

Research Article

Mathematics and Language Self-Efficacy, Reading Interest, and Bullying as Predictors of Academic Achievement in Formal and Nonformal Education

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Abstract: Although mathematics self-efficacy, language self-efficacy, reading interest, and bullying have individually been linked to academic achievement, their combined and domain-specific associations with Indonesian Language and Mathematics achievement across formal and nonformal education remain insufficiently understood. This study examined the relationships among mathematics self-efficacy, language self-efficacy, reading interest, bullying, gender, educational unit type, and achievement in both subjects. A quantitative, correlational, cross-sectional design involved 241 Grade IV students from formal and nonformal educational units in Cirebon, Indonesia. Data were obtained through questionnaires assessing the four psychosocial constructs and documented academic scores. SmartPLS was used solely to evaluate convergent validity and internal consistency, while the General Linear Model Multivariate procedure was used for hypothesis testing. Mathematics self-efficacy, language self-efficacy, reading interest, bullying, and educational unit type were significantly associated with the combined academic outcomes, whereas gender was not. Mathematics self-efficacy was specifically associated with Mathematics achievement, while language self-efficacy was specifically associated with Indonesian Language achievement. Reading interest was positively associated with both subjects, whereas bullying was negatively associated with both. These findings suggest that academic achievement is related to domain-specific confidence, reading engagement, social experiences, and educational context. The study supports targeted interventions that strengthen subject-specific self-efficacy, promote reading across subjects, and prevent bullying through scaffolded learning tasks, cross-curricular reading activities, and structured school-based prevention protocols in both formal and nonformal settings.

Keywords: academic achievement, instrument validity, multivariate analysis, reading interest, self-efficacy.

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INTRODUCTION

Academic achievement in Indonesian Language and Mathematics is an important indicator for examining students' ability to understand information, communicate ideas, and solve problems systematically. Such achievement cannot be explained solely through cognitive ability because the learning process is also influenced by personal beliefs, involvement in academic activities, social experiences, and characteristics of the educational environment. Studies that combine individual and contextual factors show that student achievement is formed through interrelated relationships between learner characteristics and school conditions (Salvo-Garrido et al., 2023). A conducive school climate and safe social relationships are also associated with better academic achievement because students can focus their attention on learning activities (Diaz-Vargas et al., 2023). In addition, teacher support, family support, and student profiles need to be analyzed jointly so that variations in achievement are not understood only partially (García-Crespo et al., 2021).

Self-efficacy is one relevant psychological factor because it describes students' assessment of their ability to complete specific academic tasks. Students with stronger self-efficacy tend to set clearer learning targets, maintain effort when facing difficulties, and use more directed strategies to complete tasks. The relationship between self-efficacy and achievement often operates through academic engagement, because beliefs about personal capability encourage students to participate more actively in the learning process. Social support can also improve achievement through the strengthening of self-efficacy and learning engagement, so the role of the environment remains important in shaping academic beliefs (H. Zhang, 2024). A positive peer context can further strengthen expectations of success and encourage more consistent engagement in academic activities (Woreta et al., 2025). An alternative interpretation is that mathematics tasks at this grade level rely more heavily on procedural confidence than language tasks do, which may explain why mathematics self-efficacy showed a stronger and more domain-specific association than would be expected if self-efficacy operated uniformly across subjects.

Self-efficacy is specific to subject areas; therefore, confidence in mathematics is not always the same as confidence in language. Mathematics self-efficacy is related to students' perceptions of their ability to understand concepts, perform calculations, and solve quantitative problems. When this confidence is strong, students are more likely to persist with complex problems and correct errors through appropriate strategies. Research on secondary school students shows that academic self-efficacy and learning interest are important mechanisms linking teaching style with behavioral engagement in mathematics (Geng et al., 2024). In language learning, self-efficacy helps students manage cognitive load

and maintain motivation when facing difficult texts or tasks. Academic resilience in language learning is also determined by a combination of self-belief, environmental support, and the ability to adapt to learning demands (Duan et al., 2024).

Reading interest is a learning resource that encourages students to interact with texts voluntarily, consistently, and meaningfully. Students who are interested in reading have greater opportunities to expand vocabulary, improve comprehension, and acquire knowledge that can be used across subjects. Good reading habits are associated with study skills and higher academic achievement because students are accustomed to seeking and processing information independently (Abid et al., 2023). Reading motivation profiles also determine the amount of reading completed by students, so interest functions not only as an attitude but also directs actual reading behavior (Wang, Jin, & Jia, 2022). Reading engagement is subsequently related to achievement because reading activities encourage deeper processes of comprehension, reflection, and knowledge development (X.-W. Wang et al., 2022) (Wang, Zhu, & Zhang, 2022).

