

Exploring The Influence of Mental Health and Academic Stress on The Academic Achievement of PLS-SEM Analysis Among First-Year College Students at Universitas Riau

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ABSTRACT

This study was focused on analyzing the influence of mental health and academic stress on the academic achievement of first-year students. This research was conducted in the Study Program of Chemistry Education, Biology Education, Physics Education, Mathematics Education, History Education, Economics Education, Pancasila and Civics Education, at the Faculty of Teacher Training and Education (FKIP), University of Riau. The sample size for this study was 303 first-year students. The research data were collected using questionnaires distributed directly to students. The data were analysed using SmartPLS version 4.0. There was a significant effect of mental health on student academic achievement ($p < 0.05$; calculated t -value = 8.592 > t -table value of 1.96), categorised as strong. Meanwhile, academic stress also had a significant effect on student achievement (calculated t -value = 2.106 > t -table = 1.96, $p < 0.05$), indicating a strong effect. Academic stress was also found to impact students' mental health ($p < 0.05$). Simultaneously, the combination of mental health and academic stress was also found to influence academic achievement ($p < 0.05$) significantly. A path analysis found that the path from academic stress to mental health to academic achievement was an effective predictor of first-year students' academic achievement. Path coefficient analysis identified this pathway as an effective model for improving student academic achievement. This research is expected to provide attention and policy guidance for first-year students' academic achievement at the Faculty of Teacher Training and Education, University of Riau.

Keywords: *mental health, academic achievement, academic stress, quantitative analysis, Smart PLS*

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INTRODUCTION

Academic achievement is a fundamental measure used to evaluate student progress in their studies, and it is important to understand the factors that may be responsible for defining, predicting, facilitating, and triggering differences in academic achievement (Sakitri, 2020; Khan and Sharmama-Tus- Sabah, 2020). Academic achievement refers to a student's level of success in learning course material, as reflected in test scores in a specific subject (Nugrahen et al., 2017). A student's academic achievement in higher education is reflected in their cumulative grade point average (GPA) at the end of the course (Putri et al., 2020). GPA is believed to be a measure of a student achievement with good internal reliability, temporal stability, and comprehensiveness (Richardson et al., 2012).

Meanwhile, first-year university students experience many changes in learning conditions compared to their school days, such as larger classes, more intense competition, varied teaching styles, higher-volume, more frequent assignments, and higher-grade standards (Nugrahen et al., 2017). Furthermore, students are faced with significant changes in their social, family, and personal lives, making them vulnerable to psychological distress (Liu et al., 2022). Furthermore, good first-year grades play a crucial role in subsequent

academic success and graduation rates. This contributes to improved academic achievement, increased on-time graduation rates, and reduced the likelihood of students dropping out (Hinkson et al., 2022). Beyond good grades, academic failure is also a significant issue in the quality of university education. This can contribute to increased costs and to psychological and social problems for students (Uji and Kawaguchi, 2021). Thus, the lack of attention to this issue has been blamed for the decline in the country's scientific standing and significant damage to society in the years to come (Hinkson et al. 2022; Khan et al. 2020). Furthermore, negative behaviours, such as addiction, suicide, and alcohol consumption, can emerge after dropping out of college (Hinkson et al. 2022; Ghamari et al. 2010). Mental health has a significant impact on academic achievement and is a crucial aspect in achieving academic success. Mental health is defined as a person's psychological and emotional state that enables them to function optimally in daily life (World Health Organization, 2014). It plays a crucial role in cognitive abilities, motivation, and adaptation to the learning environment (Mahdavi et al., 2023). Some examples of mental health disorders include depression, anxiety, and stress, which can disrupt a person's cognitive, affective, and behavioural functions, negatively impacting their academic performance (Kintan et al., 2021). Students with good mental health are better able to cope with pressure and stress, are more focused and concentrated, and absorb information more effectively (Chu et al., 2023). Good mental health also plays a role in managing academic stress levels, which is crucial for achieving educational goals (Uji and Kawaguchi, 2021; Mahdavi et al., 2023). Furthermore, poor mental health can hinder the learning process (Halat et al. 2023). Therefore, addressing the mental health of first-year students in educational settings is crucial.

