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# Parental Involvement and SES on Academic Achievement: A Weighted Regression Analysis in Public Senior High Schools

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**Abstract:** This study aims to examine the impact of parental involvement and socioeconomic status (SES) on academic achievement at public senior high schools in Tangerang Municipality. The study used a cross-sectional survey design. The study population consisted of students from public senior high schools in Tangerang Municipality. We applied Weighted Regression analysis utilizing a sample size of 893 participants. We used a validated questionnaire that was distributed via WhatsApp groups. The findings showed that parents with high SES tended to be more involved in their children's learning; however, high parental SES did not guarantee high academic achievement for their children. The mean difference tests revealed that academic achievement did not differ significantly by parental involvement, whereas it did differ significantly by parental SES. Researchers also found that parents' involvement in education significantly boosted students' academic achievement. In contrast, parents' SES did not have a significant impact. Intensive discussions, good communication, full attention, giving gifts, and providing learning facilities are effective parental involvement actions that encourage increases in children's academic achievement. Parental involvement matters more than parental SES in improving students' academic achievement. Therefore, maintaining strong relationships between schools and parents is essential to support students' educational outcomes. Local governments need to strengthen regulations governing parents' roles at home and at school.

**Keywords:** academic achievement, parental involvement, SES.

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## INTRODUCTION

Academic achievement shapes students' futures, helping them secure better career opportunities, compete in the workforce, determine their socioeconomic status (SES), and continue to college. Academic achievement depends on various factors, including the learning environment, innate abilities, and the important role of parents. One parental role is parental involvement, which is considered effective in reducing the academic achievement gap across socioeconomic status groups (Day & Dotterer, 2018; Li et al., 2020) and plays a crucial role in learning activities and academic performance (X. Liu et al., 2025). Basically, parental involvement does not depend on socioeconomic status; rather, it depends on parents' behavior in supporting their children's learning and life success (Freund et al., 2018; Lv et al., 2019).

Based on PISA results, Indonesian students' reading, numeracy, and science achievements remain low compared with those of several OECD member countries during 2000-2018 (OECD, 2019). Although it has increased, the rise is modest and fluctuates. This condition encourages more intensive parental involvement.

Previous studies have investigated the impact of parental involvement on academic achievement (Boonk et al., 2018; Erdem & Kaya, 2020; Gan & Bilige, 2019; Lara & Saracostti, 2019; McDowell et al., 2018; Otani, 2020; Tan et al., 2020). Therefore, parental involvement needs to improve both inside and outside the home. Forms of parental involvement include reading at home, setting expectations and aspirations for academic achievement, discussing school, communicating, and supporting learning (Boonk et al., 2021). Additionally, one form of parental involvement is motivating children so learning outcomes match parents' expectations (Gonzalez-DeHass et al., 2005).

Empirical evidence on the exact contribution of home-based parental support remains highly polarized. Several studies show that consistent learning support at home increases student academic achievement (Karbach et al., 2013), especially in quantitative disciplines such as science and mathematics (Ogg & Anthony, 2020). The same findings also show that parental involvement significantly affects academic performance (Fatimmaningrum, 2021; Kantova, 2024; Rumbaoa et al., 2022). Recent studies have also shown similar results (Eker & Yildizli, 2025; Kang et al., 2024; Kovács et al., 2024; S. Zhang & Wu, 2025; Y. Zhang et al., 2025).

Conversely, a prominent counter-argument indicates that direct interventions, such as intensive homework monitoring or excessive contact with school administrations, can trigger negative performance patterns (Desimone, 1999). Li et al. (2019) also reinforce the finding that parental involvement contributes less to students' academic achievement. Similarly, inconsistent findings also show that academic performance is not determined by parental involvement (Duan et al., 2018; A. Li, 2024) or by the quality of that involvement (Liu et al., 2013). These studies have produced inconsistent findings. This decline occurs because adolescents often perceive highly intensive monitoring as an invasive overregulation of their autonomy, which dampens their learning motivation and increases procrastination (Avcý et al., 2025; Cimon-Paquet et al., 2023; Toren, 2025; Won & Yu, 2018). This divergence shows that the relationship between parental involvement and learning performance is non-linear and highly contextual, requiring localized investigation (Hill, 2022). This inconsistency stems from different analytical approaches and varying measures of parental involvement.

Parents' socioeconomic status (SES) also plays an essential role in academic achievement. However, the inconsistency becomes more visible when analyzed alongside parents' socioeconomic status (SES). Families with low SES are also more likely to be motivated to invest in their children's success. Several arguments explain this phenomenon. Williams and Sánchez (2013) state that high-SES parents invest in education for their children's future (academic ability) based on their awareness and ignore others' interventions. Some parents also have limited experience guiding their children, and their low SES may limit the time they have. SES also shapes people's understanding of educational values and their investment in their children's education (Vellymalay, 2012).

Previous research shows that parents' SES is significantly linked to students' learning success (Zhao et al., 2012). Meanwhile, Sirin (2005) also concluded that SES determines school success and thus affects student learning outcomes. Recent studies also show that SES contributes significantly to high school students' academic achievement (Gan & Bilige, 2019; Sentosa, 2023; Sentosa et al., 2024). In contrast, researchers have found that parents' SES does not determine learning outcomes (Rumbaoa et al., 2022). In addition, students from low SES tend to have lower academic achievement (Lam & Zhou, 2022). Another study found that people with low SES tend to have poorer academic

performance (van Zwieten et al., 2021). This may result from a general lack of motivation and commitment to academic success. Additional research also found that parents' SES affects academic performance (Suna & Özer, 2021). However, Maslowsky et al. (2015) and Bignardi et al. (2024) found otherwise.

