



Comparison of Physical Literacy and Physical Fitness by Gender among Phase C Elementary School Students

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ABSTRACT

This study compared physical literacy and physical fitness between male and female Phase C students at SDN Melong Mandiri 1. Using a quantitative comparative cross-sectional design, the study involved 213 grade V–VI students through total sampling. Physical literacy was assessed using the Physical Literacy in Children Questionnaire (PLC-Quest), with 203 valid records after excluding 10 incomplete questionnaires. Physical fitness was measured using the Indonesian Student Fitness Test (TKSI). Data were analyzed using descriptive statistics, Shapiro–Wilk and Levene’s tests, the Independent Samples t-test, and the Mann–Whitney U test ($\alpha = 0.05$). Physical literacy did not differ significantly by sex ($p = 0.067$), although males scored higher (97.71 ± 10.02) than females (95.28 ± 8.77), with a mean difference of 2.428 (95% CI: -0.17 to 5.03) and a small effect size (Cohen’s $d = 0.26$). Physical fitness differed significantly ($p < 0.001$), favoring males (19.26 ± 2.30) over females (17.04 ± 2.36), with a moderate effect size ($r = 0.45$). These findings highlight physical literacy and physical fitness as distinct constructs: physical literacy integrates affective, cognitive, behavioral, and physical competence dimensions, whereas TKSI primarily measures physical performance. PJOK teachers should balance fitness development with learning experiences that foster broader physical literacy dimensions in both sexes.

Keywords: Physical Literacy; Physical Fitness; Elementary School; Gender



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INTRODUCTION

Physical, Sports, and Health Education (PJOK) is an important part of the educational process that helps develop students' movement skills, health, and character through planned physical activities. Physical education is not only oriented towards improving physical abilities, but also helps students develop according to their stages of growth and development so that they are able to form complete individuals (Rosmi, 2016). In addition, PJOK learning contributes to instilling character values such as cooperation, sportsmanship, and responsibility through various learning activities (Purwanto & Yuliawan, 2025). At primary school age, the habit of physical activity is an important foundation for building a healthy

lifestyle throughout life, although technological developments have led to a tendency to decline in physical activity in children (Jayadilaga et al., 2023; Hasan et al., 2020).

One of the concepts that is currently developing in physical education is physical literacy. The development of reliable measurement instruments follows the progress of physical literacy research. To measure the physical literacy of children aged 4-12 years, the physical literacy questionnaire in children (PLC-Quest) was created and has been shown to be successful in measuring various dimensions of physical literacy (Diao et al., 2024). Cultural adaptation and psychometric assessments have also been carried out in Indonesia to ensure that the tool can be used by primary school students (Lubay et al., 2025).

Physical literacy includes motivation, confidence, physical competence, knowledge, and understanding that encourage individuals to participate in physical activity throughout life (Metri et al., 2023; Kusuma & Riyadi, 2024). In contrast, physical fitness refers to a person's ability to perform daily activities effectively without excessive fatigue while retaining energy for other activities (Irawati et al. 2024; Z. Rumawatine, 2024). Previous studies have discussed the relationship between physical literacy, physical activity, and physical fitness (Husnan et al., 2023). However, physical literacy and physical fitness are conceptually distinct constructs. Physical fitness primarily represents physical capacity and performance, whereas physical literacy encompasses broader affective, cognitive, behavioral, and physical competence dimensions. Therefore, differences in physical fitness do not necessarily result in corresponding differences in overall physical literacy. A valid and reliable tool is needed to measure children's physical literacy abilities as physical literacy research develops in Indonesia. (Lubay et al. 2025) found that the student physical literacy questionnaire (PLC-Quest) met legitimate and reliable criteria for use in elementary school students in Indonesia. Therefore, PLC-Quest can be considered an appropriate tool for conducting research on physical literacy in the context of primary education. In recent years, research on physical literacy has developed quite rapidly both at the national and international levels. The study focused on the development of concepts, measurement instruments, implementation in PJOK learning, and the relationship between physical literacy and

physical activity and physical fitness (Sativa & Pramudinta, 2025; Ridha et al., 2025). These developments show that physical literacy has become one of the important indicators in supporting the quality of physical education in schools.

