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Implementation of Physical Test Measurement Using PJOK Application in Handball Sports

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Abstract

The study aims to evaluate students' physical condition. This study is descriptive and was conducted on fifth grade students of Elementary School 112 Palembang. The purpose of this study was to determine the average results of students' physical condition measurements in handball sports using the application. The dominant physical components in handball include speed, agility, leg muscle explosive power, strength, and endurance. A total of 30 students were the subjects of this study, consisting of 11 male students and 19 female students. Measurements were carried out through a 30-meter running test, agility test using the agility T-test, leg muscle explosive power was measured using a vertical jump test, strength was tested using a sit-up test, and endurance was measured using a beep test. The data obtained were analyzed using quantitative descriptive techniques. The results of the study showed that the average physical condition of fifth grade students of SD Negeri 112 Palembang in the handball sport was in the "very good" category with a percentage of 40%, the "good" category 7%, the "sufficient" category 9%, the "less" category 14%, and the "very less" category 30%. The conclusion of this study shows that most students have very good physical conditions. It is hoped that students can maintain and improve their physical condition in order to achieve higher achievements in the future.

Keywords: application, handball, physical fitness test, test implementation

Introduction

Handball is a sport played using the hands to score goals against the opposing team. It relies heavily on hand coordination (Susanto, 2020). Another source describes handball as a dynamic sport that enhances physical fitness, boosts enthusiasm, sharpens intelligence, and teaches players teamwork (Setiawan, 2019). Handball is a team sport played by two teams, each consisting of seven players (six outfield players and one goalkeeper). Each player tries to score by carrying the ball while running or walking and bouncing it on the ground (Rohman, 2018). The main objective of the game is to score points by throwing the ball into the opponent's goal while preventing the opponent from scoring (Yilkal, 2020). In handball, the primary skill that players must master is the throwing technique. This skill is fundamental to the game, as it is used both for passing and shooting at the goal. The goal of the game is to score as many goals as possible within a given timeframe (Setiawan, 2019). Handball is played on a 40-meter by 20-meter court, with each team made up of six field players and one goalkeeper. The game is played in two 30-minute halves with a 10-minute break in between (Susanto, 2017). As a team sport, handball requires mutual agreement in terms of rules and social values such as honesty, cooperation, trust, and mutual respect (Setiawan & Rahmat, 2018).

Physical fitness plays an equally vital role in every sport. Outstanding achievements can be attained through athletes' optimal physical condition. An athlete is considered physically fit if they can perform physical activities without excessive fatigue.

According to Harsono (2018), the main factor in maintaining athletes' physical condition lies in the training program applied. A structured and systematic training program enhances the body's ability to adapt and perform optimally to achieve peak performance. To obtain optimal results, sports require testing and measurement that provide accurate insights into physical abilities and basic motor skills. Performance improvement is more clearly observed through structured physical and skill assessments—from initial, mid, to final testing—so that the results are more measurable.

Sport is a series of physical activities specifically designed to improve or maintain physical fitness (Hartati et al., 2019). A study by Gumelar et al. (2017) titled *"Development of Aerobic Capacity Software Using Android-Based Bleep Test"* employed a research and development (R&D) method. The study compared the effectiveness of manual versus Android app-based bleep tests, and the results revealed that the app-based method was more convenient, effective, and efficient, supported by questionnaire responses from the participants. Similarly, Gumantan et al. (2021) in their study *"Use of Android-Based Application for Physical Fitness Test Measurement"* found that the application was effective and represented an innovation in the field of physical fitness testing using Android programs.

Based on observations, students' physical conditions can be assessed through tests and measurements. One such test is the physical fitness test, which is specifically designed to monitor students' physical development to support their achievement at regional, national, and international levels.

However, advancements in science and technology (IPTEK), which should simplify tasks, have not been fully utilized by teachers in physical education classes, especially in physical test measurements. Proper integration of technology in this process is crucial for maximizing performance outcomes. Technology can significantly improve the accuracy of measuring students' physical conditions.

Currently, physical test measurements are still performed manually, from recording personal data and measurement results to data processing. This manual approach takes a lot of time and carries a higher risk of errors in recording test results.

The results of physical fitness tests are an important source of data for teachers to understand students' conditions and serve as a basis for improving their fitness levels. Therefore, applying an application to measure physical test results can assist teachers and students in achieving optimal performance. According to Huda & Priyatna (2019), an application is software that serves as a front-end interface of a system used to manage various types of data and transform it into useful information for users and related systems.

