

Research Article

Interpersonal Relationships and Academic Performance: Discriminant Analysis and ANOVA of Elementary School Students

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Abstract: Although academic achievement and interpersonal relationships are recognized as closely related components of elementary education, limited evidence has examined these relationships simultaneously among young Indonesian students. This study investigated whether relationships with parents, teachers, and peers differentiated levels of academic achievement among elementary school students. A total of 240 fourth- and fifth-grade students were classified into three achievement groups based on report card scores: adequate (<80 , $n = 89$), remarkable ($80-84.9$, $n = 83$), and exceptional (≥ 85 , $n = 68$). Interpersonal relationships were measured using a 21-item Likert-scale questionnaire ranging from 1 (strongly disagree) to 4 (strongly agree). Data were analyzed using confirmatory factor analysis, one-way ANOVA, canonical discriminant analysis, and multinomial logistic regression in SPSS and SmartPLS 4. The results showed no significant differences among achievement groups in parent relationships, $F(2, 237) = 0.38$, $p = .684$, $\eta^2 = .003$. Peer relationships showed a non-significant tendency, $F(2, 237) = 2.53$, $p = .082$, $\eta^2 = .021$. In contrast, teacher relationships differed significantly across achievement levels, $F(2, 237) = 3.33$, $p = .038$, $\eta^2 = .027$. Canonical discriminant analysis further indicated that the three relationship dimensions jointly differentiated the achievement groups, Wilks' $\lambda = .940$, $p = .023$. Overall classification accuracy reached 43.8%, with the highest accuracy obtained for the exceptional-achievement group. These findings provide comparative evidence that teacher-student relationships are the strongest and most consistent interpersonal differentiator of academic achievement, while parent and peer relationships show weaker distinctions across achievement levels.

Keywords: interpersonal relationship, academic performance, teacher relationship, peer relationship, parent relationship.

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INTRODUCTION

Academic performance is an important indicator of learning success, encompassing various factors, including students' cognitive abilities and social and relational variables in their environment (Roorda et al., 2020; Nurhasanah & Sobandi, 2016). Elementary school students spend most of their time in a school environment filled with social interactions with teachers, peers, and parents. According to (Kiuru, 2020), the quality of relationships in this environment is considered to have a significant impact on students' motivation, engagement, and academic achievement. Interpersonal relationships allow student experience psychological safety, belonging, and treated the same, thus promoting active participation in education as well as wholesome social engagements. In contrast, weaker interpersonal relationships may result in a decrease in self-assurance, the rise of social tensions, and barriers to students' ethical and emotional growth. (Citra et al., 2026). In the realm of education, the standard of personal relationship between educators and learners acts as a vital basis for reaching activate efficient bidirectional communication, a feeling of safety, and a balanced classroom environment (Lilik Sriyanti, 2025).

Social interactions that occur between individuals in a given environment are called interpersonal relationships. They cover the cognitive, emotional, and behavioral facets of relationships. The quality of kids' educational experiences is largely determined by the interpersonal relationships they have at school and in their families. Students' involvement, motivation, academic success, and social-emotional well-being are all correlated with the quality of their connections. Studying how students' connections with instructors, peers, and parents affect their academic performance is so essential. Relationships between teachers and students in the classroom are not always optimal. Not all educators are able to establish cordial and encouraging relationships with their pupils. Some educators still have a tendency to be authoritarian, insensitive to the emotional needs of their pupils, and more concerned with teaching the material than with fostering positive relationships.

Student feel less psychologically safe in the classroom as a result of these circumstances. As a result, this reduces their drive and level of participation. Many primary school pupils do not get the best support from their families. This is brought on by parents' hectic schedules, lack of social time, and lack of involvement in their kids' at-home schooling (Dearing et al., 2006). Students' independence and enthusiasm to learn may decline if parents do not offer both practical and emotional assistance. Positive peer connections are not always supported by social dynamics in the classroom. Social rejection, bullying, and unequal acceptability are still common occurrences for students, which can lower their sense of school community and have a detrimental effect on their academic achievement (Ogg et al., 2020).