However, the implementation of physical literacy in Indonesia still faces various challenges. Physical literacy is a relatively new concept, so the standardization of measurement, application in the PJOK curriculum, and equitable implementation are still not optimal (Sativa & Pramudinta, 2025). This condition is accompanied by concerns regarding the physical fitness of school-age children in Indonesia, where many children have not reached an adequate level of fitness (Ridha et al., 2025). In addition, international research has reported differences in physical literacy and physical fitness between male and female students, particularly in aspects of physical competence, motivation, and participation in physical activity (Chaeroni et al., 2024; Anggraini et al., 2025). However, similar evidence among elementary school students in Indonesia remains limited. Most Indonesian studies have focused on the relationship between physical literacy and physical activity or physical fitness, whereas studies that simultaneously compare physical literacy and physical fitness based on gender among Phase C elementary school students remain limited.

Some previous studies have focused on the relationship between physical literacy and physical fitness or on comparisons of fitness levels based on regional characteristics. Research by Pazrudin et al. (2024), shows that there are differences in physical fitness levels between elementary school students in rural and urban areas, while Fatimah (2024), found a positive relationship between physical literacy and physical fitness in secondary school students. Other research has also shown that physical literacy and fitness are associated with PJOK learning outcomes, but these outcomes may be influenced by various factors, such as gender, physical activity, and environment (Prasetyo & Hidayat, 2021). Thus, a research gap remains regarding gender-based comparisons of physical literacy and physical fitness among Phase C elementary school students in Indonesia. In contrast to previous research, this study does not examine the statistical relationship between physical literacy and physical fitness; rather, it compares both variables simultaneously according to gender. The study uses the PL-C Quest instrument to measure physical literacy and

the Indonesian Student Fitness Test (TKSI) to measure physical fitness, thereby providing a comparative description of two distinct but educationally relevant constructs.

This research is important because information about differences in physical literacy and physical fitness based on gender can be the basis for the preparation of a PJOK learning program that is more effective, inclusive, and in accordance with the characteristics of students. Based on these gaps, this study aims to analyze the difference in physical literacy and physical fitness levels between male and female Phase C students at SDN Melong Mandiri 1. The contribution of this research lies in presenting a comprehensive picture of these two aspects through a gender-based comparative approach using the PL-C Quest instrument to measure physical literacy and the Indonesian Student Fitness Test (TKSI) to measure physical fitness. The results of the research are expected to enrich the study of physical literacy in the context of basic education in Indonesia as well as become a reference for PJOK teachers in designing more effective, inclusive, and in accordance with the characteristics of students.

METHODS

This study employed a quantitative comparative cross-sectional design to compare physical literacy and physical fitness between male and female Phase C students at SDN Melong Mandiri 1. The cross-sectional approach was selected because all data were collected during one observation period, making it appropriate for describing differences between groups without examining changes over time (Sofya et al., 2024). The quantitative approach was used because the data were numerical and analyzed statistically to objectively test differences between groups (Sugiyono, 2017). The comparative approach was used because the study did not provide treatment to participants but described and compared existing conditions between male and female students (Pradana, 2015).

The research was carried out at SDN Melong Mandiri 1, Cimahi City. The selection of the location was based on the characteristics of the school that has an adequate number of Phase C students, facilities that support the implementation of the Indonesian Student Fitness Test (TKSI), and the school's support for the implementation of the research. The subjects of the study were students in grades V

and VI who were in the age range of 10–12 years, which is an important developmental phase in the formation of physical literacy and physical fitness (Longmuir et al., 2015). The research will be carried out in the 2025/2026 school year.

The research population consisted of all students in grades V and VI of SDN Melong Mandiri 1, totaling 213 students, comprising 105 male students and 108 female students. The study used a total sampling technique, so all members of the population were included as research participants. However, for the physical literacy analysis, 10 respondents were excluded because their PL-C Quest questionnaires were incomplete. Consequently, 203 complete questionnaire records were analyzed for the physical literacy variable, consisting of 99 male students and 104 female students. The 10 incomplete questionnaire records were not included in the physical literacy analysis, whereas all 213 students remained included in the physical fitness analysis using TKSI. This procedure was applied to ensure that the physical literacy analysis was based only on complete questionnaire data (Purwanza, 2020).

