



Physical literacy profiles of elementary school students by gender

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Abstract: Physical literacy is an essential outcome of physical education and plays an important role in promoting lifelong engagement in physical activity. This study aimed to describe the physical literacy profiles of elementary school students based on gender. A descriptive quantitative survey was conducted involving 82 students from SDN Cimahi Mandiri 5, consisting of 45 boys and 37 girls. Data were collected using the Physical Literacy in Children Questionnaire (PL-C Quest), which assesses four domains: physical, psychological, social, and cognitive. Data were analyzed using descriptive statistics, including mean, standard deviation, minimum and maximum scores, percentages, and norm-referenced categorization. The results showed that boys demonstrated a higher overall physical literacy score ($M = 91.16$) than girls ($M = 84.95$). Overall, most students were categorized at the medium level (41.5%). Across all participants, the social domain obtained the highest mean score (3.02), followed by the physical (3.01), psychological (2.92), and cognitive (2.82) domains. Boys showed higher mean scores in the physical, social, and cognitive domains, whereas girls demonstrated slightly higher scores in the psychological domain. These findings indicate that differences in physical literacy profiles were observed between boys and girls across several domains. The results provide baseline information for designing more adaptive and inclusive physical education programs that accommodate students' characteristics and support the development of physical literacy in elementary schools.

Keywords: Physical literacy; Gender differences; Elementary school students; Physical education; PL-C Quest.

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INTRODUCTION

Physical literacy has become one of the central concepts in contemporary physical education, public health, and sport sciences because it provides the foundation for lifelong participation in physical activity. Rather than focusing solely on motor competence, physical literacy encompasses the integration of physical competence, motivation, confidence, knowledge, and understanding that enables individuals to value and take responsibility for engaging in physical activity throughout their lives. Whitehead conceptualized physical literacy as a holistic lifelong journey in which physical, cognitive, affective, and social dimensions interact to support meaningful movement experiences (Whitehead, 2001). Building upon this perspective, (Durden-myers & Keegan, 2019; Shearer et al., 2018) argued that physically literate individuals are more likely to maintain active lifestyles because they possess not only movement competence but also the motivation and confidence required to participate regularly in physical activity. Furthermore, (Cornish et al., 2020) emphasized that physical literacy should be viewed as a multidimensional construct that integrates physical, psychological, cognitive, and social domains rather than as a measure of physical performance alone.

The development of physical literacy during childhood is widely recognized as a critical foundation for healthy growth, lifelong physical activity participation, and overall well-being. Elementary school represents a particularly important period because children experience rapid development in motor competence, cognitive abilities, social skills, and emotional regulation. During this stage, meaningful movement experiences can positively shape children's confidence, motivation, and attitudes toward physical activity, thereby influencing their future engagement in active lifestyles. In support of this finding, (Weir et al., 2024) reported that positive movement experiences during childhood contribute to improvements in motor competence, self-confidence, and sustained participation in physical activity. Similarly, (Cornish et al., 2020) highlighted that higher levels of physical literacy are associated with better physical fitness, psychosocial well-being, and healthier lifestyle behaviors. Consequently, promoting physical literacy in elementary school should be regarded as a fundamental objective of physical education, as it supports children's holistic development across physical, psychological, cognitive, and social dimensions.

In Indonesia, research on physical literacy has gradually gained attention over the past few years, particularly in the fields of physical education and child development. Previous studies have primarily focused on the adaptation and validation of physical literacy assessment instruments as well as the implementation of instructional approaches designed to enhance students' physical literacy. For example, (Friskawati & Stephani, 2021) reported that research on physical literacy in Indonesia has predominantly emphasized instrument development and learning innovation. More recently, (Nur et al., 2025) successfully adapted and validated the Indonesian version of the Physical Literacy in Children Questionnaire (PL-C Quest) using Rasch model analysis, providing a valid and reliable instrument for assessing physical literacy among elementary school students. In addition, (Nuraryati, 2025) highlighted that declining levels of physical activity and increasing sedentary behavior among Indonesian children have become important challenges for developing physical literacy in elementary school settings. Collectively, these studies have advanced the development of physical literacy research in Indonesia and established a methodological foundation for future investigations involving elementary school students.

