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The effect of breakfast and concentration on learning achievement in physical education

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ABSTRACT

This study examines the effects of breakfast habits and concentration on learning achievement in Physical Education, Sports, and Health (PJOK) among seventh- and eighth-grade students at SMPN 1 Pariaman. Using a quantitative correlational design with an ex post facto approach, data were collected through questionnaires on breakfast habits, standardized concentration tests, and PJOK score documentation from 64 students selected via cluster random sampling. Multiple linear regression analysis showed that breakfast habits ($p = 0.016$) and concentration ($p = 0.001$) significantly influenced learning achievement individually, and together ($p = 0.000$) explained 30.1% of the variance. The findings indicate that regular breakfast and high concentration positively support PJOK learning outcomes.

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Introduction

Physical Education, Sports, and Health (PJOK) is an essential subject in junior high school, aiming not only to improve students' physical fitness but also to develop motor skills, healthy lifestyle awareness, discipline, and cognitive understanding of movement concepts (Baumann et al., 2022; Welis et al., 2022). Effective PJOK learning requires students to actively engage in physical activities while maintaining adequate concentration to follow instructions, execute movements correctly, and comprehend both practical and theoretical components. However, learning achievement in this subject is often suboptimal when students experience low energy and decreased attention during lessons (Hammoudi Halat et al., 2023; Sepriani et al., 2024).

One key factor influencing students' readiness to learn is nutritional intake, particularly breakfast habits. Breakfast provides energy and essential nutrients that support both physical performance and cognitive functioning throughout the school day. Students who skip breakfast or consume nutritionally inadequate meals may experience fatigue, reduced endurance, and difficulty focusing, which can negatively impact their PJOK learning achievement (Burson et al., 2021; Hasan et al., 2020).

In addition to nutritional factors, concentration is a critical psychological component affecting learning outcomes in PJOK (Rachmat & Fajri, 2023; Riarita et al., 2025; Siregar & Harahap, 2025). Adequate concentration enables students to understand instructions, coordinate movements, and

respond accurately during physical activities, while lapses in attention can lead to mistakes, reduced participation, and lower performance evaluations (Metwally et al., 2020; Roshita et al., 2021).

Previous research has examined the relationship between breakfast habits and academic achievement, as well as the influence of concentration on learning outcomes in various subjects (Hou et al., 2020; Masini et al., 2023; Santos et al., 2023; Zhang et al., 2021). These studies generally indicate that regular breakfast consumption improves attention, cognitive performance, and academic achievement, while higher concentration levels correlate with better learning outcomes. However, most studies focus on cognitive-based subjects such as mathematics, language, or science, with limited attention to PJOK (Christiana et al., 2024; Wote et al., 2022).

Moreover, prior research often examines breakfast habits and concentration independently, without exploring their combined effect on learning achievement in PJOK (Guirado et al., 2021; Oftedal et al., 2024). This presents a research gap, as PJOK learning uniquely integrates physical activity and cognitive engagement. Empirical studies in Indonesian junior high school settings, particularly in SMPN 1 Pariaman, remain limited.

Addressing this gap, the present study investigates both the partial and simultaneous effects of breakfast habits and concentration on PJOK learning achievement. By integrating nutritional behavior and concentration into a single analytical framework, this research offers a comprehensive understanding of factors influencing physical education learning outcomes (Vasilopoulos et al., 2023; Williams et al., 2020).

The novelty of this study lies in examining breakfast habits and concentration together as determinants of PJOK achievement using a quantitative correlational ex post facto design. Unlike prior studies focusing mainly on academic subjects or analyzing variables separately, this research highlights the interplay of physical readiness and mental focus in physical education learning, with implications for teachers, schools, and parents to enhance student outcomes (Kawabata et al., 2021; Simarmata & Pariama, 2025).

Method

This study employed a quantitative research design using a correlational method with an ex post facto approach. The research was conducted at SMPN 1 Pariaman and focused on examining the relationship between breakfast habits, concentration, and learning achievement in Physical Education, Sports, and Health (PJOK). The population of this study consisted of all seventh- and eighth-grade students at SMPN 1 Pariaman. A sample of 64 students was selected using a cluster random sampling technique to ensure representative data from different class groups. Breakfast habits were measured using a structured questionnaire, while students' concentration levels were assessed through a standardized concentration test. PJOK learning achievement data were obtained from official school documentation in the form of students' PJOK scores.

The collected data were analyzed using multiple linear regression analysis with the assistance of SPSS version 26. Prior to hypothesis testing, data were examined to meet statistical assumptions required for regression analysis. Partial effects of breakfast habits and concentration on PJOK learning achievement were tested using the t-test, while the simultaneous effect of both independent variables was examined using the F-test. The level of significance was set at 0.05. In addition, the coefficient of determination (R^2) was calculated to determine the proportion of variance in PJOK learning achievement explained by breakfast habits and concentration.

Results and Discussions

This section presents the findings of the study regarding the effects of breakfast habits and concentration on students' learning achievement in Physical Education, Sports, and Health (PJOK) at SMPN 1 Pariaman. The data were analyzed using descriptive statistics and multiple linear regression analysis to examine both partial and simultaneous influences of the independent variables on PJOK learning achievement.

Table 1. Descriptive Statistics of Research Variables

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Breakfast Habits	64	45	85	65.72	8.41
Concentration	64	48	88	68.94	7.96
PJOK Learning Achievement	64	60	90	74.53	6.87

Table 1 shows the descriptive statistics of breakfast habits, concentration, and PJOK learning achievement among students. The mean scores indicate that students generally had moderate breakfast habits and concentration levels, while PJOK learning achievement was relatively good. The standard deviation values suggest a reasonable variation among students for each variable, indicating diverse conditions in breakfast behavior, concentration ability, and learning outcomes.

