

Exploring physical literacy, physical activity, motivation, and learning outcomes in elementary school physical education

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Received 30 June 2024; Accepted 15 March 2025; Published 17 April 2025

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ABSTRACT

Background: Physical education in elementary school plays an important role in building physical literacy, increasing physical activity, and motivating students to achieve optimal learning outcomes. However, the relationship between these factors has not yet been studied holistically, so a more in-depth study in elementary schools is needed. **Methods:** This type of research is correlational research using a quantitative approach. The sample of this study was elementary school students in grades IV, V, and VI. The sample is 270 students. This study used purposive sampling for 8-12 years. Sampling in this study used tests and questionnaires for tests conducted on aspects of physical literacy, IPAQ (International Physical Activity Questionnaire), motivation, and observation of student learning outcomes. Data analysis using the SPSS version 25.0 data processing application program with normality, linearity, and correlation tests. **Finding/Results:** Physical literacy, physical activity and motivation data and learning outcomes are normal. The same thing also happened in the linearity test on the four aspects. Physical literacy to learning outcomes is positively correlated. $0.000 < 0.05$. Physical activity to learning outcomes is positively correlated. $0.007 < 0.05$. Motivation to learning outcomes is positively correlated. $0.000 < 0.05$. Future research can focus on developing and testing intervention programmes that integrate these three variables to improve student learning outcomes holistically. In addition, it is important to conduct studies that explore causal relationships through experimental designs, as well as consider differences in influence across educational levels, from primary to tertiary. **Conclusion:** Physical literacy, physical activity, and motivation are specific to the learning outcomes of physical education. Understanding and paying attention to the relationship between physical literacy, physical activity, and motivation can help educators design more effective and enjoyable learning experiences in physical education, improving student learning outcomes.

Keywords: Physical literacy; physical activity; motivation; learning outcome; physical education

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 [10.25299/es:ijope.2025.vol6\(1\).17879](https://doi.org/10.25299/es:ijope.2025.vol6(1).17879)

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How to Cite: Adi S., Soenyoto, T., Yuwono, C., & Nurharsono, T. (2025). Exploring physical literacy, physical activity, motivation, and learning outcomes in elementary school physical education. *Edu Sportivo: Indonesian Journal of Physical Education*, 6(1), 66-76. [https://doi.org/10.25299/es:ijope.2025.vol6\(1\).17879](https://doi.org/10.25299/es:ijope.2025.vol6(1).17879)

Authors' Contribution: a – Study Design; b – Data Collection; c – Statistical Analysis; d – Manuscript Preparation; e – Funds Collection



INTRODUCTION

The application of the physical literacy performance framework has the potential to transform the assessment and treatment of developmental disorders in children and adolescents, such as developmental coordination disorder (Bailey et al., 2023; Boldovskaia et al., 2023; Miyahara, 2020). Physical literacy is essential to research as it provides a foundation for lifelong engagement in physical activity and positive health outcomes (Britton et al., 2023). Physical literacy has gained global attention as a holistic approach to combat physical inactivity and obesity (Lower-Hoppe et al., 2022). Overall,

physical literacy research contributes to developing effective physical activity promotion strategies, interdisciplinary studies, and advancing knowledge in the field.

Physical literacy is very closely related to physical education. Physical education is essential in promoting physical activity (Cale, 2023). PE plays a vital role in the education and upbringing of young people, helping them develop healthy lifestyles and physical and spiritual strength (Griban et al., 2020). A physical education model, implemented in a university setting, has been shown to improve physical literacy, especially in the affective and social domains, while also increasing daily physical activity levels and reducing a debilitating motivational climate (Choi et al., 2021). Therefore, physical education is crucial in promoting physical activity, physical literacy, motivation and should be central to school efforts, as it lays the foundation for lifelong health and well-being.

The physical education model further suggests that situational motivation can mediate the impact of physical education on daily activity levels, suggesting that a structured and engaging curriculum can enhance motivation and physical literacy (Choi et al., 2024). Learning motivation is essential in physical education because it can encourage students to continue learning optimally and help optimise their learning motivation (Da'i et al., 2021). Motivation is deeply rooted in the individual and can change during the activity (Stults-Kolehmainen et al., 2023). Supporting educational motivation enables students to consciously master knowledge, develop skills and abilities, and develop a positive attitude towards physical education. Moreover, high levels of motivation can lead to increased participation in physical activities, both in and out of school settings. It also contributes to greater persistence in overcoming challenges and setbacks, fostering a growth mindset among students. Ultimately, enhancing motivation in physical education not only improves academic performance but also promotes lifelong engagement in healthy, active lifestyles.

