

Academic Stress and Academic Burnout as Predictors Academic Achievement: The Mediating Role of AI-Motivation Learning

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ABSTRACT

Academic achievement is the most important part of every student's learning process, so it is important to identify various factors that influence it. Therefore, this study aims to: 1) analyze the effect of academic stress and academic burnout on AI-motivation learning?, 2) analyze the effect of academic stress, academic burnout and AI-motivation learning on academic achievement?, 3) analyze the effect of academic stress and academic burnout on academic achievement through AI-motivation learning?. This study uses a quantitative approach with a cross-sectional study design. The research location is ISBI Singkawang with a population of 578, then a sample of 236 was taken using a simple random sampling technique. The data collection technique used is measurement with a psychological scale instrument adopted from previous studies. Data analysis techniques use percentages, correlations, multivariate analysis, and linear regression analysis with a path analysis approach. The results of the study show that: 1) academic stress ($\beta = -.403$) and academic burnout ($\beta = -.545$) have a significant effect on AI-motivation learning, 2) academic burnout ($\beta = -.400$) and AI-motivation learning ($\beta = .491$) significantly influence academic achievement. 3) AI-motivation learning can mediate the relationship between academic stress and academic achievement ($\beta = -.198$). This finding has implications for the development of programs in University related to optimizing the use of AI in the learning process to increase student learning motivation.

Keywords: Academic Stress, Academic Burnout, AI-Motivation Learning, Academic Achievement

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INTRODUCTION

Academic achievement is a crucial construct for students' future success, defined as the degree to which students achieve predetermined educational goals or the extent to which they meet their academic outcomes. Academic achievement in the university context is a multifaceted construct, conventionally assessed through metrics such as test scores and instructor-assigned grades, although alternative evaluative measures are increasingly being used for more comprehensive predictions of success (Halat et al., 2023). This emphasis on diverse assessment strategies highlights the inherent complexity of explaining academic achievement, which is influenced by a variety of individual and environmental factors (Nazari & Far, 2019). Understanding these determinants is crucial for developing targeted interventions that improve student learning outcomes and foster holistic development (Lydster, 2024). Indeed, academic achievement is not only an indicator of immediate educational attainment but also a significant predictor of future socioeconomic success and overall well-being (Kalbacher & Randler, 2024). Therefore, investigating the various cognitive and non-cognitive factors underlying academic achievement in higher education is crucial to inform pedagogical practices and institutional support structures (Chen et al., 2020; Živčić-Bećirević et al., 2017).

Higher education has undergone a fundamentally significant transformation over the past ten years, encompassing changes in teaching methods and the complex challenges students face throughout their studies. Students today are required to balance multiple responsibilities simultaneously, including heavy academic workloads, high social pressures, demanding family expectations, and intense global competition. Academic stress has become an unavoidable phenomenon in their academic lives (Pascoe et al., 2020; Beiter et al., 2015). Recent research indicates a significant spike in stress levels, particularly following the COVID-19 pandemic, which has reinforced the role of online learning. Factors such as rapid technological transitions and the blurring of boundaries between personal and academic environments have exacerbated this situation (Son et al., 2020; Aristovnik et al., 2020).

Essentially, academic stress can be understood as a reaction to educational demands that exceed an individual's capacity. Academic stress is a multifaceted phenomenon characterized by psychological and physiological responses to perceived academic demands exceeding an individual's coping resources (Iqra, 2024). This can manifest as psychological reactions such as anxiety and depression, in addition to physiological symptoms including sleep disturbances (Pérez-Jorge et al., 2025). The sources of this stress are diverse, ranging from piling up assignments and a busy exam schedule to time constraints and pressure from the surrounding environment (Pascoe et al., 2020).

This pressure often stems from high academic demands, exam pressure, and the accumulation of assignments, which collectively define academic stressors (Kushendar & Maba, 2022). Specifically, students often face excessive academic workloads, tight deadlines, and extensive memorization of theoretical content, which significantly contribute to increased stress levels (Dzonlic et al., 2025). These stressors can be further exacerbated by academic expectations from students themselves and other significant others, such as parents and teachers (Gobena, 2024). Rising expectations, particularly in highly competitive educational environments, have been identified as a significant factor in increasing stress levels among students (Akbaba, 2024; Ding et al., 2025). This increased pressure can lead to cognitive impairment, affecting concentration and memory, ultimately lowering overall academic performance (Walsham et al., 2023).

