JPPI (Jurnal Penelitian Pendidikan Indonesia)
Volume 11, Number 4 2025

The influence of physical fitness and nutritional status on students' learning outcomes

Author Name(s): Yeni Ambar Wati, Hendri Neldi, Wilda Welis, Alnedral Alnedral

Publication details, including author guidelines
URL: https://jurnal.iicet.org/index.php/jppi/about/submissions#authorGuidelines
Editor: Nining Maizura

Article History
Received: 22 Oct 2025
Revised: 03 Nov 2025
Accepted: 30 Dec 2025

How to cite this article (APA)
Wati, Y.A., Neldi, H., Welis, W. & Alnedral, A. (2025). The influence of physical fitness and nutritional status on students' learning outcomes. Jurnal Penelitian Pendidikan Indonesia, 11(4), 289-295. https://doi.org/10.29210/020256686

The readers can link to article via https://doi.org/10.29210/020256686

JPPI (Jurnal Penelitian Pendidikan Indonesia)
ISSN: 2502-8103 (Print) | ISSN: 2477-8524 (Electronic)

JPPI (Jurnal Penelitian Pendidikan Indonesia)
ISSN: 2502-8103 (Print) ISSN: 2477-8524 (Electronic)
Vol. 11, No. 4, 2025, pp. 289-295
DOI: https://doi.org/10.29210/020256686

The influence of physical fitness and nutritional status on students' learning outcomes

Yeni Ambar Wati, Hendri Neldi*), Wilda Welis, Alnedral Alnedral
Universitas Negeri Padang, Indonesia

Article Info

Article history:

Received Oct 22nd, 2025
Revised Nov 03rd, 2025
Accepted Dec 30th, 2025

Keyword:

Learning outcomes,
Nutritional status,
Path analysis,
Physical education,
Physical fitness

ABSTRACT

Floor gymnastics learning at SMAN 1 Siberut Barat Daya faces several challenges, including low student skill levels, limited facilities, and the constraints of a 3T (frontier, outermost, and disadvantaged) school context. This study aimed to develop and examine the feasibility and effectiveness of a Kurikulum Merdeka–based floor gymnastics teaching module. The study employed a research and development approach using the ADDIE model, consisting of analysis, design, development, implementation, and evaluation stages. The participants were 47 Grade X students. Data were collected through gymnastics skill tests, observations, questionnaires, and interviews, and analyzed using descriptive statistics and paired sample t-tests. The results showed significant improvements in students' performance on forward roll, backward roll, and candlestick movements after using the module ($p < 0.001$). Expert validation and student responses indicated that the module is valid, practical, and suitable for use in schools with limited resources.

Corresponding Author:

Hendri Neldi,
Universitas Negeri Padang,
Email: hendrineldi@fik.unp.ac.id

Introduction

National education in Indonesia aims to develop students holistically by integrating physical, cognitive, emotional, and moral aspects. Within this framework, Physical Education, Sports, and Health (PJOK) holds a strategic position because it directly supports students' physical development, character formation, and readiness to learn (El-gyar and Abdelkarim 2025; Luh 2020). Through structured physical activities, PJOK is expected to improve physical fitness, foster healthy lifestyles, and indirectly enhance academic achievement. However, achieving these goals remains a challenge, particularly at the elementary school level, where students' physical activity patterns and learning engagement are still relatively low.

Despite its importance, learning outcomes in PJOK have not reached optimal levels in many schools. The Evaluation Report on the Implementation of the 2013 Curriculum in PJOK by the Center for

Assessment and Learning shows that most elementary school students have not achieved minimum competency standards in physical skills and understanding of fitness-related activities (Yudhistira 2022). Nationally, PJOK practical exam scores remain in the "fair" category, with an average score of 68 out of 100, indicating a persistent gap between curriculum expectations and actual learning outcomes.