Based on the explanation above, the researcher is interested in conducting a study titled "Application of Physical Test Measurement Using an Application in Handball Sports at SD Negeri 112 Palembang." With the help of an application-based tool, it is expected that PJOK teachers can improve the effectiveness of physical fitness testing and enhance students' physical condition through more accurate and efficient measurements.

Methods

Research Design

This research utilized a quantitative descriptive method aimed at describing and explaining

ongoing phenomena, as well as providing systematic, accurate, and factual problem-solving based on data regarding certain characteristics or factors being studied. The goal of this descriptive research is to offer factual and systematic explanations related to the realities and characteristics of the population. Data were collected through questionnaires, observations, and interviews. The research was conducted at SD Negeri 112 Palembang on May 13, 2024. The participants were Physical Education (PJOK) teachers who are members of the PJOK Teacher Working Group (KKG) in Palembang City.

Participants

According to Aprilianto & Fahrizqi (2020), a population refers to all members of a group—people, animals, events, or objects—that coexist in a particular space and are the target of research conclusions. The population in this study consisted of 30 fifth-grade students at SD Negeri 112 Palembang. The sampling technique used was purposive sampling, where samples are selected based on specific criteria or considerations. All 30 students were selected as research participants based on their relevance to the study's objectives.

Instrument

The instruments used in this study included physical fitness tests and structured questionnaires using a Likert scale. The physical fitness tests included:

1. 30-Meter Sprint Test
   Measures speed using a 30-meter track, cones, and stopwatch. The best time from two trials was recorded. The standard time for handball athletes is 4.74 seconds (Alica & Afrizal, 2019).
2. Shuttle Run Test (4x10 meters)
   Assesses agility through back-and-forth running. Participants must complete four sets of shuttle runs. The standard time for handball athletes is 12.56 seconds (Mirfan et al., 2020).
3. Sit and Reach Test
   Measures hamstring and lower back flexibility. Participants reach forward from a seated position to touch the farthest point on a ruler.
4. Sit-Up Test (30 seconds)
   Measures abdominal muscle strength. Participants perform as many correct sit-ups as possible in 30 seconds.
5. PACER Test (Progressive Aerobic Cardiovascular Endurance Run)
   Assesses cardiorespiratory endurance through 20-meter shuttles following an audio signal. Speed increases gradually, and the test ends when participants fail twice to reach the line on time. VO2Max standards for handball athletes range between 44.2–51.9 (Fauzan et al., 2016).

In addition, a closed-ended questionnaire based on the Likert scale was used to measure participants' perceptions. The scoring criteria are presented in Table 1.

Procedure

Participants completed five physical fitness tests representing physical conditions in handball. The data collection involved observation, direct testing, and the use of a Likert-scale questionnaire. Participants were informed about the procedures, and each test was conducted under standardized conditions to ensure accuracy and reliability. Each physical fitness component was explained and demonstrated prior to testing, and trials were conducted where necessary.

The quantitative questionnaire was administered after the tests to evaluate participants' perceptions and attitudes toward physical fitness in handball.

Data Analysis

Data were analyzed using quantitative descriptive statistics, with percentage formulas applied to interpret the frequency of responses and test results. The percentage was calculated using the following formula:

$$P: \frac{f}{N} \times 100\%$$

P=Percentage
f=Frequency
n=Number of participants
(Rizaldi Setiawan, 2017)

Result

Based on data obtained through tests and measurements in the handball sport branch using the 30-meter sprint test, agility T-test, vertical

Figure 1
Assesment Criteria

Response	Code	Score
Strongly Agree	SS	4
Agree	S	3
Disagree	TS	2
Strongly Disagree	STS	1

Table 2
Distribution of Physical Fitness Test Results – Speed (Boys)

Test Result	Frequency	%	Category
<5.4	0	0%	Excellent
5.4–6.6	6	54.5%	Good
6.6–7.2	0	0%	Fair
7.2–9.0	5	45.5%	Poor
>9.0	0	0%	Very Poor
Total	11	100%	

Table 3
Distribution of Physical Fitness Test Results – Speed (Girls)

Test Result	Frequency	%	Category
<5.2	5	26.3%	Excellent
5.2–6.0	2	10.5%	Good
6.0–6.4	3	15.7%	Fair
6.4–7.6	4	21%	Poor
>7.6	5	26.3%	Very Poor
Total	19	100%	

