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Student engagement: Gender differences in senior high school

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ABSTRACT

Student engagement is a broad concept that encompasses student commitment, interaction, and connection with academic material, curriculum, and activities that support learning and achievement. Student engagement has been conceptualized as a three-dimensional construct: emotional/affective, behavioral, and cognitive engagement. There are differences in student engagement levels between male and female students, based on PISA results between 2012 and 2022, with performance in mathematics declining among male students, but remaining stable among female students in Indonesia. This study aimed to identify gender-based differences in student engagement. This research method employed a quantitative approach. Sampling was conducted using non-probability and purposive sampling (N=467). Confirmatory Factor Analysis (CFA) was used to test the construct validity of each variable using the Lisrel 8.8 software, and difference tests were conducted using SPSS 23 software. The results of the study indicate that there were differences in variance between male and female groups in the behavioral and cognitive engagement variables, while there were no differences in variance between male and female groups in the emotional engagement variable. Additionally, the categorization of scores for the behavioral engagement, emotional engagement, and cognitive engagement variables was dominated by the moderate category. Future research should investigate variables related to behavioral and cognitive engagement among female students to foster school engagement. This study aims to develop potential teaching strategies and interventions for both male and female students to enhance student engagement in school.

Keywords: Student engagement, behavioral engagement, cognitive engagement, emotional engagement, gender.

1. INTRODUCTION

Learning requires sincere effort from students to create learning that emphasizes deep conceptual understanding, not just memorization. Students are required to be active in the learning process, which is in line with the government's Merdeka Curriculum Program. Learning in the Merdeka curriculum is student-centered, so students need to be actively involved in the school. Engagement in academic work is a psychological investment made by students in learning, understanding, and mastering knowledge or skills. The level of student engagement in academic work can be inferred from how students complete academic tasks: the amount of time they spend, the intensity of their concentration, the enthusiasm they show, and the level of attention they demonstrate (Newmann, 1989).

The Programme for International Student Assessment (PISA) is an international program that studies student engagement in countries around the world. PISA uses a proactive mathematics learning behavioral index to measure the frequency of student engagement in such activities (Organisation for Economic Co-operation and Development, 2023). Hartono (2018) stated that the level of student engagement differs between males and females. The 2022 PISA results in Indonesia regarding gender differences in achievement show that females outperform males in mathematics by a margin of 6 points and in reading by a margin of 23 points in Indonesia (Organisation for Economic Co-operation and Development, 2023). Between 2012 and 2022, performance in mathematics declined among male students but remained stable among female students in Indonesia (Organisation for Economic Co-operation and Development, 2023).

Numerous studies have examined the reasons for the disparities between male and female pupils in various academic areas. As a person develops and engages with their surroundings, gender inequalities in educational settings appear to emerge, and gender preconceptions picked up from the social environment, like from peers (Muntoni et al., 2020), instructors (Muntoni & Retelsdorf, 2018), and parents Casad et al. (2015); Tiedemann (2000) appear to be major contributors to the development of these disparities. There are numerous hypothesized mechanisms for how these gender stereotypes are picked up, including direct expression of gender stereotypical expectations, reinforcement of gender-typical behavioral, model learning, and differential treatment of boys and girls (Gunderson et al., 2012; Heyder et al., 2019). Gender stereotypes then lead to differences in the interests and pleasures that girls and boys have, their beliefs about their own abilities, and the choices they make throughout their academic careers (Eccles et al., 1993; Wigfield & Eccles, 1994).

Most research on student engagement focuses on its relationship with academic achievement and whether students are likely to complete secondary education (Willms, 2003). Variables describing engagement are often treated in analyses as predictors of other educational outcomes, particularly academic achievement (Wang & Degol, 2014). Student engagement is treated as a predictor of academic achievement, with the assumption that low engagement or dissatisfaction with school leads to poor academic achievement (Organisation for Economic Co-operation and Development, 2023). Based on gender in the research conducted by (Santos et al., 2021), female participants reported higher levels of engagement for all three dimensions.

In addition, Reeve & Tseng (2011) define student engagement as the reciprocal influence of student involvement on the teacher's interpersonal style, which is considered to flow through teacher interaction, awareness, observation, and reaction to student behavioral, emotional, and cognitive involvement. In this context, classroom management becomes a key factor, as dynamic and diverse teacher-student interactions allow teachers to enjoy the teaching process, sometimes making it difficult for them to monitor every student. This enables students to constructively contribute to the learning process. This aspect constitutes an additional dimension of student engagement known as agentic engagement.

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academic achievement (Organisation for Economic Co-operation and Development, 2023). Based on gender in the research conducted by (Santos et al., 2021), female participants reported higher levels of engagement for all three dimensions.