Academic stress is a student's response to university demands, leading to discomfort, tension, and behavioural changes (Lubis et al. 2021). Excessive academic stress can impair memory, concentration, problem-solving skills, and academic performance. Furthermore, academic stress can also lead students to engage in negative behaviours such as brawls, smoking, alcohol consumption, promiscuity, and drug and illicit drug abuse (Ambarwati et al. 2019). Academic stress is influenced by time management, academic demands, assignments, and the academic environment (Pertiwi, 2018). The impact of academic stress is not necessarily negative; it can also have positive effects on students, including increased creativity and fostering self-development (Adrian et al. 2021). Academic stress is necessary for students' self-development, provided it remains within individual limits (Pathrose & Ramaa, 2020). To manage students' stress, self-regulation in learning is crucial. Self-regulation can reduce stress and frustration and facilitate the implementation of problem-solving strategies, in which self-regulation is used to activate and maintain thoughts, behaviours, and emotions to achieve desired goals (Rodameria & Ediati, 2020).

Several previous studies have comprehensively discussed the influence of mental health on academic achievement. Hinkson et al. (2022) examined the influence of mental health on academic achievement among senior students at several American universities. Mahdevi et al. (2023) reported on the relationships among mental health, achievement motivation, and academic success among medical students at the University of Kurdistan. Uji and Kawaguchi (2021) discussed the relationship between mental health and academic achievement among Japanese students. Halat et al. (2023) explored the impact of mental health and health behaviours on academic achievement among students at a Lebanese university. Kvitova et al. (2024) reported the influence of internet and smartphone addiction, mental health, and personality traits on academic achievement. Hosseinkhani et al. (2020) examined mental health, academic stress, academic achievement, and physical activity among schoolchildren in Iran. Zada et al. (2021) analyzed the influence of mental health on academic achievement among college students in Pakistan.

Meanwhile, the relationship between academic stress and academic achievement has been reported in previous studies. Tus (2020) analyzed the relationship between academic stress and academic motivation on academic achievement among adolescents in the Philippines. Tabus and Ledesma (2021) discussed the relationship between academic stress and academic achievement among English language students in the Philippines. Deng et al. (2022) also examined the effects of academic stress and family stress on depression levels and academic achievement in students in Rawalpindi, India. In general, mental health variables are

always combined with academic motivation, health behaviours, personality traits, and physical activity to influence academic achievement. Academic stress variables are paired with academic motivation and family stress on academic achievement.

This study aimed to analyze the influence of mental health and academic stress on the academic achievement of first-year college students. This research was conducted in the Departments of Social Sciences and Natural Science Education, Faculty of Teacher Training and Education, University of Riau. The study programs included in this study were History Education, Pancasila and Citizenship Education, Economics Education, Chemistry Education, Physics Education, Biology Education, and Mathematics Education.

METHOD

Research Design and Sample

This study was designed as a quantitative study, using a questionnaire as the primary instrument. The questionnaire method was chosen for its practical and efficient ability to obtain accurate information on mental health, academic stress, and academic achievement among first-year university students. The sample for this study consisted of 303 students from two departments: Social Sciences, Mathematics Education, and Natural Sciences.

Research Instruments

The research instrument used in this study consisted of a set of questionnaires containing four sections. Section 1 contained information on the respondents' demographics. Section 2 included 22 items on mental health constructs. Section 3 included 20 items on academic stress. Section 4 included 24 items on academic achievement. The questionnaire used a Likert scale with five options: 1) strongly disagree, 2) disagree, 3) somewhat agree, 4) agree, and 5) strongly agree. The items were divided into constructs to ensure that each question truly addressed mental health, academic stress, and academic achievement, and was completed in accordance with these constructs.

Data collection

The data collection technique used in this study was a questionnaire. It was used to obtain comprehensive information regarding a problem and to ensure respondents were free from the fear of providing inconsistent answers. The questionnaire in this study was compiled from questions on the relationships among mental health (X1), academic stress (X2), and academic achievement (Y) among first-year undergraduate students at the Faculty of Teacher Training and Education, University of Riau. Each respondent's answer was measured using a Likert scale.

