15 (3) (2026) 1506 - 1511

Journal of Physical Education, Sport, Health and Recreations

http://journal.unnes.ac.id/journals/peshr

The Relationship Between Physical Fitness and Volleyball Playing Skills Among Junior High School Students

Fani Firlana[1]*, Agung Wahyudi[2]

[12]Physical Education, Health, and Recreation, Faculty of Sports Science, Universitas Negeri Semarang, Semarang, Indonesia

Keywords

Physical Fitness; Volleyball Skills; Junior High Scholl

History Dates

Received: July 14, 2026
Revised: *July 22, 2026*
Accepted: *August 12, 2026*
Published: *November 6, 2026*

DOI

https://doi.org/10.15294/active.v15i3.59073

Copyright

©Universitas Negeri Semarang

License

Creative Commons Attribution License (CC BY 4.0)

Abstract

Physical fitness is one of the important factors that support students' ability to carry out sports activities, including volleyball. Volleyball requires good physical abilities, such as endurance, strength, flexibility, coordination, and movement control, so that playing techniques can be performed optimally. This study aims to determine the relationship between physical fitness and volleyball playing skills among students of SMP N 3 Kalibawang. The study used a quantitative approach with a correlational method. The research subjects were 49 students of SMP N 3 Kalibawang. Data were collected using the Nusantara Student Fitness Test (TKPN) to measure physical fitness levels and a volleyball playing skills test to determine basic game technique abilities. Data analysis began with prerequisite tests, namely normality and linearity tests, followed by the Pearson Product Moment correlation test using SPSS 25. The results showed that the data were normally distributed, with significance values of 0.055 for physical fitness and 0.200 for volleyball playing skills. The linearity test produced a significance value of 0.074, indicating a linear relationship between the variables. The correlation test obtained a Pearson Correlation value of 0.820 with a significance value of 0.001, showing a very strong and significant relationship between physical fitness and volleyball skills. Therefore, physical fitness has a significant relationship with the volleyball skills of students at SMP N 3 Kalibawang.

✉ Corresponding author :
E-mail: fanifirlana221@gmail.com

p-ISSN 2460-724X
e-ISSN 2252-6773

INTRODUCTION

Physical education is a crucial part of the national education system, playing a strategic role in developing students' physical abilities, motor skills, knowledge, and healthy lifestyles. In the context of modern education, learning approaches no longer focus solely on the cognitive domain but must also address the affective and psychomotor domains in a balanced manner. Structured physical activity within Physical Education, Sports, and Health (PJOK) instruction in schools has been shown to improve students' physical fitness and mental capacity, ultimately positively impacting their readiness to participate in all academic activities (Sinaga et al., 2026). Through regular exercise interventions, children's motor skills can develop in line with their physical growth (Hikayati & Afifah, 2026).

Within the context of physical education in schools, physical fitness plays a vital role as a primary foundation. Physical fitness is defined as the body's ability to optimally perform daily activities or work without experiencing significant fatigue, while still having energy reserves for enjoying leisure time. Components of physical fitness include cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition (Supariyadi et al., 2022). Volleyball is one of the large ball games taught in the physical education curriculum at the junior high school (SMP) level. Mastering basic volleyball techniques, such as underhand passing, overhand passing, serving, and smashing, requires efficient body movement coordination and can only be achieved optimally if students have a high level of physical fitness (Karim, 2025).

Theoretically and practically, there is a strong link between physical fitness and motor skill achievement in sports. An adequate level of physical fitness enables students to repeat volleyball technical movements with stability, power, and precision (Saputra et al., 2025). Several previous studies confirm that basic motor skills are positively correlated with the effectiveness of basic volleyball techniques in students (Soraya et al., 2025). Furthermore, abdominal muscle strength, flexibility, and agility significantly contribute to coordination skills during passing and jumping for smashing (Praditya, 2025). However, the majority of previous research has focused on high school students, club athletes, or extracurricular activities, so further studies focusing on regular junior high school students are needed.