Within metropolitan fringe areas like Tangerang Municipality, this dynamic takes on a unique form. As an industrial hub adjacent to the capital, Tangerang exhibits high socioeconomic stratification among its public senior high schools. Sociologically, diverse occupational profiles from factory laborers to corporate professionals produce distinct family time allocations and distributions of learning resources. Furthermore, despite progressive local government regulations on educational funding and expanded access, substantial disparities in student learning performance persist across urban neighborhoods. This urban variation makes Tangerang Municipality a strategic setting to assess whether active parental intervention can overcome structural financial limitations in a rapidly developing education ecosystem.

Although many previous studies have been conducted, the current study offers new dimensions of parental involvement variables that are correlated with academic achievement, so that the dimensions of parental involvement are more complete than before (Boonk et al., 2018; Fatimmaningrum, 2021; Hill, 2022; Hsieh, 2023; Kantova, 2024). In addition, the authors produced consistent findings on this topic, even though previous findings remain debated. Studies on the nexus between parental involvement, SES, and academic achievement in public senior secondary schools in Tangerang Municipality are still lacking. In addition, previous literature on parental involvement as a construct that considers aspects of the home environment needs to be more complete, and researchers should examine parental involvement more deeply in relation to SES variance. This study seeks to clarify the nexus between parental involvement and academic achievement, with some studies focusing on involvement at home and others on interactions at school. This research is also unique because it examines differences in academic achievement based on parental involvement and SES, which has not been explored previously. In addition, the research aims to investigate how parental involvemnt and SES affect academic achievement and to assess differences in Tangerang Municipality public high schools. Hopefully, the research findings can inform schools, parents, and policymakers about the importance of parental involvement in supporting learning success.

Additionally, based on the research gaps and the study's novelty discussed above, the researcher formulates the following research questions: RQ1 What are the characteristics of parental involvement based on parents' socioeconomic status among students in public senior high schools in Tangerang Municipality? RQ2 What is the profile of students' academic achievement based on their parents' socioeconomic status in public senior high schools in Tangerang Municipality? RQ3 Are there significant differences in students' academic achievement according to the characteristics of parental involvement in public senior high schools in Tangerang Municipality? RQ4 Are there significant differences in students' academic achievement according to their parents' socioeconomic status in public senior high schools in Tangerang Municipality? RQ5—Does parental involvement have a significant influence on the academic achievement of students in public senior high schools in Tangerang Municipality? RQ6 Does the socioeconomic status of parents have a significant influence on the academic achievement of students in public senior high schools in Tangerang Municipality?

Based on the six research questions, two are descriptive and do not require hypothesis

testing, while four require hypothesis testing. Therefore, the researcher has formulated the following hypotheses:

H1: There is a significant difference in students' academic achievement based on the characteristics of parental involvement among students at public senior high schools in Tangerang Municipality.

H2: There is a significant difference in students' academic achievement based on the characteristics of their parents' socioeconomic status among students at public senior high schools in Tangerang Municipality.

H3: There is a significant influence of parental involvement on the academic achievement of students at public senior high schools in Tangerang Municipality.

H4: There is a significant influence of parents' socioeconomic status on the academic achievement of students at public senior high schools in Tangerang Municipality.

## ■ LITERATURE REVIEW

Student results, in the form of test scores from academic activities, are referred to as academic achievement. Academic achievement is also defined as the cognitive and affective skills developed from learning outcomes organized by educational institutions (York et al., 2015). Academic achievement is related to students' competence, test performance, and effort (Weiner & Peter, 1973). Academic achievement is defined as a specific level of attainment or proficiency in academic work, as assessed by a teacher, through standardized tests, or via a combination of both (Chaplin, 2010). In addition, student performance is equivalent to academic performance (Pilcher, 1994). In this case, teachers assign grades by considering cognitive, affective, and motivational aspects of learning activities. Academic achievement can be expressed as follows (Pilcher, 1994):

$$Score = f[cognitive, effort, attitude]$$

Students who have good cognitive abilities, strong effort, and a consistent attitude tend to achieve higher scores (academic achievement). Academic achievement refers to cognitive competence and skills, as measured by teacher assessment, along with student effort, attitudes, and cognitive scores, all presented in numerical form.

The main theoretical foundation of parental involvement is social capital theory. Coleman (1988) argues that families play a more significant role in students' academic success than communities and educational institutions. Social capital also refers to "the totality of available resources, both real and potential, that come with having a network of formally established ties based on mutual acquaintance or recognition" (Bourdieu, 2002). In the social and cultural environment, parents are influenced by the school's "norms, rules, and obligations." Cheung and Pomerantz (2011) stated that the domains of parental involvement include cognitive (intellectual), emotional, and behavioral aspects.

Previous studies on parental involvement in the form of resource allocation (Jeynes, 2007; LaRocque et al., 2011), attending school invitations, discussing with children, and assisting with homework (Barger et al., 2019; Karbach et al., 2013; Mägi et al., 2011), have been shown to significantly increase academic achievement. Other studies also indicate that parental involvement is significantly linked to academic outcomes in the US (Ogg & Anthony, 2019). Meanwhile, Lara and Saracostti (2019) found that lower levels of educational involvement tend to be associated with lower academic outcomes, and vice versa, in Chile.

A current study by Hu and Wu (2020) in China found that communication with teachers, as a component of parental involvement, significantly affected students' academic

competence. In China, the academic achievement gap between children of wealthy and less affluent parents decreased with increased parental involvement at home and at school (X. Li et al., 2020). Otani (2020) concluded that parental involvement is related to students' educational outcomes in secondary school. Meanwhile, Gubbins and Otero (2020) found that parental educational expectations, a form of parental involvement, significantly affected academic achievement in language and mathematics in Chile. Other empirical studies have also found similar results (Rakesh et al., 2025; Song & Tan, 2025; Yigiter, 2025). A person's education and occupation also strongly predict academic achievement (Stankov & Lee, 2025). However, previous researchers have presented ambiguous findings (Holzer et al., 2025).