Data Analysis

Data analysis was conducted using descriptive and inferential statistics using the PLS-SEM program version 4.0. Descriptive analysis was conducted to characterize the research sample's demographics, using MS Excel to calculate percentages and frequencies. Meanwhile, an inferential analysis was conducted to evaluate the instrument's validity and reliability. Correlation analysis was used to examine the relationships among the tested variables. Partial Least Squares Structural Equation Modelling (PLS-SEM) was considered suitable for this purpose (Hair et al., 2017).

RESULTS AND DISCUSSION

Respondent Demographics

The demographic profile of the respondents included gender, study program, and grade point average (GPA). The study programs focused on undergraduate programs offered by the Mathematics and Natural Sciences Education (PMIPA) and Social Sciences Education (PIPS) departments of the Faculty of Teacher Training and Education (FKIP), Riau University. The detailed demographics of student respondents at FKIP, Riau University, are shown in Table 1. By gender, the highest percentage was observed among females at 93.73%. Based on the study program, the highest percentage was found in the Chemistry Education program at 22.44%. Based on GPA, first-year FKIP students at Riau University achieved the highest scores in the 3.0-3.5 GPA range, representing 75.58%.

Table 1. The demographic profile of respondents analyzed based on gender, study program and GPA

No	Demographic	Frequency	Percentage (%)
1	Gender		
	a. Male	19	6.27
	b. Female	284	93.73
	Total	303	100.00
2	Study Program		
	a. Chemistry education	68	22.44
	b. Biology education	40	13.20
	c. Physics Education	39	12.87
	d. Mathematics Education	38	12.55
	e. Economic Education	39	12.87
	f. History Education	36	11.88
	g. Pancasila and Citizenship Education	43	14.19
	Total	303	100.00
3	GPA		
	a. >3.0	12	3.96
	b. 3.0 -3.5	229	75.58
	c. >3.5	62	20.46
	Total	303	100.00

Student Academic Achievement Level

First-year students' responses to academic achievement, mental health, and academic stress are shown in Table 2. Academic achievement had the highest average score, categorised as high, while mental health had the lowest, categorised as moderate. In order from highest to lowest, the responses for first-year students' academic achievement were: academic achievement > academic stress > mental health. Overall, the first-year students' academic achievement score was 4.23, indicating high achievement.

Academic stress parameters were found to be high. This was contributed to by several factors, such as living far from parents or family, financial constraints, piling up of coursework, and irregular study management (Atikal et al., 2020; Kiran and Javaid, 2020). Meanwhile, student academic success is largely contributed to by two factors: internal factors such as health, interests, talents, motivation, attitudes, and intelligence, and external factors such as family support and the learning environment (Angelia et al., 2023). Internal, controllable factors always drive high student achievement, whereas low-achieving students are driven by external, uncontrollable factors (Mona and Yunita, 2021). Furthermore, mental health was found to be in the moderate category. This relates to students being in their first year of university. Students in their first year of study are often found to experience less academic stress than senior students.

Table 2. Academic achievement level of first-year students

No	Parameter	Mean	Standard Deviation	Interpretation
1	Academic achievement	4.54	0.37	Tall
2	Mental health	3.89	0.34	Medium
3	Academic stress	4.25	0.52	Tall
	Average	4.23	0.41	Tall

Analysis of Validity and Reliability

The instrument's validity and reliability were assessed using multiple methods, including convergent validity, Cronbach's alpha, average variance extracted (AVE), composite validity, discriminant validity, and the Heterotrait-Monotrait Ratio test. Each of these measurements was discussed in detail below.

a. Convergent Validity

The instrument was distributed to obtain data and analyzed using SmartPLS version 4.0. Convergent validity was assessed using standardised outer loadings >0.70 or <0.70 (Hamid and Anwar, 2019; Savitri et al., 2021). The convergent validity of academic achievement for first-year students at the Faculty of Teacher Training and Education, University of Riau, is shown in Table 3. The mental health variable consisted of eight items, and two items had loadings <0.70 , indicating they were invalid. The academic achievement construct contained 7 items, and 1 item had a convergent validity value <0.70 , indicating it was invalid. Meanwhile, the academic stress construct comprised 7 items, all of which had outer loadings >0.7 , indicating validity.

