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The Effect of Physical Fitness, Motor Skills and Concentration on Improving Students' Learning Outcomes in Physical Education, Sport and Health

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Abstract

Study purpose. This study aimed to examine the effects of physical fitness, motor skills, and concentration on learning outcomes in Physical Education, Sports, and Health (PJOK). Physical fitness serves as a critical component in supporting cognitive and learning processes.

Materials and Method. A quantitative approach with path analysis was employed to analyze these relationships. The sample comprised ok 25 student age 11-12 years female Phase C students, selected via purposive sampling. Research instruments included the TKSI Phase C physical fitness test, motor skills assessment, and the Concentration Grid Test data analysis with Causal Modeling.

Result. The analysis revealed that the three independent variables collectively exerted a significant influence on PJOK learning outcomes ($R^2 = 0.992$, $p < 0.05$). Partially, concentration demonstrated the most dominant effect ($\beta = 0.864$, $p < 0.001$), followed by physical fitness ($\beta = 0.095$, $p = 0.040$) and motor skills ($\beta = 0.091$, $p = 0.001$).

Conclusions. Additionally, physical fitness and motor skills significantly affected concentration. These findings suggest that PJOK learning outcomes are directly and indirectly influenced by students' physical and mental conditions. The study's implications provide a foundation for developing more effective and holistic PJOK learning strategies.

Keywords. Physical fitness, Motor skills, Concentration, Learning outcomes, Physical Activity

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Introduction

Physical education, sport and health is an important component in the basic education system that aims to form students who are healthy, active, and have character. Currently, physicaleeducation for sport anddhealth in Indonesia still faces various serious challenges in its application at the primary school level. Although the curriculum of physical education, sport and health is recognized as an integral part of efforts to form healthy, active, and character students, the reality of implementation in the field is often constrained by limited facilities and infrastructure, low teacher competence in innovative learning methods, and lack of attention to the importance of physical development and motor skills of children. Many educational units make physical education for sports and health only as a complement or light lesson, not as the main pillar of students holistic development. This has an impactoon the lack of motivation of students to take physicaleeducation and health lessons seriously and the decline in the level of physical fitness among school-age children. The biggest problem is that students' lack of fitness causes them to be unmotivated in other subjects.

This condition is also reflected locally in Ogan Komering Ulu Regency, South Sumatra Province. In several elementary schools in this area, the implementation of physicaleeducation, sport and health learning is not optimal. There are still many students with low physical fitness levels, undeveloped motor skills, and lack of concentration ability when participating in learning. In addition, the limited sports facilities and the lack of professional training for physical education and health teachers are major obstacles in achieving the overall learning objectives of physical education and health. This situation shows that there needs to be attention and intervention from the school, local government, and the community to improve the system and implementation of physical education and health so as to create a generation that is healthy, resilient, and achieves both academically and physically.

Within the framework of the Merdeka Curriculum, physical and health education transcends the mere instruction of physical skills by also instilling core values such as sportsmanship, discipline, and social responsibility. Nevertheless, the implementation of physical and health education continues to face multifaceted challenges, particularly concerning suboptimal student learning outcomes. This phenomenon was observed at Elementary School 04 Ogan Komering Ulu, where a significant proportion of students demonstrated difficulties in attaining both cognitive and psychomotor competencies in physical and health education.

This study aims to empirically investigate the impact of physical fitness, motor skills, and concentration on learning outcomes in physical education and health. These three variables are hypothesized to play a critical role in facilitating successful learning processes. Specifically, physical fitness provides a physiological foundation that enables students to engage in learning activities optimally without premature fatigue (Welis et al., 2024). Meanwhile, both gross and fine motor skills are the main prerequisites in mastering sports movements and techniques (Abdullah, 2025). Concentration, as a cognitive function that regulates focus and information processing, also determines the effectiveness of receiving and processing learner material (Schunk, 2012).

Physical fitness has a relationship with a person's physical condition. "Physical fitness is divided into two categories, namely physical fitness for health and physical fitness for skills (Fadlan et al., 2023). Students will stay focused if they have a strong physical fitness condition during the learning process. If the physical fitness is lacking, it will tire quickly, which can cause the child's condition to become tired and sleepy. Good student health will help optimize understanding of the various knowledge taught, thus indirectly supporting academic progress. Therefore, it is important for students to maintain physical fitness through regular exercise,

adequate sleep patterns and an overall healthy lifestyle. Good support and understanding from the school and family environment is also important to encourage students to maintain their physical fitness to support optimal academic performance (Putra et al., 2023).

