



Implementation Application for Measuring Physical Fitness Test Results in Badminton

Muhammad Dimas Praja¹, Hartati^{2✉}, Silvi Aryanti³

Program Study of Physical Education and Health Sciences, Faculty of Teacher Training and Education, Sriwijaya University, Palembang, Indonesia¹²³

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Abstract

The study, titled "Implementation of Physical Fitness Test Measurement for Badminton Players Using Applications for Students at Palembang 04 Public Junior High School," aims to establish norms for assessing physical fitness in badminton through the use of applications. Key components, including endurance, speed, strength, and explosive power, are crucial for volleyball. This quantitative research employs a descriptive research design and involves 30 volleyball extracurricular students from Palembang 04 Public Junior High School, comprising 9 male students and 21 female students. Data collection utilizes various test instruments: T Test Agility for agility, 30-meter running for speed, 1-minute push-ups for arm muscle strength, sit-up test for abdominal muscle strength, and standing board jump test for muscle explosive power. The research is conducted at Palembang 04 Public Junior High School in collaboration with a member of the MGMP Pjok City of Palembang. Results from the study indicate that the average physical condition of badminton extracurricular students at Palembang 04 Public Junior High School falls into the very good category (11.20%), good category (9.40%), fair category (12%), less than average category (40%), and very less than average category (19%). In summary, the overall physical condition of badminton extracurricular students at Palembang 04 Public Junior High School is categorized as poor, accounting for 40%. The intention behind this research is to serve as a discussion point for evaluation, fostering awareness among students to continually improve and maintain their physical fitness for optimal performance.

How to Cite

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✉ Correspondence address :
E-mail: hartati@fkip.unsri.ac.id

INTRODUCTION

Badminton is a popular sport played both indoors and outdoors, individually or in groups. It has a significant fan base and serves as a social activity. The game involves the use of a racket, shuttlecock, and net as boundaries on the court. Badminton techniques range from slow to fast-paced shots, requiring high levels of intensity with limited rest. Currently, the focus has shifted towards strength and endurance as key factors for success in the sport. According to (Aksan, 2016), badminton is a racket sport played by two individuals (for singles) or two pairs (for doubles) who take opposing positions on a court divided by a net. In the game of badminton, there are fundamental techniques such as the serve, smash, netting, and drop shot. For this research, the focus is solely on the basic technique of the forehand smash as the reference point.

Physical condition plays a crucial role in enhancing performance in sports. Optimal physical fitness is essential for athletes in any sport, supporting the execution of techniques and strategies during training and competitions. Good physical fitness is a key element in achieving desired sports achievements.

In the context of badminton, physical fitness is vital, with factors like speed, strength, endurance, and agility influencing a player's performance. At Public Junior High School, the assessment of physical test results for badminton students is integral to developing competitive players. However, the current methods of measuring physical test results may not be optimal in providing accurate and relevant data for student performance improvement.

Therefore, research is needed to explore the implementation of application-based physical test result measurements that are more effective and efficient in terms of time. This approach would enable more accurate and efficient data collection, analysis, and reporting of physical test results, facilitating instructors and coaches in designing training programs tailored to individual needs. In the context of Pencak Silat athletes in West Java (Hambali et al., 2020), the research findings suggest that muscle strength is in the average category, agility is good, and power is also good. However, endurance is in the average category. Therefore, there is a need for focused training on improving endurance to ensure athletes have optimal physical conditions for achieving impressive results (Hambali et al., 2020)

Badminton Talent Identification Physical Test Model for Children Under 11 in DIY

(Zhannisa & Sugiyanto, 2015) based on the research findings, it is concluded that a valid and reliable physical test model for nurturing potential badminton students comprises seven test components. These components include flexibility, speed, leg muscle power, agility, arm muscle power, reaction time, and endurance. The tests are considered suitable for use in Indonesia due to their validity, reliability, and objectivity. Students are categorized based on the model, with those having an excellent average score. Analysis of the Physical Condition of the Badminton Team at Universitas PGRI Semarang (HUV, 2020) The average speed level for UPGRIS Badminton Club students is moderate, while agility, arm muscle strength, leg muscle explosive power, and endurance (VO₂max) for the futsal team are also in the moderate category.

Analysis of the Physical Condition of Male Badminton Students at PB Mandala Putra Mahesa Kediri 2022 (Arif & Wiriawan, 2022) The research indicates that out of 11 physical condition test instruments, 10 are categorized as sufficient, while 1 is considered lacking. In summary, male badminton students are in satisfactory condition.