Earlier research focused on examining the relationship between student' academic success and the quality of interpersonal relationships. These studies revealed a consistent link between positive teacher-student relationship and heightened engagement and academic performance across different educational levels. Additionally, it was shown that the quality of peer relationship, particularly in terms of acceptance and friendship, influences students' motivation and academic performance (Dearing et al., 2019). Found that parental warmth and involvement influence children's academic orientation and self-regulation. (Longobardi et al., 2020) also found that positive social relationships at school are linked to prosocial behavior and better academic outcomes. But there are still some gaps that need to be addressed. First, most previous studies examined the influence of each relationship dimension separately, without considering the multivariate and comparative contributions of all three dimensions together.

Second, discriminant analysis is still rarely used to determine which aspects of interpersonal relationships are most effective in distinguishing group academic achievement, even though this method has significant analytical relevance. Third, research specifically investigating how interpersonal relationships affect the academic performance of elementary school students in Indonesia is still very limited. As a result, it's impossible to make generalizations about other situations. By concurrently and comparatively analyzing teacher, peer, and parent relationships through canonical discriminant analysis in an Indonesian elementary school sample an analytical and contextual combination not previously studied together this study fills these gaps and advances previous single-relationship-focused research toward a multivariate, group-comparison approach pertinent to Indonesian educational practice.

One method for evaluating the factors influencing academic success is discriminant analysis. According to independent variables, discriminant analysis is a statistical approach that may be used to classify or cluster objects into numerous groups, guaranteeing that each item belongs to a single category and does not fit into any other (Shekhar, 2021). Students in primary school exhibit more sophisticated relationship development in the fourth and fifth grades. Their learning orientation changes from being totally dependent on parents to interactions that are more heavily affected by peers and teachers. In actuality, even when kids in the same school receive equal instruction, their actual academic attainment differs.

This raises the question: Does a student's achievement vary depending on how well they get along with their parents, teachers, and peers. Based on this, this study aims to find out whether students' relationships with teachers, peers, and parents can distinguish them into categories of fair, good, and very good academic achievement, both individually and together. Three hypotheses are proposed in this study: Hypothesis H1 suggests that the quality of the relationship with teachers significantly affects elementary school students' academic achievement; Hypothesis H2 suggests that the quality of the relationship with peers significantly affects elementary school students' academic achievement; and Hypothesis H3 suggests that the quality of the relationship with parents significantly affects elementary school students' academic achievement.

THEORETICAL FRAMEWORK

Interpersonal Relationship

Interpersonal relationships are defined by the bonds an individual shares with significant people in their life, demonstrated through emotional support, honesty, friendship, satisfaction in relationships significant, and minimal conflict and critic in social (Barbara,2013).

Interpersonal relationship consistent of framework of engagement and interaction between individuals, developed through communication, trust, and emotional connection. Interpersonal relationships denote the ways in which individuals connect and Engage with each other. Sullivan contends that personality is dynamic, evolving over time through engagement with the environment and across a person's lifetime, highlighting the importance of interaction in its growth (Jayawickreme et al., 2021). Students' interpersonal interactions are generally categorized into relationships with parents (student-parent), teachers (student-teacher), and peers (student-peer), as these relationships encompass the primary social contexts and characteristics of their daily activities (Wang et al., 2023).

According to recent research on interpersonal relationships, students' social ties should be taken into account in conjunction with their interactions with instructors, parents, and peers. Together, these three components establish a foundation of social support that influences kids' academic achievement (Valentin Emslander, 2024). The relationship between perceived social support from parents, peers, and teachers and implicit intelligence beliefs is not very clear. The relationship among students and teachers, peers, and parents are interconnected components in establishing a social support system that impacts students' motivation for learning, achievement, mental health, and educational success (Endedijk et al., 2022). When educators place themselves as friends, they encourage transparent dialogue and provide support when learners face challenges, that helps students feel at ease sufficient to talk about the difficulties they confront, enabling them to process a beneficial time during schooling (Adhi et al., 2025).

A study revealed that adolescents' beliefs about intelligence were linked to the amount of support or control they received from their parents (Wang et al., 2023). Peer relationship, which serve as a key aspect of social interactions in learning environments, pertain to the relationships established through engagements between people of comparable ages or similar stages of emotional or psychological growth (Zhang & Liu, 2025). Peer relationship denote the social interaction and ties that people create with their peers, involving interpersonal relationship, social feeling, communicative exchange (Shao et al., 2024). Social circles have a significant impact on the lives of young people. teenagers are keen to gain acceptance and be seen as peers in their social circle, both in educational settings and beyond the classroom. Consequently, they are inclined to act in manners characteristic of their age group. (Noorlaila & Permana, 2025).