Based on initial observations at SMP N 3 Kalibawang, students' performance and enthusiasm during volleyball practice showed significant variation. Some students were able to execute stable underhand passes and had good endurance, but many others tired quickly and lacked agility, resulting in difficulty controlling the ball's direction. This phenomenon is strongly suspected to be closely related to the uneven physical fitness levels of each student. Furthermore, the school had never conducted a physical fitness assessment using the latest national standard instrument, the Nusantara Student Fitness Test (TKPN). Therefore, this study is crucial to empirically analyze the existence of a significant relationship between physical fitness and volleyball skills among students at SMP N 3 Kalibawang

METHODS

This research used a quantitative approach with a correlational method. The correlational method was used because this study aimed to determine the relationship between two variables without any treatment or manipulation of the research variables. The variables in this study consisted of physical fitness as the independent variable and volleyball skills as the dependent variable (Siroj et al., 2024).

The research was conducted at SMP N 3 Kalibawang. The participants consisted of 49 students from grades VII and VIII. The sample consisted of 24 students from grade VII and 25 students from grade VIII, with an age range of 13–15 years. Based on gender, the participants consisted of 26 male students and 23 female students. The participants were selected from students who were actively enrolled in the respective classes and were able to participate in the physical fitness and volleyball skills tests. Thus, the total number of participants in this study was 49 Students selected as the research sample who are capable of representing the population within a specific research subject (Candra Susanto et al., 2024). The data used in the study were primary data obtained directly through measurements of physical fitness and volleyball skills.

The instrument used to measure physical fitness was the Nusantara Student Fitness Test (KEMENPORA, 2022). This instrument consists of several test components: body mass index measurement, V-Sit and Reach, Sit-Up, Squat Thrust, and the PACER Test. This instrument was used to determine students' physical fitness levels based on the physical ability components being measured. The instrument used to measure volleyball skills was a basic volleyball technique skills test. This test was used to determine students' abilities in performing several basic techniques, such as passing and serving. Data collection was carried out directly by the researcher through physical fitness tests and volleyball skills tests. The data obtained were then analyzed using statistical analysis. The analysis steps included a normality test to determine data distribution, a linearity test to determine the relationship between variables, and a Pearson Product Moment correlation test to determine the level of relationship and significance between physical fitness and volleyball skills. Data analysis was performed using SPSS version 25.

RESULTS AND DISCUSSION

Field data collection from 49 students at SMP N 3 Kalibawang went smoothly, including a physical fitness test (TKPN) and a volleyball skills practice test. Prior to conducting correlation tests to test the research hypotheses, classical assumption tests were conducted as a prerequisite for data analysis.

The first prerequisite test was the data normality test, which aims to determine whether the regression model or variables have a normal distribution. This test used the Kolmogorov-Smirnov statistical formula in SPSS, with the data summary results shown in **Table 1.**

Table 1. Normality Test

Variable	Sig(p)	Description
Physical Fitness	0.055	Sig.
Volleyball Skills	0.200	Sig.

Based on the results of the normality test presented in **Table 1**, the significance value (Sig.) for the TKPN variable was 0.055, while the significance value for the volleyball skills variable was 0.200. Both values are higher than the 0.05 level (0.055 > 0.05 and 0.200 > 0.05). Therefore, the data for both research variables are normally distributed, meeting the assumptions for analysis using parametric statistics.

Next, the second prerequisite test, the linearity test, was conducted. This test aims to determine whether there is a linear relationship between the physical fitness variable (X) and volleyball skills (Y). The linearity test was performed by examining the significance value in the Deviation from Linearity section of the ANOVA table in the SPSS data processing results, as presented in **Table 2**.

Table 2. Linearity Test

Variable	Sig(p)	Description
Physical Fitness* Volleyball Skills	0.074	Sig.

Based on the results of the linearity test analysis in **Table 2**, the significance value obtained for the Deviation from Linearity component was 0.074. Because this significance value is greater than the critical limit of 0.05 (0.074 > 0.05), it can be concluded that there is a significant linear relationship between physical fitness and volleyball skills of students at SMP N 3 Kalibawang.

