise provides many benefits to physical fitness, improves overall quality of life, and plays an important role in maintaining physical and mental health. Here are some of the key benefits of exercise on physical fitness: (Keogh & MacLeod, 2012)

a. Increases muscle strength. Exercise, especially those involving weight training or strength-challenging activities, helps to increase muscle mass and strength. This is important for supporting daily activities, improving posture and reducing the risk of injury.
b. Improves heart and lung health. Aerobic activities, such as running, cycling and swimming, promote cardiovascular health by strengthening the heart and increasing lung capacity. This helps blood and oxygen circulate more efficiently throughout the body, thereby improving cardiovascular endurance.
c. Improves endurance. Exercise improves physical endurance, allowing the body to perform activities for longer periods of time without getting tired. Good endurance also helps one to stay energetic throughout the day and be able to perform additional activities.
d. Improves flexibility and mobility. Stretching exercises and sports such as yoga or pilates help improve flexibility. Good flexibility allows for more freedom of body movement and reduces the risk of injury to muscles and joints.
e. Maintain ideal body weight. Exercise helps burn calories, which plays an important role in maintaining a healthy weight and reducing the risk of obesity. By maintaining a balanced body composition between muscle and fat, exercise helps improve overall fitness.

f. Reduced risk of chronic diseases. Regular physical activity has been shown to lower the risk of various chronic diseases such as hypertension, type 2 diabetes, heart disease and osteoporosis. Exercise also helps maintain stable cholesterol and blood sugar levels.
g. Improves speed and agility. Exercises that involve quick movements and changes in direction help to improve the body's speed and agility. This is beneficial not only in sports, but also in everyday activities that require quick body responses.
h. Improves balance and coordination. Exercise that involves balance, such as yoga or specialized balance training, as well as team sports, improves the body's ability to maintain position and coordinate movements. This is especially important for older people to reduce the risk of falls.
i. Reduces stress and improves mental health. Exercise stimulates the production of endorphins, known as "happy" hormones. These help reduce stress, improve mood, and help with symptoms of depression and anxiety. Physical activity can also improve sleep quality and provide a sense of calm.
j. Improves quality of life and productivity. With a fit body, one tends to have more energy, better concentration and increased productivity in daily activities. Exercise helps one feel healthier, stronger and more confident.

Overall, regular exercise has a major positive impact on physical fitness, improves quality of life and promotes a long-term healthy lifestyle.

Sports Volleyball

Volleyball is a team sport played by two teams of six players each on a court separated by a net (Kenny & Gregory, 2015). The aim of the game is to pass the ball over the net and drop it in the opponent's area to score points, as well as prevent the opponent from doing the same. Volleyball involves technical skills such as passing, setting, spiking, blocking and serving.

Here are some important aspects of volleyball Basic Rules: teams consist of six players who have specific positions on the court, each game starts with a serve, where one player sends the ball to the opponent's area, each team is allowed a maximum of three touches to return the ball to the opponent's area, points are earned when the ball is successfully dropped in the opponent's area, or when the opponent commits a foul such as touching the net or touching the ball more than three times.

Player positions in volleyball include: Setter: In charge of organizing the attack by giving the right pass to the attacking player. Spiker (Attacker): The player who attacks by hitting the ball into the opponent's area. Libero: A defensive player who has a special role and may not attack, but is free to replace players in the back row without having to follow rotation rules. Middle Blocker: In charge of blocking the opponent's attacks and sometimes also making quick attacks.

Basic Techniques: Serve: The initial blow to start the game, can be done with underhand (bottom) or overhand (top) techniques. Passing: The technique of receiving and passing the ball from the opponent, using the hand or forearm to direct the ball to the setter. Setting: The technique of feeding the ball so that it is ready to be attacked by the spiker. Smash/Spike: A hard hit towards the opponent's court to score points. Blocking: Holding the opponent's attack near the net to prevent the ball from entering one's own area (Mitchell et al., 2020).