A study in Indonesia by Fatimmaningrum (2021) investigated 18 out of 40 studies using meta-analysis techniques and demonstrated a significant correlation between parental involvement and academic achievement. Another study by Prima and Fikry (2021) also found a significant correlation. Yulianti et al. (2022) showed that increased parental involvement, including consistently attending teacher invitations, has a significant impact on student learning outcomes at school. Additionally, parents are involved in the strategic decision-making process at school. Other findings revealed that participation and monitoring are significantly correlated with academic achievement (Hsieh, 2023).

Parental expectations have a stronger influence on student academic achievement than helping with homework (Wilder, 2014). A similar meta-analysis of 54 studies also supports this, showing that parental expectations, as a component of parental involvement, are significantly related to student academic achievement (Jeynes, 2024). Similarly, Kang et al. (2024) found that parental involvement is significantly correlated with good academic performance in China. Zhang and Wu (2025) also found that parental involvement is significantly correlated with student learning outcomes in Hong Kong and Macau. Using the same approach, Eker and Yildizli (2025) found the same results in Turkiye. However, Li (2024) found that parental involvement had no significant effect on academic achievement in the US after controlling for parenting approaches and child, family, and school factors. Other researchers also showed non-significant results (Avcý et al., 2025; Tan et al., 2026; Toren, 2025).

Social capital theory provides a foundation for research on the correlation between parental involvement and academic achievement. While many studies show a significant relationship between the two, others present differing results. These discrepancies often depend on how parental involvement is defined, whether as a whole or by its individual elements. Furthermore, parents' and children's perceptions of parental involvement vary, resulting in different outcomes. This study aims to analyze the impact of parental involvement on students' academic achievement in senior high school, emphasizing the importance of understanding parental involvement from different perspectives.

Parents' socioeconomic status (SES) is also an important factor in detecting changes in student learning achievement. SES reflects an individual, family, or community's income, employment, education, wealth, and social position (Liu et al., 2020; Zhao et al., 2012). It is often assumed that SES is crucial because people tend to predict their SES favorably. However, the facts show otherwise (Indrawati, 2015), including family financial capability and material wealth (Basrowi & Siti, 2010). Yuxiao and Chao (2017) argue that the SES of students' parents contributes to socioeconomic segregation in schools, where students tend to group based on their parents' SES, resulting in a stark gap. SES also represents

society's recognition of a family's financial ability to meet its needs.

Previous research has linked SES to academic achievement. For example, Baoyan and Minggang (2015), in Gansu Province, concluded that there is a significant difference in academic achievement based on gender, with male students outperforming female students. Other findings indicate that social capital, family capital, and SES (parental education and income) significantly impact student academic achievement. Additionally, Ogg and Anthony (2020), using data from 2,352 participants, found that SES is strongly correlated with student academic outcomes.

An earlier study by van Zwieten et al. (2021) concluded that low SES across all secondary school ages is cumulatively associated with better reading grades, suggesting that academic interventions should target those with persistently low SES. Researchers such as Lam and Zhou (2022), using PISA data from 2003 to 2018, reached similar conclusions. Finch and Finch (2022) found that students attending schools with greater SES inequality and lower average family income tend to have lower academic achievement. Their results showed that narrowing the SES gap improves academic performance. Additional findings show that parental income as an SES indicator contributes to improved students' academic performance (Sentosa, 2023). In addition, Erdem and Kaya (2023), in a cross-sectional study involving 6,890 students attending 186 schools, concluded that SES is strongly correlated with academic achievement. However, another study found the opposite: that high parental SES has a negative impact (Maslowsky et al., 2015). Some studies also suggest that parental SES weakly predicts certain cognitive and academic skills in the US (Bignardi et al., 2024).

Parents' SES plays a key role in promoting better academic performance. Parents with higher SES can provide the resources their children need, helping them face fewer obstacles in their learning and achieve better outcomes. On the other hand, some studies have shown that students with low SES can achieve higher academic achievement in certain contexts. This variation is due to the different measures of SES variables and analysis models used in previous research. The current study aims to strengthen theory and prior research on the role of SES in improving academic achievement, particularly in the senior high school context.

## METHOD

### Research Design and Data

This research used a quantitative approach because the data were numerical, analyzed using inferential statistics, and used to draw conclusions (Cohen et al., 2005). This research used a cross-sectional survey design. This research design included comparative and correlational tests. Researchers used non-parametric statistical tests to test differences in academic achievement based on parental involvement and SES. Meanwhile, to test the influence of parental involvement and SES on academic achievement, the study used the Weighted Least Squares (WLS) Regression model. This model is adaptive to heteroscedasticity in the analysis. The study's target population was students enrolled and active in public high schools in Tangerang Municipality, totaling 6,551 students. Researchers set a sample size of 893 units with a sampling error rate of 1% from the Krejcie-Morgan table (Krejcie & Morgan, 1970). A simple random sampling technique was utilized by the researchers. The researchers are conducting this work from April 2024 to March 2025.

Data collection for this study was conducted between July 25, 2024, and October 30, 2024. The researcher obtained an official assignment letter (No. 198.a/LPPM-UNIS/VI/2024) from the Head of the Institute for Research and

Community Service (LPPM) at Syekh-Yusuf Islamic University for an Independent Research project. The researcher upheld ethical principles regarding the participation of individuals aged 15–17 (students classified as minors). Formal institutional permission was secured from the board of the Tangerang Municipality Economics Subject Teachers' Forum (MGMP Ekonomi), which acted as the facilitator and official representative of the economics teachers (serving as the students' guardians) in the study area; this authorization was granted via letter No. 10/MGMP-Ekonomi/VII/2024. The permission process continued with obtaining verbal consent from the relevant school leadership, who serve as the students' formal guardians while on school premises. Before distributing the questionnaires, the researcher clearly explained the research objectives, guaranteed identity confidentiality, and emphasized the voluntary nature of participation. Written consent was subsequently obtained directly from each student before the respondents (students) completed the questionnaires.