Student engagement is a broad concept encompassing commitment, interaction, and connection between students and academic material, curriculum, and activities that support learning and achievement (Wang & Hofkens, 2020). In current educational research, student engagement has been conceptualized as a three-dimensional construct: emotional/affective, behavioral, and cognitive engagement (Fredricks et al., 2004; Furlong & Rebelez-Ernst, 2013). Emotional or affective engagement is related to the willingness to learn and refers to students' emotional responses to school, learning, and the academic community (Fredricks et al., 2004). Behavioral engagement encompasses actions that serve as observable indicators of persistence and active participation in extracurricular and academic activities (Fredricks et al., 2004; Furlong & Rebelez-Ernst, 2013). Cognitive engagement includes students' self-confidence, motivation, expectations, and beliefs related to teachers and/or peers (Fredricks et al., 2004).

More comprehensively Fredricks et al. (2004). explains the dimensions of student engagement in three dimensions. Behavioral engagement draws on the idea of participation; it includes involvement in academic, social, or extracurricular activities and is considered crucial for achieving positive academic outcomes and preventing dropout. Emotional engagement encompasses positive and negative reactions to teachers, classmates, academics, and schools, and is presumed to create ties to an institution and influence willingness to do the work. Finally, cognitive engagement draws on the idea of investment, incorporating thoughtfulness and willingness to exert the effort necessary to comprehend complex ideas and master difficult skills.

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Due to its impact on the apprenticeship trajectory, its usefulness as a safeguard against internalized and externalized challenges, and its adaptability, Student engagement has drawn a lot of attention recently (Fredricks et al., 2016). Academic success (Pietarinen et al., 2014), physical and mental health (Salmela-Aro & Read, 2017), wellbeing, and continuing education after secondary school Wang and Eccles (2012) are all related to student engagement. In this study, the researchers aimed to determine the level of student engagement in Indonesia based on gender. Lietaert et al. (2015) revealed a gap between males and females, with males receiving less support than females, resulting in different levels of engagement, aged 15–18 years old or in grades 10–12 of senior high school. This research is important to develop the potential, teaching strategies, and treatment of both male and female students to increase student engagement in school.

2. METHOD

This study used a quantitative approach and non-probability sampling, specifically purposive sampling, which is a technique that uses criteria determined by the researcher. The study population consisted of both male and female high school students in the Lebak area of Banten (N=467). In this study, the researcher conducted data analysis using confirmatory factor analysis (CFA) with the Lisrel 8.8 software, this is to determine whether the items in each variable are valid in measuring what is to be measured. Difference testing analysis using SPSS 23 software was used to determine whether the differences found in the sample data also reflected differences in the wider population.

The authors used a questionnaire for data collection in this study. In this study, a Likert-scale model was used. Each statement had alternative answers, ranging from strongly agree to strongly disagree. This scale includes favorable and unfavorable statements. By removing neutral numbers from the Likert scale, users could determine whether their answers were positive or negative. Participants must select one of four response categories that correspond to the specific question: "Strongly Agree (SS)," "Agree (S)," "Disagree (DS)," "Strongly Disagree (SD)." The choice that scores the highest on positive statements is "strongly agree," while the option that scores the lowest on favorable words is "strongly disagree." On the other hand, when it comes to negative assertions, the option that scores the highest is "strongly disagree," while the option that scores the lowest is "strongly agree."

2.1. Measurement Tool

Student Engagement. The student engagement scale used in this study is the School Engagement Measure (SEM) – MacArthur, derived from the dimensions of student engagement proposed by (Fredricks et al., 2005). The student engagement measurement tool consists of 19 items across three dimensions: behavioral, emotional, and cognitive engagement. Items were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with three items rated inversely. The CFA results with a unidimensional model for the behavioral engagement dimension yielded a model fit with chi-square = 0.81, df = 2, P-value = 0.66747, and RMSEA = 0.000. The CFA results showed that all items were valid for measuring student engagement because the T-value was <1.96. The emotional engagement dimension yielded a model fit with chi-square = 7.23, df = 7, p-value = 0.40534, and RMSEA = 0.008. The CFA results showed that all items were valid for measuring emotional engagement because the T-value was <1.96. The cognitive engagement dimension obtained a model fit with chi-square = 19.66, df = 11, p-value = 0.05026, and RMSEA = 0.041. The CFA results showed that all valid items measured cognitive engagement, because the T-value was <1.96.

3. RESULTS AND DISCUSSION

3.1. Results Statistical Description of Research Variables

Table 1. Statistical Description of Variables

Variable	N	Min	Max	Mean	Std. Dev
Behavioral Engagement	467	9.16	67.52	50.0000	7.63466
Emotional Engagement	467	13.18	68.74	50.0000	8.83447
Cognitive Engagement	467	-.61	71.29	50.0000	8.55317

Based on Table 1, it can be seen that the number of research subjects was 467, with the lowest behavioral engagement score of 9.16 and the highest of 67.62. Emotional engagement had the lowest score of 13.18 and the highest was 68.74. Cognitive engagement had the lowest score of -.61 and the highest score was 71.29.