Despite these important advances, several important knowledge gaps remain. First, existing studies in Indonesia have largely concentrated on instrument development and instructional interventions, while descriptive evidence regarding the physical literacy profiles of elementary school students remains limited. Second, although systematic reviews have demonstrated that boys and girls may differ across several domains of physical literacy, most of this evidence has been derived from Western countries, making its applicability to Indonesian elementary school settings uncertain (Chaeroni et al., 2024). Furthermore, although the Indonesian version of the Physical Literacy in Children Questionnaire (PL-C Quest) has been shown to be a valid and reliable assessment instrument (Nur et al., 2025), empirical studies utilizing this instrument to describe gender-based physical literacy profiles are still scarce. Consequently, physical education teachers and schools have limited baseline evidence to support the design of learning experiences that accommodate students' diverse developmental characteristics. Addressing these gaps is therefore important for providing context-specific evidence that can support the development of more adaptive and inclusive physical education practices in Indonesian elementary schools.

To address these research gaps, the present study provides a comprehensive description of physical literacy profiles among Indonesian elementary school students based on gender

using the validated Indonesian version of the Physical Literacy in Children Questionnaire (PL-C Quest). Rather than focusing on instrument development or evaluating the effectiveness of instructional interventions, this study examines physical literacy across its physical, psychological, social, and cognitive domains to generate a more comprehensive understanding of students' characteristics. By providing context-specific baseline evidence, the findings are expected to enrich the current body of knowledge on physical literacy in Indonesia while offering practical information that may assist physical education teachers in designing learning experiences that are more responsive to the diverse needs of boys and girls in elementary school settings.

Therefore, this study aimed to describe the physical literacy profiles of Indonesian elementary school students based on gender using the validated Indonesian version of the Physical Literacy in Children Questionnaire (PL-C Quest). Specifically, the study provides descriptive evidence of students' overall physical literacy as well as profiles across the physical, psychological, social, and cognitive domains. The findings are expected to contribute baseline information for future physical literacy research and support the development of more adaptive, inclusive, and evidence-informed physical education practices in Indonesian elementary schools.

MATERIAL AND METHODS

Participants

This study employed a descriptive quantitative survey design to describe the physical literacy profiles of elementary school students based on gender. The study was conducted at SDN Cimahi Mandiri 5, Cimahi City, Indonesia, from 5 to 7 May 2026. The target population consisted of 87 Grade 3 elementary school students aged 8–9 years, comprising 48 boys and 39 girls. A total sampling technique was employed because the target population was relatively small and all students who met the eligibility criteria were invited to participate, thereby maximizing population coverage and minimizing sampling bias. During the data collection period, five students (three boys and two girls) were absent from school and therefore did not participate in the study. Consequently, the final sample consisted of 82 students, including 45 boys (54.9%) and 37 girls (45.1%).

Participants were eligible for inclusion if they (1) were officially enrolled as active Grade 3 students at SDN Cimahi Mandiri 5, (2) regularly attended physical education classes, and (3) were able to complete the questionnaire independently or with minimal guidance from the researcher when clarification was required. Students who submitted incomplete questionnaires were excluded from the final analysis.

SDN Cimahi Mandiri 5 was selected purposively because it provided adequate access for conducting the research, had established collaboration with the research team, represented the characteristics of public elementary schools in Cimahi City, and enrolled students whose demographic characteristics were consistent with the objectives of this study. The selection of Grade 3 students was also considered appropriate because children aged 8–9 years are at an important stage of motor, cognitive, social, and emotional development, making this period particularly relevant for examining physical literacy profiles.

Instrument

The present study employed the Indonesian version of the Physical Literacy in Children Questionnaire (PL-C Quest) developed by (Barnett et al., 2023) and culturally adapted for Indonesian elementary school students by Nur et al. (2025). The instrument was selected because it provides a comprehensive self-report assessment of children's physical literacy across multiple dimensions and has demonstrated satisfactory psychometric properties in the Indonesian context.

The PL-C Quest consists of 30 questionnaire items distributed across four domains: Physical (12 items), Psychological (7 items), Social (4 items), and Cognitive (7 items). These domains collectively assess children's movement competence, motivation and confidence, social interaction related to movement, and knowledge and understanding of physical activity. Responses were recorded using the original PL-C Quest response format, with positively and negatively worded items scored according to the instrument guidelines. Item scores were summed and averaged before being converted into five physical literacy categories: Very High, High, Medium, Low, and Very Low, following the scoring procedures established in the Indonesian adaptation.

The Indonesian adaptation of the PL-C Quest has previously undergone psychometric evaluation using Rasch model analysis, demonstrating satisfactory measurement properties. All 30 items met the Rasch model fit criteria and were retained as valid measurement items. The instrument also demonstrated excellent internal consistency (Cronbach's $\alpha = 0.92$), high

person reliability (0.84), excellent item reliability (0.96), and a person separation index of 3.31, indicating that the questionnaire is capable of distinguishing different levels of physical literacy among elementary school students (Nur et al., 2025).