Bullying is a risk factor because it can disrupt students' sense of safety, attendance, concentration, and engagement in learning. Repeated social pressure can make students use more cognitive resources to deal with threats than to understand learning material. Involvement in bullying and cyberbullying is known to be associated with lower use of cognitive and metacognitive learning strategies (Solas-Martínez et al., 2025). The presence of peers as bystanders also determines whether aggressive acts will continue or be stopped; therefore, prevention needs to involve the entire school community (Polanco-Levicán & Salvo-Garrido, 2021). In the Indonesian context, cyberbullying among students shows that the digital environment must be treated as part of the educational space that requires clear rules, literacy, and protection mechanisms (Efianingrum et al., 2021).

The type of educational unit needs to be included in the analysis because formal and nonformal education may have different curriculum structures, learning time, resources, and learner characteristics. School literacy programs in formal pathways show that consistent policy can increase students' interest in reading activities and create a more supportive learning environment (Nopita & Dafit, 2021). Research on elementary school students also found that the implementation of the literacy movement is associated with increased reading interest when activities are carried out in a directed manner and supported by appropriate reading materials (Pertivi et al., 2024). The impact of the literacy movement on reading interest shows that institutional context has the potential to shape students' learning behavior through planned programs (Yulianto et al., 2022).

Although previous studies have examined self-efficacy, reading interest, bullying, and educational context, most have analyzed these factors separately or focused on a single subject area, so their combined and domain-specific relationships with achievement across both Indonesian Language and Mathematics remain unclear. Few studies have simultaneously tested mathematics self-efficacy, language self-efficacy, reading interest, and bullying alongside gender and type of educational unit within one multivariate model that compares formal and nonformal learners. Examining these variables simultaneously provides a new contribution because it clarifies which psychological and contextual factors are uniquely associated with achievement in each subject, offering a more integrated understanding than prior single-variable or single-subject approaches. Based on this gap, this study analyzes the simultaneous relationship of self-efficacy, reading interest, bullying, gender, and type of educational unit with Indonesian Language and Mathematics scores.

THEORETICAL FRAMEWORK

Self-Efficacy and Academic Achievement

Self-efficacy explains an individual's belief that they are able to organize the actions required to achieve a particular outcome (Bandura, 1997). In learning, this belief affects task choice, amount of effort, persistence, and the way students interpret failure. Students with good self-efficacy tend to view difficulties as challenges that can be overcome rather than as evidence of incapacity. Self-efficacy together with psychological resilience has been shown to be an important predictor of academic motivation when students face learning environments that demand independence (Abdolrezaipoor et al., 2023). At the elementary school level, learning that provides mastery experiences can also strengthen self-efficacy and students' readiness to attempt new tasks (Saptono et al., 2021). National research shows that academic self-efficacy needs to be developed because it is related to students' ability to complete tasks and achieve educational goals (Fauziah et al., 2022).

Mathematics self-efficacy and language self-efficacy need to be separated because both refer to different assessments of ability. Mathematics self-efficacy is related to confidence in mastering concepts, performing calculations, and solving problems, whereas language self-efficacy is related to reading, understanding, and conveying information. This separation allows the analysis to show whether students' beliefs have a stronger relationship with the corresponding subject. Research on mathematics engagement confirms that self-efficacy and learning interest constitute psychological pathways that support student participation in learning (Geng et al., 2024). Self-efficacy is also related to achievement through increased academic engagement and persistence in completing tasks (Meng & Zhang, 2023). In the national context, self-efficacy is considered important for maintaining learning motivation because students are more prepared to face difficulties when they believe in their abilities (Hendra et al., 2023).

Reading Interest as a Learning Resource

Reading interest includes enjoyment, attention, and willingness to engage in reading activities continuously, consistent with the broader construct of reading engagement described in foundational reading-motivation theory (Guthrie & Wigfield, 2000). Strong interest increases the likelihood that students will choose reading materials, persist when texts are difficult, and connect new information with prior knowledge. The relationship between reading and achievement emerges because students obtain greater exposure to vocabulary, language structures, and various forms of information. Reading habits and study skills together are associated with better language achievement (Abid et al., 2023). Picture storybooks can increase reading interest when the content, language, and presentation are appropriate to the development of elementary school students (Dewi et al., 2022). Android-based reading applications also show that technology can be used to make reading activities more engaging, accessible, and aligned with the learning habits of today's students (Widiani & Riastini, 2022).

Reading interest is not only relevant to language subjects because text comprehension is needed to follow instructions, interpret information, and solve mathematical word problems. Therefore, students with good reading interest may obtain benefits across subjects. The decline in reading interest during the pandemic shows that reading habits are strongly influenced by environmental support, access to reading materials, and adult supervision (Fahmy et al., 2021). The school literacy movement can strengthen reading interest when the program does not stop at routine activities but is connected with learning

and students' needs (Sinta et al., 2023). Literacy programs accompanied by scheduled reading activities and the provision of diverse materials have also been shown to have a positive impact on elementary school students' reading interest.