Empirical studies have consistently reported similar findings. Nur (2016) found that most students at SDN II Yungyang Modo Lamongan scored below the Minimum Competency Criteria (KKM) in PJOK. Yudhistira (2022) further confirmed that low physical fitness levels and poor nutritional status significantly affect PJOK learning outcomes among elementary school students in West Sumatra. Hidayat (2023) also identified monotonous teaching methods and low student motivation as contributing factors to weak learning outcomes, resulting in passive student participation and limited development of physical and social skills.

Students' PJOK learning outcomes are influenced by various internal and external factors. Nur (2016) emphasized that limited variation in teaching methods and learning media often leads to boredom and declining student engagement. From a structural perspective, the availability of sports facilities and infrastructure also plays a critical role, as inadequate facilities restrict opportunities for optimal movement practice and skill development (Fisabilillah 2021). These conditions highlight that PJOK learning outcomes cannot be separated from the learning environment provided by schools.

From a social and psychological standpoint, parental support is another influential factor affecting students' learning outcomes. Children who receive encouragement and attention from their parents tend to be more motivated to participate in physical activities and maintain healthy behaviors. Parental and peer support has been shown to significantly increase children's engagement and motivation in physical education, ultimately improving physical literacy and learning outcomes (Irawati et al. 2023). At the same time, rapid technological development has increased children's exposure to gadgets and sedentary activities, further reducing their daily physical activity levels.

Global and national data confirm this trend. The World Health Organization reports that 81% of school-aged children worldwide do not meet the recommended minimum of 60 minutes of daily physical activity (WHO 2022). In Indonesia, the 2023 Riskesdas data indicate that 52.5% of children aged 7–12 years are physically inactive, a condition that directly affects their physical fitness levels. This decline in physical activity has become a serious concern because physical fitness is closely related to students' movement abilities, emotional regulation, and learning outcomes (Luh et al. 2021).

Physical fitness is a fundamental component of PJOK learning and a key determinant of students' ability to actively participate in physical activities. Physical fitness refers to the body's capacity to perform daily activities efficiently without excessive fatigue and includes components such as cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition. Research by Kuwanti (2023) demonstrates that higher levels of cardiorespiratory fitness are associated with improved cognitive abilities, better academic performance, and reduced anxiety and depression among students.

In addition to physical fitness, nutritional status plays a crucial role in shaping students' learning capacity. Indonesia continues to face a double burden of malnutrition, characterized by high rates of stunting and increasing obesity among school-aged children. According to national data, approximately 17.8% of children experience stunting and 8.5% are underweight, conditions that negatively affect concentration, motor skills, and learning motivation. Batubara, Hendrika, and Prameswari (2025) noted that children with balanced nutritional intake tend to be more active, healthier, and better able to concentrate during learning, while both undernutrition and overnutrition can hinder physical performance and social participation in PJOK classes.

Although physical fitness and nutritional status are critical, learning outcomes in PJOK are also influenced by motivational factors. Learning motivation determines students' willingness to engage actively, persist in challenging activities, and enjoy the learning process. Alahmadi (2021) found that students with strong intrinsic motivation tend to achieve better learning outcomes because they perceive learning activities as enjoyable and meaningful. These findings indicate that PJOK learning outcomes result from complex interactions between physical, nutritional, psychological, and environmental factors.

Based on this rationale, direct observation was conducted in March 2025 at State Elementary School 01 Tiumang to examine real classroom conditions. Observations revealed low student participation, rapid fatigue during light activities, limited enthusiasm for movement, and passive learning behaviors. These conditions were exacerbated by monotonous teaching methods, poor physical endurance, and inadequate nutritional habits, such as skipping breakfast. Therefore, this study seeks to analyze the relationships between physical fitness, nutritional status, and learning outcomes in PJOK, providing empirical evidence to support more effective and context-sensitive physical education practices.