Table 3. The convergent validity value of academic achievement taken from the outer loading

Variables	Statement code	Outer loading	Category
Mental health	MH1	0.597	Invalid (<0.70)
	MH2	0.731	Valid (>0.70)
	MH3	0.740	Valid (>0.70)
	MH4	0.787	Valid (>0.70)
	MH5	0.833	Valid (>0.70)
	MH6	0.828	Valid (>0.70)
	MH7	0.856	Valid (>0.70)
	MH8	0.477	Invalid (<0.70)
Academic achievement	PA1	0.541	Invalid (<0.70)
	PA2	0.920	Valid (>0.70)
	PA3	0.860	Valid (>0.70)
	PA4	0.904	Valid (>0.70)
	PA5	0.751	Valid (>0.70)
	PA6	0.946	Valid (>0.70)
	PA7	0.878	Valid (>0.70)
Academic stress	SA1	0.712	Valid (>0.70)
	SA2	0.718	Valid (>0.70)
	SA3	0.894	Valid (>0.70)
	SA4	0.854	Valid (>0.70)
	SA5	0.787	Valid (>0.70)
	SA6	0.838	Valid (>0.70)
	SA7	0.816	Valid (>0.70)

Validity and Reliability Based on AVE and Cronbach's Alpha Values

This validation analysis was measured using the correlation between statement items and constructs. Validity values, Cronbach's alpha, and AVE are summarized in Table 4. Initially, several statement items were collected, and their AVEs were found to be >0.5 . Two statement items in the mental health variable had AVEs <0.5 , indicating they were invalid. The academic achievement variable contained one invalid item with an AVE <0.5 . All invalid statement items were removed and not analyzed. Furthermore, all analyzed variables had AVE values >0.6 and Cronbach's alpha values >0.8 . This indicates that all statement items in the variables can be accepted as reliable constructs (Peterson, 2013; Hair et al., 2017).

Table 4. The validity and reliability values of the instrument obtained from Cronbach's alpha and AVE

No	Variables	Cronbach's alpha	Rho_a	Composite reliability	AVE
1	Mental health	0.875	0.888	0.905	0.615
2	Academic achievement	0.940	0.946	0.953	0.772
3	Academic stress	0.894	0.914	0.917	0.613

In addition, composite reliability (>0.8) was assessed using SmartPLS 4.0. This was intended to strengthen the Cronbach's Alpha reliability value (>0.6). The composite reliability was >0.9 , indicating high reliability. Overall, the composite reliability and Cronbach's Alpha values were >0.9 and >0.8 , respectively (Table 4). This indicates that the developed instrument is classified as valid and reliable.

Analysis of Academic Achievement Hypothesis

a. Direct Influence Analysis

The results of the hypothesis testing on the relationship between mental health and academic stress on academic achievement are shown in Table 5. The relationship between mental health and academic stress on academic achievement was found to be significant, with a t-test value of >1.96 at the 95% confidence level and a significance value of $p<0.05$. Meanwhile, the relationship between academic stress and mental health was also found to be positive and significant, with a t-test value of >1.95 (95%) and a significance value of $p<0.05$. This indicates that hypotheses H1a, H1b, and H1c were supported in this study.

Table 5. Hypothesis and structure of the relationship model in academic achievement

Hypothesis	Parameters	Original samples	Mean samples	Standard deviation	T statistic	Sig. (p values)	Ket.
H1a	Mental health → Academic	0.717	0.712	0.084	8.592	0.000	Supported
H1b	Academic stress → academic achievement	0.196	0.201	0.093	2.106	0.035	Supported
H1c	Academic stress → mental health	0.902	0.906	0.015	59.653	0.000	Supported

Note: significance value $p=0.05$, confidence level 95%

b. Indirect Influence Analysis

The analysis of the relationship between academic stress and academic achievement, mediated by mental health, is shown in Table 6. The mental health variable demonstrated intense mediation of the relationship between academic stress and academic achievement, with a t-statistic of >1.96 (8.909) at the 95%

confidence level. Mental health, as a mediator, also demonstrated a significant effect on academic achievement ($p < 0.05$). This indicates that the mental health variable effectively mediates the academic achievement of first-year students.