While in motor skills, students are more emphasized on developing and even mastering motion and motor skills (Utama Bandi, 2011). This is very important because with a lot of experience and mastery of motion will equip students with heavier or more complex motion tasks so that they can take part in learning physical education sports and health properly (Setiawan et al., 2020).

Furthermore, concentration significantly influences learning outcomes. A higher level of concentration correlates with improved academic performance. Enhanced concentration enables students to maintain focus, facilitates better comprehension of learning materials, and promotes the effective application of acquired knowledge (Nurunnabilah et al., 2022).

By synthesizing learning theory, physical fitness theory, and motor skill theory, this study seeks to advance scientific knowledge by developing a more effective and contextually relevant physical education learning model. The findings are expected to serve as an evidence-based reference for designing pedagogical strategies and informing physical education policy at the primary school level**.**

Materials and Method

Study participants

This study utilizes a quantitative methodology with path analysis to investigate structural relationships among variables, evaluating both direct and indirect effects of exogenous variables on the endogenous variable (Ardiansyah et al., 2023; Kadir, 2010). This approach was selected to examine both the direct and indirect effects of the independent variables physical fitness (X_1), motor skills (X_2), and concentration (X_3) on the dependent variable, which comprises the Physical Education, Sports, and Health (PJOK) learning outcomes of sixth-grade students at SD Negeri 04 Ogan Komering Ulu (Y).

The population in this study were all grade VI students of Elementary School 04 Ogan Komering Ulu, totaling 102 students. The sampling technique used purposive sampling, with a sample size of 25 female phase C students aged 11 to 12 years. This selection is based on considerations of homogeneity and ease of variable control.

Study organization

Research Instruments, physical fitness tests using the Indonesian student fitness test instrument phase C Kemendikbudristek (Rahmadi., Kahri, M., & Mashud, 2025), TKSI has been shown to have high reliability and validity in the context of assessing the physical fitness of elementary school students. The motor skills test uses the motor skills test instrument for elementary schools from Mustafa & Sugiharto (2020) which has a validation of 0.87 and a reliability of 0.93. The concentration test used the "Concentration Grid Test (Nafiah et al., 2025) which has been modified for elementary school age. This test measures the focus of students attention during a certain time in identifying numbers in sequence. In the test, there is a matrix consisting of 100 cells containing random numbers with a value range of 1 to 100. The measurement instrument exhibited a validity coefficient of 0.87 and a reliability coefficient of 0.70. The Physical Education, Sports, and Health (PJOK) learning outcomes were calculated as a composite score incorporating both cognitive and psychomotor evaluations conducted by the school.

Statistical analysis

The data were analyzed using path analysis in SPSS version 20. Prior to conducting the path analysis, classical assumption tests normality, linearity, multicollinearity, and heteroscedasticity were performed to validate the model (Osemeke et al., 2024) in Figure 1.

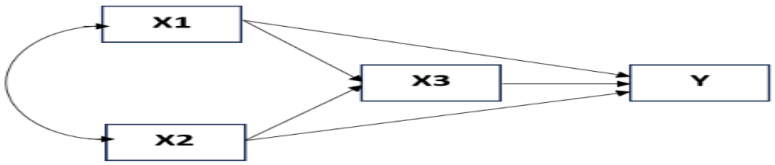

Figure 1. Research design

Result

Normality test

The normality test serves to assess whether data follows a normal distribution. (Yang & Berdine, 2021). The criterion for assessing normality is based on the significance (Sig) value: if Sig > 0.05, the data are normally distributed; conversely, if Sig < 0.05, the data deviate from a normal distribution (Wasserstein et al., 2019).

The Shapiro-Wilk test was employed to assess normality. The acceptance criterion for normality is a significance value (p-value) exceeding the α threshold of 0.05; otherwise, the distribution is considered non-normal in Table 1.