Method

Research design and approach of the study

The research method used was a quantitative research method with a correlational design. Correlational design is a research design using correlational statistics to measure the degree of relationship or association between two or more variables (Cresswell 2011) This research started from research observation, research design, data collection and research data processing. In quantitative research, many use numbers as an alternative to data collection (Sugiyono 2022) This statement is in line with research conducted by (Setiyadi 2018) that quantitative research is a systematic research approach to collect and analyze numerical data explaining certain phenomena and test hypotheses. The numbers obtained from the results of data collection have been processed using SPSS version 25 software so that accurate research results are obtained.

Research site and participants

This research was conducted in SDN 01 Tiumang Dharmasyara Subdistrict, West Sumatera province, a total 140 students as the population, the teacher used purposive sampling as the method in choosed the sample, with in 41 students were the sample of the research. This approach was carried out without distinguishing gender, educational background, subjects taught or positions at school by using the Slovin formula. Sampling was done to reduce errors, increase accuracy and increase validity.

Data collection and analysis

This study used the Indonesian Student Fitness Test (Tes Kebugaran Siswa Indonesia/TKSI) and Body Mass Index (BMI) as the main data collection instruments. TKSI was administered to Grade IV–VI students to assess physical fitness through five components: hand–eye coordination, movement accuracy, abdominal muscle strength, agility, and cardiorespiratory endurance. Test results were converted using TKSI norms and classified into five fitness categories. Nutritional status was measured using BMI, calculated from students' height and weight and classified according to national standards. These instruments were used to obtain objective measures of students' physical fitness and nutritional status in relation to PJOK learning outcomes. Data analysis was conducted using paired sample t-tests, multiple correlation analysis, and a simultaneous F-test to examine relationships among variables.

Results and Discussions

Findings on the result of statistics descriptive Physical Fintes, learning outcomes and Nutritional Status by students.

This study aimed to know the impact of physical fitness and nutritional status towards learning outcomes by the students at SDN 01 Tiumang Dharmasyara, the result of test and IMT were described on Table 1:

Table 1. The Result of Descriptive Statistics

Statistics	Physical Fitness(X1)	Nutritional status(X2)	Learning outcomes (Y)
N	41	41	41
Std.Deviation	41	41	9,168
Minimum	3,22	2,454	60
Maximum	11	14	94
Mean	20	26	81

Sources : Data Analysis (2025)

The results of the descriptive statistics show that the study involved 41 students for all variables. Physical fitness (X1) had a minimum score of 3.22 and a maximum score of 11, with a mean score of 20, indicating varying levels of students' physical fitness. Nutritional status (X2) also involved 41 students, with scores ranging from 2.454 to 14 and a mean value of 26, suggesting differences in students' nutritional conditions. Meanwhile, learning outcomes (Y) ranged from 60 to 94, with a mean score of 81 and a standard deviation of 9.168, reflecting a moderate dispersion of students' academic performance in Physical Education, Sports, and Health.

The Result of Normality Test

The researcher also conducted the normality test described on Table 2:

Table 2. The Result of Normality Test

Parameter	Score
N	41
Mean	,00000
Std. Deviation	6,3568
Test statistic	0,116
Asymp.Sig. (2-tailed)	0,188

Sources : Data Analysis (2025)

Based on the results of the hypothesis test, the Asymp. Sig. (2-tailed) value was 0.188 with a significance level (α) of 0.05. Since the Asymp. Sig. (2-tailed) value is higher than the alpha value (0.188 > 0.05), it can be concluded that the data are normally distributed. This finding indicates that the data meet the normality assumption required to proceed with further statistical analyses.

The Result of Path analysis Hypothesis

Path analysis using SPSS begins by ensuring that the data are valid and normally distributed. The next step is to construct a path model that connects the independent, mediating, and dependent variables. Multiple regression analyses are then conducted for each path in the model, with careful attention to the regression coefficients and their significance levels. Significant regression results indicate strong causal relationships among the variables. The results of the analysis are presented as follows

Table 3. The Result of Path Analysis Hypothesis

Direct effect	Percentage of effect	Beta Coefficient	Sig.Value	Alpha	Conclusion
X1 on Y	9%	0,300	0,030	0,05	Ha Diterima
X2 on Y	6,76%	0,260	0,048	0,05	Ha Diterima