Table 6. The relationship between academic stress and academic achievement mediated by mental health

No	Mediator analysis	Original samples	Mean samples	Standard deviation	T statistic	Sig. (p value)
1	Stress of academic → Mental health → Academic achievement	0.647	0.645	0.073	8.909	0.000

Note: significance value $p = 0.05$, confidence level 95%

Path Analysis of Academic Achievement

The path analysis of the relationships among academic stress, mental health, and academic achievement is shown in Figure 1. The mental health construct was influenced by academic stress to the extent of 90.2%, while other constructs not yet examined in this study contributed 9.8%. Furthermore, the academic achievement variable was influenced by mental health to the extent of 71.7%, with the remaining 28.3% attributed to other unexamined variables. The academic achievement variable was also influenced by academic stress by 19.6%, and the remaining 80.4% was contributed by other variables not yet examined in this study. Overall, the academic stress → mental health → academic achievement pathway was a practical pathway for shaping first-year students' academic achievement. Path coefficient analysis identified this pathway as an effective model for improving student academic achievement.

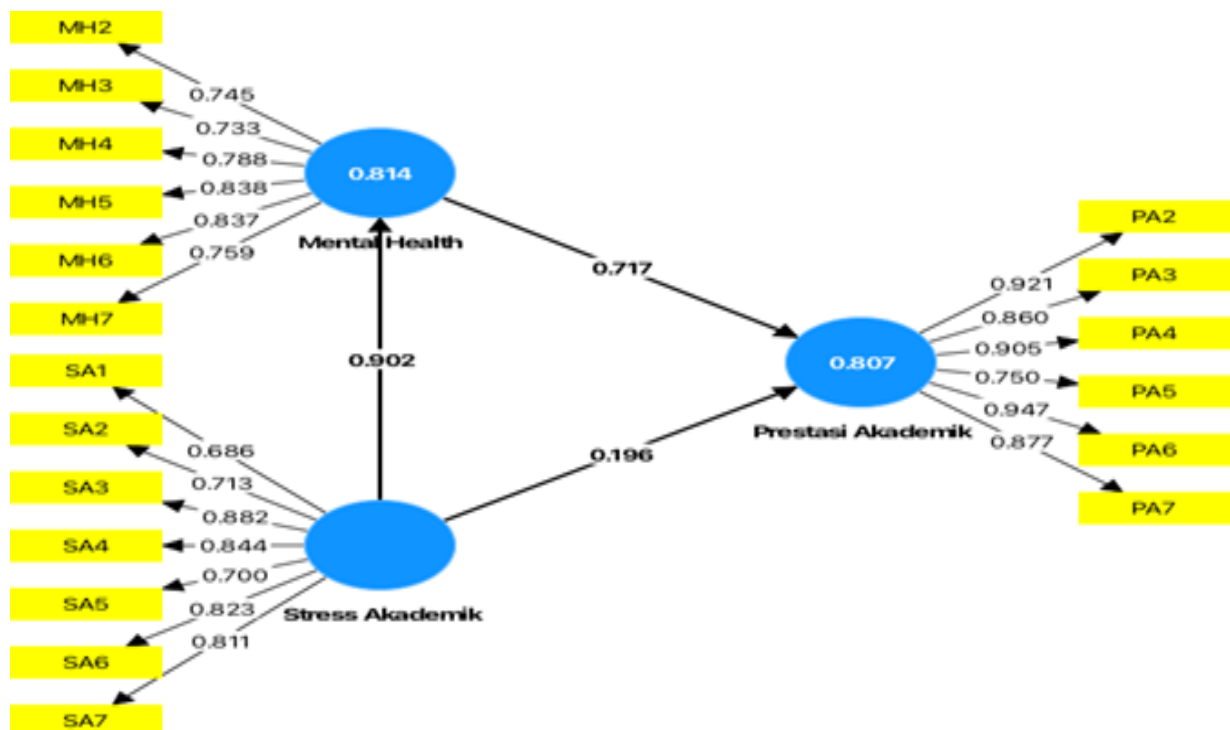


Figure 1. The relationship model obtained from the variables of mental health, academic stress and academic achievement