Table 1. Shapiro-Wilk normality test results

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Physical fitness	25	100.0%	0	0.0%	25	100.0%
Motor skills	25	100.0%	0	0.0%	25	100.0%
Concentration	25	100.0%	0	0.0%	25	100.0%
Physical education learning outcomes	25	100.0%	0	0.0%	25	100.0%

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Physical fitness	.152	25	.142	.956	25	.337
Motor skills	.128	25	.200*	.962	25	.462
Concentration	.135	25	.200*	.926	25	.070
Physical education learning outcomes	.102	25	.200*	.928	25	.080

Source: Results of SPSS 20 data processing, (2025)

The normality test results indicate that the significance value for each variable exceeds the threshold of α = 0.05. Thus, it can be concluded that all variables in this study follow a normal distribution.

Linearity Test

The linearity test serves to ascertain the nature of the relationship between the independent and dependent variables (Uyanık & Güler, 2013). The basis for making a linearity test decision, if Sig (significance)> 0.05 then there is a linear relationship between the independent variable and the dependent variable, on the other hand, If the significance (Sig) value is less than 0.05 ($p < 0.05$), it indicates the absence of a linear relationship between the independent and dependent variables in Table 2.

Table 2. Linearity test between variables

Variables	Sig	Ket
$X_1 \rightarrow Y$	0,649	Linear
$X_2 \rightarrow Y$	0,462	Linear
$X_3 \rightarrow Y$	0,381	Linear

Source: Results of SPSS 20 data processing, (2025)

The linearity test results demonstrate that all variables exhibit significance values exceeding 0.05, indicating a linear relationship between each independent variable and the dependent variable in this study.

Multicollinearity test

The multicollinearity test serves to identify whether multicollinearity issues exist among independent variables. Multicollinearity refers to an excessively high or low correlation between independent variables. This test is essential when multiple independent variables are included in the analysis. Detection is typically performed by examining the Variance Inflation Factor (VIF) and tolerance values. A VIF exceeding 10 or a tolerance value below 0.10 indicates the presence of multicollinearity. Conversely, multicollinearity is not considered problematic if the VIF remains below 10 or the tolerance exceeds 0.10 in Table 3.

Table 3. Multicollinearity test results structure 1

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Physical fitness	.889	1.124
	Motor skills	.889	1.124

Source: Results of SPSS 20 data processing, (2025)

Based on Table 3, it can be seen that the Variance-Inflating Factor (VIF) value of physical fitness is 0.889 <10 and tolerance is 1.1224>0.10. Variance-Inflating Factor (VIF) motor skills of 0.889 <10 and tolerance of 1.124>0.10. Variance-Inflating Factor (VIF). Thus, it can be concluded that the regression model is free from multicollinearity in Table 4.

Table 4. Multicollinearity test results of structure 2

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Physical fitness	.199	5.028
	Motor skills	.717	1.395
	Concentration	.171	5.858

Source: Results of SPSS 20 data processing, (2025)

Based on Table 4, it can be seen that the *Variance-Inflating Factor* (VIF) value of physical fitness is 5.028 <10 and tolerance is 0.199>0.10. *Variance-Inflating Factor* (VIF) motor skills of 1.395<10 and tolerance of 0.717>0.10. *Variance-Inflating Factor* (VIF) concentration of 5.858<10 and tolerance of 0.171>0.10. Thus, it can be concluded that the regression model is free from multicollinearity.

Heteroscedasticity test

The heteroscedasticity test involves examining the presence of specific patterns in a graphical plot to assess variance inconsistencies (Rajh-weber & Huber, 2020). This test aims to assess whether the regression model exhibits heteroscedasticity, where the variance of residuals differs across observations Figure 2.

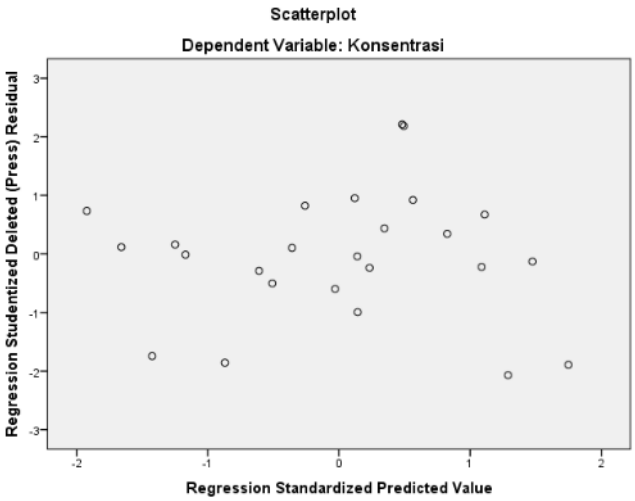

Figure 2. Scatterplot of structure 1 of grade VI students of SD Negeri 04 OKU
Source: Results of SPSS 20 data processing, (2025)

