

Exercise, Nutrition, And Love Of Learning As Predictors Of Critical Thinking Skills In Elementary School Students: Evidence From Indonesia's Seven Habits Framework

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Abstract

Critical thinking is a foundational twenty-first-century competency, yet international assessments continue to show Indonesian students trailing global benchmarks, prompting renewed attention to the everyday, non-academic habits that may underlie children's cognitive development. This study tested whether exercise habits, nutritious eating, and love of learning -- three of the habits foregrounded in Indonesia's national Seven Habits of Great Indonesian Children framework -- jointly and individually predict the critical thinking skills of sixth-grade elementary students. Using an ex post facto, associative quantitative design, data were collected via Likert-scale questionnaires from all 38 sixth-grade students (saturated sampling) at a public elementary school and analyzed with multiple linear regression in IBM SPSS Statistics 26. All three predictors significantly and positively predicted critical thinking: exercise habit ($B = 0.275$, $t = 2.511$, $p = .017$, standardized beta = .250), nutritious eating ($B = 0.384$, $t = 3.767$, $p = .001$, standardized beta = .397), and love of learning ($B = 0.262$, $t = 2.997$, $p = .005$, standardized beta = .377). Nutritious eating was the dominant predictor. Together, the three variables significantly predicted critical thinking, $F(3, 34) = 59.140$, $p < .001$, explaining 83.9% of its variance ($R\text{-squared} = .839$; adjusted

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R-squared = .825). Diagnostic testing confirmed normally distributed residuals, no multicollinearity (tolerance > .29, VIF < 3.4 for all predictors), and no heteroscedasticity. The findings suggest that cultivating children's critical thinking benefits from attention to physical and dispositional habits, not only classroom pedagogy, with implications for whole-child education policy in comparable elementary school systems worldwide.

Keywords: Exercise Habit; Nutritious Eating; Love of Learning; Critical Thinking; Character Education.

INTRODUCTION

Critical thinking -- the capacity to analyze, evaluate, and reason through problems -- is a core competency education systems worldwide must cultivate. Yet international assessments continue to show many developing-country school systems trailing global benchmarks; the OECD's Programme for International Student Assessment places Indonesian students' mathematics, science, and reading performance well below the international average (OECD, 2023). Much of the policy response has focused on classroom pedagogy, but a growing body of evidence suggests children's cognitive performance is also shaped by everyday physical and dispositional habits outside the lesson itself.

Indonesia's Ministry of Education has responded by promoting the Seven Habits of Great Indonesian Children, a national character-education framework that includes regular exercise, nutritious eating, and love of learning among the habits children are encouraged to internalize (Universitas Negeri Surabaya, 2025). The framework assumes these habits jointly support children's development, yet quantitative tests -- particularly ones examining several habits jointly rather than in isolation -- remain scarce. At a public elementary school in a regency of South Sulawesi Province, Indonesia, preliminary observation found that as the program was newly introduced, roughly 40% of sixth-grade students still struggled with consistent exercise and study routines, and economic constraints limited many students' access to balanced meals. This study therefore examined whether exercise habit, nutritious eating, and love of learning -- individually and jointly -- predict sixth-grade students' critical thinking skills.



LITERATURE REVIEW

Physical Habits and Cognitive Development

Exercise habit is commonly operationalized through indicators of cardiovascular and respiratory function and aerobic capacity (Djurdjević et al., 2024), and prior classroom-based evidence links regular exercise to improved physical condition, concentration, and mood among elementary students (Al Farisi & Sariakin, 2025). Nutritious eating is similarly framed within the Seven Habits framework as a foundation for physical health and cognitive capacity (Universitas Negeri Surabaya, 2025); because higher-order cognitive processes depend on stable neural energy supply, inconsistent nutrition -- including skipped breakfast -- has been linked to reduced learning concentration (Salsabila & Nareswari, 2023).

Love of Learning, Critical Thinking, and Prior Findings

Love of learning is indexed by enjoyment, curiosity, attentiveness, engagement, and a sense of responsibility toward one's own learning (Wahab & Rosnawati, 2021), and is theorized as a strong intrinsic driver of the exploratory behavior from which critical thinking develops. Consistent with this view, elementary students' learning interest has been linked to their mathematical critical-thinking ability (Ningrum et al., 2023), and community-based programs that deliberately cultivate love of learning have been shown to strengthen learners' independence (Nur'aeni, 2019). Broader evidence on Indonesia's Seven Habits framework suggests that when families and schools coordinate on cultivating these habits together, character and learning outcomes are stronger (Aisyah Nur Jannah et al., 2025; Haybi Septiani, 2020). Quantitative work integrating physical and dispositional habits as joint predictors of critical thinking specifically, however, remains limited, motivating the present study's combined regression approach.

METHOD

Research Design and Participants

This study used a quantitative, ex post facto associative design, which examines cause-effect relationships among variables as they naturally occur, without experimental manipulation (Widarto, 2013). Data were collected during the 2025/2026 odd semester at a public elementary school in a regency of South Sulawesi Province, Indonesia. The population comprised all sixth-grade students at the school; because a saturated sampling technique was applied, all 38 students in the population served as the study sample.