Because the present study adopted the validated Indonesian version of the PL-C Quest without modification, no additional validity or reliability testing was performed. The instrument was administered in its original adapted form to maintain consistency with the established psychometric characteristics reported by (Nur et al., 2025).

Data Collection Procedure

Data collection was conducted from 5 to 7 May 2026 at SDN Cimahi Mandiri 5 during regular school hours after obtaining permission from the school administration. Before the questionnaire administration, the researcher explained the purpose of the study, introduced the Physical Literacy in Children Questionnaire (PL-C Quest), and provided standardized instructions on how to complete the questionnaire. Because the participants were Grade 3 elementary school students aged 8–9 years, special attention was given to ensuring that every participant fully understood each questionnaire item before responding.

The questionnaire was administered in the students' classrooms under the supervision of the researcher, the physical education teacher, and the classroom teacher. To minimize potential misunderstanding arising from differences in reading comprehension, each questionnaire item was read aloud by the researcher using standardized wording. Participants were given sufficient time to consider each statement and record their responses independently. Whenever students requested clarification regarding the meaning of a particular item, the researcher and accompanying teachers provided explanations solely to improve comprehension without suggesting or influencing any specific response.

The completion of the PL-C Quest required approximately 20–30 minutes for each class. Immediately after the questionnaires were collected, the researcher carefully examined each response sheet to ensure completeness and consistency. Questionnaires containing incomplete responses were excluded from the analysis according to the predetermined exclusion criteria. Subsequently, all eligible questionnaires were coded and entered into the statistical database for further analysis.

Statistical Analysis

Data were analyzed using Microsoft Excel (Microsoft Corporation, Redmond, WA, USA). Descriptive statistical analysis was employed because the primary objective of the study was

to describe the physical literacy profiles of elementary school students based on gender rather than to examine causal relationships or test statistical differences between groups.

Descriptive statistics, including frequency distributions, percentages, means, and standard deviations, were calculated to summarize students' overall physical literacy scores as well as scores for each physical literacy domain (physical, psychological, social, and cognitive). The analysis was performed separately for boys and girls to provide a comprehensive description of gender-based physical literacy profiles.

To facilitate score interpretation, students' physical literacy scores were classified into five categories using a norm-referenced categorization approach based on the sample mean (M) and standard deviation (SD). The classification criteria were adapted from the *Penilaian Acuan Norma (PAN)* approach, with category thresholds determined as follows:

Table 1. *Penilaian Acuan Norma* Formula

Category	Formula
Very High	$X \geq M + 1.5 \text{ SD}$
High	$M + 0.5 \text{ SD} < X \leq M + 1.5 \text{ SD}$
Medium	$M - 0.5 \text{ SD} \leq X \leq M + 0.5 \text{ SD}$
Low	$M - 1.5 \text{ SD} \leq X < M - 0.5 \text{ SD}$
Very Low	$X < M - 1.5 \text{ SD}$

Because this study was designed as a descriptive quantitative survey, no inferential statistical analyses or assumption tests were performed. The findings are therefore presented as descriptive summaries intended to characterize students' physical literacy profiles across gender and physical literacy domains.

Ethics Committee

Ethical Considerations

Prior to data collection, permission to conduct the study was obtained from the principal of SDN Cimahi Mandiri 5. In addition, verbal parental consent was obtained through the school before students participated in the study. Participation was entirely voluntary, and all students were informed that they could decline to answer any question or withdraw from the study at any time without any academic consequences. However, all eligible students agreed voluntarily to participate. To ensure participants' comfort and well-being throughout the data collection process, the questionnaire was administered in the presence of the researcher, the physical

education teacher, and the classroom teacher. Because the participants were Grade 3 elementary school students, assistance was provided only to clarify the meaning of questionnaire items without directing or influencing students' responses. Participants' names were recorded on the questionnaires solely for administrative purposes during data collection. All personal information was treated confidentially, removed from the research database before analysis, and was not reported in any research outputs or publications. The collected data were used exclusively for academic research purposes and were stored securely to protect participants' privacy.

RESULTS

Overall Physical Literacy Profile

To provide an overview of students' physical literacy, descriptive statistics were calculated for the total sample and by gender. The results are presented in Table 2.