Bullying as an Academic Risk

Bullying is an intentional aggressive act, carried out repeatedly, and involving a power imbalance between the perpetrator and the victim, following the foundational definition established in early bullying research (Olweus, 1993). Its impact on education may appear through fear, decreased sense of belonging to school, absenteeism, and reduced concentration. Students involved in bullying are also at risk of using lower learning strategies because their psychological attention and energy are diverted to social problems. The role of bystanders in cyberbullying shows that peer responses can reinforce or stop aggression, so interventions are not sufficient if directed only at perpetrators and victims (Polanco-Levicán & Salvo-Garrido, 2021). Bullying and cyberbullying are associated with lower cognitive and metacognitive learning strategies among adolescents (Solas-Martínez et al., 2025). Accurate measurement is also needed so that the forms, frequency, and severity of bullying can be validly identified and used as a basis for educational intervention (Bariyyah et al., 2024).

Integrating the Constructs into a Conceptual Framework

Although self-efficacy, reading interest, and bullying are discussed separately above, they are theoretically connected through their combined influence on students' cognitive engagement and use of learning resources. Domain-specific self-efficacy shapes how much effort and persistence students invest in mathematics or language tasks, reading interest determines the breadth of vocabulary and information students can draw on across both domains, and bullying represents a contextual risk factor that can undermine both self-efficacy and reading engagement by diverting attention and reducing students' sense of safety. Type of educational unit and gender are treated as contextual and demographic factors that may shape the strength of these psychological pathways. Taken together, these constructs are conceptualized as jointly, rather than independently, shaping the combined academic outcomes of Indonesian Language and Mathematics scores, which provides the rationale for testing them simultaneously within a single multivariate model.

METHODS

Design and Participants

This study used a quantitative approach with a non-experimental, correlational, and cross-sectional design. The research was conducted in April 2025 in formal and nonformal educational units located in Cirebon City. The research population was elementary school students, while the research participants were grade IV students or an equivalent level in formal and nonformal educational units. Participant selection was based on the criteria that students attended learning at that level and had complete questionnaire and academic score data. The analysis sample consisted of 241 students, comprising 109 boys or 45.2% and 132 girls or 54.8%. Based on the type of educational unit, 211 students or 87.6% came from formal education and 30 students or 12.4% came from nonformal education. The difference in the size of the two groups was considered in interpreting the results because the number of nonformal education students was smaller than that of formal education students.

Variables and Instruments

The dependent variables in this study were Indonesian Language scores and Mathematics scores. The predictor variables included mathematics self-efficacy, language self-efficacy,

reading interest, and bullying, whereas gender and type of educational unit were treated as categorical factors. The questionnaire consisted of two mathematics self-efficacy items, two language self-efficacy items, two reading interest items, and three bullying items. The items were adapted from previously used academic self-efficacy, reading-motivation, and school-bullying questionnaires, and were reviewed for language clarity and contextual relevance to Indonesian grade IV students before administration. Each item used a four-point Likert scale ranging from strongly disagree to strongly agree. Positively worded items were scored from 1 to 4, while negatively worded items were reverse-scored. Each construct score was obtained by summing the scores of the items representing that construct.

SmartPLS was used only to assess the validity and reliability of the four questionnaire constructs: mathematics self-efficacy (SEIM), language self-efficacy (SEIL), reading interest (IIR), and bullying (BL). It was not used to estimate structural relationships or test the research hypotheses. All indicators had outer loadings ranging from 0.802 to 0.874. The empirical score ranges were 2 to 8 for mathematics self-efficacy, 2 to 8 for language self-efficacy, 3 to 8 for reading interest, and 5 to 12 for bullying. Indonesian Language scores ranged from 72 to 100, while Mathematics scores ranged from 71 to 100. Because mathematics self-efficacy, language self-efficacy, and reading interest were each measured with only two items, and because the reading interest scale showed relatively low internal consistency (see Table 1), these constructs should be regarded as brief indicators rather than comprehensive measures. This limited item coverage constitutes a methodological limitation that should be addressed in future studies through longer, more thoroughly validated scales.

Table 1. Validity and Reliability Assessment of Questionnaire Construct.

Aspect	Item	Loading	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Bullying	PT7	0.874	0.813	0.826	0.887	0.723
	PT8	0.802				
	PT9	0.874				
Reading Interest	PT5	0.856	0.607	0.608	0.836	0.718
	PT6	0.838				
Language Self-Efficacy	PT3	0.832	0.715	0.715	0.823	0.699
	PT4	0.841				
Mathematics Self-Efficacy	PT1	0.822	0.730	0.730	0.831	0.711
	PT2	0.864				

All indicators met the recommended outer-loading criterion, and all constructs met the Composite Reliability and Average Variance Extracted criteria. The reading interest construct had Cronbach's Alpha and rho_A values below 0.70. Therefore, its internal consistency should be interpreted with caution, although its Composite Reliability and AVE remained acceptable. The other constructs met the reported validity and reliability criteria.