Sources : Data Analysis (2025)

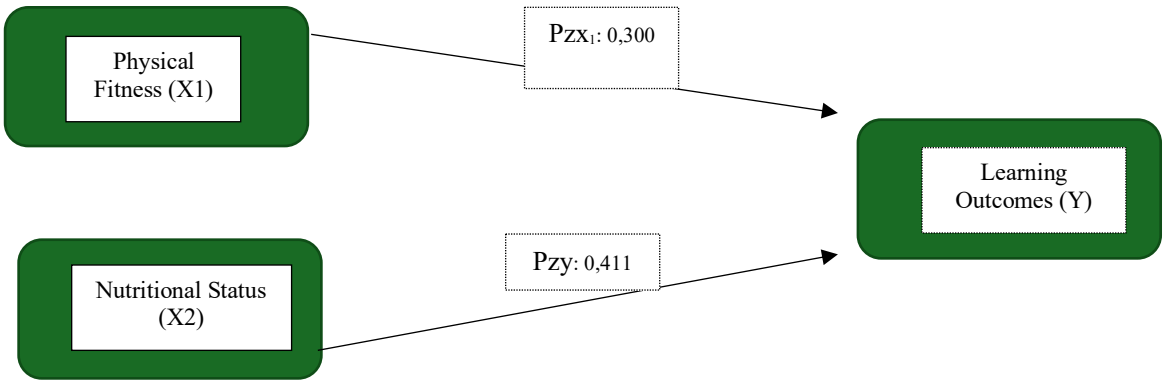

Figure 1. The Path Analysis

The results of the path analysis hypothesis testing indicate that physical fitness (X1) has a direct effect on learning outcomes (Y) with a contribution of 9%, a beta coefficient of 0.300, and a significance value of 0.030, which is lower than the alpha level of 0.05, leading to the acceptance of Ha. Similarly, nutritional status (X2) also shows a direct effect on learning outcomes (Y) with an effect size of 6.76%,

a beta coefficient of 0.260, and a significance value of 0.048, which is below the alpha threshold of 0.05, indicating that Ha is accepted for this relationship as well. The path analysis showed on figure 1:

The findings of this study indicate that both physical fitness (X1) and nutritional status (X2) significantly influence students' learning outcomes in Physical Education, Sports, and Health (PJOK) (Y). Physical fitness contributed 9% to learning outcomes ($\beta = 0.300$), while nutritional status contributed 6.76% ($\beta = 0.260$), with both relationships statistically significant ($p < 0.05$). These results suggest that students with higher fitness levels and adequate nutrition are more likely to achieve better performance in PJOK, supporting the idea that physical and biological factors form a foundation for learning in physically demanding subjects.

The positive effect of physical fitness on learning outcomes is consistent with the notion that students with better stamina, coordination, and motor skills can engage more effectively in physical activities (Sugiarto, Sin, and Putra 2023). High fitness levels allow students to follow instructions accurately, perform movements optimally, and maintain participation throughout lessons. This aligns with Permatasari (2024), who reported that physically fit students exhibit greater concentration and motivation during learning activities, which directly contributes to better outcomes in PJOK.

Nutritional status also plays a critical role in supporting both physical and cognitive development. Adequate nutrition provides the energy necessary for sustained physical activity and promotes brain function, which is crucial for understanding learning materials (Osrita et al. 2023). Students with normal nutritional status tend to demonstrate higher endurance, better attention, and improved learning outcomes, whereas malnourished students may experience fatigue, poor concentration, and reduced capacity to perform physical tasks effectively (Sepriani, Pratiwi, and Sabillah 2025).

These results confirm previous studies highlighting that balanced growth, reflected in proper body weight and height, is a key determinant of optimal learning performance in physical education (Luh et al. 2021). Poor nutritional status not only limits physical capability but can also reduce students' intrinsic motivation to participate in activities, creating a cycle of low engagement and suboptimal learning outcomes. This finding emphasizes the need for holistic interventions that integrate fitness programs with nutritional support in school settings.