**Participants**

Participants were students enrolled and active at school, with no distinctions by gender, age, distance, ethnicity, major, or achievement. Female participants outnumbered male participants by 64.28%. By age, participants were generally 15-17 years old (66.75%). Most participants lived less than 5 km from the school. Participants whose parents have non-Javanese ethnicity were 60.25%, and those who were Muslim were the majority (94.40%). Meanwhile, 27.09% of participants reported accomplishing non-academic goals in sports and the arts.

**Variables**

This study's operationalization of variables emphasizes research on variable constructs. Researchers used a Likert scale ranging from Strongly Disagree to Strongly Agree (1-5) to measure parental involvement and SES. For more details about variable descriptions, see the following table:

**Table 1.** Variables description

| Variable | Description | Indicator | Scale |
|---|---|---|---|
| Dependent Variable: | | | |
| Academic achievement (AA) (X. Li et al., 2020; Maimad et al., 2023; Maksum et al., 2025; OECD, 2020; Sentosa, 2023) | The teacher or school determines the achievement of learning outcomes, cognitive skills, and abilities assessed through the evaluation procedure after the test. | Final exam scores in even semester 2022/2023 | Ratio |
| Independent Variable | | | |
| Parental Involvement (*PI*) (Boonk et al., 2018; Gan & Bilige, 2019; Hill, 2022; Hu & Wu, 2020; Kantova, 2024) | Parents allocate educational resources to their children, communicate, and educate in order to encourage their educational progress. | Communication, attention, discussion activities, learning space, internet access, rewards, and equipment and assets. | Ordinal |
| Socioeconomic Status (*SES*) (Fang et al., 2020; Khusaini et al., 2023; X. Li et al., 2020; Poon, 2020; Wang et al., 2020) | A condition that reflects the community's recognition and the family's financial ability to provide adequate resources to meet its needs. | Family income, parental education, parents' occupation, and family assets/facilities | Ordinal |

| Control variables | | | |
|---|---|---|---|
| Gender (Jeynes, 2024; Mappadang et al., 2022; Parmer & Nathans, 2022) | Attributes attached to female students. | Gender (if female 1, male = 0) | Nominal |
| Age (*A*) (Fang et al., 2020) | Student age is determined by adding their birth year to the current year, reflecting how mature their thinking and behavior have become. | Age <15 years = 1; 15 years = 2; 16 years = 3; 17 years = 4; 18 years = 5; and > 18 years = 6. | Ordinal |
| Distance (*D*) (Damm et al., 2022) | Distance between student's home and school. | Distance was categorized < 1.50 km =1, 1.50-3.49 km; 3.50 – 4.49 km = 2; and >=5 km = 3 | Ordinal |
| Math score (*MS*) (Fang et al., 2020; Y. Li et al., 2019) | Students' mathematics scores either through school exams or end-of-semester grades. | Scale 0 – 100 | Ratio |

**Instruments Calibration**

Before collecting data, the researchers tested the research instruments for parental involvement and family economic status variables. To test the instrument's validity, this study used bivariate Pearson correlation. The test criterion is that if r-count > r-table, the question or statement item is valid. The author determined the r-table value using p = 0.05 and degrees of freedom (df) = n – 2 = 101 – 2 = 99, which was 0.195. The validity test results showed that the r-count value for the 9-item parental involvement variable was 0.299–0.659 > 0.195, and for the 13-item SES variable it was 0.392–0.623 > 0.195. The results stated that all question items were valid. In addition, instrument reliability testing showed Cronbach's alpha values of 0.652 (parental involvement) and 0.626 (SES). The reliability of the parental involvement and SES instruments was acceptable.

Subsequently, the researchers validated the previous analysis using an Exploratory Factor Analysis (EFA) approach. The validation results indicated that the findings did not support the previous analysis. The Parental Involvement scale proved to be unidimensional (single- factor), comprising six valid items with factor loadings ranging from 0.402 to 0.684 (CFI = 0.976; TLI = 0.959; RMSEA = 0.049) and a Cronbach's Alpha (á) reliability coefficient of 0.712 (see Table 2). Meanwhile, the Socioeconomic Status (SES) scale was validated as a multidimensional, just-identified model divided into three independent sub-factors, comprising eight remaining items with factor loadings ranging from 0.452 to 0.811 (CFI = 0.981; TLI = 0.925; RMSEA = 0.055) and a Cronbach's Alpha (á) value of 0.621. Guilford (1956) stated that a Cronbach's alpha value within the 0.60–0.80 range was considered high and acceptable for exploratory social science research. The dimensions and indicators of the parental involvement and SES variables were specific, item heterogeneous, and conceptually consistent. This meant that the variable instruments for parental involvement and SES were high reliable.

**Table 2.** Results of instrument validation test using EFA analysis

| Latent Variable | Item | Factor Loading | Valid Factor |
|---|---|---|---|
| Parental Involvement ($\alpha$=0.712) | PI4 | 0.684 | Valid (Factor 1) |
| | PI5 | 0.581 | Valid (Factor 1) |
| | PI6 | 0.576 | Valid (Factor 1) |
| | PI7 | 0.535 | Valid (Factor 1) |
| | PI8 | 0.474 | Valid (Factor 1) |
| | PI9 | 0.402 | Valid (Factor 1) |
| Socio-Economic Status ($\alpha$= 0.621) | SSE3 | 0.811 | Valid (Factor 1) |
| | SSE2 | 0.766 | Valid (Factor 1) |
| | SSE6 | 0.563 | Valid (Factor 2) |
| | SSE10 | 0.489 | Valid (Factor 2) |
| | SSE5 | 0.472 | Valid (Factor 2) |
| | SES9 | 0.542 | Valid (Factor 3) |
| | SES7 | 0.490 | Valid (Factor 3) |
| | SSE8 | 0.452 | Valid (Factor 3) |

Source: Authors' Calculation

**Classic Assumption and Requirement Test**

The researchers also tested the classical assumptions first, which included normality, multicollinearity test, and heteroscedasticity test. The residual normality results indicate that the Jarque-Bera statistic was 1686.628 dan p-value was 0.000 < 0.005. It meant that the residual was not normally distributed. Considering that this research data included large data (n = 893 > 30), residual normality testing was not mandatory. In addition, the author also carried out a multicollinearity test by looking at the variance inflation factor (VIF) value. The results showed that the VIF value = 1.005 – 1.499 < 10. This concluded that the regression model was free from symptoms of multicollinearity. In addition, the Breusch-Pagan-Godfrey Heteroscedasticity test results showed the statistical value Obs*R-squared = 13.856 and the probability value of Chi-squared = 0.031 < 0.05. It could be stated that in the regression model there were symptoms of heteroscedasticity.