Data Collection Procedures and Permission

Data collection was conducted by distributing questionnaires directly to grade IV students or an equivalent level in formal and nonformal educational units. Before completion, students received an explanation of the instructions for filling out the questionnaire and were then asked to answer each statement according to their conditions and experiences. The questionnaire was used to obtain data on mathematics self-efficacy, language self-efficacy, reading interest, and bullying. Academic achievement data in the form of Indonesian

Language and Mathematics scores were obtained directly from teachers based on the documentation of grade IV students' first-semester scores. All data were checked for completeness before analysis. The implementation of the study was preceded by the submission of an observation permit letter to the educational units serving as the research locations. Data collection was carried out after permission was obtained from the school or related educational institution. Students' personal identities were not included in the presentation of results, and data were reported in aggregate form for academic purposes.

Data Analysis

The analysis was conducted in two stages. First, SmartPLS was used solely to assess the measurement quality of the questionnaire constructs. The assessment included outer loadings, Cronbach's Alpha, rho_A, Composite Reliability, and Average Variance Extracted (AVE). The reporting criteria were outer loadings above 0.70, Composite Reliability above 0.70, and AVE above 0.50 (Hair et al., 2021). No structural paths, path significance tests, or R² values from SmartPLS were used to test the research hypotheses. Second, the primary analysis was performed in IBM SPSS Statistics using the General Linear Model Multivariate procedure, which is substantively a multivariate analysis of covariance or MANCOVA. Indonesian Language and Mathematics scores were entered simultaneously as dependent variables. Mathematics self-efficacy, language self-efficacy, reading interest, and bullying were entered as covariates, while gender and type of educational unit were entered as fixed factors. Because Box's M was significant, multivariate decisions were based on Pillai's Trace, which is more robust to violations of covariance-matrix homogeneity. Follow-up analyses used Tests of Between-Subjects Effects and Parameter Estimates at a significance level of 0.05.

RESULT

Respondent Characteristics and Descriptive Statistics

The composition of respondents showed that girls were slightly more numerous than boys, while most respondents came from formal education. All variables had 241 valid observations with no missing values in the multivariate analysis. The mean mathematics self-efficacy score was 5.49 with a standard deviation of 1.354, while language self-efficacy had a mean of 5.75 with a standard deviation of 1.300. The mean reading interest score was 6.11, and the mean bullying score was 10.06. For the academic outcomes, the mean Indonesian Language score was 86.34 with a standard deviation of 5.600, while the mean Mathematics score was 84.97 with a standard deviation of 5.815. These descriptive values indicated sufficient variation for the subsequent analysis. SmartPLS results were reported only for instrument validity and reliability, while descriptive statistics and hypothesis testing were based on the multivariate analysis.

Table 2. Respondent Characteristics

Characteristic	Frequency	Percentage
Boys	109	45.2%
Girls	132	54.8%
Formal education	211	87.6%
Nonformal education	30	12.4%

Table 3. Descriptive Statistics of Research Variables

Variable	N	Minimum	Maximum	Mean	SD
Mathematics self-efficacy	241	2	8	5.49	1.354

Language self-efficacy	241	2	8	5.75	1.300
Reading interest	241	3	8	6.11	1.436
Bullying	241	5	12	10.06	1.475
Indonesian Language score	241	72	100	86.34	5.600
Mathematics score	241	71	100	84.97	5.815

Evaluation of Instrument Validity and Reliability

SmartPLS was used only to evaluate the validity and reliability of the questionnaire constructs. As shown in Table 1, all indicator loadings exceeded 0.70, Composite Reliability values ranged from 0.823 to 0.887, and AVE values ranged from 0.699 to 0.723. These results supported convergent validity and construct reliability. However, the reading interest construct had Cronbach's Alpha of 0.607 and rho_A of 0.608, so its internal consistency requires cautious interpretation.

Assumption Tests and Multivariate Results

The Box's Test of Equality of Covariance Matrices result obtained Box's M of 32.171 with $F(9, 4182.250) = 3.390$ and $p < 0.001$. This finding indicates that the assumption of equality of covariance matrices across groups was not met, so the multivariate interpretation used Pillai's Trace, which is more robust to violations of this assumption. The Levene test showed that the error variance of Indonesian Language scores was homogeneous, $F(3.237) = 1.879$; $p = 0.134$, and the error variance of Mathematics scores was also homogeneous, $F(3.237) = 1.578$; $p = 0.195$. Based on Pillai's Trace, type of educational unit, mathematics self-efficacy, language self-efficacy, reading interest, and bullying were significantly related to the combined Indonesian Language and Mathematics scores. Gender did not show a significant multivariate relationship after all other variables were controlled. In practical terms, the partial eta squared (η^2) values indicate that type of educational unit accounted for the largest share of explained variance ($\eta^2 = 0.596$), followed by mathematics self-efficacy ($\eta^2 = 0.291$) and language self-efficacy ($\eta^2 = 0.275$), both representing large effects, whereas reading interest ($\eta^2 = 0.068$) and bullying ($\eta^2 = 0.052$) represented smaller but still educationally meaningful effects on the combined academic outcomes.