Student learning outcomes reflect the knowledge, skills, attitudes, competencies, and habits of mind students are expected to acquire after completing a course or programme (Shafait et al., 2021). Learning outcomes are the main objectives that students should achieve through their learning activities (Xu et al., 2022). Physical literacy has been shown to improve learning outcomes (Jerebine et al., 2024). Suggesting that while motivation can improve learning outcomes, better outcomes can also improve motivation, creating a reciprocal reinforcing cycle (Vu et al., 2022). Education leads to increased physical activity, including more intense weekly activity and daily steps (Kari et al., 2020). Overall, student learning outcomes provide a clear framework for assessing and evaluating the effectiveness of the learning process. Ultimately, clear learning outcomes not only enhance accountability but also foster a culture of continuous improvement in educational practices.

For students, integrating physical literacy into the school curriculum through innovative methods has been shown to improve not only physical literacy but also motivation and academic performance, especially in subjects such as mathematics (Goncalves et al., 2023). Similarly, physical literacy significantly influences daily physical activity levels, with motivation acting as a key mediator in this relationship (Choi et al., 2024). For older adults, physical literacy-based interventions are essential to promote active aging and improve self-esteem, thereby addressing the public health challenges associated with an aging population (Sum et al., 2024). Furthermore, understanding the interactions between motor competence, motivation, and enjoyment in physical education may help tailor interventions to different child profiles, potentially reducing the risk of unhealthy lifestyles (Carcamo-Oyarzun et al., 2023).

Based on the results of observations and metadata analysis, there has been no research that connects these three variables. Several limitations of previous [Meisahro et al. \(2022\)](#) show a weak relationship between learning motivation and learning styles and learning outcomes, research [Serly et al. \(2023\)](#) small sample size and no significant correlation was found between physical literacy and academic achievement in research ([Chagas et al., 2022](#)). Whereas several recent studies have shown that all of these elements influence each other. This research is important to prove it.

Based on the observation and vos viewer analysis there is no research connects these three variables. Some limitations of previous research are that research [Meisahro et al. \(2022\)](#) shows a weak relationship between learning motivation and learning style and science learning outcomes. [Serly et al. \(2023\)](#) small sample size. No significant correlation was found between physical literacy and academic achievement ([Chagas et al., 2022](#)). This is an important step to provide new knowledge in physical education. Physical education teachers have never done profiling related to these areas, even though these variables are essential to uncover.

Table 1: Limitations Previous Research

No	Paper	Conclusions	Limitations
1	(Stoddart et al., 2023) PLitPE: an intervention for physical literacy enriched pedagogy in Canadian elementary school physical education classes	Physical literacy (PLitPE) significantly improves students' physical competence and psychological domains (affective and cognitive).	This study did not produce improved behavioural outcomes, indicating limitations in the effectiveness of the physical literacy behavioural domain among students.
2	(Blegur et al., 2023) Integrating analytical thinking skills into physical education to improve student learning outcomes	Analytical thinking in physical education learning improves students' mastery of movement skills and overall learning outcomes, helping them make the right decisions during play.	Further investigation with multiple instruments and larger samples is needed.
3	(Simón-Chico et al., 2023) The Impact of a Challenge-Based Learning Experience in Physical Education on Students' Motivation and Engagement	Challenge-based learning (CBL) enhances students' basic psychological needs, such as autonomy, competence, and relatedness, which support motivation and engagement in physical education.	The sample size is small, requiring more significant statistical analysis and deeper exploration of variables.
4	(Carcamo-Oyarzun et al., 2023) Motor competence, motivation and enjoyment in physical education to profile children in relation to physical activity behaviours	Identifying three different profiles of school children based on Actual Motor Competence (AMC), Perceived Motor Competence (PMC), intrinsic motivation, and enjoyment of Physical Education (PE) classes. The majority of the sample fell into two profiles (non-conforming and low-conforming) that may be at risk of unhealthy lifestyles due to lower motivation and enjoyment in PE.	This study's focus on a specific population of children may limit the generalisability of the findings to other cultural or geographic contexts, potentially affecting the applicability of the results to broader populations.
5	(Jerebine et al., 2024) Effects of Holistically Conceptualised School-Based Interventions on Children's Physical Literacy, Physical Activity, and Other Outcomes	Holistic interventions in schools have been shown to improve the physical domain of children's physical literacy, with strong positive evidence for intervention effects in controlled designs, particularly in the quantitatively assessed physical domain.	There was no evidence for positive intervention effects on physical activity (PA) or cognitive performance.