Academic Performance

Academic performance is key metric for assessing the effectiveness of the educational process, reflecting how well students can meet established learning goals. Academic performance serves as an important metric for assessing effectiveness in the educational journey and demonstrating how well student meet established learning goals (Chung et al., 2022). Academic performances indicates the learning result students achieve via diverse assessments, and other evaluations that demonstrate the degree of skill mastery during the educational experience (Tindle et al., 2022). Academic performance significantly impacts a student self-worth, drive, and determination in tertiary education learning. Subpar academic results or elevated rates of failure rates might lead to intolerable levels of attrition, decreased graduate output and heightened expense if learning. This likewise diminishes chances for admission to students in higher education pursuing advanced degrees. Consequently, learners' scholarly achievement has consistently been a subject of fascination (Jayanthi et al.,

2014). Performances academic will be reached when both social and academic motivation mechanisms are taken into account.

Certainly, our analysis indicates that methods by which students combine and organize their academic and social environment in which learning occurs can significantly influence their success in school. We also suggest that the social environment in which will be reached when both social and social inspiration at educational institutions. Specifically, the teaching methods employed by educators as well since the nature of their interpersonal engagement with students seems to provide significant support for student' motivation and performance (Wentzel, 2017). Success is the most frequent result of an educational institution and the one that garners focus from its stakeholders. Student success, regardless academic or nonacademic fields, acts as an indicator of academic performance of school (Hakim & Fitrayansyah, 2024). Teachers who can cultivate a supportive and encouraging connections with their students are typically more successful in inspiring attain improved educational outcomes (Nurwahyuni, 2022).

In this study, academic results are grouped into three categories: sufficient (scores below 80), good (scores between 80 and 84.9), and very good (scores above 85). For discriminant analysis, these classifications serve as grouping variables. The quality of pupils' interpersonal relationships with instructors, peers, and parents may be empirically tested thanks to this categorization. When combined, the aforementioned constructs can be incorporated into a single conceptual framework: relationships between teachers, peers, and parents serve as three interrelated sources of social support that influence students' sense of psychological safety, belonging, and relatedness (Endedijk et al., 2022), which in turn support the motivation, engagement, and self-regulation that underpin academic performance (Kiuru, 2020). Hypotheses H1, H2, and H3 examined in this study are based on the expectation that these three relationship characteristics will collectively and differentially distinguish students' academic achievement levels rather than functioning as independent, unrelated predictors.

METHODS

Design

This study employs a quantitative survey approach to investigate how children' academic achievement levels might be classified into fair, good, and very good categories based on their connections with instructors, peers, and parents. This method was selected because it makes it distinguish to compare groups using common statistical techniques and assess latent characteristics in a methodical manner.

Location and Participant

Indonesian public elementary school served as the study's site. There were 240 fourth and fifth graders in the study group, with 107 boys (44,6%) and 133 girls (55,4%). The age range of the participants was 9 to 13 years old, fourth-graders were roughly 10-11 years old, and fifth-graders were roughly 11-12 years old. With 49.2% of fourth graders and 50,8% of fifth graders, the participants' grade level distribution was comparatively equal.

Sampling Techniques

Samples were chosen at random (random sample) from the fourth and fifth grade student population at the public primary schools where the study was carried out. This method

reduced selection bias and increased the generalizability of the study's findings by guaranteeing that each student had an equal chance of being chosen as a respondent.

Ethical Procedures

Both the school and the pupils themselves have verbally consented. Participation in this study is completely voluntary and has no repercussions, and the respondent's anonymity is secured.

Instruments

The Interpersonal Relationship Scale tool was used to gather data. This tool, which was created to assess the caliber of kids' interpersonal connections in both school and family contexts, was modified from studies by (Collie et al, 2016) and (Chen, 2006). The original scale had 21 statements that addressed the relationships between parents, teachers, and peers. A Likert scale with 1 denoting strongly disagree and 4 denoting strongly agree was utilized (Chang, 1994). Following validity testing, four items with an outer loading value of at least 0.70 and two items with an outer loading value of at least 0.60 were kept for additional study (Hair, 2017), indicating adequate construct validity for further analysis. Using a Likert scale allows for standard and efficient measurement of respondents' perceptions of interpersonal relationship quality. This method is very suitable for measuring latent psychological traits in a large number of respondents.