Table 2. Descriptive Statistics of Overall Physical Literacy Scores by Gender

Statistics	Male	Female	Overall
Sum	4102	3143	7245
Mean	91,16	84,95	88,35
Standard deviation	12,23	12,49	12,66
Maximum value	118	111	118
Minimum score	71	50	50

Table 2 presents the descriptive statistics of the overall physical literacy scores for boys, girls, and the total sample. Overall, boys obtained a higher mean physical literacy score ($M = 91.16$, $SD = 12.23$) than girls ($M = 84.95$, $SD = 12.49$). Across all participants, the overall mean score was 88.35 ($SD = 12.66$). The highest physical literacy score recorded in the study was 118, whereas the lowest score was 50. These descriptive findings indicate that boys tended to report higher overall physical literacy scores than girls within the study sample. A more detailed interpretation of students' physical literacy levels is presented through the norm-referenced categorization in the following section.

Distribution of Physical Literacy Categories

To facilitate the interpretation of students' physical literacy scores, the overall scores were classified into five categories using the norm-referenced classification criteria presented in Table 3.

Table 3. Classification Criteria for Physical Literacy Scores

Score Range	Category
≥ 107	Very High
95 - 106	High
82 - 94	Medium
69 - 81	Low
≤ 68	Very Low

The distribution of students across the five physical literacy categories is presented in Table 4

Table 4. Distribution of Physical Literacy Categories by Gender

Category	Absolute			Relative (%)		
	Male	Female	Overall	Male	Female	Overall
Very High	6	1	7	13,3%	2,7%	8,5%
High	11	6	17	24,4%	16,2%	20,7%
Medium	16	18	34	35,6%	48,6%	41,5%
Low	12	9	21	26,7%	24,3%	25,6%
Very Low	0	3	3	0,0%	8,1%	3,7%
Total	45	37	82	100%	100%	100%

Overall, most students were classified in the Medium category (34 students; 41.5%), followed by the Low category (21 students; 25.6%) and the High category (17 students; 20.7%). Smaller proportions of students were categorized as Very High (7 students; 8.5%) and Very Low (3 students; 3.7%). When examined by gender, boys were more frequently represented in the Very High and High categories, whereas girls were more frequently represented in the Medium and Very Low categories. Specifically, six boys (13.3%) were classified as Very High, compared with one girl (2.7%). Conversely, three girls (8.1%) were classified as Very Low, whereas no boys were included in this category.

Physical Literacy Profile Across Domains

To provide a more detailed description of students' physical literacy, descriptive statistics were calculated for each physical literacy domain. The results are presented in Table 5.

Table 5. Descriptive Statistics of Physical Literacy Domains

Domain	Mean	SD
Physical	3,01	0,286
Psychological	2,92	0,39
Social	3,02	0,523
Cognitive	2,82	0,367

Table 5 summarizes the descriptive statistics for the four physical literacy domains. Among the domains, the Social domain recorded the highest mean score ($M = 3.02$, $SD = 0.52$), followed closely by the Physical domain ($M = 3.01$, $SD = 0.29$). The Psychological domain showed a mean score of 2.92 ($SD = 0.39$), whereas the Cognitive domain had the lowest mean score ($M = 2.82$, $SD = 0.37$).

Overall, the descriptive statistics indicate slight variation in the average scores across the four domains, with the Social and Physical domains demonstrating marginally higher mean scores than the Psychological and Cognitive domains. To further illustrate gender-based patterns across these domains, the mean scores for boys and girls are presented in Figure 1.