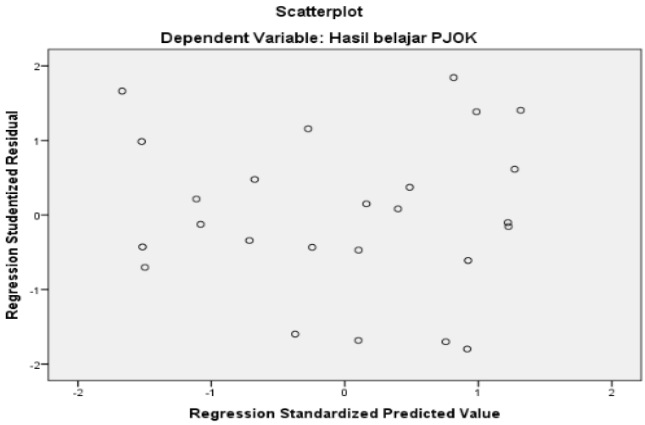

Figure 3. Scatterplot of structure 2 of grade VI students of SD Negeri 04 OKU
Source: Results of SPSS 20 data processing, (2025)

Figures 2 and 3 demonstrate that the data points are distributed bothaabove and below zero on the Y-axis, indicating the absence of heteroscedasticity in the model.

Hypothesis test (t test)

The t-test fundamentally measures the extent to which an individual independent variable explains variation in the dependent variable. This hypothesis test is performed by comparing the calculated t-value (t-count) with critical values based on predetermined significance levels in Table 5:

1. If the significance of tcount < 0.05 then H0 is rejected, Ha is accepted
2. If the significance of tcount > 0.05 then H0 is accepted, Ha is rejected

Table 5. T-testt results of structure 1

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of thee Estimate
1	.911[a]	.829	.814	1.097

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.255	2.393		.524	.605
	Physical fitness	.792	.091	.816	8.740	.000
	Motor skills	.026	.011	.215	2.303	.031

Source: Results of SPSS 20 data processing, (2025)

Thus it is known:

1) Physical fitness obtained the value of t countt (8.740) > t tablee (2.064) or significancee (0.00) < 0.05. This means that thee physical fitness variable has a significant effect on student concentration.

2) Motor skills obtained the value of t countt (2.303) > t tablee (2.064) or significance (0.031) <0.05. This means that thee motor skill variable has a significant effect onn student concentration.
3) The value of RR*square* is 0.829. This shows that the contribution of the influence of X_1 and X_2 on X_3 is 82.9%, while the remainingg 17.1% is influenced byyother variables not included in this study..

From the table above, the structural equation 1 can be obtained in Table 6.

$$Y1= \rho1X1+ \rho2X2 + \varepsilon1$$
$$Y_1= 0.816\ X_1+ 0.215\ X_2+ 0.413\ \varepsilon1$$

Table 6. Structure 2 t-test results

Model Summary

Model 1	Rr	R Square	Adjusted R Squaree	Std. Error of the Estimatee
1	.996[a]	.992	.991	.831

Coefficients[a]

Modell		**Unstandardized Coefficientss**		**Standardized Coefficientss**	**t**	**Sig.**
		B	Std. Error	Beta		
1	(Constant)	7.406	1.825		4.058	.001
	Physical fitness	.317	.145	.095	2.184	.040
	Motor skills	.038	.010	.091	3.967	.001
	Concentration	2.959	.162	.864	18.311	.000

Source: Results of SPSS 20 data processing, (2025)

Thus it is known:

1) Physical fitness obtained the value of t countt (2.184) > t tablee (2.064) or significance (0.04) < 0.05. This means that thee physicalLfitness variable has a significant effect on PJOK learning outcomes.
2) Motor skills obtained the value of t countt (3.967) > t tablee (2.064) or significance (0.001) > 0.05. This means that thee motor skills variable has a significant effect on the learning outcomes ofFPJOK.
3) Concentration obtained the value of t countt (18.311) > t tablee (2.064) or significance (0.000) <0.05. This means that thee concentration variable has a significant effect on PJOK learning outcomes.
4) The value of R *square* is 0.992. This shows that the contribution of the influence of $X_{(1,)}$ $X_{(2,)}$ $X_{(3)}$ on Y is 99.2%, while the remainingg 0.8% is influenced by other variables not included in this study..