Validity and Reliability

Several phases of statistical analysis were used to test the instrument's validity and reliability. Reliability analysis (including Cronbach's Alpha, composite reliability, McDonald's Omega, and average variance extracted) were used to evaluate the instrument's reliability all of these metrics showed a sufficient degree of internal consistency. Confirmatory factor analysis (CFA) and PLS-SEM were used to examine construct validity in order to ascertain whether the instrument's three component structure relationships with teacher, peers, and parents was consistent with the collected data. According to the test results, the three-factor model fits the research data with sufficient model fit indices ($\chi^2 = 22,482$, $\chi^2/df = 2,044$, GFI = 0,975, TLI = 0,835, CFI = 0,914, RMSR = 0,048, RMSEA = 0,066). Next, three important statistical analyses.

Data Collection Procedures

Students were given a paper-based questionnaire in their individual classrooms to complete in order to gather data. To guarantee that students understood the instructions and to preserve the caliber of the data gathered, the questionnaire was completed under the observation of teachers.

Analysis Techniques

First, a one-way analysis of variance (ANOVA) with eta squared effect size testing (η_p^2). This was done to evaluate the significance of differences in the average of each interpersonal relationship among different achievement groups. Second, canonical discriminant analysis was conducted to examine which aspects of students' interpersonal relationships (relationships with teachers, peers, and parents) simultaneously distinguish between their different levels of academic achievement. In this discriminant analysis, academic achievement was used as the dependent variable for grouping, divided into three levels based on the students' average odd-semester report card scores obtained from their

homeroom teachers: (sufficient, score < 80, n = 89), (Notable, score 80-84.9, n = 83), and (Outstanding, score ≥ 85, n = 68).

This categorization serves as a grouping variable in discriminant analysis to test how interpersonal relationship variables differentiate those three levels of academic achievement. Referring to this structural framework, aspects of the interpersonal relationship quality scale are introduced as independent predictive variables: (1) relationships with teachers, (2) relationships with peers, and (3) relationships with parents. Prior to doing the discriminant analysis, the assumptions of linearity and normality of distribution were carefully verified. The Kolmogorov-Smirnov test was used to examine the data's normal distribution; the results indicated $p < .05$, indicating that all of the observed variables were normal. Accordingly, a non-significant p-value ($p < .05$) from the M Box test confirms the equality of covariance matrices between groups. Third, a multinomial logistic regression was performed to determine the odds ratio (OR) in addition to discriminant analysis. Aspects of interpersonal connections served as predictors, and academic performance which was split into three levels was the outcome variable in this analysis. SPSS version 21.0 was used for all statistical analyses.

Justification for the use of Discriminant Analysis

Discriminant analysis was chosen because the goal of this study is to find factors that significantly differentiate predetermined groups (such gender or grade level), discriminant analysis was selected. Discriminant analysis is suitable when the dependent variable is categorical, in contrast to regression techniques, which predict continuous variables. Based on the resulting discriminant scores, it can thus identify the combination of predictor variables that is most effective in differentiating group membership and classifying new respondents into the appropriate groups. In determining the validity of the scale used in this study, we utilized the model fit indices shown in Table 1, which were obtained from confirmatory factor analysis using the PLS-SEM test in Smart PLS 4. As you can see, although the optimal model could not be identified, the model fit indices almost reached the desired value.

Tabel 1. Goodness-of-fit Indicator, Quality of Interpersonal Relationships

Model (3 related factor)	χ^2	χ^2 / df	GFI	TLI	CFI	RMSR	RMSEA
Teacher Relationship	22.482	2.044	0.975	0.835	0.914	0.48	0.66
Peer Relationship							
Parent Relationship							

Note. χ^2 = Chi-square statistic; χ^2 / df = Chi-square divided by degrees of freedom; GFI = Goodness-of-fit index; TLI = Tucker Lewis index; CFI = Comparative fit index; RMSR = Root mean square residual; RMSEA = Root mean square error of approximation.

The results from Table 1 show the goodness-of-fit test results, indicating that the interpersonal relationship quality measurement model overall has met most of the model feasibility requirements. Although the TLI index hasn't reached the recommended value (>0.90), most of the goodness-of-fit indices have shown satisfactory results. Therefore, the model can be considered to have a fairly good fit and can be used for the next structural equation modeling (SEM) analysis.