The researcher also tested the normality distribution of the data with Shapiro-Wilk, but the test results showed a p-value = 0.000 < 0.05 for the two sample groups so the data was not normally distributed. Furthermore, the researchers conducted a homogeneity test to identify the variance of data. The homogeneity test results revealed that academic achievement based on parental involvement yielded a Levene's statistic of 11.33 and a p-value of 0.000, meaning that the data of the two sample groups was not homogeneous. The homogeneity test for the SES variable yielded a Levene's statistic of 11.69 and a p-value of 0.000 (< 0.05), indicating that the data variance across the three sample groups was not homogeneous. Parametric statistical tests require data from two or more sample groups to follow a normal distribution and exhibit homogeneity of variance. As these requirements were not met in this study, the researchers utilized non-parametric statistical tests.

**Data Analysis**

To examine the influence of parental involvement and SES on academic achievement in Tangerang Municipality, the researchers used WLS regression. WLS regression accounts for heteroscedasticity, making it better than OLS. The model is part of the Generalized Least Squares (GLS) model because it uses weights proportional to the inverse of the response variable's variance, so the new errors have properties similar to OLS in certain cases. The empirical model equation for this research is:

$$AA^* = \alpha_0 + \alpha_1 PI^* + \alpha_2 SES^* + \alpha_3 G^* + \alpha_4 A^* + \alpha_5 D^* + \alpha_6 MS^* + \varepsilon \quad (2)$$

where "AA" is academic achievement, "PI" is parental involvement, "SES" is socioeconomic status, "Gen" is gender, "Age" is the participant's age, "Dis" is the distance between the participant's home and the school, and MS is the math score. In addition, * marks the weight, á$_1$ is a constant, and á$_i$ is the regression coefficient for i = 1, ..., 6.

## RESULT AND DISCUSSION

### Crosstab Analysis

To determine the level of parental involvement based on SES, the researchers present an overview of public senior high school students in Tangerang Municipality. Parental involvement is grouped into two parts: good and poor. The criteria for the grouping are that if "involvement score >= 25.66", then "parental involvement is good," and if "parental involvement score < 25.66", then "parental involvement is poor." Meanwhile, parents' SES is categorized into the low, moderate, and high. Researcher set the criteria if the SES is e" 27.12 = "high", 20.84 to 27.11 = "moderate", and < 20.84 = "low" (see Figure 2).

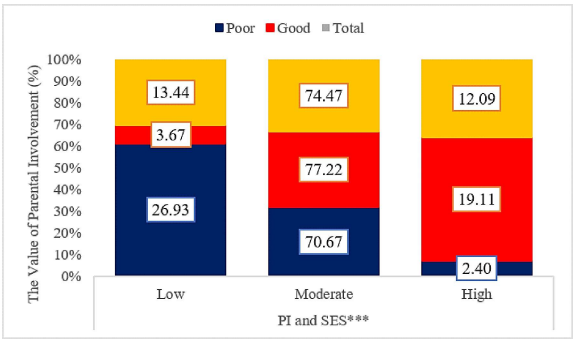



**Figure 1.** Crosstab test results between parental involvement and SES. (***sig.=0.01)




**Figure 2.** Crosstab test results between academic achievement and SES (p-value = 0.307, insig.)

Figure 1 shows that parents with high SES tend to have high parental involvement as well, or vice versa, with a significance level of 1%. However, Figure 2 indicates that high parental SES does not show a significant correlation with student academic achievement in Tangerang Municipality.

### Statistical Summary

This section provides a brief description of the research data which consists of average, standard deviation, minimum and maximum values. The descriptive statistics summary demonstrates that the students' average Academic Achievement (AA) score is high, at 80.84 (SD = 5.63), while the average Mathematics score is 77.02 (SD = 10.25). This outcome indicates that the variability in learning results reflects a significant performance gap between student groups. While the majority of students achieve excellent academic performance, a minority group continues to lag behind. It is noteworthy that the variation in mathematics scores is far more diverse and fluctuating than the general academic achievement of public high school students in Tangerang Municipality. (see Table 3).

Regarding the psychosocial variables, the mean score for Parental Involvement (PI) was 25.66 (SD = 3.73), and for Socioeconomic Status (SES), it was 23.98 (SD = 3.14). These means indicate that the distribution of scores for parental involvement and socioeconomic status (SES) reveals a tendency toward homogeneity

**Table 3.** Statistical summary

| Variables, n=893 | Mean | Std. dev. | Max | Min. |
|---|---|---|---|---|
| AA | 80.84 | 5.63 | 94.40 | 48.36 |
| PI | 25.66 | 3.73 | 30.00 | 6.00 |
| SES | 23.98 | 3.14 | 30.00 | 8.00 |
| Gen | 0.64 | 0.48 | 1 | 0 |
| Age | 2.98 | 0.86 | 6 | 1 |
| Dis | 3.16 | 0.99 | 4 | 1 |
| MS | 77.02 | 10.25 | 100.00 | 40.00 |

among the high-status group. Most students perceive their parents as having a relatively stable socioeconomic standing. The relatively low standard deviation confirms the absence of sharp economic polarization among most subjects. Nevertheless, the very low minimum scores serve as a crucial warning about a small subset of students who are financially vulnerable. Parents are generally actively involved in supporting their children's education; however, a small minority of parents provide insufficient psychological support at home.