From the table above, the structure equation 2 can be obtained as follows:

$$Y_2= \rho3X1+ \rho4X2+ \rho5X3 + \varepsilon2$$
$$Y_2=_0.095\ X_1+_0.091\ X_2+ 0.864\ X_3+ 0.089\ \varepsilon2$$

After the value of each variable data is obtained, then path analysis is carried out. The effect of variable relationships can be categorized as follows Table 7:

Table 7. Categories of variable influence relationships

***Path* coefficient**	**Power/Influence**
0,05 - 0,09.	Weak.
0,10 - 0,29.	Medium.
≥ 0,30.	Strong.

Source : (Harpadeles et al., 2016)

Therresults of hypothesis testing for path analysis can be seen from the direct and indirect tables in the following Table 8.

Table 8. Results of direct and indirect effectss

Influence	**Direct**	**Indirect**	**Total**	**Ket**
$X_1 \rightarrow X_3$.	0,816		0,095	Strong
$X_2 \rightarrow X_3$.	0,215		0,091	Medium
$X_1 \rightarrow$ Y.		0,816 x 0,864 = 0,705	0,705	Strong
$X_2 \rightarrow$ Y.		0,215 x 0,864 = 0,185	0,185	Medium
$X_3 \rightarrow$ Y.	0,864		0,864	Strong

Source: Results of SPSS 20 data processing, (2025)

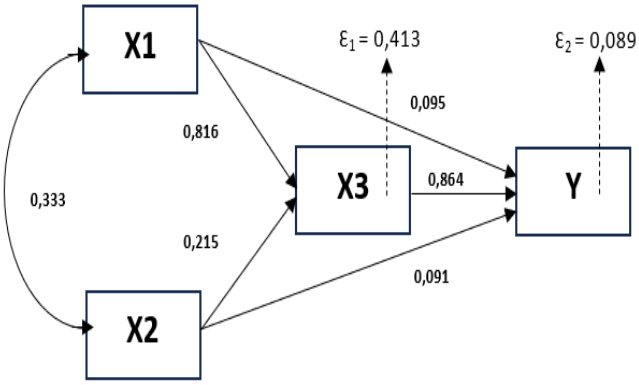

Figure 4. complete structure of path analysis X_1, X_2, X_3 and Y.

Figure 4 the results of the path analysis reveal the following findings :

1. Physical fitness (X1) has a small direct effect on learning outcomess in Physical Education (PJOK), with a coefficient off 0.095. However, physical fitness has a strong influence on concentration (X3), with a value of 0.864. This means that the better the students' physical fitness, the better their concentration tends to be.
2. Motor skills (X2) also have a small direct effect on learning outcomes, with a coefficient of 0.091. However, motor skills moderately affect concentration, with a value of 0.215. This suggests that motor skills can improve students' concentration, although not as strongly as physical fitness does.
3. Concentration (X3) has a fairly strong direct influence on PJOK learning outcomes, with a coefficient of 0.333. This indicates that concentration is a key factor that determines how well students can understand and participate in PJOK learning.

4. The error value (Ɛ1 = 0.413) shows that about 41.3% of the variation in concentration is influenced by other factors not included in this study..
5. The error value (Ɛ2 = 0.089) indicates that approximately 91.1% of the variation iin PJOK learning outcomes can be explained by the three variables studied: physical fitness, motor skills, and concentration. This shows that the model used in the study iss very strong.

Discussion

The results of this study indicate thatt physical fitness, motor skills,, and concentration have a significant influence on the learning outcomes of physical education and health class VI students of Elementary School 04 Ogan Komering Ulu. These findings are in line with various scientific theories that have been discussed previously, and are supported by several previous studies.