Physical Benefits Playing volleyball has many physical fitness benefits, including: Increases Muscle Strength: Jumping, hitting and holding the ball increases muscle strength especially in the hands, arms and legs. Increases Agility: Players have to move quickly and reflexively, thus improving the body's agility. Improves Balance and Coordination: Playing volleyball requires coordination between the eyes, hands and feet. Improves Cardiovascular Endurance: The constant activity during a match helps improve cardiovascular health.

Mental and social aspects in addition to physical aspects, volleyball also helps in: Developing Teamwork: Volleyball relies heavily on cooperation between players to score points. Sharpening Concentration and Focus: Volleyball requires high focus to respond to the ball quickly. Reducing Stress and Improving Mood: The intense physical activity in this sport can help release mood-boosting endorphins.

Volleyball is a sport that can be played recreationally and competitively, both indoors and outdoors (beach volleyball). The sport not only keeps the body healthy, but also improves social skills and teamwork.

Physical Fitness Test with Multistage fitness test

The Multistage Fitness Test, also known as the beep test or bleep test, is one of the physical fitness tests used to measure a person's cardiovascular endurance, specifically aerobic ability. It is very popular among athletes, students and the armed forces as it gives a good idea of the heart and lungs' ability to support prolonged physical activity (Ashok, 2008; Thomas & Credeur, 2015).

How to Implement the Multistage Fitness Test:

Field Preparation. A room or open area 20 meters long is required. Marks or lines are placed at both ends of the track as boundaries for each repetition.

Test Instructions. Participants will run back and forth between two lines for 20 meters. At the end of each run, the participant must reach the line before a beep is heard.

Increasing Intensity. The test starts at a low speed, and at each interval (about one minute) the speed increases in accordance with the beeps getting faster. These intervals are called "levels" or "stages."

Participant Endurance. Participants must reach the line each time a beep sounds. If the participant fails to reach the line in time, they are given one chance to catch up on the next pass. If they fail twice in a row, they must stop the test.

Calculation of Results. A participant's score is based on the last level or stage they reached before failing to keep up with the prescribed pace. This score can be converted into an estimate of VO_2 max, which is the maximum capacity of oxygen the body can use during intense exercise.

Research Methods

This research is an experimental study using two treatment groups, namely male student volleyball group I and female student volleyball group II. According to Suharsimi Arikunto (2006, p. 6), "experiments are always carried out with the aim of seeing the results of a treatment" The research design used was pre-test and post-test group.

The research design in picture form is:

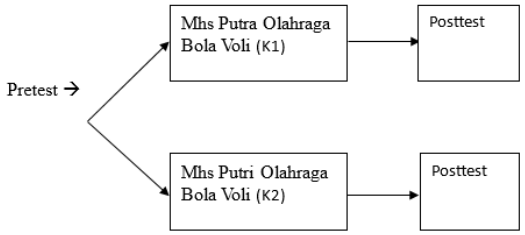

Figure 1. The research design

Description:
- Pre-test
- Experimental group 1: Male students, volleyball sport
- Experimental group 2: Female students, volleyball sport
- Post-test

In the diagram above, it can be explained that first, the subjects took the test, then Group I consisted of male students who played volleyball, and Group II consisted of female students who played volleyball.

Research Population and Sample

This study's population included all students of the Communication Science Study Program of UPN "Veteran" Yogyakarta who will take the Volleyball II Sports course in the 2023/2024 academic year.

Samples are taken randomly according to certain procedures, which provide equal opportunities for each member of the population to be sampled (Siswandari, 2009, p. 6). Based on this opinion, the author assumes a population of 50 students, which is the total population of all Communication Science students who took Sports II in the 2023/2024 academic year.

Data Collection Technique

The data collection tool used is a physical fitness test for two groups of students participating in sports II courses: male students in group I who play volleyball and female students in group II who play volleyball.

Data Analysis Technique

This research involves several steps. That is, the analysis prerequisite test consists of normality test, homogeneity test, and difference test. The steps of each data analysis are as follows. a) Normality test was conducted using the Kolmogurov-Smirnov test. b) The homogeneity test was conducted using the Levene test with the F test using the SPSS 16 program. c) Data analysis in this study was conducted using the T-test.