RESULT

Positive relationship with teachers as an indicator of the level of achievement in discriminant analysis. Table 2 shows the mean and standard deviation of each positive subscale on the teacher relationship quality scale, based on different levels of achievement. Students with very good achievement scores got higher average scores compared to the good achievement group and the moderate achievement group on all subscales.

Table 2. ANOVA Results, Means, and Standard Deviations for the Positive Subscale of Teacher Relationship Quality by Achievement Level

Academic Performace Levels	ANOVA Test					
Positive Subscale	Sufficient M (SD)	Notable M (SD)	Outstanding M (SD)	F	p	ηp²
Teacher Relationship	7.22 (0.79)	6.99 (0.95)	7.34 (0.82)	3.329	.038	.027

Note. Quality of the teacher-student relationship. Partial eta squared (η^2) was interpreted as small if $.01 \leq \eta^2 < .06$, moderate if $.06 \leq \eta^2 < .14$, and large if $\eta^2 \geq .14$.

The results in Table 2 of the variance analysis (ANOVA) show a significant difference in the quality of the relationship between students and teachers based on academic achievement levels. According to Field (2018) ANOVA results are considered significant if ($p < .05$), since $p < .038$, this indicates that there is a difference in the average quality of interaction with teachers among the three academic achievement groups. Students with very high academic achievement show the highest interaction values with teachers. Next, the possible differences that might appear between the averages of the three achievement levels were analyzed based on the scores on the positive subscale of the teacher-student relationship quality scale.

An analysis of variance (ANOVA) was conducted, showing significant differences between the three achievement levels for the following subscale: there is a significant difference in the relationship with the teacher ($\text{Wilks' } \lambda = .973, F = 3.329, p = .038, \eta^2 = .027$). Table 3 shows that the canonical discriminant function is able to classify 56.2%. At the same time, for the average-level group, the classification model achieved a prediction accuracy of 66.3%, while for the high-level group, the accuracy reached 54.4%. Overall, these findings indicate that the variable of peer relationship quality has a moderate level of accuracy. However, this model has proven to be much more consistent and precise in identifying students with fairly good academic performance compared to those with higher achievement.

Table 3. Classification Results by Applying the Discriminant Function for the Relationship with the Teacher

Academic Performance	Sufficient (%)	Notable (%)	Outstanding (%)
Sufficient	0.0	56.2	43.8
Notable	0.0	66.3	33.7
Outstanding	0.0	45.6	54.4

Note. Quality of relationship with teacher * Partial eta squared effect size test: if $0.06 \leq \eta^2 < .14$, the effect is moderate; and if $\eta^2 \geq .14$, the effects is strong.

Table 3. shows the discriminant function model with a classification accuracy rate of 44.3% and a significant model fit ($\chi^2 = 31.833, p = 0.004$). The analysis results show that the relationship with teachers is a significant predictor for students in achieving very good

academic performance (Wald=6.308, $p=0.012$), but it does not have a significant effect on the 'sufficient' level ($p=0.299$). Based on effect size criteria, the relationship with teachers shows a contribution or effect size in explaining variations in students' academic levels. According to (Hair, 2019) a canonical correlation value < 0.30 indicates a weak relationship, $0.30-0.49$ indicates a moderate relationship, and ≥ 0.50 indicates a strong relationship. Therefore, based on the obtained canonical correlation value, the contribution of the relationship with teachers in differentiating academic performance levels can be categorized. A good relationship with peers as an indicator of the level of achievement in discriminant analysis. Table 4. Shows the average standard deviation of each positive subscale on the peer relationship quality scale, according to different achievement levels. Students with very high achievement got higher average scores compared to the good and fair achievement groups. Conversely, the good achievement group scored higher than the fair achievement group.

Table 4. ANOVA Results, Means, and Standard Deviations for the Positive Subscale of Peer Relationship Quality by Achievement Level

Predicted Membership Group			ANOVA Test			
Positive Subscale	Sufficient M (SD)	Notable M (SD)	Outstanding M (SD)	F	p	η^2
Peer Relationship	9.93 (1.355)	10.08 (1.118)	10.40 (1.405)	2.526	.082	.021

Note. Quality of relationships with peers. * Partial eta squared effect size: $.06 \leq \eta^2 < .14$ indicates a moderate effect, and $\eta^2 \geq .14$ indicates a large effect.