Physical Performance Level of Teenage Badminton Players at PB SAM Mobil Kabupaten Sumenep (Rasyid et al., 2022) The study concludes varying performance levels in aspects such as vertical jump, abdominal muscle strength, arm muscle strength, running speed, agility, and aerobic capacity. Definition of Applications and Their Importance (Yan Tirtobisono, 1999; Hartati, 2019): An application is a structured program designed to solve practical problems, often associated with computer software. Applications play a crucial role in practical and efficient task execution. The development of applications, such as those related to badminton, can aid in physical measurement for students.

Research Objective on Developing a Badminton Physical Test Measurement Application the researcher aims to address challenges in measuring physical fitness in badminton by developing a technological solution. The application aims to enhance physical fitness in badminton athletes, particularly students at Palembang 04 Public Junior High School.

METHODS

The research employed a quantitative descriptive design, aiming to describe, examine, and explain the observed phenomena in their natural state, drawing conclusions using numerical data. Data collection utilized questionnaires and ob-

servations. The subjects consisted of 30 junior high school students from Palembang 04 Public Junior High School, comprising 9 males and 21 females. Research instruments are tools employed to collect, manage, and interpret respondent information created with the same measurement scheme (Sugiyono, 2015). The research instrument, designed for measuring physical fitness, was a set of tests conducted collaboratively with the MGMP PJOK at Palembang 04 Public Junior High School. The selected tests align with the physical components relevant to badminton, including the 30-meter sprint, T-test agility, sit-ups, 1-minute push-ups, and standing board jump.

The following outlines the standardization of the assessment of physical tests in the athletic short-distance running branch, which serves as the data collection technique.

Agility Test

Objective: To measure the agility of athletes.

Equipment: Cones, measuring tape, stopwatch, and a flat field

Procedure:

- a. Place cones in a T-shaped configuration, with a 10-meter distance from cone A to B, and 5 meters from cone B to C and B to D.
- b. The testee stands on the line at cone A, and on the start signal, runs to touch cone B.
- c. Next, they run sideways to the right to touch cone C, then run sideways to the left to touch cone D, and finally, return to touch cone B.
- d. Subsequently, they run backward towards the finish line at cone A.

Assessment: The test results are calculated upon reaching the finish line at cone A, and the time taken to complete the movements is recorded.

Table 1. Agility Test Norms

Norms	Man	Woman
Excellent	< 9,5	< 10,5
Good	9,5 - 10,5	10,5 – 11,5
Adquate	10,5 – 11,5	11,5 – 12,5
Inadequate	>11,5	>12,5

Source: (Wiriawan, 2017)

Push-Up Test

Objective: To measure the power strength of the arm muscles of athletes.

Equipment: Carpet or flat floor, stopwatch.

Procedure:

- a. The testee lies on the carpet, and after receiving instructions, they are allowed to find the most comfortable position for performing push-ups.

ming push-ups.

- b. Determine the hand position, placing them on the floor with a wider distance. Ensure that the thumbs are in line with the chest, position the fingers facing upwards and apart.

- c. Movements are counted when the testee lifts their body, passing a certain point, and when lowering, the arms must be straight.

Assessment: Record the number of push-up movements completed within 1 minute.

Table 2. Norms for Push-Up

Norms	Man	Woman
Excellent	56 ≥	35 ≥
Good	55 – 36	34– 22
Adquate	35 – 19	21 - 11
Inadequate	18 – 12	10 – 6
Very Poor	11 ≤	5 ≤

Source: (Wiriawan, 2017)

Sit-Up Test

Objective: To measure the power strength of the arm muscles of athletes.

Equipment: Carpet or flat floor, stopwatch.

Procedure:

The procedure for the lying-sit kneeling bend 30-second test is as follows.

- a. The athlete lies on their back, both hands behind the nape of the neck, and both elbows straight forward.
- b. Both knees are bent, and the soles of the feet remain on the floor.
- c. Simultaneously with the "ready" command, the athlete prepares to perform the test.
- d. Simultaneously with the "go" command, the timing device is started, and the athlete lifts their body, touching both elbows to the knees, then returns to lying down or to the original position.

Perform as many movements as possible within 30 seconds.

Table 3. Norms for Sit-Up Test

Norms	Man	Woman
Excellent	56 ≥	35 ≥
Good	55 - 36	34– 22
Adquate	35 - 19	21 - 11
Inadequate	18 - 12	10 – 6
Very Poor	11 ≤	5 ≤

Source: (Wiriawan, 2017)

Standing Board Jump

Execution:

The procedure for conducting the no-run long

jump test is as follows:

- a. The athlete stands behind the boundary line, both feet parallel, knees bent, and both arms to the back.
- b. Without using a run-up, both feet push off simultaneously and jump forward as far as possible.
- c. The jump is executed with the assistance of swinging arms.
- d. The jump distance is measured from the boundary line to the nearest point where any part of the body touches the mat/sand.