A complex interplay between neurocognitive, endocrine, and affective systems characterizes academic stress, which arises when individuals perceive an imbalance between environmental demands and their ability to cope (Abd-Alrazaq et al., 2023). This systemic imbalance is not simply a subjective experience, but rather an adaptive physiological process involving three stages: perceiving the stressor, experiencing the systemic imbalance, and responding to that imbalance (Brata et al., 2025). Acute stressors can trigger a variety of subjective physiological and cognitive responses, in addition to negative affective and behavioral manifestations (De La Fuente et al., 2020). Sustained exposure to such academic stress can further trigger a variety of somatic complaints, including headaches, backaches, and sleep disturbances, in addition to more pronounced psychological reactions such as worry and isolation (Restrepo et al., 2023). These impacts extend beyond individual well-being, often correlating with decreased academic performance and engagement (Pérez-Jorge et al., 2025).

Stress isn't always negative; to some extent, it can be a motivator or a wake-up call, prompting someone to focus and work harder. However, serious problems arise when stress becomes chronic, accumulates, and is not properly managed. This condition then triggers academic exhaustion, or burnout. The phenomenon of burnout goes beyond simple fatigue; it encompasses profound emotional exhaustion, the emergence of cynicism toward the educational process, and a strong sense of inability to meet academic expectations (Schaufeli et al., 2002; Salmela-Aro & Read, 2017).

Academic burnout is a significant problem in educational contexts, characterized by persistent academic stress leading to exhaustion, cynicism, and feelings of helplessness (Wei, 2023). This syndrome, often associated with the chronic interpersonal and performance pressures inherent in demanding academic environments, can manifest as energy depletion, emotional exhaustion, and detachment from studies (Amponsah et al., 2024). It is further characterized by increasing mental distance from one's studies and negative feelings or

cynicism regarding academic obligations (Kourea et al., 2023). This phenomenon often leads to poor student outcomes, including decreased academic performance, impaired mental health, and increased dropout rates (Campillo et al., 2023). The intense academic demands, competitive educational environment, and constant evaluation inherent in university settings exacerbate this problem, contributing to chronic stress and emotional exhaustion among students worldwide (Roziqova, 2026).

Students experiencing this condition typically experience a significant decrease in motivation, begin to withdraw from learning activities, and ultimately view themselves as incompetent. The impact of this condition is significant, especially in higher education settings, where burnout levels are closely correlated with low levels of student engagement in their academic activities. Barusi & Kurniawati (2024) emphasized that academic burnout is conceptualized as a multidimensional construct consisting of emotional exhaustion, depersonalization or cynicism, and decreased personal accomplishment.

Various studies indicate that as academic burnout increases, students' intrinsic motivation to learn tends to decline. This condition leads to decreased activity levels and participation, ultimately negatively impacting their academic achievement (Madigan & Curran, 2021). However, the interaction between stress, burnout, and academic performance is not always linear or uniform. Some studies highlight the detrimental effects of stress, particularly when it reaches the point of extreme burnout. However, other findings suggest that in certain situations, stress can actually be a motivator and enhance performance (Pascoe et al., 2020). This raises fundamental questions about the dynamics of this relationship and the reasons for the differences in results. It is likely that additional psychological factors influence this relationship but have not been adequately explained in the current literature. At the same time, rapid technological advances, particularly in the field of Artificial Intelligence (AI), represent another significant transformation that should not be overlooked.

The integration of AI is gradually transforming the student educational experience, shifting from a supplementary tool to an integral part of daily academic activities. Students are increasingly relying on AI to search for information, manage assignments, and explore complex concepts (Luckin et al., 2016; Zawacki-Richter et al., 2019). This shift is having a significant impact on how students perceive the educational process and their motivation levels. The use of AI enables a more personalized and efficient learning experience thanks to its instant feedback mechanisms, which in many contexts have been shown to increase motivation (Holmes et al., 2019). However, behind this convenience lies a complexity that requires vigilance. There is a risk of dependence on technology, which can erode students' independent learning abilities. If not implemented wisely, AI has the potential to increase psychological stress, such as the urge to be relentlessly productive or the demand to consistently achieve perfection (Kizilcec et al., 2017).

Specifically, the presence of AI is not only changing learning methods but also introducing new dynamics in the interaction between stress, burnout, and academic achievement. However, to date, many previous studies have analyzed this relationship in a simplistic and linear manner, focusing primarily on how stress triggers burnout, which then directly impacts achievement. The role of AI technology within this relationship has not received adequate attention (Zawacki-Richter et al., 2019). Furthermore, the concept of learning motivation used is generally still based on a traditional paradigm that only separates intrinsic and extrinsic motivation. However, student interactions with AI appear to trigger more complex forms of motivation, not fully accommodated in existing theoretical models (Ryan & Deci, 2020). Therefore, the area of empirical research in this area remains vast and underexplored.