Physical literacy was measured using the Physical Literacy in Children Questionnaire (PL-C Quest). Sport Australia (2020) developed the Physical Literacy in Children Questionnaire to measure children's physical literacy. The instrument has demonstrated validity for measuring physical literacy among children aged 4–12 years (Diao et al., 2024). It has also been adapted and validated for use among elementary school students in Indonesia, with all 30 items demonstrating acceptable validity, with item-total correlation coefficients ranging from 0.226 to 0.677 ($r > 0.207$; $p < 0.05$), and good internal consistency reliability (Cronbach's $\alpha = 0.847$) (Lubay et al., 2025).

The instrument measures four main dimensions, namely motivation and confidence, knowledge and understanding, physical activity behavior, and perception of physical competence. The questionnaire uses a four-level Likert scale with scores ranging from 1 to 4, with higher scores indicating a higher level of physical literacy. Before completing the questionnaire, the researcher explained the procedures and provided an example of how to complete the items so that respondents understood the questions. The source information available in this

study does not provide the total number of questionnaire items or separate score ranges for each dimension; therefore, these details are not specified further. Physical fitness was measured using the Indonesian Student Fitness Test (TKSI), which is recommended by the Ministry of Education, Culture, Research, and Technology as a standard instrument for measuring the physical fitness of Indonesian students (Ministry of Education and Culture, 2023 in Risaldi et al., 2023). TKSI includes measurements related to cardiorespiratory endurance, muscle strength and endurance, agility, and coordination and balance. The data used in this study consisted of the total TKSI scores obtained by the students.

Data collection was carried out through the distribution of the PL-C Quest questionnaire to obtain physical literacy data and the implementation of TKSI directly in the field according to testing procedures. All measurements were carried out systematically with the assistance of researchers to ensure uniformity of procedures and minimize errors during the data collection process (Nashrullah et al., 2023).

Data were analyzed using IBM SPSS Statistics version 25. Descriptive statistics included the mean, standard deviation, minimum, and maximum values. The normality of the data was assessed using the Shapiro–Wilk test, while homogeneity of variance was assessed using Levene's test. The Independent Samples t-test was used when the data met the assumptions of normality and homogeneity of variance. When the normality assumption was not met, the Mann–Whitney U test was used. All statistical tests were conducted at a significance level of 0.05 (Fathoni, 2023). In addition to p-values, effect sizes were reported to provide information about the magnitude of the observed differences. For the physical literacy comparison, Cohen's d was calculated from the group means and pooled standard deviation.

RESULTS

The results and discussion presented the results of the research based on the analysis of physical literacy and physical fitness data of students in phase C. Then, the results were devoted to answering the formulation of the research problem and explaining the relationship between the research findings and the theory of physical literacy and the findings of previous research, so that the results of the research could be used to improve the quality of education.

The results of the physical literacy analysis showed that the overall mean score was 96.46 with a standard deviation of 9.45. The scores ranged from 71 to 117 among 203 students. By gender, male students obtained a mean score of 97.71 with a standard deviation of 10.02, whereas female students obtained a mean score of 95.28 with a standard deviation of 8.77. Descriptively, male students had a higher physical literacy score than female students, with a mean difference of 2.43 points. However, whether this descriptive difference was statistically significant was determined through hypothesis testing.

Table 1. Descriptive statistics of physical literacy by gender

Gender	N	Mean	Std. Deviation	Minimum	Maximum
Male	99	97,71	10,02	71	117
Female	104	95,28	8,77	71	114
Total	203	96,46	9,45	71	117

The results of the normality test showed that the physical literacy data in both groups were distributed normally, so the data met the assumption to carry out the Independent Samples t-test. with a Shapiro-Wilk significance value of 0.218 in male students and 0.284 in female students. The homogeneity test also showed homogeneous variance with a Levene significance value of 0.164.