No	Paper	Conclusions	Limitations
6	(Jurak, 2024) Supporting Physical Literacy Journey with Physical Fitness Monitoring	The Fitback4Literacy project successfully developed and tested an open transnational digital tool aimed at improving physical literacy among children and adolescents through effective fitness monitoring, addressing both the physical and cognitive domains of physical literacy.	Improper fitness testing can lead to negative experiences for students, which can result in a stigma against fitness testing.

Previous studies have not linked these variables with physical education learning outcomes, on average, using a single variable, and none have linked these variables. The relationship between these variables is essential to improve knowledge and practice in PE. This study can significantly contribute to understanding how physical literacy, physical activity, and motivation affect student learning outcomes in physical education at the elementary school level. This study can develop physical education policies and programmes for students' physical well-being. This study aims to examine the relationship between physical literacy, physical activity, motivation, and learning outcomes in elementary schools.

METHOD

This type of research is correlational research using a quantitative approach. Correlational research is one part of ex-post facto research because researchers usually do not manipulate the state of existing variables and look directly at the existence of relationships and the level of variable relationships reflected in the correlation coefficient. In the sense that correlational research seeks the existence of a relationship between variables.

Participants

The sample of this study was elementary school students in grades IV, V, and VI. The sample amounted to 270 students, 178 male and 92 female. This study used purposive sampling for 8-12 years. The population of this study were elementary school students in grades IV, V, and VI aged 8 to 12 years. Students in this class are assumed to be able to fill out the instruments and follow the entire series of research. The selected schools were schools that held the range and had a close distance between one school and another. The researcher selected students by purposive sampling based on the criteria that they were in the age range of 8 to 12 years and were in grades IV, V, or VI. The sample consisted of 178 male students and 92 female students, in accordance with the research design. The researcher ensured this gender distribution by selecting students who matched the required gender proportion. Students who met the criteria for "purposive sampling" were invited to participate voluntarily, with informed consent from the students and their parents. The researcher then visited the schools and informed the students and their parents about the purpose of the study. Once a total sample size of 270 students was reached, the researcher continued data collection, focusing on ensuring that the students selected accurately represented the target group.

Instruments

Sampling in this study used tests and questionnaires for tests conducted on aspects of physical literacy [Permana et al. \(2024\)](#) a Validity and reliability > 0, IPAQ [Dharmansyah & Budiana \(2021\)](#) validity 0.000 and reliability 0.884, motivation [Da'i et al. \(2021\)](#)

validity 0.000 and reliability > 0.886, and observation of student learning outcomes. The physical literacy have physical competencies test: (1) Tiamsa Test (2) Pacer Test (3) Sit up Test Cognitive test: Motivation, Confidence, Knowledge and Understanding IPAQ Motivation..... The Likert scale was used in measuring the answers of this study.

Research Procedures

The procedure of this study began with sampling students from a specific population that met the specified criteria. To measure aspects of physical literacy, specific tests were used, while physical activity levels were measured through the IPAQ (International Physical Activity Questionnaire) questionnaire. In addition, the questionnaire was also used to assess students' motivation in the context of physical education, providing insight into the factors that influence their participation. The researcher then conducted observations of students' learning outcomes, recording academic achievements and skills acquired during the learning process. Once the data was collected, analysis was conducted to evaluate the relationship between physical literacy, physical activity, motivation and student learning outcomes, using appropriate statistical analysis techniques to draw valid conclusions.

Data Analysis

Data analysis used the SPSS version 25.0 data processing application programme with normality, linearity, and correlation tests.

RESULTS AND DISCUSSION

This section of the study findings was customised to meet the requirements of the data analysis. The information needed for this study was to measure how physical literacy, physical activity, motivation and learning outcomes. Based on the results of data collection, raw data was obtained. Then the normality and linearity tests were carried out. The following is a data description table:

Table 2. Descriptive, Normality, and Linearity Data

	N	Min	Max	Mean	Std. Deviation	Normality	Linierity
PL (X1)	270	8	27	17.15	4.282	Normal	Linear
PA (X2)	270	4	5	4.30	.215	Normal	Linear
Motivation (X3)	270	4	5	4.71	.215	Normal	Linear
Learning Outcome (Y)	270	70	95	87.89	6.437	Normal	Linear

In the data in table 2, it can be seen that the physical literacy, physical activity and motivation data and learning outcomes are normal. The same thing also happened in the linearity test on the four aspects. Normal and linear data are tested for correlation in the table below:

Table 3. Predictor

	Sig.	Conclusion On Learning Outcomes
PL	0.000	Corelated
PA	0.007	Corelated
Motivation	0.000	Corelated