After the two prerequisite assumptions for data analysis above were met, the next step was to test the hypothesis using the Pearson Product Moment bivariate correlation analysis tech-nique. The results of the correlation coefficient calculation using SPSS are summarized in **Table 3.**

Table 3. Correlation Test

Variable	Sig(p)	PC	Description
Physical Fitness* Volleyball Skills	0.001	0.820	Sig.

Based on the results of the correlation test presented in **Table 3**, a significance value (Sig. 2-tailed) was obtained between the TKPN value variable and volleyball playing skills of 0.001. This value is smaller than the significance limit used, namely 0.05 (0.001 < 0.05). Therefore, the test decision shows that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. These results indicate that there is a significant relationship between the level of physical fitness and volleyball playing skills in students.

Furthermore, when examining the strength of the relationship, the Pearson Correlation value is 0.820. This positive correlation coefficient indicates that the direction of the correlation between the two variables is unidirectional or positive, meaning that any increase in physical fitness will be followed by an increase in volleyball skill. Referring to the correlation coefficient interpretation criteria, a value of 0.820 falls within the index range of 0.80 - 1.00, indicating that the level of relationship or correlation between physical fitness (TKPN Value) and volleyball skill is in the very strong category.

The results of this study align with research (Maksum & Rahmat, 2025), which explains that physical fitness levels are related to physical activity ability and achievement in physical education lessons. Students with good physical fitness are able to perform physical activities more optimally, thus supporting success in sports learning. Research (Ardiansyah, 2026), also shows a relationship between motor skills and volleyball skills. Good motor skills will help students control body movements, adjust positions, and execute playing techniques more effectively. This strengthens the findings of this study that physical condition factors contribute to volleyball skills. Furthermore, research explains that arm muscle strength and hand-eye coordination are related to volleyball underhand passing ability. This indicates that technical ability in volleyball is influenced not only by technical training but also by the physical abilities that support the execution of these movements.

Based on the results of the study, it was found that students with better physical fitness levels tended to be more active in physical education lessons and had better volleyball technique skills. Conversely, students with lower fitness levels have difficulty maintaining game activity for long periods and require greater effort to perform basic techniques. This also illustrates that volleyball instruction in schools is not sufficient to focus solely on mastering playing techniques. Physical education (PJOK) teachers need to pay attention to physical fitness aspects through physical training programs tailored to the characteristics of junior high school students. Physical fitness can be improved through endurance, strength, flexibility, and coordination training combined with volleyball technique training.

The findings of this study reinforce theories in sports science which state that motor performance and mastery of basic techniques in sports games are highly dependent on the physical readiness of the athlete or student. Through the five physical components measured in the TKPN test—namely balanced nutritional status (BMI), back flexibility, abdominal muscle strength endurance (sit-ups), body agility coordination (squat thrust), and prime cardiorespiratory aerobic capacity (PACER test)—students have efficient body functional capacity. This fit physical condition provides mechanical ease for the student's body to adapt motor movements, stabilize the accuracy of underhand passes, transfer power when serving, and maintain a consistent vertical jump when smashing from the beginning to the end of the game without experiencing excessive fatigue.

CONCLUSION

Based on the results of data processing and hypothesis testing regarding the relationship between physical fitness and volleyball skills of students at SMP N 3 Kalibawang, it can be concluded that all research data met the analysis requirements and demonstrated a significant relationship between variables. This is evidenced by the results of the Kolmogorov-Smirnov normality test, which showed a significance value of 0.055 for the physical fitness

variable (TKPN value) and 0.200 for the volleyball skill variable. Both values are above the 0.05 significance level (p > 0.05), indicating that the research data is normally distributed. Furthermore, the linearity test yielded a Sig. value in the Deviation from Linearity section of 0.074. Since this value is great-er than 0.05 (0.074 > 0.05), it can be concluded that the relationship between physical fitness and volleyball skill is linear. Furthermore, the analysis using the Pearson Product Moment correla-tion test showed a significance value (Sig. 2-tailed) of 0.001, which is lower than the significance limit of 0.05 (0.001 < 0.05). The relationship between the two variables was also strengthened by a Pearson correlation coefficient of 0.820, indicating a positive relationship with a very strong level of relationship. Thus, the results of this study indicate a positive and significant relation-ship, categorized as very strong, between physical fitness and volleyball skills among students at SMP N 3 Kalibawang. This means that the better a student's physical fitness level based on the TKPN measurement, the better their volleyball skills will be.