Although both variables significantly affect learning outcomes, the effect sizes indicate that other factors, such as teaching methods, student motivation, and school environment, likely contribute to learning performance in PJOK. The relatively modest contributions of physical fitness and nutrition (9% and 6.76%) suggest that multifactorial strategies are needed to maximize student outcomes. Future research should explore these additional variables to better understand the combined influences on PJOK learning.

The findings also have practical implications for curriculum and instructional design. Teachers can use these insights to develop differentiated learning activities that accommodate varying fitness levels and nutritional conditions, ensuring that all students can participate actively and achieve learning goals. Incorporating regular fitness assessments and nutrition education may further enhance students' readiness and capacity to engage in physical education lessons.

In conclusion, this study reinforces the importance of considering both physical fitness and nutritional status as determinants of learning outcomes in PJOK. Interventions targeting these areas can enhance students' physical ability, motivation, and overall performance, while acknowledging that other psychosocial and environmental factors must also be addressed to achieve comprehensive improvements in student learning (Sugiarto, Sin, and Putra 2023; Permatasari 2024; Osrita et al. 2023; Sepriani, Pratiwi, and Sabillah 2025; Luh et al. 2021).

Conclusions

This study concludes that physical fitness and nutritional status significantly influence students' learning outcomes in Physical Education, Sports, and Health, with students who are fitter and better nourished achieving higher performance. The findings provide quantitative support for theoretical frameworks linking physiological readiness to learning achievement and emphasize the importance of integrating physical fitness programs and nutrition education in elementary schools. Schools, teachers,

parents, and health practitioners are encouraged to collaborate in promoting healthy habits and structured physical activities to enhance academic and physical development. Future research should consider additional factors such as learning motivation, socio-economic background, and parental support, involve larger and more diverse samples, and explore broader educational contexts to strengthen the generalizability of these results.

References

Adriani, D., & Fadilah, T. (2023). Peran kadar hemoglobin pada kebugaran jasmani remaja. *Jurnal Penelitian dan Karya Ilmiah Lembaga Penelitian Universitas Trisakti, 8*(2), 199–214. https://doi.org/10.25105/pdk.v8i2.14312

Afif, R., Syahrastani, S., Syamsuar, S., & Igoresky, A. (2023). Tingkat kebugaran jasmani kelas atas SD Negeri 17 Pakan Kurai Kota Bukittinggi. *Jurnal JPDO, 6*(12), 124–129.

Alahmadi, M. A. (2021). Health-related physical fitness among adolescent schoolgirls in Madinah City, Western Saudi Arabia. *Journal of Sport Exercise and Health Research, 5*(1), 34–37.

Anggraini, H. A. (2025). Peran guru bimbingan dan konseling dalam penerapan etika guru bimbingan dan konseling. *Jurnal Bimbingan Konseling dan Psikologi, 5*(1), 49–57. https://doi.org/10.56185/jubikops.v5i1.572

Batubara, F. R., Hendrika, W., & Prameswari, S. A. (2025). The relationship between body fat percentage and physical fitness: A cross-sectional study among medical students in Indonesia. *Journal of Applied Nursing and Health, 7*(3), 381–391.

Creswell, J. W. (2011). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Pearson Education.

El-Gyar, N., & Abdelkarim, O. (2025). Health-related physical fitness in children among five Mediterranean countries: A cross-cultural study from the DELICIOUS project. *Frontiers in Psychology, 2*, 1–9. https://doi.org/10.3389/fpubh.2024.1520096

Febrianti, S. W. R., & Dale, D. S. (2019). Pemeriksaan pertumbuhan tinggi badan dan berat badan bayi dan balita. *Celebes Abdimas: Jurnal Pengabdian Kepada Masyarakat, 1*(1), 15–20.