The results Table 4, the analysis of variance (ANOVA), show that there is no significant difference in the quality of students' relationships with their peers based on academic achievement levels. This is because the p-value ($p < .05$) is higher, so the null hypothesis (H_0) cannot be rejected. Therefore, the quality of students' relationships with peers does not show a significant difference among students with sufficient, good, or very good academic achievement. In addition, the partial eta squared value ($\eta^2 p$) is below 0.06, so the effect is considered small, indicating that academic achievement has only a very minor impact on the quality of students' relationships with peers.

Table 5. Classification Results Using the Peer Relationship Discriminant Function

Academic Performance	Sufficient (%)	Notable (%)	Outstanding (%)
Sufficient	61.8	0.0	38.2
Notable	56.6	0.0	43.4
Outstanding	44.1	0.0	55.9

Note. Quality of relationships with peers. * Partial eta squared effect size: $.06 \leq \eta^2 < .14$ indicates a moderate effect, and $\eta^2 \geq .14$ indicates a large effect.

In Table 5, the classification results using the discriminant function with the peer interaction variable show a classification accuracy rate of 39.23%. The model shows an imbalance in classification, where it fails to group students into the high achievement category (0%). Peer relationships contribute relatively little in explaining differences in students' academic performance, as seen from the partial eta squared $F(2, 237) = 2.526$, $p = .082$, $\eta^2 = .021$ values below the threshold for strong effect classification. The multinomial regression analysis shows a satisfactory fit ($\chi^2(14) = 31.833$, $p = .004$; $R^2_{\text{Nagelkerke}} = .033$) allowing for correct classification of 38.8% of cases. Specifically, for the model results comparing the moderate category with the excellent category, parameter estimates indicate that peer relationships (Wald = 4.858, $p = .028$) have a significant association with performance level. The OR

estimation model shows that the likelihood of being in the fair category compared to the very good level decreases by .810 for each one-unit increase in peer relationships. For the model outcomes comparing the good level (good group) with the very good category, the parameter estimates indicate that peer relationships (Wald = 2.367, $p = .124$) are significantly related to performance level.

A good relationship with parents as an indicator of achievement level in discriminant analysis. Table 6 shows the average scores and standard deviations for each positive subscale on the parent relationship quality scale, based on different achievement levels. Students with excellent achievement get higher average scores compared to the good and fair achievement groups. On the other hand, the good achievement group scores higher than the fair achievement group in this positive relationship.

Table 6. ANOVA Results, Means, and Standard Deviations for the Positive Subscale of Parent Relationship Quality by Achievement Level

Academic Performance Levels			ANOVA Test			
Positive Subscale	Sufficient M (SD)	Notable M (SD)	Outstanding M (SD)	F	p	η^2
Parent Relationship	7.38 (0.959)	7.29 (0.891)	7.25 (1.125)	.380	.684	.003

Note. Quality of relationships with parents. * Partial eta squared effect size: $.06 \leq \eta^2 < .14$ indicates a moderate effect, and $\eta^2 \geq .14$ indicates a large effect.

The results from Table 6. Analysis of variance (ANOVA) show that the quality of the relationship between students and parents does not differ significantly based on academic achievement, $F = .380$, $p = .684$, because the significance value is greater than the threshold ($p < .05$). Moreover, the partial eta squared value of .003 ($\eta^2 < .06$) indicates that the effect is very small, meaning academic achievement has a very low impact on the quality of the relationship between students and parents.

Table 7. Classification Results Using the Discriminant Function Related to Parents

Academic Performance	Sufficient (%)	Notable (%)	Outstanding (%)
Sufficient	64.0	0.0	36.0
Notable	51.8	0.0	48.2
Outstanding	52.9	0.0	47.1

Note. Quality of relationships with parents. * Partial eta squared effect size: $.06 \leq \eta^2 < .14$ indicates a moderate effect, and $\eta^2 \geq .14$ indicates a large effect.

In Table 7, the discriminant function results comparing the “fair” category with the “excellent” category show that the parameter estimates indicate that the relationship with parents (Wald = .707, $p = .401$) is significantly related to performance level. The model’s OR estimates show that the odds of being in the “fair” category compared to “excellent” decrease by .810 for each one-unit increase in the relationship with parents. For the model results comparing the “good” category with the “excellent” category, the parameter estimates indicate that the relationship with parents (Wald = .161, $p = .814$) is significantly related to performance level.