AUTHOR CONTRIBUTION STATEMENT

Using the CRediT (Contributor Roles Taxonomy) framework: Fani Firlana: Conceptualization, Methodology, Formal analysis, Writing – original draft. Agung Wahyudi S.Pd., M.Pd.: Investigation, Data curation, Visualization, Validation. All authors have read and agreed to the published version of the manuscript.

FUNDING STATEMENT

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

AI USAGE STATEMENT

During the preparation of this work, the author(s) used Concensus Ai and ChatGpT in order to improve readability and language editing. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

Ardiansyah, H. (2026). Analysis of basic skills of lower passing and upper passing in volleyball extracurricular students at SMP Negeri 2 Sanga Desa. *Journal of Education and Applied Teaching (JEAT), 2*(3), 1670–1678.

Candra Susanto, P., Ulfah Arini, D., Yuntina, L., Panatap Soehaditama, J., & Nuraeni, N. (2024). Konsep penelitian kuantitatif: Populasi, sampel, dan analisis data (Sebuah tinjauan pustaka). *Jurnal Ilmu Multidisplin, 3*(1), 1–12. https://doi.org/10.38035/jim.v3i1.504

Hikayati, H. A. H., & Afifah, H. H. M. (2026). Kontribusi kinerja guru terhadap keterampilan siswa dalam pembelajaran PJOK materi passing bawah bola voli siswa kelas 5 di SDN se-Dabin II Kecamatan Salaman, Kabupaten Magelang. *Pendas: Jurnal Ilmiah Pendidikan Dasar, 11*(2), 150–164.

Karim, A. (2025). Analisis kemampuan servis bawah pada permainan bolavoli SMAN 14 Makassar. *Indonesian Journal of Physical Activity, 5*(1), 37–42.

Kementerian Pemuda dan Olahraga Republik Indonesia. (2022). *Pedoman pelaksanaan tes kebugaran pelajar Nusantara*.

Maksum, H., & Rahmat, A. (2025). Analysis of the level of physical fitness of male students in extracurricular volleyball games at SMK Koperasi Pontianak. *COMPETITOR: Jurnal Pendidikan Kepelatihan Olahraga, 17*(2), 1163–1174.

Praditya, A. D. (2025). *Hubungan kekuatan otot lengan dan koordinasi mata-tangan terhadap kemampuan passing bawah siswa putra ekstrakurikuler bola voli di SMK Negeri 3 Pacitan* [Skripsi, STKIP PGRI Pacitan].

Saputra, K. M., Damayanti, A., & Bawah, S. (2025). Pengembangan keterampilan teknik dasar bermain bola voli pada siswa kelas 3 SDIT Nurul Amal Pondok. *2042–2046*.

Siroj, R. A., Afgani, W., Septaria, D., & Zahira, G. (2024). Penelitian kuantitatif: Populasi, sampel, dan analisis data. *Jurnal Review Pendidikan dan Pengajaran, 7*(3), 11279–11289.

Soraya, A., Juita, A., & Sulastio, A. (2025). Korelasi motor ability dengan keterampilan bermain bola voli pada ekstrakurikuler di SMK Negeri Kesehatan dan Pariwisata Bangkinang. *Journal Sport Science Indonesia, 4*(3), 113–124.

Supariyadi, T., Mahfud, I., & Aguss, R. M. (2022). Hubungan tingkat kebugaran jasmani terhadap prestasi belajar Penjas tahun 2021. *J. Arts Educ, 2*(2), 60–71.