An analysis of the strength of the relationship between mental health and academic stress on academic achievement is shown in Table 7. There was a strong positive relationship between academic stress and mental health ($r = 0.814$). Meanwhile, there was also a strong relationship between academic performance and academic achievement, with a correlation of 0.813. Furthermore, a simultaneous analysis of academic stress and mental health on academic achievement also found a significant effect ($p < .$).

Table 7. Nilai R-squared

No	Variables	R^2	R^2 adjusted	Category
1	Mental health	0.814	0.814	Strong
2	Academic achievement	0.807	0.808	Strong

In general, there was a significant relationship between mental health and student academic achievement. This research aligns with studies on mental health and academic achievement. Rahmawati et al. (2025) found a significant relationship between mental health and academic achievement ($p < 0.05$). This relationship was negative, meaning that the higher a person's mental health, the lower their academic achievement. Kasanah and Widyanignrum (2024) also found a significant relationship between mental health and academic achievement, with mental health influencing academic achievement by 14.3%, categorised as moderate. Fitriyah et al. (2024) also reported a significant relationship ($p < 0.05$) between mental health and student academic achievement, with a correlation of 63.4%, categorised as moderate. Student academic achievement is significantly influenced by mental health, especially among first-year students. This is because the first year marks a transition from a school to a university environment, with academic pressures and the challenges of adjusting to a new environment (Rahmawati et al. 2025). A study found that mental health among college students continued to increase over time and negatively impacted their academic experience (Wyatt et al. 2017). Furthermore, poor mental health during the first semester increases the risk of poor academic performance throughout the undergraduate program (Chu et al. 2023).

Furthermore, this study also found a significant relationship between academic stress and academic achievement. Students with effective stress management are more likely to achieve academic success. This research aligns with studies that have analysed the relationship between academic stress and academic achievement. Sari et al. (2022) also found a significant relationship between academic stress and academic achievement ($p < 0.05$, 95%). Based on a t-test, this study found a calculated t-value of 0.467, which is greater than the t-value of 0.195. Friantini et al. (2024) also found a significant relationship ($p < 0.05$) between academic stress and academic achievement, with academic stress accounting for 60.7% of the variance in academic achievement. Gibran and Wiyono (2022) also found a linear relationship between academic stress and academic achievement, with academic stress positively and significantly affecting academic achievement. This study found that academic achievement was influenced by academic stress by 20.30%. Suriani et al. (2025) also found that academic stress significantly influenced student academic achievement ($p < 0.05$), with academic achievement scores categorized as very high due to academic stress in 99.20% of cases.

Other research also suggests a positive and significant relationship between academic stress and academic achievement (Mulyani, 2013). Academic stress among students can lead to physical tension and psychological distress. This can alter student behaviour and affect cognitive achievement. High levels of academic stress in students will decrease academic achievement. Gadzella et al. (2005) found that problematic academic stress, such as headaches and back pain, can interfere with cognitive performance, resulting in impaired academic performance at school or college.

Furthermore, Gibran and Wiyono (2022) found that academic stress directly affects academic performance. Increased academic stress can decrease student achievement, while reduced academic stress can improve it. This research also suggests that academic stress arises as a reaction to high learning demands for better grades, heavy academic workloads, high parental expectations, and intense competition.

CONCLUSIONS AND RECOMMENDATION

The results of this study revealed several important factors, namely that first-year students' academic achievement is significantly influenced by mental health and academic stress. These influences are detailed based on the research findings. A partial analysis revealed a significant association between the mental health variable and student academic achievement. This relationship yielded a substantial R^2 value. Furthermore, a significant relationship was found between the academic stress construct and student academic achievement. Simultaneously, the combination of mental health and academic stress significantly influenced students' academic achievement. The path analysis revealed that academic stress \rightarrow mental health \rightarrow academic achievement is a practical pathway for shaping first-year students' academic achievement.

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