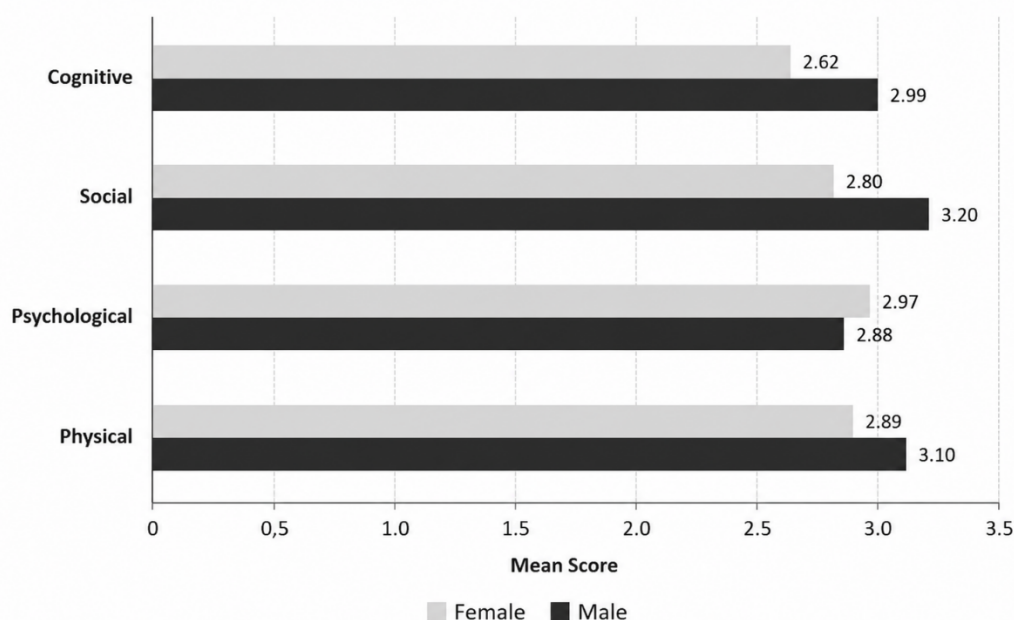


Figure 1. Mean Physical literacy score across four domains by gender

Figure 1 illustrates the mean physical literacy scores of boys and girls across the four physical literacy domains. Boys demonstrated higher mean scores than girls in the Physical (3.10 vs. 2.89), Social (3.20 vs. 2.80), and Cognitive (2.99 vs. 2.62) domains. In contrast, girls obtained a slightly higher mean score than boys in the Psychological domain (2.97 vs. 2.88). The largest difference between boys and girls was observed in the Cognitive domain, whereas the smallest difference occurred in the Psychological domain.

Discussion

The present study provides important insights into the physical literacy profiles of Indonesian elementary school students using the Physical Literacy in Children Questionnaire

(PL-C Quest). Overall, most students demonstrated a moderate level of physical literacy, with noticeable variations across gender and the four assessed domains. Boys generally achieved higher overall physical literacy scores than girls, whereas girls demonstrated slightly higher scores in the psychological domain. In addition, the social domain recorded the highest average score, while the cognitive domain showed the lowest average score. These findings should be interpreted within the contemporary understanding of physical literacy as a holistic and multidimensional construct encompassing physical, psychological, social, and cognitive dimensions rather than physical competence alone (Bailey, 2020). Likewise, (Rudd et al., 2020) emphasized that physical literacy develops through continuous interaction between the individual and meaningful movement experiences, whereas (Carl et al., 2023) highlighted that physical literacy has become a central objective of physical education and health promotion worldwide. Consequently, the present findings provide valuable evidence for understanding children's physical literacy within the Indonesian elementary school context and contribute to the growing international literature advocating holistic approaches to physical literacy development.

The predominance of students within the moderate physical literacy category suggests that the participants have established a foundation for lifelong engagement in physical activity while still possessing substantial potential for further development. Rather than indicating inadequate development, a moderate level of physical literacy may represent a transitional stage in children's physical literacy journey, which continues to evolve through participation in physical education, active play, and meaningful movement experiences. This interpretation aligns with the ecological perspective proposed by (Rudd et al., 2020), who described physical literacy as a lifelong process of enrichment shaped by continuous interactions between individuals and their environments.

Similar patterns have been reported internationally. Consistent with this perspective (Brown et al., 2020) demonstrated that children's physical literacy profiles vary according to their movement experiences and participation in physical activity rather than reflecting uniformly high competence across all domains. Likewise, (Shearer et al., 2021) concluded that physical literacy should always be interpreted holistically because the physical, psychological, social, and cognitive domains are closely interconnected. Supporting this perspective, (Barnett et al., 2023) emphasized that valid physical literacy assessment should capture these multiple dimensions simultaneously, while (Jean de Dieu & Zhou, 2021) highlighted the importance of

multidimensional assessment for accurately describing children's physical literacy development.

The present findings also correspond with recent evidence from Indonesia. More recently (Nur et al., 2025) reported that Indonesian elementary school students generally exhibited physical literacy levels ranging from low to high, with the largest proportion of students classified in the high and medium categories, suggesting considerable variability among primary school children and reinforcing the importance of early assessment to identify individual developmental needs. Furthermore, (Weir et al., 2024) argued that promoting physical literacy during childhood provides a critical foundation for lifelong physical activity participation, health, and well-being, emphasizing that educational interventions should foster not only physical competence but also confidence, motivation, knowledge, and positive movement experiences. Therefore, the predominance of students in the moderate category should not be viewed as a limitation; rather, it indicates substantial opportunities for schools and physical education teachers to strengthen children's physical literacy through developmentally appropriate, enjoyable, and inclusive learning experiences.