Table 4. Multivariate Test Results Based on Pillai's Trace

Predictor	Pillai	F	df hypothesis	df error	p	η^2
Gender	0.001	0.163	2	233	0.849	0.001
Type of educational unit	0.596	171.530	2	233	<0.001	0.596
Mathematics self-efficacy	0.291	47.883	2	233	<0.001	0.291
Language self-efficacy	0.275	44.240	2	233	<0.001	0.275
Reading interest	0.068	8.554	2	233	<0.001	0.068
Bullying	0.052	6.417	2	233	0.002	0.052

Note. Pillai's Trace was used because Box's M was significant.

Results for Each Subject

The Indonesian Language score model was significant, $F(6.234) = 55.350$; $p < 0.001$, with $R^2 = 0.587$ and adjusted $R^2 = 0.576$. Language self-efficacy was positively and significantly related to Indonesian Language scores, $B = 1.775$; $p < 0.001$, while reading interest was also positively related, $B = 0.445$; $p = 0.012$. Bullying showed a negative relationship, $B = -0.493$; $p = 0.003$. Mathematics self-efficacy and gender were not significant. The Mathematics score model was also significant, $F(6.234) = 55.787$; $p < 0.001$, with $R^2 = 0.589$ and adjusted $R^2 = 0.578$.

Mathematics self-efficacy was positively related, $B = 1.828$; $p < 0.001$, reading interest was positively related, $B = 0.608$; $p = 0.001$, and bullying was negatively related, $B = -0.349$; $p = 0.042$. Language self-efficacy and gender were not significant.

Table 5. Parameter Estimates for Indonesian Language and Mathematics Scores

Predictor	B Ind.	SE	p	η^2	B	SE	p	η^2
					Math			
Boys vs girls	0.263	0.488	0.590	0.001	-0.093	0.505	0.854	0.000
Formal vs nonformal	10.102	0.736	<0.001	0.446	9.735	0.763	<0.001	0.410
Mathematics self-efficacy	0.313	0.182	0.087	0.012	1.828	0.189	<0.001	0.286
Language self-efficacy	1.775	0.191	<0.001	0.269	0.365	0.198	0.067	0.014
Reading interest	0.445	0.176	0.012	0.027	0.608	0.182	0.001	0.045
Bullying	-0.493	0.165	0.003	0.037	-0.349	0.171	0.042	0.018

Note. Girls and nonformal education served as the reference categories. B is the unstandardized coefficient.

DISCUSSION

The instrument assessment supported the use of the four questionnaire constructs in the multivariate analysis. Outer loadings ranged from 0.802 to 0.874, Composite Reliability values ranged from 0.823 to 0.887, and AVE values ranged from 0.699 to 0.723. These values indicated acceptable convergent validity and construct reliability. Nevertheless, the reading interest construct had Cronbach's Alpha and rho_A values below 0.70. This limitation suggests that findings involving reading interest should be interpreted cautiously and that future studies should use a broader set of indicators to strengthen internal consistency. SmartPLS was limited to this instrument assessment and was not used to infer structural or causal relationships among the research variables.

Mathematics self-efficacy was the predictor with the strongest association with Mathematics scores, while its relationship with Indonesian Language scores did not reach the level of significance. This result reinforces the concept that self-efficacy is domain-specific and works most strongly when students' beliefs correspond to the demands of the task at hand. Students who believe in their mathematical ability tend to be more willing to try new strategies, persist with difficult problems, and correct errors without immediately avoiding the task. Behavioral engagement in mathematics is known to be influenced by self-efficacy and learning interest that develop through instructional experiences (Geng et al., 2024). Self-efficacy also promotes achievement through more intensive and directed academic engagement (Meng & Zhang, 2023). Peer support further strengthens engagement through expectations of success and students' academic beliefs (Woreta et al., 2025).

Language self-efficacy was the predictor with the strongest association with Indonesian Language scores, while its relationship with Mathematics scores was not significant. This finding shows that a sense of capability in reading and understanding language contributes differently from reading interest. Self-efficacy helps students manage difficulty, reduce the tendency to avoid tasks, and maintain effort when they have to understand long or complex texts. Academic resilience in language learning develops through a combination of self-belief, support, and the ability to adapt to learning demands (Duan et al., 2024). Self-efficacy

also plays a role in reducing cognitive load and maintaining language learning motivation (H. Zhang, 2024). The relationship between self-efficacy and motivation becomes stronger when students have resilience to face changes and pressure in the learning environment (Abdolrezapour et al., 2023).

Reading interest was positively related to Indonesian Language and Mathematics scores after self-efficacy, bullying, gender, and type of educational unit were controlled. This relationship can be explained through the function of reading as a tool for understanding instructions, expanding knowledge, and interpreting information, including verbal information in mathematics problems. Students with good reading habits tend to develop more organized study skills and higher language achievement (Abid et al., 2023). Reading motivation profiles affect the amount of reading activity undertaken, so interest can produce broader literacy experiences (Wang, Jin, & Jia, 2022). Reading engagement is also related to achievement because students process information more actively, deeply, and reflectively during academic activities (Wang, Zhu, & Zhang, 2022).