Table 2. Results of the normality and homogeneity test of physical literacy

Gender	Shapiro-Wilk Sig.	Remarks
Male	0,218	Normal

Female	0,284	Normal
Levene	0,164	Homogeneous

The results of the Independent Samples t-test showed $t = 1.840$, $df = 201$, and $p = 0.067$, with a mean difference of 2.428 points between male and female students. The 95% confidence interval for the mean difference ranged from -0.17 to 5.03. The standardized effect size was small (Cohen's $d = 0.26$). Because the p-value was greater than 0.05 and the confidence interval included zero, there was no statistically significant difference in physical literacy between male and female students. Thus, although male students had a higher descriptive mean, the magnitude of the observed difference was relatively small.

Table 3. Independent physical literacy t-test results

Test	t	df	Sig. (2-tailed)	Mean Difference
Independent Samples t-test	1,840	201	0,067	2,428

Descriptive analysis of physical fitness using TKSI showed that the overall mean score was 18.13 with a standard deviation of 2.58. The scores ranged from 11 to 24 among 213 students. Male students had a mean score of 19.26 with a standard deviation of 2.30, whereas female students had a mean score of 17.04 with a standard deviation of 2.36. Thus, male students had a descriptive advantage of 2.22 points over female students in physical fitness.

Table 4. Descriptive statistics of physical fitness (TKSI) by gender

Gender	N	Mean	Std. Deviation	Minimum	Maximum
Male	105	19,26	2,30	13	24
Female	108	17,04	2,36	11	21
Total	213	18,13	2,58	11	24

The results of the normality test on the physical fitness variable showed that the data was not normally distributed. The Shapiro-Wilk significance value in the male group was 0.000 and in the female group was 0.002, both smaller than 0.05. Therefore, the difference analysis was performed using the Mann-Whitney U nonparametric test.

Table 5. Results of the Physical Fitness Normality Test (TKSI)

Gender	Shapiro-Wilk Sig.	Remarks
Male	0,000	Abnormal
Female	0,002	Abnormal

The Mann-Whitney U test showed $U = 2715.500$, $Z = -6.626$, and $p < 0.001$. The mean rank was 135.14 for male students and 79.64 for female students. The corresponding effect size was $r = 0.45$, indicating a moderate difference in the rank distributions between the two groups. Therefore, there was a statistically significant difference in physical fitness between male and female students, with male students showing higher physical fitness scores in the study sample.

Table 6. Results of the Mann-Whitney U physical fitness test (TKSI)

Test	U	Z	Sig. (2-tailed)	Male rank Mean	female rank Mean
Mann-Whitney U	2715,500	-6,626	0,000	135,14	79,64

DISCUSSION

The findings reveal two different gender patterns. Physical literacy did not differ significantly between male and female students ($p = 0.067$), whereas physical fitness measured by TKSI differed significantly ($p < 0.001$). This pattern should not be interpreted as evidence that physical literacy and physical fitness are statistically unrelated because the present study did not test their correlation. Rather, the findings indicate that gender-based differences were more pronounced for physical fitness than for the broader construct of physical literacy.

The absence of a significant difference in physical literacy can be understood from the multidimensional nature of the construct. Physical literacy includes physical competence as well as motivation, confidence, knowledge, understanding, and behavioral dimensions (Ridha et al., 2025). Therefore, a student may have a lower physical fitness score while still demonstrating favorable motivation, confidence, knowledge, or movement-related experiences that contribute to overall physical literacy. These findings are also supported by (Aziz and Nur 2024), which showed that learning experiences, physical activities, and PJOK learning contribute to the development of physical literacy among elementary school students beyond physical performance.

The physical literacy result ($p = 0.067$) indicates that the observed difference of approximately 2.43 points between male and female students was not statistically significant. The small effect size (Cohen's $d = 0.26$) further indicates that the magnitude of the observed gender difference was relatively modest. This finding is consistent with the holistic perspective described by Chaeroni et al. (2024), which emphasizes that physical literacy develops through interactions among multiple developmental domains and learning experiences. The similarity of learning opportunities, PJOK instruction, and access to school-based physical activities may have contributed to comparable physical literacy levels between the two groups. However, these factors were not directly measured in the present study and should therefore be regarded only as possible explanations.