Instruments and Data Analysis

Four closed-ended, five-point Likert questionnaires measured exercise habit, nutritious eating, love of learning, and critical thinking skills. Item validity was assessed through Pearson product-moment item-total correlation (Arikunto, 2005; Umar, 2013), with every item found valid, and reliability, assessed through Cronbach's alpha, likewise met the accepted threshold of .60 for all instruments (alpha = .794 for exercise habit, .727 for nutritious eating, .827 for love of learning, and .807 for critical thinking; Sugiyono, 2014). Prior to hypothesis testing, classical assumption testing covered residual normality (One-Sample Kolmogorov-Smirnov test), multicollinearity (tolerance and VIF), and heteroscedasticity (visual inspection of the standardized residual scatterplot; Ghazali, 2019). Hypotheses were then tested through multiple linear regression, evaluated via the t-test for each predictor's partial effect, the F-test for the simultaneous effect, the coefficient of determination (R-squared), and comparison of standardized beta coefficients to identify the dominant predictor, all computed in IBM SPSS Statistics 26.

RESULTS AND DISCUSSION***Classical Assumption Testing***

Residuals were normally distributed: Kolmogorov-Smirnov significance values exceeded .05 for all four variables (exercise habit = .200, nutritious eating = .117, love of learning = .200, critical thinking = .200). Multicollinearity testing showed tolerance values of .476, .425, and .299 and VIF values of 2.102, 2.351, and 3.348 for exercise habit, nutritious eating, and love of learning respectively, within the accepted thresholds (tolerance > .10, VIF < 10). The standardized residual scatterplot showed no systematic pattern, indicating no heteroscedasticity.

Regression Results and Hypothesis Testing

Multiple linear regression, entering exercise habit (X1), nutritious eating (X2), and love of learning (X3) simultaneously, is summarized in Table 1.

Table 1. Multiple Regression Coefficients

Variable	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	0.013	1.231	-	0.010	.992	-	-

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Exercise Habit (X1)	0.275	0.110	.250	2.511	.017	.476	2.102
Nutritious Eating (X2)	0.384	0.102	.397	3.767	.001	.425	2.351
Love of Learning (X3)	0.262	0.088	.377	2.997	.005	.299	3.348

Table 2. Model Summary and Simultaneous (F) Test

R	R-squared	Adjusted R-squared	F	df	Sig.
.916	.839	.825	59.140	3, 34	<.001

All three predictors significantly and positively predicted critical thinking (X1: $t = 2.511$, $p = .017$; X2: $t = 3.767$, $p = .001$; X3: $t = 2.997$, $p = .005$), supporting the first three hypotheses. Comparing standardized beta coefficients -- the appropriate metric for ranking predictors measured on different item scales -- nutritious eating was the dominant predictor ($\beta = .397$), followed by love of learning ($\beta = .377$) and exercise habit ($\beta = .250$). Tested simultaneously, the three variables significantly predicted critical thinking, $F(3, 34) = 59.140$, $p < .001$ (Table 2), supporting the fourth hypothesis; the model explained 83.9% of the variance in critical thinking ($R\text{-squared} = .839$; adjusted $R\text{-squared} = .825$), leaving 16.1% attributable to factors outside the model.

DISCUSSION

Exercise habit's significant effect is consistent with evidence that regular physical activity strengthens students' physical condition, concentration, and mood (Al Farisi & Sariakin, 2025).

Nutritious eating's status as the dominant predictor is consistent with the view that higher-order cognitive processes require a stable supply of neural energy and micronutrients, so inconsistent nutrition -- including skipped breakfast -- undermines the concentration reasoning tasks depend on (Salsabila & Nareswari, 2023).

Love of learning's significant contribution aligns with evidence linking elementary students' learning interest directly to their critical-thinking ability (Ningrum et al., 2023) and with programs showing that cultivating this habit strengthens independent engagement with new material (Nur'aeni, 2019). That all three habits remained significant when entered jointly, together explaining nearly 84% of the variance, supports treating them as complementary rather than substitutable, consistent with the Seven Habits framework's premise that physical and



dispositional habits jointly build children's capacities (Aisyah Nur Jannah et al., 2025), reinforcing the case for whole-child education policy beyond classroom pedagogy alone (OECD, 2023).

CONCLUSION

This study found that exercise habit, nutritious eating, and love of learning each significantly and positively predicted the critical thinking skills of sixth-grade elementary students, both individually and jointly. Nutritious eating was the dominant predictor, followed by love of learning and exercise habit, and the three variables together explained 83.9% of the variance in critical thinking. These findings support the Seven Habits framework's underlying premise that physical and dispositional habits jointly, rather than singly, cultivate children's higher-order cognitive capacities, with plausible relevance to whole-child education policy in other elementary school systems.

RECOMMENDATIONS

Schools and local education authorities are encouraged to integrate structured exercise routines, nutrition-support programs, and curiosity-driven learning activities into daily school life rather than treating them as separate initiatives, particularly for students from economically constrained households. Future research should extend this design with larger, multi-school samples and longitudinal designs capable of testing whether habit formation causally precedes gains in critical thinking over time.

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