3.2. Results of the Categorization of Research Variable Scores

After the statistical description of the research variables is known, their scores of the research variables can be categorized. The number of respondents in the low- and high-score categories for each variable can be determined from the categorization of the research variable scores. Categorization was performed according to the norms in Table 4.2.

Table 2 Categorization of Research Variable Scores

Variable	Frequency %		
	Low	Medium	High
Behavioral Engagement	51 (10.9%)	364 (77.9%)	52 (11.1%)
Emotional Engagement	74 (15.8%)	325 (69.6%)	68 (14.6%)
Cognitive Engagement	53 (11.3%)	363 (77.7%)	51 (10.9%)

As shown in Table 2, 51 respondents (10.9%) fell into the low category, 364 (77.9%) into the medium category, and 52 (11.1%) into the high category for the behavioral engagement variable. The emotional engagement variable showed that 74 respondents (15.8%) fell into the low category, 325 (69.6%) into the moderate category, and 68 (14.6%) into the high category. The cognitive engagement variable showed that 53 respondents (11.3%) fell into the low category, 363 (77.7%) into the moderate category, and 51 (10.9%) into the high category. Thus, it can be concluded that the categorization results of the behavioral, emotional, and cognitive engagement variables were dominated by the moderate category.

3.3. Results of the Difference Test for the Behavioral Engagement Variable Based on Gender

Independent t-tests and one-way ANOVA were conducted to examine differences in behavioral, emotional, and cognitive engagement as variables based on gender (male and female). To examine the homogeneity of variance in behavioral engagement between males and females, refer to Table 3.

Table 3 Differences in Behavioral Engagement Based on Gender Variables

	Gender	N	Mean	Levene's Test Equality of Variances Sig	T-tes for Equality of Mean Sig
Behavioral Engagement	Male	161	49.0754	0.021	0.058
	Female	306	50.4865		

Table 3 shows that in the test of homogeneity of variances (Levene's test for equality of variances), a sig value of 0.021 was obtained. As the sig value was < 0.05, the variances between the male and female groups were not homogeneous. This means that there was a difference in variance between the two groups. As the sig value was > 0.05, there was no statistically significant difference between the mean behavioral engagement scores of males and females. Although females had a higher mean behavioral engagement score (50.4865 > 49.0754), this difference was not statistically significant.

3.4. Results of the Emotional Engagement Variable Difference Test Based on Gender Variables

To test the homogeneity of emotional engagement variance between males and females, refer to Table 4.

Table 4 Differences in Emotional Engagement Based on Gender Variables

	Gender	N	Mean	Levene's Test Equality of Variances Sig	T-tes for Equality of Mean Sig
Emotional Engagement	Male	161	51.2033	.692	0.045
	Female	306	49.3669		

From Table 4, it can be seen that in the test of homogeneity of variances (Levene's test for equality of variances), a sig value of 0.692 was obtained. As the sig value is > 0.05, it can be concluded that the variances of emotional engagement in women and men are homogeneous. This means that there was no difference in variance between the two groups. The mean emotional engagement score for men was higher than that for women (51.2033 > 49.3669). However, this difference was statistically significant at 0.045 (sig < 0.05).

3.5. Results of the Test for Differences in Cognitive Engagement Based on Gender

To examine the homogeneity of variance in cognitive engagement between men and women, see Table 5.

Table 5 Differences in Cognitive Engagement Based on Gender

	Gender	N	Mean	Levene's Test Equality of Variances Sig	T-tes for Equality of Mean Sig
Cognitive Engagement	Male	161	48.9080	.000	0.045
	Female	306	50.5745		

From Table 5, it can be seen that, in the test of homogeneity of variances (Levene's test for equality of variances), a sig value of 0.000 was obtained. As the sig value was < 0.05, the variances between the male and female groups were not homogeneous. This means that there was a difference in variance between the two groups. As the sig value was > 0.05, there was no statistically significant difference between the average cognitive engagement of males and females. Furthermore, the average cognitive engagement of females is known to be higher than that of males (48.9080 > 50.5745). However, this difference was statistically significant at 0.045 (sig < 0.05).

3.6. Discussion

Much work frames engagement and its underlying skills as a partial explanation for girls' general advantage in school over boys (Pyne, 2020). Recent research has shown that individual characteristics, particularly gender, play an important role in determining students' levels of learning engagement. For example, Van Houtte (2023) demonstrates that female students tend to be more active and engaged in classroom activities, especially when traditional gender norms remain strong. Similar findings are supported by a meta-analysis by (Lesperance et al., 2022), which found that school intervention strategies have more significant motivational and emotional effects on female students than on male students. Additionally, during online learning during the pandemic, females reported higher levels of teacher support and intrinsic engagement, consistent with their tendency to seek more intense social and emotional support (Korlat et al., 2021).