The findings are also in line with research (Longmuir et al., 2015), which emphasizes the importance of learning experiences, motivation to participate, and opportunities to participate in physical activity in the development of physical literacy. In addition, (Metri et al. 2023) state that physical literacy is a multidimensional construct involving affective, cognitive, and behavioral aspects. These perspectives help explain why a gender difference in a performance-oriented measure such as TKSI does not necessarily result in a corresponding difference in overall physical literacy.

In contrast to physical literacy, physical fitness showed a statistically significant difference between male and female students ($p < 0.001$). Male students obtained a higher mean score (19.26) than female students (17.04), and the Mann–

Whitney U analysis produced a moderate effect size ($r = 0.45$). This indicates that the observed difference was not only statistically significant but also represented a meaningful difference in the distribution of physical fitness scores between the two groups. This finding is in line with research conducted by Pazrudin et al., (2024), which found that male students had higher physical fitness than female students. The finding is also consistent with (Anggraini et al., 2025), which discusses differences associated with biological factors, physical-activity intensity, and exercise frequency.

Physiological characteristics may provide one possible explanation for the observed difference in physical fitness. Male students of primary school age may have greater muscle mass and strength and may participate more frequently in moderate- to high-intensity physical activity than female students (Mijalković et al., 2026). Such factors can influence performance on physical fitness components involving endurance, strength, agility, and coordination. Nevertheless, the present study did not directly measure biological maturation, muscle mass, physical-activity intensity, or exercise frequency. Therefore, these factors should be interpreted as plausible explanations rather than established causes of the gender difference observed in TKSI scores.

The contrast between the physical literacy and physical fitness findings is theoretically important. PLC-Quest captures a broader profile of how children understand, value, experience, and engage with movement, whereas TKSI is more directly oriented toward measurable physical performance. Consequently, a statistically significant difference in physical fitness can occur alongside a small and statistically nonsignificant difference in overall physical literacy. The findings therefore support the interpretation that physical literacy and physical fitness are distinct constructs that should not be treated as interchangeable indicators.

From a pedagogical perspective, the findings suggest that PJOK instruction should not focus exclusively on improving physical fitness scores. Learning activities should also provide opportunities for students to develop motivation, confidence, knowledge, understanding, and positive movement experiences. Physical fitness remains important, particularly because the present study identified a substantial gender difference in TKSI performance, but fitness-oriented activities should be

integrated into inclusive learning experiences that allow both male and female students to participate meaningfully. Research conducted (Darmawan, 2017) affirmed that children can recognize their strengths and weaknesses in a free but guided environment, which can help teachers support their development effectively and efficiently. Thus, the practical implication of this study is not to attribute fitness differences solely to gender, but to encourage teachers to design learning that responds to students' different needs while maintaining equitable learning opportunities.

CONCLUSION

This study found no significant difference in physical literacy between male and female Phase C students at SDN Melong Mandiri 1 ($p = 0.067$). Although male students had a higher descriptive mean score (97.71) than female students (95.28), the effect size was small (Cohen's $d = 0.26$). In contrast, physical fitness measured using TKSI differed significantly between male and female students ($p < 0.001$), with male students obtaining a higher mean score (19.26) than female students (17.04) and a moderate effect size ($r = 0.45$). These findings indicate that gender differences in physical fitness were more pronounced than differences in overall physical literacy in this sample. Because the study did not directly test the statistical relationship between PLC-Quest and TKSI scores, no conclusion regarding their correlation or causal relationship can be drawn. PJOK teachers are encouraged to balance the development of physical fitness with learning experiences that strengthen the broader dimensions of physical literacy for both male and female students. Future research should involve larger and more diverse samples and consider additional variables, such as nutritional status, physical-activity patterns, biological maturation, and extracurricular participation, to provide a more comprehensive explanation of differences in physical literacy and physical fitness.

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