Table 3 also shows that the study sample is predominantly female students aged 15 to 16, representing the mid-adolescent age group. This narrow age range suggests the sample has comparable cognitive and psychological maturity. However, spatial variability poses a distinct challenge, as most students must travel a significant distance to reach the school (> 5 km). Such high mobility requirements may impact academic performance due to physical fatigue resulting from the long commute.

**Test Results of Empirical Model**

After the researchers conducted the requirement test, the analysis showed that the sample group data were not normally distributed and were homogeneous. Researchers employed non-parametric statistical tests to assess differences in academic achievement based on parental involvement and SES.

**Table 4.** Differential academic achievement test results by parental involvement and socioeconomic

| Variables | Types test | Statistic | Sig. | Conclusion |
|---|---|---|---|---|
| Parental involvement | Mann-Whitney U test | 45650.50 | 0.074 | Insignificant |
| Socioeconomic status | Kruskal-Wallis H test | 10.29 | 0.006 | Significant |

Table 4 shows that the Mann-Whitney U test yields a p-value of 0.074 (> 0.05). This means parental involvement level does not significantly affect academic achievement. Parental involvement level, whether high or low, does not determine student academic achievement. Meanwhile, the Kruskal-Wallis H test result yielded a p-value of 0.006 (< 0.05). This indicates a significant difference in academic achievement across SES groups. In other words, the higher a student's parents' SES, the higher their academic achievement.

Weighted least squares regression investigates the effect of parental involvement and SES on academic achievement. This model has advantages over ordinary OLS because it can account for heteroscedasticity. As a comparison with OLS, the following regression estimation results are presented:

Table 5 shows that WLS regression produced better estimates than OLS. The coefficient for parental involvement is 0.104, and the p-value = 0.040. This means parental involvement has a positive and significant effect

**Table 5.** Regression results

| Variables, n=893 | OLS | | | WLS | | |
|---|---|---|---|---|---|---|
| | **Coef.** | **Std. Error** | **Prob.** | **Coef.** | **Std. Error** | **Prob.** |
| PI | 0.105 | 0.056 | 0.062 | 0.104 | 0.051 | 0.040 |
| SES | -0.004 | 0.067 | 0.955 | -0.028 | 0.064 | 0.667 |
| Gen | 0.550 | 0.359 | 0.125 | 0.612 | 0.335 | 0.068 |
| Age | -0.528 | 0.207 | 0.011 | -0.209 | 0.197 | 0.288 |
| Dis | -0.417 | 0.176 | 0.018 | -0.498 | 0.170 | 0.003 |
| MS | 0.201 | 0.017 | 0.000 | 0.202 | 0.017 | 0.000 |
| Constant | 65.294 | 2.278 | 0.000 | 65.378 | 2.175 | 0.000 |
| R | 0.420 | | | 0.417 | | |
| $R^2$ | 0.177 | | | 0.174 | | |
| Adjusted $R^2$ | 0.171 | | | 0.169 | | |
| F-stat | 31.70 | | | 31.17 | | |
| Prob. | 0.000 | | | 0.000 | | |

on the academic achievement of public senior high school students in Tangerang Municipality (á = 0.05), ceteris paribus. In addition, the SES coefficient is -0.028, and the p-value is 0.667 (p > 0.05). This means SES does not significantly affect the academic achievement of public senior high school students in Tangerang Municipality. The control variables include gender (female) and mathematics scores, which positively affect academic achievement. In contrast, age and distance have the opposite effect, with significance levels of 1% and 5%, respectively.

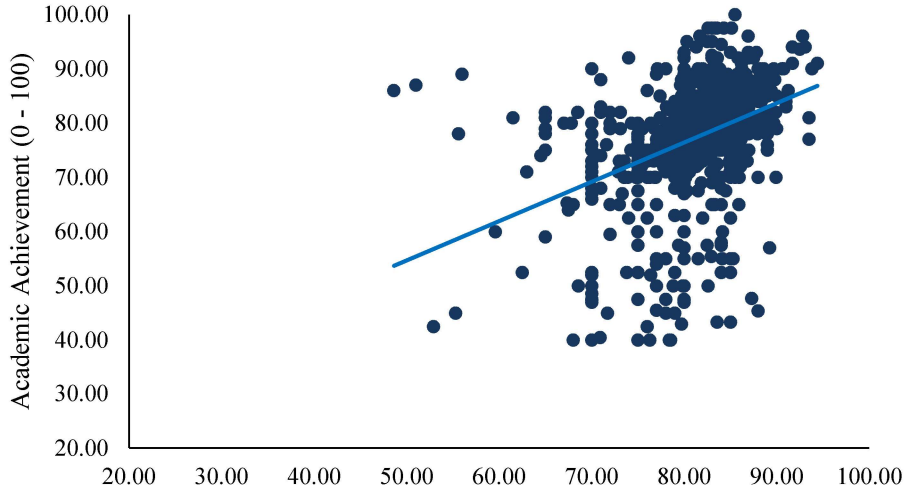



**Figure 3.** Scatter plot between mathematics scores and student academic achievement in tangerang municipality public high school students

For the mathematics score variable, the researcher presents a scatter plot showing the relationship between mathematics scores and academic achievement, with a regression line. This visualization reinforces the WLS regression model estimates, in which mathematics scores emerge as the dominant control variable, exhibiting the largest coefficient and high statistical significance (see Figure 3). The regression line's positive slope indicates a strong correlation between higher

numerical competence and greater cumulative academic achievement among public high school students in Tangerang Municipality. Methodologically, the scatter plot shows a non-constant residual distribution, particularly within the 70.00 to 85.00 mathematics score range. In this area, residual variance widens vertically, creating a fan-like pattern, a dispersion characteristic that strongly suggests heteroskedasticity. These results also provide mathematical justification for using the WLS regression model to obtain unbiased parameter estimates.