Santos et al. (2021) mention that there are gender differences in student engagement during adolescence. Additionally, the results of Santos et al. (2021) study also indicate that female participants reported higher engagement across all three dimensions of student engagement. This aligns with the results of this study, specifically in the behavioral and cognitive engagement dimensions. Overall, females have higher levels of engagement than males, according to research by (Fullarton, 2002). There are also several gender disparities in engagement levels. This indicates that in the context of this study, female students are more likely than male students to engage in extracurricular activities, which will increase their degree of school connection. While men are more likely to play sports, women's engagement is significantly higher due to the larger percentage of men who regularly participate in theater and volunteer work.

Provide King (2016) study entitled "Gender Differences in Motivation, Engagement, and Achievement Are Related to Students' Perceptions of Peer—But Not of Parent or Teacher—Attitudes Toward School" aims to examine gender differences in students' motivation, engagement, and academic achievement. The sample used in this study consisted of 848 students from two secondary schools in the Philippines. The results of this study indicate that female students have higher levels of motivation and academic achievement than male students do. Regarding student engagement, no significant differences were found between the female and male students, although the male students had lower levels of engagement. This is in line with the results of the present study, which found no difference in variance between the two groups.

It is currently unknown how much reporter prejudice occurs, despite the fact that bias was not linked to gender or differing family SES (Li & Lerner, 2013). Additionally, depending only on students' self-reports could lead to issues with socially desirable responses and common method variance due to the possibility of erroneous recollection of previous feelings or acts. Observer ratings and teacher reports, for example, may be used in conjunction with other data collection techniques or different informants to obtain information about students' behavioral engagement.

This study concludes that school engagement is a multidimensional construct with internal dynamics and that positive emotions and motivational thinking among students can enhance participation and predict academic competence and positive outcomes for both male and female high school students in the future. Teachers and practitioners must create a supportive and developmentally appropriate learning environment so that students feel emotionally engaged in school activities and staff, thereby optimizing the educational experience for all adolescents. A caring learning environment inspires students to set higher goals and to strive harder. In conclusion, this study also implies that participation is crucial and that positive feelings and cognitive engagement alone are insufficient (Li & Lerner, 2013).

The research conducted by Sahil and Hashim (2017) aimed to investigate gender differences in perceptions of support for student cognitive engagement in the education system is inevitable. The pathways of cognitive engagement for males appear to be limited, whereas females have several pathways through which such support is manifested in engagement. These findings are consistent with a number of studies showing that female adolescents report higher perceptions of support in their lives than male adolescents. Furthermore, students' clarity regarding their cognitive types, gender, and major was found to be the best indicator of academic success. Male students demonstrated greater adaptability to various learning activities, whereas female students demonstrated superior performance and greater clarity regarding their preferred cognitive modes. Additionally, it was discovered that particular cognitive types were linked to particular engineering disciplines (Alalouch, 2021).

4. CONCLUSION

The conclusion of this study, based on the categorization of scores for behavioral engagement, emotional engagement, and cognitive engagement variables, was dominated by the moderate category. The results of the homogeneity of variance test for behavioral engagement showed no homogeneity between males and females, and there was no statistically significant difference between the average behavioral engagement of males and females. The variance in emotional engagement between females and males is homogeneous. Emotional engagement in men was found to be higher than in women, but the difference was statistically significant. Additionally, the variance in cognitive behavior between men and women was not homogeneous. This means that there was a difference in variance between the two groups. There was no statistically significant difference between the average cognitive engagement scores of men and women, and this difference was statistically significant.

There is a pressing need for studies conducted with diverse and representative samples, covering longer periods for adolescents (e.g., from early adolescence to the final year of high school), and collecting data from multiple informants. Finally, various measures of student engagement are required to determine whether the research findings can be applied to different datasets. Additionally, more effort is needed to identify factors that may influence student engagement. It is important to remember that processes and

relationships outside school, such as parenting practices, cultural beliefs, and community-based programs, can influence the growth of student engagement. It is crucial to have data on these types of predictors so that legislators and practitioners can receive advice on how to create schools that can optimally promote student engagement.

Ethical Approval
This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. All procedures involving human participants were designed to respect the dignity, rights, safety, and well-being of respondents.

Informed Consent Statement
All participants were provided clear information regarding the purpose, scope, and confidentiality of the study. Participation was voluntary, and respondents were informed that they could withdraw at any stage without a penalty. Written informed consent was obtained from all participants before data collection with full assurance of anonymity and confidentiality.

Author Contributions
Not Applicable.

Disclosure Statement
The authors declare no conflicts of interest.

Data Availability Statement
The data supporting this study are available upon reasonable request from the corresponding author owing to privacy considerations.

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