The Effect of Physicall Fitness on Physical Education Learningg Outcomes is in accordance with the theory states that health is an internal factor that affects learning outcomes. In this context, physical fitness is the main indicator of students physical health conditions that support stamina and active participation during the physicall education and health learning process. This is also reinforced who explains that students with good physical fitness levels tend not to get tired quickly, are more focused, and show optimal physical performance, which has an impact on higher academic achievement in physical educationn and health subjects.

The Effect of Motor Skills on Physical Education Learning Outcomes, the results are in accordance with the concept of motor skills, which explain that motor skills refer to the ability of individuals to control and coordinate body movements in certain activities. Students who have good motor skills are able to participate in sports practice activities more effectively, thus supporting cognitive and psychomotor achievements in physical education and health subjects. In addition, this ability also increases student confidence, which is an important affective factor in supporting learning outcomes.

Concentration is proven to be one of the dominant factors in supporting students learning process, concentration is the ability to focus attention on a task by ignoring distractions. Students with high concentration are able to absorb teacher instructions and apply them well in physical education and health learning activities, both in theory and practice.

Indirect Effect: Physical Fitness and Motor Skills Through Concentration, this study also demonstrates the significant indirect influence of physical fitness and motor skills on learning outcomes, mediated by concentration. This finding is supported, which states that physical activity can increase oxygen flow to the brain, which in turn improves cognitive functions such as concentration and memory. Thus, students who are fit and motorically trained have better concentration, which then has a positive impact on their learning outcomes.

The simultaneous effect test revealed that physical fitness, motor skills, and concentration collectively exerted a statistically significant influence on physical education and health learning outcomes. This finding aligns with the holistic approach in physical education, which underscores the integrated development of students' physical, mental, and cognitive domains to optimize learning.

Consequently, the findings of this study corroborate existing theoretical frameworks and empirical evidence, demonstrating that achievement in physical and health education is not determined by a singular factor. Rather, it emerges from the dynamic interplay of physical

fitness, motor competencies, and students' cognitive preparedness for learning. Educators should therefore develop integrated pedagogical strategies that simultaneously enhance these three dimensions to foster holistic improvement in learning outcomes.

Conclusion

Based on the problem formulation, objectives, and theoretical basis in this study, the following can be concluded:

1. Physical fitness has a direct and significant influence on students physical education and health learning outcomes. Students who have a good level of physical fitness tend to be more active, have sufficient stamina, and are able to follow physical education and health lessons optimally.
2. Motor skills also contribute significantly to learning outcomes in physical education. Students who are able to coordinate their body movements well will more easily understand and carry out various sports activities, thus supporting the achievement of high learning outcomes.
3. Concentration has been shown to have an important influence on learning outcomes. The ability of students to focus their attention during learning contributes to the understanding of theory and the effective implementation of sports practices. Physical fitness and motor skills, through the mediation of concentration, also influence learning outcomes in physical education. This means that fitness and motor skills can improve concentration, which in turn has a positive impact on learning outcomes. The three independent variables, namely physical fitness, motor skills, and concentration, together make a significant contribution to the learning outcomes of physical education in grade VI students of Elementary School 04 Ogan Komering Ulu.

Given the current times, these findings are even more relevant. The high use of digital technology and sedentary lifestyles among elementary school students have led to a decline in physical fitness, weak motor skills and low levels of concentration. Thus, this study emphasizes the importance of strengthening physical education based on active movement and concentration as a foundation for learning success. In a modern era full of digital distractions, education needs to not only focus on academic achievement, but also integrate structured physical activities to support students' holistic growth and development. Teachers, schools, and education policy makers need to work together in designing effective, adaptive, and appropriate learning strategies for physical education and health.

Acknowledgment

It is hoped that the findings of this study will offer practical contributions to the field of education, particularly in enhancing the quality of Physical Education, Sports, and Health (PJOK) instruction at the elementary school level.

Conflict Of Interestt

The authors declare no conflicts of interest regarding the conduct of this research. All data collection, analysis, and conclusion processes were conducted independently, without any intervention or influence from any party that could bias the results of the study. This research purely aims to develop science in the field of physical education and is not funded by institutions or parties that have commercial interests in the results of the research.

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