Table 8. Structure Matrix: Variables Arranged According to Their Correlations with the Discriminant Functions

Variable	Function 1	Function 2
Teacher Relationship	.633	.735
Peer Relationship	.625	-.465
Parent Relationship	-.169	.317

Note. *A higher absolute value indicates a stronger correlation between each variable and the discriminant function.

According to Table 8 data, the relationship with peers has the highest correlation with Function 1 (.625), and the relationship with teachers has the highest correlation with Function 2 (.735). Both factors contribute significantly to differentiating between various academic attainment levels, as seen by loading values above .50. However, the relationship with parents has less of an impact on distinguishing accomplishment groups because it has relatively modest loading values on both functions (.317 and -.169).

DISCUSSION

Overall, the analysis findings show that certain dimensions of interpersonal relationships can affect the academic achievement levels of different student groups. With $F = 3,329$, $p = 0,038$, $\eta^2p = 0,027$, the most significant findings indicate that H1 is supported in this study because of the significant role of relationships with teachers in differentiating academic achievement levels. Compared to the adequate ($M = 7,22$) and good ($M = 6,99$), groups, students with very high achievement showed higher average scores in teacher relationships ($M = 7,34$). The quality of relationship between teachers and students is a significant predictor of academic involvement and student success across different educational stages. In the framework, supportive and attentive teachers assist student in fulfilling their needs for autonomy, competence, and relatedness, enhancing intrinsic motivation and involvement in learning. The connection with teachers shows the strongest correlation with function 2 (0.735), as indicated by further discriminant analysis. This indicates that this factor plays a crucial role in distinguishing multivariate student academic profiles.

This finding is theoretically consistent with attachment and self-determination perspectives, which suggest that a secure, responsive teacher-student bond satisfies students' basic psychological needs for competence, autonomy, and relatedness, thereby sustaining engagement and achievement (Roorda et al., 2020). It also converges with prior evidence that teacher-student relationship quality predicts prosocial behavior and a positive orientation toward school (Longobardi et al., 2020). Taken together with the present results, this suggests that among the three interpersonal domains examined, the teacher relationship exerts the most direct and consistent influence on Indonesian elementary students' academic standing, extending prior findings from largely Western samples to an Indonesian primary-school context.

H2 receives partial support as peer relationship indicate a trend nearing significance ($F = 2,526$, $p = 0,082$, $\eta^2p = 0,021$). The distribution of average scores indicates a steady trend: exceptional students possess the highest peer relationship ratings ($M = 10,40$) in contrast to the good group ($M = 10,08$) and the fair group ($M = 9,93$). This occurs despite the average score pattern failing to meet the standard significant threshold ($p < 0,05$). This corresponds to the idea that camaraderie and acceptance among peers improve students' feelings of belonging at school, leading to heightened dedication and involvement in their education.

Connections with peers are also indicated as a noteworthy factor in Function 1 (0,625) in the discriminant analysis, affirming the relevance of this aspect in differentiating multivariate achievement categories. On the other hand, relationships with parents did not show support for H3 ($F = 0.380$, $p = 0.684$, $\eta^2p = 0.003$). Children's social orientation shifts from family to school environment during grades 4 and 5. Compared to family-based relationships during this developmental period, school-based relational experiences with teachers and peers tend to have a more direct impact on academic achievement. Relationships with parents showed low loading values on both discriminant functions (Kimura & Miyake, 1987) (Function 1: -0.169; Function 2: 0.317), indicating that their contribution to distinguishing achievement groups is limited. This was confirmed by discriminant analysis.

The failure of the peer-relationship trend to reach conventional significance may reflect the still-emerging role of peer influence at this developmental stage: fourth- and fifth-graders are transitioning toward greater peer orientation but remain more strongly anchored to adult relationships than older adolescents, for whom peer effects on achievement tend to be more pronounced (Wang et al., 2023). It is also possible that the present peer-relationship subscale did not fully capture more distal but influential aspects of peer interaction, such as peer academic norms or exposure to social rejection, which other studies link more directly to achievement outcomes through motivational and engagement pathways (Shao et al., 2024). Rather than dismiss this near-significant pattern, we interpret it as preliminary evidence that peer relationships function as a secondary, supportive pathway to achievement that may strengthen as students move into higher grades. The non-significant result for parent-student relationships, meanwhile, diverges from studies conducted in Western contexts that report meaningful associations between parental involvement and academic outcomes (Dearing et al., 2006; Ogg et al., 2020). A plausible explanation is that, at this age, parental influence on Indonesian elementary pupils' achievement becomes increasingly indirect and mediated through the school environment, since children spend more of their waking hours with teachers and peers than with parents. Contextual factors specific to the sampled schools, such as parent's limited day-to-day involvement in academic activities, may further explain why the parent-relationship dimension did not emerge as a discriminating factor here, in contrast to family-involvement research conducted in other cultural settings.