The visualization also identifies a small number of outliers situated outside the main cluster. An outlier in the upper-left quadrant represents a low mathematics score (approximately 50.00) paired with high academic achievement (above 80.00). Conversely, an outlier in the lower quadrant shows an academic score of around 40.00 within the 70.00 to 80.00 mathematics score range. Although the data are heavily concentrated in the high mathematics score range (75.00–95.00) and high academic achievement range (70.00–95.00), the regression trend line remains robust and stable.

**Categorization of Parental Involvement, Academic Achievement, and Its Relation to Socioeconomic Status**

Parental involvement is divided into two categories: good and poor. This differs from Lara and Saracostti's (2019) study, which classifies parental involvement in supporting children's (students') learning into low, medium, and high levels. The results show that parents with high socioeconomic status tend to have high parental involvement. Parents always invite their children to discuss lessons and family matters at home. They also provide pocket money, school supplies, and rewards for their children's academic performance. This study's results confirm previous findings that parental involvement in low-SES families is lower than in high-SES families (Caro, 2018; Fang et al., 2020; X. Li et al., 2020). Low-SES families also tend to have poorer communication within the family and weaker relationships with children, which can lead to lower academic performance among their children (Ramdahl et al., 2018). Other research also finds that parental SES gaps significantly affect student academic achievement (Suna & Özer, 2021). One possible explanation is that parents with low SES may have limited knowledge about family education, and parental involvement in children's learning may be less effective.

**Parental Involvement and Difference in Student Academic Achievement**

The results of the test for differences in academic achievement based on parental involvement characteristics indicate an insignificant difference. This implies that increased parental involvement does not necessarily lead to better outcomes, as parents' approaches vary in effectiveness. Parental involvement, ranging from providing study spaces and supporting facilities to offering guidance and rewards for academic results—has not been proven to boost students' academic achievement. Theoretically, while home facilities and expressions of affection (such as praise) provide external support, they do not automatically change a student's innate cognitive capacity, self-efficacy, or intrinsic motivation when grappling with complex school curricula. Parental approaches that lean toward passive-materialistic tendencies or excessive control can trigger academic anxiety in adolescents, which in turn stifles their learning performance. Therefore, the effectiveness of parental involvement depends not on the amount of physical support or supervision provided at home, but on how students internalize that support and translate it into independent learning in the classroom. This result aligns with earlier studies that found learning motivation and

subjective well-being did not differ significantly between students who tended to avoid higher performance and lower life satisfaction and those who perceived high involvement and autonomy support from parents (Kang et al., 2024; X. Li et al., 2020).

**SES as a Significant Differentiator of Academic Achievement**

In contrast to parental involvement, the researchers showed that academic achievement differs significantly by socioeconomic status (SES). This indicates that students' academic performance is strongly determined by their parents' SES. Parental education, occupation, and asset ownership encourage students to engage in learning activities, improving academic achievement. Conversely, students from lower socioeconomic backgrounds tend to achieve relatively lower academic results. The results confirmed earlier studies, suggesting a significant academic achievement gap between children from wealthy and middle-class families and their low-income counterparts across all fields of study and attendance rates (Khusaini & Muvera, 2020; Reardon & Portilla, 2016). These findings also refute van Zwieten et al.'s (2021) alternative perspective, which found that students with higher SES tend to have worse academic performance. Thus, parental socioeconomic background stratification remains a powerful structural factor differentiating student academic achievement in public high schools in Tangerang Municipality.

**Parental Involvement and Academic Achievement**

Meanwhile, the test results on the relationship between parental involvement and academic achievement among public high school students in Tangerang Municipality are positive and statistically significant. This indicates that increased parental involvement can explain changes in children's academic achievement. Students think that parental involvement in their education, both at home and at school, has a significant positive impact on their ability to study. Families spend more time with their children. Parents interact effectively, attend to their children's needs at home and at school, and consistently give them rewards and pocket money. Parents also provide their children with access to internet networks and learning resources so they can study effectively and comfortably at home. As a result, their learning achievement will improve.

In addition, researchers found disparities between the Mann-Whitney comparative test and the WLS regression test. Several factors explain the differences in findings regarding the influence of parental involvement on student academic achievement. First, the difference lies in how parental involvement is measured: ordinal scales ("Poor" and "Good") versus continuous data. Continuous score truncation removes detailed inter-respondent variability information within the same group, thereby increasing the risk of a Type II error. This risk is the failure to detect real differences in continuous data. This is shown by the academic achievement test using the Mann-Whitney non-parametric approach, which is not significant. Meanwhile, the WLS test of parental involvement on academic achievement based on continuous data is significant. Second, the WLS regression model has accommodated the presence of control variables (covariates). The Mann-Whitney test is a simple bivariate test that does not account for other variables. At the same time, the WLS regression model accounts for variance in Socioeconomic Status (SES), Gender, Age, Distance from Home, and Mathematics Score (Math Score). When the model controls for external variance, the error shrinks significantly, shifting the effect of parental involvement from subtle to marked in its impact on academic achievement.

This study reinforces previous research showing that student academic achievement improves as parental involvement in supporting

learning increases (Eker & Yildizli, 2025; Jeynes, 2024; Kang et al., 2024; Wilder, 2014; S. Zhang & Wu, 2025). Meanwhile, Ogg and Anthony (2020) concluded that children's science skills tend to improve as their math and reading skills improve, along with the intensity of parental involvement at home. Effective communication should be established between parents and children, both directly and indirectly. There are several goals of good communication. First, children can feel that communication is part of parental attention. Second, children can convey learning problems faced without obstacles. Lastly, parental affection for children models good communication. Parental involvement can enhance learning success in many ways, not only material ones, including praise, appreciation for learning outcomes, and so on. Research findings from Won and Yu (2018) further emphasize that parental autonomy support and control tend to increase academic time management and procrastination. These results also conflict with previous findings (Avcý et al., 2025; Tan et al., 2026; Toren, 2025).