Table 4
Distribution of Physical Fitness Test Results – Agility (Boys)

Test Result	Frequency	%	Category
<9.4 seconds	0	0%	Excellent
9.5–10.5 seconds	2	18.18%	Good
10.6–11.5 seconds	0	0%	Fair
11.6–12.5 seconds	5	45.45%	Poor
>12.6 seconds	4	36.36%	Very Poor
Total	11	100%	

Table 5
Distribution of Physical Fitness Test Results – Agility (Girls)

Test Result	Frequency	%	Category
<10.1 seconds	0	0%	Excellent
10.2–10.10 seconds	1	9%	Good
10.11–11.12 seconds	16	84%	Fair
12.8–13.10 seconds	1	9%	Poor
>13.3 seconds	1	9%	Very Poor
Total	19	100%	

jump, sit-up, and bleep test on fifth-grade students at SD Negeri 112 Palembang, the physical condition of the students was assessed using an application. This was intended to determine the students' physical fitness level, which significantly affects their physical development. The results from the application-based measurements are described below:

Based on Table 2, the distribution of 30-meter sprint test results for boys in fifth grade at SD Negeri 112 Palembang (handball) shows that 0 students (0%) achieved an "Excellent" category, 6 students (54.5%) were in the "Good" category, and 5 students (45.5%) were in the "Poor" category. Therefore, it can be concluded that the 30-meter sprint performance of the boys is generally in the “Good” category.

Based on Table 3, the 30-meter sprint results for fifth-grade girls show 5 students (26.3%) achieved "Excellent", while 4 students (21%) were categorized as "Poor", and 5 students (26.3%) were in the "Very Poor" category. Although some students performed well, the overall distribution indicates that performance varies widely among female students.

From Table 4, the agility performance of boys in the fifth grade is mostly in the "Poor" (45.45%) and "Very Poor" (36.36%) categories, indicating a general need for improvement in agility among male students.

According to Table 5, the majority of girls (84%) are in the “Fair” category, while the remaining fall into either "Good", "Poor", or "Very Poor". This suggests that most female students have moderate agility.

Table 6
Sit and Reach Test Results – Boys

Test Result	Frequency	%	Category
>14	0	0%	Excellent
11–14	0	0%	Good
7–10	6	54%	Fair
4–6	5	45%	Poor
<4	0	0%	Very Poor
Total	11	100%	

Table 7
Sit and Reach Test Results – Girls

Test Result	Frequency	%	Category
>15	0	0%	Excellent
12–15	0	0%	Good
7–11	6	31.57%	Fair
4–6	10	52.63%	Poor
<4	3	15.78%	Very Poor
Total	19	100%	

Table 8
Sit-Up Test Results – Boys

Test Result	Frequency	%	Category
>45	0	0%	Excellent
40–45	0	0%	Good
35–39	3	27.2%	Fair
25–34	4	36.3%	Poor
<25	4	36.3%	Very Poor
Total	11	100%	

Table 9
Sit-Up Test Results – Girls

Test Result	Frequency	%	Category
>40	0	0%	Excellent
35–40	0	0%	Good
30–34	1	5.26%	Fair
20–29	8	42.1%	Poor
<20	10	52.6%	Very Poor
Total	19	100%	

Table 10
Sit and Reach Test Results – Boys

Test Result	Frequency	%	Category
>12	0	0%	Excellent
9–12	0	0%	Good
7–8	3	27.2%	Fair
5–6	4	36.3%	Poor
<5	4	36.3%	Very Poor
Total	11	100%	

Table 11
Sit and Reach Test Results – Girls

Test Result	Frequency	%	Category
>10	0	0%	Excellent
8–10	0	0%	Good
7–8	2	10.52%	Fair
5–6	3	15.78%	Poor
<5	14	73.6%	Very Poor
Total	19	100%	

The results in Table 6 indicate that most boys are in the “Fair” category (54%) for flexibility, while 45% fall into the “Poor” category, showing limited flexibility among the male students.

Table 7 shows that the majority of female students fall into the “Poor” category (52.63%), and only a small portion reached “Fair” (31.57%).

None of the students achieved "Good" or "Excellent", indicating a need for flexibility development.

Table 8 shows that none of the male students achieved “Good” or “Excellent” levels of abdominal strength and endurance. Most students were in the “Poor” (36.3%) and “Very Poor” (36.3%) categories, with only 3 students (27.2%) categorized as “Fair”. This suggests a general lack of core strength among the boys.