Table 4. Standing Board Jump Test Norms

Category	Man	Woman
Excellent	7'9" - 9'2"	6'0" - 7'76"
Good	7'3" - 7'6"	5'10" - 6'2"
Adquate	6'11"-7'2"	5'2" - 5'6"
Inadequate	6'6" - 6'9"	4'9" - 5'1"
Very Poor	5'5" - 6'4"	4'0" - 4'7"

Source: (Harsuki, 2017)

30-Meter Sprint

Objective: To measure the speed of badminton athletes.

Equipment: Running track, whistle, and stopwatch.

Procedure:

- a. The testee stands behind the starting line and assumes a ready position to run.
- b. The run starts from a standing position.
- c. With the command "ready," the testee prepares to run, then on the command "go," the testee runs as fast as possible, covering a distance of 30 meters until crossing the finish line. The time is measured from the "go" command.
- d. The testee performs the test twice, with the next runner starting after a minimum interval of one runner. The best running speed is recorded.
- e. The testee is considered unsuccessful if they cross or deviate from the track.

Assessment: Record the time taken to cover the 30-meter sprint.

Table 5. 30 Meter Sprint Test Norms

Category	Man	Woman
Excellent	7'9" - 9'2"	6'0" - 7'76"
Good	7'3" - 7'6"	5'10" - 6'2"
Adquate	6'11"-7'2"	5'2" - 5'6"
Inadequate	6'6" - 6'9"	4'9" - 5'1"
Very Poor	5'5" - 6'4"	4'0" - 4'7"

Source: (Harsuki, 2017)

The data analysis technique employed in this research is quantitative descriptive data analysis.

In this study, the Shapiro-Wilk test is employed for normality testing, with the following criteria:

Significance level (α): 0.05

If the p-value > α , then the sample is derived from a normally distributed population.

If the p-value < α , then the sample does not normality test is conducted using computer originate from a normally distributed population.

The software such as SPSS, and the percentage is calculated using the formula:

$$P = N / F \times 100\%$$

Source: (Setiawan & Mintarto, 2017)

Information:

P: percentase

F: frequency

RESULTS AND DISCUSSION

This research was conducted at Palembang 04 Public Junior High School, located at Jl. Bambang Utoyo No. 534, Ilir Timur III, Palembang, South Sumatra. The research was supervised by one of the Physical Education teachers (MGMP PJOK) at Palembang 04 Public Junior High School. The aim of this study is to implement the measurement of physical fitness test results in the badminton sports branch using an application for the students of Palembang 04 Public Junior High School.

Based on the gathered information, a problem was identified concerning the manual measurement of physical fitness test results in the badminton sports branch, which has not been contributing to the school's achievements. Upon further observation, it was noted that the physical condition of badminton students lacked attention, making it challenging for teachers to establish norms based on the accumulated data. To address this issue, the researcher aims to conduct a measurement of physical fitness test results for badminton students at Palembang 04 Public Junior High School using an application at the school. The primary goal is to determine the results of the physical fitness tests and their respective norm categories.

The normality test results were conducted to determine whether the data follows a normal distribution or not. The normality test employed the Shapiro-Wilk analysis technique, and the calculations were performed using SPSS 29. The

tested data included endurance tests, speed tests (30-meter sprint), agility tests (T test agility), strength tests (1-minute push-up, sit-up), muscle explosive power tests (T test agility), and balance tests (standing board jump) for students in the extracurricular badminton sports branch. Below are the results of the Shapiro-Wilk normality test.

Table 6. Shapiro-Wilk Data Normality Test Results

	Test of Normality		
	Shapiro-Wilk		
	Statistic	df	Sig.
Push Up Strength	.923	30	.032
Sit Up Strength	.967	30	.460
Agility	.959	30	.300
Speed	.914	30	.018
Explosive Power	.957	30	.266

Based on the data used in **Table 6**, the normality test was conducted using SPSS 29 with the results presented in the Shapiro-Wilk table. The data consists of 20 samples. To determine whether the data in the Shapiro-Wilk output follows a normal distribution or not, decisions are made based on two main criteria. First, if the *sig. value is > 0.05, the data is considered normally distributed. Second, if the *sig. value is < 0.05, the data is considered not normally distributed. Further details regarding the normality test results for the physical fitness tests are provided below: The results of the Push Up Strength test were 0.032, the sit up strength test was 0.460, Agility test was 0.300, Speed test was 0,018 and Explosive Power test was 0.266, all results indicate a significance value < 0.05, thus confirming that the normality test results are considered normal.

The analysis data was obtained by calculating the respective norm categories and describing the data from each component of the physical fitness test, allowing us to determine the average physical condition of the students of Palembang 04 Public Junior High School. For clarity, the data for each norm category is presented in the **Table 7**.