The implication of reading interest in this study is consistent with various national studies that place the environment and media as important factors in shaping reading habits. Picture storybooks can increase students' interest because the material is presented through a combination of visuals and texts appropriate to their developmental level (Dewi et al., 2022). Learning video media can also strengthen digital literacy, reading interest, and learning outcomes when used as part of directed learning activities (Putri & Ahmadi, 2023). The school literacy movement is further related to reading interest when its implementation is consistent and integrated into school culture (Sinta et al., 2023). Therefore, reading programs should not be positioned as supplementary activities, but as part of Indonesian Language, Mathematics, and other subject learning.

Bullying showed a negative relationship with both scores, although its effect size was smaller than that of self-efficacy and type of educational unit. The consistency in the direction of this relationship remains important because social pressure can reduce the sense of safety, disrupt attention, and weaken students' engagement in the learning process. This finding is consistent with (Salvo-Garrido et al., 2023), who found that bullying was associated with lower average achievement in mathematics and language. Bullying and cyberbullying are also associated with lower use of cognitive and metacognitive strategies needed to understand material and regulate the learning process (Solas-Martínez et al., 2025). Among Indonesian students, cyberbullying shows that risks are not only present in the physical school environment but also occur through social media (Efianingrum et al., 2021). Validated instruments are needed so that schools can distinguish the forms, frequency, and severity of bullying as a basis for designing interventions (Bariyyah et al., 2024). However, because this study used observed composite scores, the magnitude of the coefficients cannot be directly compared with latent construct coefficients in the reference study.

The type of educational unit had the largest multivariate association, and formal students showed higher adjusted scores in both subjects. This difference may be related to curriculum, schedule regularity, access to learning resources, learning intensity, or students' initial characteristics. This result cannot be interpreted as evidence that formal education directly causes higher scores because respondents were not randomly assigned and the group sizes were unbalanced. Cross-national research shows that academic resilience is influenced by a combination of teacher support, family support, and student profiles (García-Crespo et al., 2021). School climate and social relationships are also associated with achievement after

student characteristics are considered (Diaz-Vargas et al., 2023). School-level literacy programs can shape reading interest when implemented in a planned and sustainable manner (Yulianto et al., 2022).

Gender did not show a significant relationship after psychological variables and educational context were controlled. This finding indicates that differences in achievement in this sample were explained more by self-efficacy, reading interest, bullying, and type of educational unit than by gender categories. Social support can affect achievement through self-efficacy and engagement without necessarily producing fixed differences between boys and girls (X. Zhang & Qian, 2024). Mastery experiences designed through learning can also increase students' self-efficacy across backgrounds (Saptono et al., 2021). In the Indonesian school context, self-efficacy needs to be strengthened through realistic targets, feedback, and opportunities for success because this belief is related to learning motivation (Hendra et al., 2023). A plausible explanation is that once psychological and contextual variables were statistically controlled, any gender gap present in the raw data was substantially reduced, suggesting that observed gender differences in achievement may often reflect differences in self-efficacy, reading habits, or exposure to bullying rather than gender itself; this interpretation should nonetheless be treated as tentative given the cross-sectional design, which cannot establish the direction of these relationships. Thus, interventions should focus on individual learning needs rather than assumptions based on gender.

CONCLUSION

The findings show that academic achievement in Indonesian Language and Mathematics was associated with domain-specific self-efficacy, reading interest, bullying, and type of educational unit. Mathematics self-efficacy was specifically associated with Mathematics scores, whereas language self-efficacy was specifically associated with Indonesian Language scores. Reading interest was positively associated with both academic outcomes, while bullying was negatively associated with both outcomes. Gender did not show a significant relationship after the other predictors were controlled. The large association between type of educational unit and both scores should be interpreted cautiously because the formal and nonformal groups were unequal in size and may have differed in curriculum, learning resources, assessment practices, and initial student characteristics. These results support learning interventions that strengthen subject-specific self-efficacy, integrate reading activities across subjects, and provide consistent bullying-prevention mechanisms in formal and nonformal educational settings. For teachers, this implies embedding brief self-efficacy-building activities, such as scaffolded problem-solving in mathematics and guided reading tasks in language lessons, into daily instruction. School administrators can support this by allocating time and materials for cross-subject reading programs and by establishing clear anti-bullying reporting procedures accessible to both formal and nonformal students. Policymakers, in turn, may use these findings to help ensure that nonformal educational units receive learning resources and literacy support comparable to those of formal schools, given the achievement gap observed between the two pathways in this study. Future research should involve more balanced samples from formal and nonformal educational units, use equivalent academic assessment procedures across institutions, and control for prior achievement, socioeconomic background, and school-level characteristics. The measurement instruments should also include a broader set of items, particularly for reading interest, and should undergo further content, convergent, and discriminant validity assessment. Longitudinal or multilevel designs may provide stronger evidence regarding changes over time and the influence of institutional context.