Results and Discussion

A description of the results of the analysis of physical fitness data using the graded fitness test in the comparison group can be seen in the following table. The data results of each variable are summed up to form the final test data before testing. To improve the results of the initial test and final

test. When compared with male and female student volleyball games, it can be seen that the average increase in physical fitness of male student volleyball groups is 2.431666667, lower than the increase in physical fitness of female students, where the average increase in physical fitness is 3.001666667.

Table 1. Data description of physical *fitness* results with *multistage fitness test*

Treatment	Gender	Statistics	Initial test results	Final test results	Improved
Sports Volleyball	Mhs Putra	Total	213,82	228,41	14,59
		Mean	35,63666667	38,06833333	2,43166667
		SD	3,387041482	6,392245302	1,83559709
	Female student	Total	151,6	169,61	18,01
		Mean	25,26666667	28,26833333	3,00166667
		SD	1,555634919	4,235569619	1,49372577

Source: Data processed, 2024

Table 2. Average value of physical fitness improvement

No.	Treatment group	Physical fitness improvement score
1	Class I Male students volleyball sport	2,43166667
2	Kel II Female students of volleyball sport	3,00166667

Source: Data processed, 2024

Data Analysis

Previously, data normality tests was conducted using the Lilliefors method. The results showed that all groups were normally distributed.

Table 3. Summary of Data Normality Test Results

Treatment group	N	Mean	SD	Counter	L_{tabel} 5%	conclusion
KP1	6	2,431666667	1,83559709	0,1662	0,319	Normally distributed
KP2	6	3,001666667	1,493725767	0,2649	0,319	Normally distributed

Source: Data processed, 2024

The results of the normality test conducted on KP1 show the value of Lcount = 0.1662. This value is less than the critical limit at the 5% significance level, namely Ltabel = 0.319. It can be concluded that the KP1 data is normally distributed. From the results of the normality test conducted on KP2, the value of Lcount = 0.2649 was obtained. This value is less than the critical limit at the 5% significance level, namely Ltabel = 0.319. It can be concluded that the KP2 data is normally distributed.

The homogeneity test using the Bartlet test showed that the variance between groups was homogeneous. The homogeneity test resulted in a value of $\chi 2o = 0.725733$. If K-1 = 4 -1 = 3 then the $\chi 2$ table is 5% = 7.81 so it gives a value of $\chi 2 = 0.725733$ smaller than the $\chi 2$ table 5% = 7.81. It can be concluded that there are homogeneous variances in the groups in this study.

The results of this study provide further interpretation of the results of the data analysis presented. The results based on hypothesis testing are:

a. The effect of volleyball games on improving the physical fitness of male students. Based on testing the first hypothesis, it is known that there is a real influence between groups of male students on volleyball with a mean of 2.431666667 on increasing physical fitness.
b. The effect of volleyball games on improving students' physical fitness. Based on testing the second hypothesis, it shows that the achievement of an average of 3.001666667 has a real impact on increasing the physical fitness of a group of female students in volleyball.
c. Differences in the effect of volleyball games on improving physical fitness between male and female students. Based on the hypothesis test, there is a real difference in the impact of increasing physical fitness between the group of male students who play volleyball and the group of female students who play volleyball. The group of male students who participated in volleyball sports recorded an average increase in physical fitness of 2.431666667, and the group of female students who participated in volleyball sports recorded an average increase in physical fitness of 3.001666667. When compared with the figures obtained from data analysis, it can be seen that there is an average difference of 0.57 when comparing the average increase in physical fitness of students through volleyball. It can be concluded that female students who play volleyball have a greater increase in physical fitness than male students.

Conclusion

Based on the analysis, it is concluded that the average effect of volleyball games on increasing the physical fitness of male students is 2.43166667. The average effect of volleyball games on improving the physical fitness of female students is 3.00166667. There is a difference of 0.57 between male and female students on the effect of volleyball games on improving physical fitness. The selection of student sports at UPN "Veteran" Yogyakarta, should consider the effectiveness and efficiency of the type of sport in order to improve student physical fitness optimally. The difference between male and female students has a better increase in physical fitness than male students, so the characteristics of students, especially gender, must be considered in choosing the appropriate sport.

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