Canonical discriminant analysis (Ganeshanandam et al., 1994) showed a significant distinguishing power of the combination of the three interpersonal relationship variables simultaneously at a multivariate level (Wilks' Lambda = 0.940, $p = 0.023$). Relationships with teachers and peers contributed the most to 69.1% of the between-group variance, according to Discriminant Function 1. The discrimination model based on interpersonal relationships was more effective at identifying high-achieving students than low-achieving students, with an overall classification rate of 43.8% and the highest prediction accuracy in the very good group (54.4%). These results have significant practical implications. They suggest that teacher training programs should focus on developing teachers' relational and interpersonal skills. In addition, it is crucial to help build positive peer relationships through collaborative learning strategies in elementary schools. This pattern also corroborates meta-analytic evidence that teacher-student relationship quality is closely intertwined with the broader peer ecology of the classroom, such that the two domains jointly, rather than independently, shape students' social and academic trajectories (Endedijk et al., 2022); this joint influence, rather than either domain in isolation, may explain why the combined discriminant model outperformed the individual contribution of any single relationship variable.

CONCLUSION

This research demonstrated the importance of interpersonal relationship in distinguishing between Indonesian elementary school pupils' academic performance. The only variable that statistically differentiated academic success groups among the three interpersonal dimensions investigated was the teacher-student connection, suggesting that helpful contacts with teachers are the strongest relational factor connected with higher academic performance. Peer connections made a positive, albeit marginally significant, contribution, indicating that positive peer interactions may also promote pupils' academic growth, even if their impact was less apparent. In contrast, academic accomplishment levels in this sample were not significantly distinguished by parent-student relationship. Furthermore, teacher and peer relationships contributed the most to the discrimination, and a canonical discriminant analysis demonstrated that the interplay between these connections, along with those between the student, peers, and parents, may be able to significantly differentiate students' academic performance profiles. These results underscore the value of promoting good social connections in the school environment as part of initiatives to raise students' academic performance. This research provides empirical evidence regarding the importance of interpersonal relationships in Indonesian primary education and establishes a foundation for developing evidence-based teaching approaches that emphasize teachers' interpersonal skills and cooperative learning settings. Additional research should explore these connections using longitudinal design and more comprehensive analytical methods, such as structural equation modeling, to examine the direct and indirect pathways linking interpersonal relationships with students' academic success.

Several limitations of this study should be acknowledged. First, the cross-sectional design precludes causal inference regarding the direction of the relationships observed between interpersonal relationships and academic achievement. Second, the sample was drawn from a limited number of public elementary schools in Indonesia, which may constrain the generalizability of the findings to other regions, school types, or cultural settings. Third, data on interpersonal relationships and academic achievement relied on student self-report measures and teacher-recorded grades, respectively, which may be subject to reporting bias and do not capture more nuanced qualitative aspects of these relationships. Finally, although the discriminant model performed reasonably well for identifying high-achieving students, its lower accuracy for the moderate-achievement group suggests that predictors beyond interpersonal relationships are needed to fully account for variation in academic performance.

Building on these limitations, future research should adopt longitudinal or experimental designs to clarify the causal pathways linking teacher, peer, and parent relationships to academic achievement over time, and should extend data collection to a broader and more diverse range of schools, including private and rural institutions, to enhance generalizability. Incorporating multi-informant measures, such as teacher and parent reports alongside student self-reports, would also help reduce single-source bias. In terms of educational practice, schools and teacher-education programs are encouraged to embed relational and socio-emotional competencies, such as active listening, empathy, and constructive conflict resolution, into pre-service and in-service teacher training, given the demonstrated primacy of the teacher-student relationship in this study. Structured peer-collaboration activities, such as cooperative learning groups and peer-mentoring programs, are also recommended to nurture the supportive peer climate that this study found to be marginally associated with achievement. Given the limited role parental relationships played in this sample, schools

might additionally explore structured, school-facilitated parent-engagement strategies, such as regular teacher-parent communication routines and take-home learning activities, to strengthen this pathway rather than assuming it will develop informally at home.

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