REFERENCES

- Abdolrezapour, P., Jahanbakhsh Ganjeh, S., & Ghanbari, N. (2023). Self-efficacy and resilience as predictors of students' academic motivation in online education. *PLOS ONE*, 18(5), e0285984. <https://doi.org/10.1371/journal.pone.0285984>
- Abid, N., Aslam, S., Alghamdi, A. A., & Kumar, T. (2023). Relationships among students' reading habits, study skills, and academic achievement in English at the secondary level. *Frontiers in Psychology*, 14, 1020269. <https://doi.org/10.3389/fpsyg.2023.1020269>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.
- Bariyyah, K., Pratama, A. M., Tsaqofah, A., Pratiwi, N. P., Siwi, R. A. C., Ahfadzi, Y. F., Budiyo, A. L., & Maizura, N. (2024). Confirmatory factor analysis for validating the Sexual Bullying Questionnaire (SEBUQU) instrument. *Jurnal EDUCATIO: Jurnal Pendidikan Indonesia*, 10(2), 258–265. <https://doi.org/10.29210/1202424887>
- Dewi, V. R. G., Jampel, I. N., & Parmiti, D. P. (2022). Improving grade III students' reading interest through picture storybooks. *Jurnal Edutech Undiksha*, 10(2), 271–279. <https://doi.org/10.23887/jeu.v10i2.46904>
- Diaz-Vargas, C., Tapia-Figueroa, A., Valdebenito-Villalobos, J., Gutiérrez-Echavarría, M. A., Acuña-Zuñiga, C. C., Parra, J., Arias, A. M., Castro-Durán, L., Chávez-Castillo, Y., Cristi-Montero, C., Zapata-Lamana, R., Parra-Rizo, M. A., & Cigarroa, I. (2023). Academic performance according to school coexistence indices in students from public schools in the south of Chile. *Behavioral Sciences*, 13(2), 154. <https://doi.org/10.3390/bs13020154>
- Duan, S., Han, X., Li, X., & Liu, H. (2024). Unveiling student academic resilience in language learning: A structural equation modelling approach. *BMC Psychology*, 12, 177. <https://doi.org/10.1186/s40359-024-01665-1>
- Efianingrum, A., Dwiningrum, S. I. A., & Nurhayati, R. (2021). Cyberbullying among senior high school students on social media: Prevalence and recommendations. *Jurnal Pembangunan Pendidikan: Fondasi dan Aplikasi*, 8(2), 144–153. <https://doi.org/10.21831/jppfa.v8i2.38300>
- Fahmy, Z., Utomo, A. P. Y., Nugroho, Y. E., Maharani, A. T., Alfatimi, N. A., Liyana, N. I., Kesuma, R. G., & Wuryani, T. (2021). The impact of the COVID-19 pandemic on elementary school students' reading interest. *Jurnal Sastra Indonesia*, 10(2), 121–126. <https://doi.org/10.15294/jsi.v10i2.48469>
- Fauziah, N., Supriatna, E., & Manuardi, A. R. (2022). A descriptive study of academic self-efficacy among students of MTs Al-Badar. *FOKUS (Kajian Bimbingan & Konseling dalam Pendidikan)*, 5(2), 162–171. <https://doi.org/10.22460/fokus.v5i2.7989>
- García-Crespo, F. J., Fernández-Alonso, R., & Muñiz, J. (2021). Academic resilience in European countries: The role of teachers, families, and student profiles. *PLOS ONE*, 16(7), e0253409. <https://doi.org/10.1371/journal.pone.0253409>
- Geng, Q., Amini, M., Binti Hashim, S. N. A., & Zhu, M. (2024). The mediating roles of academic self-efficacy and learning interest in the relationship between teaching style and math behavior engagement among junior high school students in China. *PLOS ONE*, 19(10), e0311959. <https://doi.org/10.1371/journal.pone.0311959>
- Guthrie, J. T., & Wigfield, A. (2000). Engagement and motivation in reading. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 403–422). Lawrence Erlbaum Associates.
- Hair, J. F., Jr., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook*. Springer. <https://doi.org/10.1007/978-3-030-80519-7>