The present study identified distinct gender-related physical literacy profiles among Indonesian elementary school students. Although boys demonstrated higher overall physical literacy scores, girls showed slightly stronger performance in the psychological domain, indicating that physical literacy develops differently across domains rather than uniformly between genders. This multidimensional pattern is consistent with the systematic review and meta-analysis conducted by (Chaeroni et al., 2024), which concluded that boys generally demonstrate higher levels of physical competence, whereas girls tend to perform better in affective dimensions such as motivation and confidence. These findings reinforce the view that gender-related differences in physical literacy reflect variations in developmental experiences across specific domains rather than overall superiority of one gender over another.

Similar patterns have been reported in previous international studies. Similarly, (Dania et al., 2020) observed that boys generally achieved higher physical competence scores, while girls demonstrated comparable or stronger outcomes in motivational dimensions depending on the assessment framework. Likewise, (Brown et al., 2020) emphasized that children's physical literacy profiles are strongly influenced by differences in movement experiences, opportunities for participation, and engagement in physical activity rather than biological characteristics alone. From the perspective of ecological dynamics, (Rudd et al., 2020) argued that physical

literacy evolves through continuous interactions between individuals and their physical and social environments, suggesting that differences in learning experiences may contribute to the distinct profiles observed between boys and girls.

These findings have important implications for physical education practice. Instead of designing learning experiences based on assumptions of gender superiority, physical education programs should recognize the diverse developmental characteristics of each child and provide inclusive, meaningful, and developmentally appropriate movement experiences that support all dimensions of physical literacy. Such an approach is consistent with contemporary perspectives that position physical literacy as a holistic educational outcome aimed at fostering lifelong engagement in physical activity (Carl et al., 2022; Weir et al., 2024).

An important finding of the present study is the variation observed across the four physical literacy domains. The social domain achieved the highest mean score, whereas the cognitive domain recorded the lowest. These findings suggest that children's physical literacy does not develop uniformly across domains but rather reflects differences in learning experiences, environmental opportunities, and educational practices. As highlighted by (Shearer et al., 2021), physical literacy is a multidimensional construct in which physical, psychological, social, and cognitive domains interact dynamically throughout children's development. Similarly, (Rudd et al., 2020) emphasized that each domain contributes uniquely to children's overall physical literacy and should therefore be interpreted collectively rather than independently.

The relatively high score observed in the social domain may be associated with the collaborative nature of children's daily learning experiences, particularly within physical education and school-based activities that encourage communication, cooperation, and peer interaction. Likewise, (Bailey, 2020; Rudd et al., 2020) argued that meaningful movement experiences occurring within supportive social environments facilitate the development of interpersonal relationships and strengthen children's confidence to participate in physical activity.

Conversely, the cognitive domain showed the lowest average score, indicating that children's knowledge and understanding related to physical activity may require further development. This finding should not be interpreted as a weakness but rather as an indication that cognitive aspects of physical literacy often receive less explicit attention during physical education than movement participation itself. Furthermore, (Carl et al., 2022) reported that

many physical literacy interventions continue to prioritize physical competence while placing relatively less emphasis on knowledge and understanding. Consistent with this perspective, (Weir et al., 2024) emphasized that effective physical literacy development requires balanced attention to all domains, including children's understanding of the value, purpose, and lifelong benefits of physical activity.

CONCLUSION

This study provides a comprehensive description of the physical literacy profiles of Indonesian elementary school students using the Physical Literacy in Children Questionnaire (PL-C Quest). Furthermore, the results revealed variation across the four physical literacy domains, with the social domain recording the highest average score and the cognitive domain the lowest. These findings reinforce the importance of understanding physical literacy as a holistic construct encompassing physical, psychological, social, and cognitive dimensions. The findings have important implications for physical education in elementary schools. Teachers and schools should adopt learning approaches that promote balanced development across all domains of physical literacy through meaningful, enjoyable, and inclusive movement experiences. Early assessment of physical literacy may also assist educators in identifying students' strengths and developmental needs, thereby supporting more targeted educational interventions. Future research is recommended to involve larger and more diverse samples from different regions of Indonesia, employ longitudinal or intervention-based designs, and further examine factors influencing children's physical literacy development, including school environments, family support, and participation in physical activity.

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