Fisabilillah, F. F. N., & Sakti, N. C. (2021). Pengembangan video animasi sebagai upaya peningkatan minat belajar peserta didik materi perpajakan di sekolah menengah atas. *Edukatif: Jurnal Ilmu Pendidikan, 3*(4), 1271–1282. https://doi.org/10.31004/edukatif.v3i4.562

Hidayat, A. P., & Taufik. (2023). Perbandingan hasil belajar mata pelajaran pendidikan jasmani, olahraga, dan kesehatan secara daring dan luring siswa SMPN 2 Wringinanom. *Jurnal Pendidikan Olahraga dan Kesehatan, 11*(3), 33.

Irawati, D., Slametiningsih, Nugraha, R., Natashia, D., Narawangsa, A., Purwati, N. H., & Handayani, R. (2023). Perubahan fisik dan psikososial mempengaruhi kualitas hidup pasien hemodialisis. *Jurnal Ilmiah Keperawatan, 9*(1), 96–104. https://doi.org/10.33023/jikep.v9i1.1426

Jaelani, A., Fauzi, H., Aisah, H., & Zaqiyah, Q. Y. (2020). Penggunaan media online dalam proses kegiatan belajar mengajar PAI di masa pandemi COVID-19. *Jurnal IKA PGSD UNARS, 8*(1), 12. https://doi.org/10.36841/pgsdunars.v8i1.579

Kuwanti, E., Budiharto, I., & Fradianto, I. (2023). Hubungan pola makan dengan kadar gula darah penderita diabetes melitus tipe 2: Literature review. *MAHESA: Malahayati Health Student Journal, 3*(6), 1736–1750. https://doi.org/10.33024/mahesa.v3i6.10495

Lestari, W., Kristiana, L., & Paramita, A. (2018). Stunting: Studi konstruksi sosial masyarakat perdesaan dan perkotaan terkait gizi dan pola pengasuhan balita di Kabupaten Jember. *Jurnal Aspirasi, 9*(1), 17–33. https://doi.org/10.22212/aspirasi.v9i1.985

Nabillah, T., & Abadi, A. P. (2019). Faktor penyebab rendahnya hasil belajar siswa. *Prosiding Seminar Nasional Matematika dan Pendidikan Matematika (Sesiomadika 2019)*, 659.

Nur, S., Pujiastuti, I. P., & Rahman, S. R. (2016). Efektivitas model problem based learning (PBL) terhadap hasil belajar mahasiswa Prodi Pendidikan Biologi Universitas Sulawesi Barat. *Saintifik, 2*(2), 133–141. https://doi.org/10.31605/saintifik.v2i2.105

Osrita, G., Welis, W., Rasyid, W., Zarya, F., & Ichsan, M. (2023). Pengaruh status gizi, kebugaran jasmani, dan motivasi belajar terhadap hasil belajar PJOK SD. *Jurnal Pendidikan Jasmani Indonesia, 16*(2), 224–239.

Putra, R., Sinurat, R., & Aluwis. (2022). Tinjauan status gizi dan kesegaran jasmani siswa SMP Negeri 3

Kapur IX. *Jurnal Edu Research, 11*(1), 18–23.
Sepriani, R., Pratiwi, M. D., & Sabillah, M. I. (2025). The influence of BMI, physical fitness, and clean and healthy living behavior on student learning outcomes. *Jurnal Pendidikan Jasmani Indonesia, 21*(1), 41–52.
Septiawati, D., Indriani, Y., & Zuraida, R. (2021). Tingkat konsumsi energi dan protein dengan status gizi balita. *Jurnal Ilmiah Kesehatan Sandi Husada, 10*(2), 598–604. https://doi.org/10.35816/jiskh.v10i2.660
Sugiyono. (2022). *Metode penelitian kualitatif*. Alfabeta.
WHO. (2022). *World health statistics*. World Health Organization.
Yudhistira, A., Neldi, H., & Wilis, W. (2022). Pengaruh peran orang tua terhadap hasil belajar PJOK. *Jurnal Ilmu Pendidikan, 4*(5), 7357–7362.