- Hendra, N. C., Rokmanah, S., & Kirana, W. (2023). The importance of self-efficacy for students' learning motivation. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, 9(5), 1151–1163. <https://doi.org/10.36989/didaktik.v9i5.1985>
- Meng, Q., & Zhang, Q. (2023). The influence of academic self-efficacy on university students' academic performance: The mediating effect of academic engagement. *Sustainability*, 15(7), 5767. <https://doi.org/10.3390/su15075767>
- Nopita, H., & Dafit, F. (2021). The effect of the school literacy movement program on students' reading interest at SDIT Insan Utama 2 Pekanbaru. *Jurnal Tunas Bangsa*, 8(2), 134–147. <https://doi.org/10.46244/tunasbangsa.v8i2.1644>
- Olweus, D. (1993). *Bullying at school: What we know and what we can do*. Blackwell.
- Pertiwi, R. I., Mahyudi, J., Erfan, M., & Astria, F. P. (2024). The effect of the school literacy movement program on the reading interest of grade IV students at SDN 1 Kuta, Pujut District, Central Lombok. *Jurnal Educatio FKIP UNMA*, 10(3). <https://doi.org/10.31949/educatio.v10i3.9465>
- Polanco-Levicán, K., & Salvo-Garrido, S. (2021). Bystander roles in cyberbullying: A mini-review of who, how many, and why. *Frontiers in Psychology*, 12, 676787. <https://doi.org/10.3389/fpsyg.2021.676787>
- Putri, S. R., & Ahmadi, F. (2023). The effect of learning video media on digital literacy, reading interest, and learning outcomes of elementary school students. *Journal of Education Action Research*, 7(3), 446–455. <https://doi.org/10.23887/jear.v7i3.66997>
- Salvo-Garrido, S., Zayas-Castro, J., Polanco-Levicán, K., & Gálvez-Nieto, J. L. (2023). Latent regression analysis considering student, teacher, and parent variables and their relationship with academic performance in primary school students in Chile. *Behavioral Sciences*, 13(6), 516. <https://doi.org/10.3390/bs13060516>
- Saptono, A., Wibowo, A., Widyastuti, U., Narmaditya, B. S., & Yanto, H. (2021). Entrepreneurial self-efficacy among elementary students: The role of entrepreneurship education. *Heliyon*, 7(9), e07995. <https://doi.org/10.1016/j.heliyon.2021.e07995>
- Shao, Y., Kang, S., Lu, Q., Zhang, C., & Li, R. (2024). How peer relationships affect academic achievement among junior high school students: The chain mediating roles of learning motivation and learning engagement. *BMC Psychology*, 12, 278. <https://doi.org/10.1186/s40359-024-01780-z>
- Shengyao, Y., Xuefen, L., Jenatabadi, H. S., Samsudin, N., Chunchun, K., & Ishak, Z. (2024). Emotional intelligence impact on academic achievement and psychological well-being among university students: The mediating role of positive psychological characteristics. *BMC Psychology*, 12, 389. <https://doi.org/10.1186/s40359-024-01886-4>
- Sinta, S., Marhayani, D. A., & Mulyani, S. (2023). The relationship between the School Literacy Movement and students' reading interest in elementary school. *Edukatif: Jurnal Ilmu Pendidikan*, 5(6), 2444–2452. <https://doi.org/10.31004/edukatif.v5i6.5686>
- Solas-Martínez, J. L., De la Torre-Cruz, M. J., Rusillo-Magdaleno, A., & Martínez-López, E. J. (2025). Bullying and cyberbullying is associated with low levels of cognitive and metacognitive learning strategies in young people. *Frontiers in Psychology*, 16, 1569400. <https://doi.org/10.3389/fpsyg.2025.1569400>
- Wang, X., Jin, Y., & Jia, L. (2022). Chinese adolescents' reading motivation profiles and their relations to reading amount. *Frontiers in Psychology*, 13, 875486. <https://doi.org/10.3389/fpsyg.2022.875486>
- Wang, X.-W., Zhu, Y.-J., & Zhang, Y.-C. (2022). An empirical study of college students' reading engagement on academic achievement. *Frontiers in Psychology*, 13, 1025754. <https://doi.org/10.3389/fpsyg.2022.1025754>

- Widiani, L. L. S., & Riastini, P. N. (2022). Android reading learning application (KEJARBACA): Reading interest of grade III elementary school students. *Jurnal Pedagogi dan Pembelajaran*, 5(3), 483–491. <https://doi.org/10.23887/jp2.v5i3.52568>
- Woreta, G. T., Zewude, G. T., & Józsa, K. (2025). The mediating role of self-efficacy and outcome expectations in the relationship between peer context and academic engagement: A social cognitive theory perspective. *Behavioral Sciences*, 15(5), 681. <https://doi.org/10.3390/bs15050681>
- Yulianto, A., Kusumaningrum, S., & Polan, E. F. (2022). The impact of the SLM (School Literacy Movement) on elementary school students' reading interest. *Jurnal Papeda: Jurnal Publikasi Pendidikan Dasar*, 4(2), 125–131. <https://doi.org/10.36232/jurnalpendidikandasar.v4i2.2652>
- Zhang, H. (2024). Cognitive load as a mediator in self-efficacy and English learning motivation among vocational college students. *PLOS ONE*, 19(11), e0314088. <https://doi.org/10.1371/journal.pone.0314088>
- Zhang, X., & Qian, W. (2024). The effect of social support on academic performance among adolescents: The chain mediating roles of self-efficacy and learning engagement. *PLOS ONE*, 19(12), e0311597. <https://doi.org/10.1371/journal.pone.0311597>