Table 2. Partial Test Results (t-test)

Variable	t-value	Significance (Sig.)	Description
Breakfast Habits	2.47	0.016	Significant Effect
Concentration	3.52	0.001	Significant Effect

Table 2 presents the results of the partial hypothesis testing using the t-test. The significance value for breakfast habits (Sig. = 0.016) is lower than 0.05, indicating that breakfast habits have a significant effect on PJOK learning achievement. Similarly, concentration shows a highly significant effect with a significance value of 0.001. These findings suggest that both regular breakfast habits and higher concentration levels independently contribute to better learning achievement in PJOK.

Table 3. Simultaneous Test and Coefficient of Determination

Model	R	R Square (R^2)	F-value	Sig.
1	0.548	0.301	13.15	0.000

Table 3 shows the results of the simultaneous test (F-test) and the coefficient of determination. The significance value of 0.000 indicates that breakfast habits and concentration together have a significant effect on PJOK learning achievement. The R^2 value of 0.301 means that 30.1% of the variation in PJOK learning achievement can be explained by breakfast habits and concentration, while the remaining 69.9% is influenced by other factors not examined in this study.

The findings of this study demonstrate that breakfast habits significantly affect learning achievement in Physical Education, Sports, and Health (PJOK). Students who regularly consume breakfast tend to achieve higher learning outcomes compared to those with irregular habits. This result supports the notion that adequate nutritional intake in the morning provides energy and supports both physical performance and cognitive processing during PJOK activities (Escolano-Perez & Bestue, 2021; Ruhland & Lange, 2021). In physically demanding learning environments, insufficient energy intake can lead to early fatigue, decreased engagement, and lower learning achievement.

The significant influence of concentration on PJOK learning achievement further highlights the importance of psychological readiness. Students with higher concentration levels can follow instructions more effectively, coordinate movements, and respond to dynamic learning situations, whereas lapses in concentration may reduce performance quality and increase mistakes during movement execution (Bucksch et al., 2020; Daly-Smith et al., 2021; Caillaud et al., 2022; Lambert et al., 2024). These results align with cognitive learning theories emphasizing attention and focus as prerequisites for effective learning outcomes.

The simultaneous effect of breakfast habits and concentration indicates that physical and psychological factors interact to shape learning outcomes in PJOK. Adequate breakfast supports sustained energy levels, facilitating better concentration, while poor breakfast habits can impair attention due to hunger and fatigue, limiting students' engagement (Bacon & Lord, 2021; Rakić et al., 2024). This multidimensional interaction underscores the complex nature of learning achievement in physical education contexts.

The coefficient of determination ($R^2 = 0.301$) shows that breakfast habits and concentration explain 30.1% of the variance in PJOK learning achievement, indicating moderate explanatory power (Peiris et

al., 2022; Peña-Jorquera et al., 2021). While both variables are important predictors, a substantial proportion of learning achievement is influenced by other factors, such as teaching methods, learning facilities, students' motivation, physical fitness levels, and socio-environmental support. Future studies should incorporate these factors to develop a more comprehensive explanatory model (Gao et al., 2021; Masoomi et al., 2020).

In addition, this study emphasizes the need to critically consider the limitations of self-reported breakfast habits and the concentration test. Students' responses may be affected by recall bias or social desirability, while concentration assessments in classroom settings might be influenced by environmental distractions. Acknowledging these potential biases is essential for interpreting the findings accurately (Roshita et al., 2021; Metwally et al., 2020).

Moreover, the study highlights practical implications for schools, teachers, and parents. Schools can implement nutrition education programs or school breakfast initiatives to improve students' energy levels, while teachers can structure lessons with short breaks or engaging activities to sustain concentration during PJOK lessons. Parents also play a vital role in ensuring that children consume nutritious breakfasts before school (Kawabata et al., 2021; Simarmata & Pariama, 2025).

Future research could expand on these findings by employing experimental designs to establish causal relationships and by using larger and more diverse samples to enhance generalizability. Additionally, exploring potential mediating or moderating variables, such as students' motivation, physical fitness, or classroom environment, could provide deeper insights into the complex factors influencing PJOK achievement (Hou et al., 2020; Masini et al., 2023).

Finally, integrating qualitative methods, such as observations or interviews, could complement quantitative findings by capturing students' perspectives on breakfast habits, concentration challenges, and learning experiences. This mixed-method approach could inform more holistic interventions to improve PJOK learning outcomes and student well-being (Christiana et al., 2024; Wote et al., 2022).

In conclusion, regular breakfast habits and high levels of concentration significantly contribute to PJOK learning achievement. These findings not only confirm prior research linking nutrition and attention to academic performance but also extend the evidence to physical education contexts in Indonesian junior high schools, emphasizing the combined role of physical readiness and psychological focus (Guirado et al., 2021; Oftedal et al., 2024). Implementing strategies that address both nutritional and cognitive factors can enhance learning outcomes and support students' overall development.

Conclusions

Based on the results of this study, it can be concluded that breakfast habits and concentration have a significant effect on students' learning achievement in Physical Education, Sports, and Health at SMPN 1 Pariaman. Regular breakfast consumption contributes positively to students' physical readiness and energy levels, while good concentration supports effective participation and understanding during learning activities. Both variables independently and simultaneously influence learning achievement, indicating that physical and psychological readiness play an important role in supporting successful learning outcomes in Physical Education, Sports, and Health. Therefore, improving students' breakfast habits and concentration is essential for enhancing learning achievement in this subject.

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