From Table 9, it is clear that more than half of the female students (52.6%) are in the “Very Poor” category for sit-up performance. None achieved “Good” or “Excellent”, and only one student (5.26%) reached a “Fair” level. This shows that abdominal muscle endurance is a major area for improvement among the girls.

Table 10 reveals that the boys' aerobic endurance is mostly in the “Poor” and “Very Poor” categories, each with 4 students (36.3%). Only 3 students (27.2%) were in the “Fair” category. None achieved “Good” or “Excellent”, which suggests low levels of cardiovascular fitness.

As seen in Table 11, a significant number of female students (73.6%) are in the “Very Poor” category in the bleep test. Only 2 students (10.52%) are in the “Fair” category, and none performed in the “Good” or “Excellent” ranges. This highlights the urgent need for aerobic endurance training.

Discussion

The physical fitness tests serve as a foundation for handball athletes at SD Negeri 112 Palembang to effectively carry out each training session and to support their performance during competitions. A good level of physical fitness is expected to help athletes perform well in both training and competitions, ultimately achieving optimal results. The physical fitness tests reflect the individual abilities of each athlete, providing insight into their initial fitness level in the sport (Hartati et al., 2021).

Based on the data collected from the physical fitness tests and the measurement results obtained using the application, it is necessary to discuss the implementation of the physical fitness test measurements in handball using an application. The use of this application aims to assist teachers and coaches in determining or compiling the results of the physical fitness tests that have been conducted.

From the speed test results, the first step involved students performing a 30-meter sprint test at SD Negeri 112. Thirty students participated in this test, with 11 male students and 19 female students. The speed indicator value, with a percentage of 30%, falls into the "Poor" category. Speed is the ability to perform continuous movements in the same form as quickly as possible. It is the result of muscle contraction at a high speed and strength (powerful) through smooth movements (Matitaputty, 2019). Meanwhile, (Cahyo B et al., 2012) state that speed is the body's ability to direct all of its systems to counteract the load, distance, and time, thereby producing body movement in the shortest possible time.

Based on the explanation above, the results of the agility test show an agility indicator value with a percentage of 53.3%, which falls into the "Fair" category. The T-Test agility test serves to improve students' agility in handball. Agility is closely related to the body's flexibility; thus, the better the flexibility, the better the agility that will be developed in athletes.

Based on the explanation above, the results of the sit-and-reach test show an indicator of flexibility with a percentage of 50%, which falls into the "Poor" category. According to (Kurnia et al., 2020), flexibility is a physical condition element that determines the ability to learn movement skills. Flexibility is the ability to move a joint or several joints without restriction and pain. The importance of flexibility is to allow the body to perform movements more easily and freely without requiring excessive energy. One reason for poor muscle flexibility is a lack of physical activity over a long period.

Based on the explanation above, the results of the sit-up test show an indicator of strength with a percentage of 60%, which falls into the "Fair" category. According to (Kartika et al., 2018),

strength is related to the dynamic and explosive contraction speed of muscles and the release of maximum muscle strength in the shortest possible time.

Based on the explanation above, the results of the bleep test show an endurance indicator value with a percentage of 86.6%, which falls into the "Very Poor" category. According to (Warni et al., 2017), endurance is one of the physical components that need to be trained and developed as it significantly supports the technical and tactical ability in playing sports.

Based on all the test results, including running, agility test, sit-and-reach, sit-up, and bleep test, the findings from the trial indicate that the overall physical condition of the 5th-grade students at SD Negeri 112 Palembang falls into the "Poor" category with a percentage of 38.8%. This is because the students at SD Negeri 112 Palembang do not yet possess good physical fitness, with many categorized as "Fair" or even "Poor" and "Very Poor." This can be attributed to the insufficient and poorly structured training programs. Physical education teachers or coaches are still focused more on techniques and tactics rather than overall physical conditioning.

Conclusions

Based on the research results, it can be concluded that the physical fitness test measurements for the 5th-grade students at SD Negeri 112 Palembang in the sport of handball fall into the following categories: excellent 3.32%, good 7.30%, fair 33.98%, poor 23.3%, and very poor 29.3%. From all the categories above, it can be concluded that the average physical condition of the students at SD Negeri 112 Palembang is categorized as "Fair" with a percentage of 33.98%. The implication of this research is that teachers, coaches, and athletes can use the application-based physical fitness test measurements to assess and select athletes for handball competitions, ensuring that selected players possess the necessary physical qualities categorized as good.

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