Table 7. Analysis Data Results

Indicator	Category				
	Excel- lent	Good	Ad- quate	Inade- quate	Very Poor
Push Up	0%	0%	0%	100%	0%
Sit Up	23%	37%	7%	10%	23%
Agility	33%	3%	30%	27%	7%

Speed	0%	7%	23%	63%	7%
Exp. Power	0%	0%	0%	0%	100%
Average	11,2%	9,4%	12%	40%	27,4%

Based on **Table 7**, the overall results of the physical fitness test measurements for the badminton sports branch at Palembang 04 Public Junior High School using the application, the average physical condition is categorized as excellent with a percentage of 11.2%, in the good category with a percentage of 9.4%, in the fair category with a percentage of 12%, in the poor category with a percentage of 40%, and in the very poor category with a percentage of 27.4%.

Based on the data collected from the physical fitness tests and the measurements obtained using the application, there is a need for a discussion regarding the implementation of physical fitness measurement in the badminton sports branch using the application. The implementation of this application aims to assist teachers or coaches in determining or organizing the results of the physical fitness tests that have been conducted. The presence of the badminton sports branch physical fitness measurement application is expected to enhance and develop biomotor abilities to the highest standards.

Testing and measurement are inseparable parts of various human activities, just as they are in sports teaching and training. By carrying out both of these activities, one can identify the strengths and weaknesses of an athlete, ultimately making informed decisions (Pranata et al., 2019). Agility is one of the essential elements of physical fitness that plays a crucial role, especially in racquet sports, including badminton, particularly when chasing the shuttlecock forward or backward. Agility is the ability of an individual to change direction quickly and precisely while moving without losing balance. Agility is closely related to both speed and flexibility. Without both of these elements, a person cannot move with agility. Agility is also influenced by several factors, including muscle strength, speed, muscle explosive power, reaction time, balance, and coordination (Yuliawan & Sugiyanto, 2014)

According to (Hartati et al., 2022), body posture and innate talent are factors that influence agility and balance. Many young students who excel in agility may not necessarily excel in terms of balance. The discipline of students in following the taught exercises, as well as the availability of adequate facilities and infrastructure, also cont-

tribute to the development of students' abilities. Students can reap numerous advantages from engaging in badminton, such as promoting proper posture, enhancing anatomical and physiological aspects, and fostering overall health and physical abilities. Described as a sport involving a small projectile and rackets, badminton entails hitting the shuttlecock across a net situated in the middle of the playing area. This game accommodates both singles and doubles play, involving two or four participants respectively. The regulations governing badminton are established by the International Badminton Federation (IBF), underscoring the importance of acquiring adequate knowledge to attain optimal outcomes (Aryanti & Hartati, 2020).

In terms of the results of the physical endurance measurement of Palembang 04 Public Junior High School students, which was measured through a 30-meter sprint, according to the theory by (Harsuki, 2017) and categorized by gender, it shows that the majority of students from Palembang 04 Public Junior High School, on average, fall into the moderate category for both male and female students. This is explained according to (Syamsuramel et al., 2019), where speed in badminton serves the purpose of executing quick attacks and variations, as well as the ability to move specific body parts or shift positions in the shortest possible time during a match. The lack of speed in Palembang 04 Public Junior High School badminton students may be influenced by insufficient training, such as sprints, running with resistance, and a focus solely on technique.

Regarding the agility measurement results of Palembang 04 Public Junior High School students, measured through the T-test agility, it shows that the majority of badminton students from Palembang 04 Public Junior High School, on average, fall into the good category for male students and the moderate category for female students. This is explained by (Saputro & Siswantoyo, 2018), stating that agility is the ability to change direction and body position quickly and accurately, without losing balance and awareness of body position while in motion. There is a need for increased agility training for Palembang 04 Public Junior High School badminton students; those in the good category can enhance and maintain their physical activity, while female students should improve their training.

Regarding the strength measurement results of Palembang 04 Public Junior High School students, measured through a 1-minute push-up test according to (Harsuki, 2017), explaining the execution of push-ups, it shows that, on average,

male students fall into the moderate category, and female students fall into the moderate category as well. According to (Gumantan, 2020), strength during a match is crucial for delivering powerful and quick strikes, and to enhance strength, speed factors must be improved systematically through a program. This improvement is necessary due to the lack of appropriate strength training to balance between technical training and physical conditioning.

CONCLUSION

Based on the research findings, the use of a physical fitness test results measurement application in the sport of badminton through a website platform proves its ease of implementation for teachers or coaches. This application provides access to the historical physical condition of badminton students, allowing observation of changes in their physical condition. The research results show that the overall physical condition of Palembang 04 Public Junior High School badminton students, as measured through the badminton sports branch physical fitness test application, falls into the excellent category with a percentage of 11.2%, the good category with a percentage of 9.4%, the fair category with a percentage of 12%, the poor category with a percentage of 40%, and the very poor category with a percentage of 27.4%.

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