In table 3, as predictor data, a correlation test was carried out and it was found that the variables physical literacy (X1), Physical Activity (X2) and Motivation correlated with learning outcomes. The physical education model has been shown to enhance physical literacy, which in turn positively influences daily physical activity levels among university students, with motivation acting as a significant mediator in this relationship (Choi et al.,

2024). Furthermore, physical literacy is associated with body composition, as seen in Chilean children, where higher motivation for physical activity correlates with healthier BMI levels, highlighting the importance of motivation in promoting physical activity and addressing public health challenges (Muñoz-Urtubia et al., 2024). The role of teaching styles in physical education also significantly impacts student motivation and activity levels. Competence-supportive teaching styles are linked to higher autonomous motivation, while controlling styles are associated with need frustration and amotivation (García-González et al., 2023). Collectively, these findings underscore the importance of integrating physical literacy, motivation, and supportive teaching practices to optimise physical education learning outcomes, promoting both immediate and long-term engagement in physical activity.

Physical literacy, physical activity, and motivation are related to physical education learning outcomes. Physical literacy has a positive impact on a person's physical, psychological, social, and cognitive health (Boldovskaia et al., 2023; Zhao et al., 2021). Physical literacy has the potential to support health programs, making it relevant in health care providers (Cornish et al., 2020). Physical literacy interventions effectively improve physical competence, motivation, confidence, and knowledge, which are crucial for promoting physical activity and health (Carl et al., 2022). The classroom environment also plays a role, as Rance et al. showed that enclosed classroom settings enhance reading fluency, indicating that physical settings can affect cognitive development (Rance et al., 2023).

Integrating PA into the curriculum, which not only improves health outcomes but also enhances academic performance and psychosocial well-being in elementary school children (Goswami et al., 2022). Additionally, classroom-based PA interventions have been found to improve self-efficacy, study skills, and concentration among adolescents, leading to better academic achievement and reduced anxiety (Latino et al., 2023). The role of creativity in PA interventions was explored, indicating that while creative PA did not significantly enhance executive functions or academic achievement, it did highlight the importance of varied and engaging activities for cognitive development (Vasilopoulos et al., 2023). Moreover, a study on the dose-response relationship of PA intensity during physical education lessons found that moderate PA increased on-task behavior and reduced passive off-task behavior, with positive affect during PA sessions further enhancing these outcomes (Heemskerk et al., 2023).

Well-motivated students will create a vibrant learning atmosphere and have better success rates (Hidayat et al., 2023). The effectiveness of physical education classes depends on the organisation of the educational process and the main motivational motives that determine student activity (Ezeddine et al., 2023). When these needs are supported, students exhibit higher levels of autonomous motivation and engagement, leading to more positive learning outcomes (Burgueño et al., 2024; Su et al., 2022).

These learning outcomes are measured through assessments at the end of the learning process (Khampirat, 2021) to measure learning outcomes, which must be consistent with previously established outcomes (Tomaszewski et al., 2022). Research indicates that moderate physical activity during PE lessons can directly increase on-task behavior and reduce passive off-task behavior in classroom settings, suggesting a positive impact on students' learning experiences and task-related behaviours (Heemskerk et al., 2023). Physical education (PE) contributes to learning by enhancing both cognitive and social skills through various pedagogical approaches and physical activities.

The limitation of this study is the limited sample size that was only taken from a few schools. The short-term study may not be enough to reveal changes in motivation and

learning outcomes. Recommendations for future research include a survey of the development of physical literacy, motivation, and physical activity of students since elementary school affects their learning outcomes at the next level and comparing different socioeconomic characteristics between students. This study has contributed to the literature gap that highlights these three variables. The findings in this study have good implications for teachers and stakeholders. This study can guide the development of physical education programmes according to the needs of elementary school students.

CONCLUSION

Physical literacy, physical activity, and motivation are related to physical education learning outcomes. Students who have good physical literacy find it easier to master movement tasks in physical education learning. Students who are physically active have a good level of physical fitness so that learning outcomes are good. Students who are well motivated tend to be enthusiastic about learning and always participate in physical activities. Understanding the relationship between these variables helps teachers design more effective learning so as to improve student learning outcomes. This study contributes to filling the scientific gap in this field. The findings in this study contribute to teachers and stakeholders. In the future, it is necessary to conduct research at a higher level and compare it with different socio-economic characteristics.

ACKNOWLEDGEMENTS

This research was funded by FIK UNNES DPA number 023.17.2.690645/2024.06.

CONFLICT OF INTEREST

Clearly explain whether there are any conflicts of interest related to the reported research.

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