However, this study's results contrast with earlier research that found parental involvement contributes little to students' academic advancement and that tutoring, homework monitoring, and educational expectations have a significant impact (Gubbins & Otero, 2020; Li et al., 2019). Parental involvement, such as communicating with the school, helping with homework, involvement quality, and high parental intensity at home, is less effective at improving student academic achievement (Gan & Bilige, 2019; A. Li, 2024). Students believe parents intervene too much in their lives, both at school and at home, which limits their freedom to choose their own attitudes and actions. Students also feel embarrassed by their school friends because they are perceived as lacking independence and constantly relying on their parents. Students face challenges in improving their academic performance because of this disease.

**SES and Academic Achievement**

In addition, this study failed to support the hypothesis that parents' SES significantly affects the academic achievement of public senior high school students in Tangerang Municipality. The degree of education, wealth or asset ownership, income earned, or occupation of parents does not influence the improvement of academic achievement. Generally, the SES of public senior high school students' families in Tangerang Municipality is categorized as moderate to lower class. This is among the reasons why the influence between these variables could not be demonstrated by the researchers. However, this study identified a phenomenon of "reversed disparity" regarding the SES variable. Results from the non-parametric Kruskal-Wallis test indicated that SES groupings significantly differentiated students' academic achievement, signifying a tangible performance gap across economic strata. Conversely, when SES was included simultaneously with other control variables in a Weighted Least Squares (WLS) multiple regression model, its direct effect became negative and statistically insignificant.

The loss of SES significance in the WLS regression model suggests that its variance contribution overlapped with, or was absorbed by, other covariates possessing stronger associations, such as parental involvement and mathematics scores. Furthermore, prior cross-tabulation analysis demonstrated a strong positive correlation between SES and parental involvement. In other words, SES does not directly determine student academic achievement; instead, factors such as active parental involvement in the child's education and the student's cognitive ability appear to fully mediate its influence. The results of this study do not support the previous findings, demonstrating that there is a significant correlation between parents' SES and their children's academic achievement across all educational levels (Finch & Finch, 2022; Rakesh et al., 2025; Sentosa, 2023;

Sentosa et al., 2024; Song & Tan, 2025; Yigiter, 2025). Because education shapes a child's future, parents hope their children will succeed in school. In contrast, this study confirms previous findings that students' academic achievement is not determined by their parents' socioeconomic status (Bignardi et al., 2024). Earlier studies by Lam and Zhou (2022) found that students with low SES tend to perform better academically than students with privilege. Other findings suggest that students with low SES tend to perform worse academically as they continue into secondary school (van Zwieten et al., 2021).

These findings strongly justify using multivariate regression models (such as WLS) to disentangle the net interactions between latent variables. In addition, the findings suggest that schools can effectively mitigate financial structural barriers facing students from low socioeconomic backgrounds within the school's complex ecosystem. It is crucial for schools to attend to students from low-income backgrounds so that such backgrounds no longer serve as a differentiating factor or a significant obstacle to student academic achievement.

**Study Limitation**

This result is also a weakness of the study because the parental involvement variable obtained inconsistent results with the WLS regression testing results. Additionally, the chosen method or analysis model will significantly affect the parental engagement variable linked to academic achievement. The researchers suggest that, when examining the correlation between parental involvement and academic achievement, a regression model is more appropriate than a comparative one. Another weakness is that the researchers generalize from a sample of students in public senior high schools, excluding private senior high schools. It would produce different results and possibly improve the quality of the research if senior high school students from private schools were included in the population. In addition, researchers did not include important student-related variables, such as attitude and subjective norms (Khuram et al., 2022), as well as self-efficacy and self-esteem (Ercegovac et al., 2021), which would make the study more comprehensive.

## ■ CONCLUSION

The results showed that the higher parents' SES, the higher their involvement in their children's education, but this does not necessarily increase their children's academic achievement. The study also reveals a discrepancy between the bivariate comparative analysis and the WLS regression analysis. Initially, the researchers found no difference in student academic achievement based on parental involvement characteristics. However, SES proved to be a significant differentiating factor for students in public high schools in Tangerang Municipality. Conversely, when control variables (gender, age, distance, and mathematics scores) were included, the WLS regression results shifted the findings, identifying parental involvement as a significant determinant of improved academic achievement, while parental SES became statistically insignificant. Ultimately, while parental economic stratification shapes student achievement in absolute terms, its influence operates through parental involvement at home and students' cognitive mastery at school.

This finding implies that parents should maintain parental involvement because it helps children boost academic achievement. Among the various dimensions of parental involvement, psychological attention, praise, and internet connectivity have proven to be driving forces for improved academic achievement. For schools and the Banten Provincial Education Office, these findings confirm that a family's financial situation is no longer a direct barrier to academic success, thereby providing strong justification for policies aimed at ensuring equitable access to and quality

of education. Initiatives such as operational funding and affirmative action programs support students from low-SES backgrounds. These efforts aim to mitigate structural-spatial obstacles (such as the distance from home to school) and technical barriers, ensuring that students from any economic stratum have the opportunity to achieve optimal academic results.

Regarding the study's weaknesses, future researchers can retest the insignificant variable, namely SES. Additionally, because private high schools enroll more students than public high schools, future studies may need to boost participation in both types of schools. Enhancing the quality of the research results' generalization is the objective. Because WLS regression has not been applied to analysis in Indonesia before, WLS regression analysis is still required to test whether the conclusions remain consistent using the same methodology. Future researchers should add student personal variables, including academic attitude, subjective norms, self-efficacy, and self-esteem.

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