Academic stress has been widely studied as an antecedent of academic problems, but its direct relationship with academic achievement has not been entirely consistent. A meta-analysis on the relationship between stress and academic performance among university students showed heterogeneous results and even found no significant overall relationship (Wunsch, 2021). Likewise, academic burnout has a more consistent relationship with academic achievement. A meta-analysis found a negative relationship between burnout and academic

achievement (Madigan & Curran, 2021). Various previous studies have largely explained these relationships directly, so the use of AI-Motivation learning as a psychological mechanism that mediates these relationships remains limited. This research is important to conduct because it explains how the motivation of using AI can break the negative effects of stress and burnout that truly support mental health and academic success. Therefore, the objectives of this study are: 1) Analyze the influence of academic stress and academic burnout on AI-motivation learning?, 2) Analyze the influence of academic stress, academic burnout and AI-motivation learning on academic achievement?, 3) Analyze the influence of academic stress on academic achievement through AI-motivation learning?, 4) Analyze the influence of academic burnout on academic achievement through AI-motivation learning?.

METHOD

Research is of course conducted using specific methods. In this study, a quantitative approach with a survey design is very appropriate as a system that regulates the research pattern to achieve the desired objectives. Survey research is an approach that functions to study samples from a population by collecting quantitative or numerical data, as well as attitudes or opinions (Creswell, 2018). The type of survey research applied in this study is a cross-sectional study, which is a research design that collects data at a single point in time from a sample (Creswell, 2018).

Population and Sample

The population of this study consisted of all second, fourth, and sixth semester students at the Institute of Science and International Business (ISBI) Singkawang, totaling 578 students. A sample of 236 students was selected using simple random sampling based on the Slovin formula with a margin of error of 0.05 (Sugiyono, 2019). The entire population was randomized using the RAND function in Excel to determine the desired sample. Table 1 presents the frequency and percentage data of the demographic characteristics of the respondents included in this study.

Table 1. Frequency and Percentage of Respondents Demographic Information

	Demographic Information	Frequency	Percentage
Gender	Male	41	17.4
	Female	195	82.6
Major	Primary Teacher Education	157	66.5
	Guidance and Counseling	18	7.6
	Mathematic Education	24	10.2
	Indonesian Language and Literatur Education	20	8.5
	International Business Management	17	7.2
Years of Study	1 st Year	124	52.5
	2 nd Year	57	24.2
	3 rd Year	55	23.3

Data Collection Instruments

The data collection technique in this study is measurement. While the data collection instrument used for the measurement technique is a scale. The scale used for data collection is a Likert scale consisting of five answer choices, namely very appropriate, appropriate, neutral, inappropriate and very inappropriate. The academic stress instrument used is an adaptation of an instrument developed by Dewi et al., (2025) called the Educational Stress Scale for Adolescents (ESSA) Indonesian version with 9 statement items. This scale consists of five aspects, namely Pressure from Study, Workload, Worry about Grades, Self-expectation and Despondency. Then the instrument used to measure academic burnout is the academic burnout scale (ABS) developed by Jan & Parveen (2024), with 29 statement items. This scale consists of six aspects, namely parental/guardian pressure, negative teacher-student relations, subjective overload, exhaustion, academic inefficacy, and negative peer relations. The AI-Motivation Learning instrument used is the AI-Motivation Scale (AIMS) developed by Li et al. (2025) with

20 statement items. This scale consists of six aspects, namely intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation. The validity of the instrument for each item has an r value above 0.5 and the reliability of each indicator has a Cronbach's alpha value above 0.7. The instrument used is adopted so it is declared valid and reliable because it has been used by previous researchers. Data was obtained by asking students who were the research sample to fill out a questionnaire containing a form about the matter to be subsequently used as research data.

Table 2. Variable and Its Aspect

Variable	Aspect	Item
Academic Stress	Pressure From Study	1,2,3
	Workload	4
	Worry About Grades	5,6
	Self Expectation	7
	Desponden	8,9
Academic Burnout	Parental/Guardian Pressure	1,2,3,4,5,6
	Negative Teacher-Student Relation	7,8,9,10,11
	Subjective Overload	12,13,14,15,16,17
	Exhaustion	18,19,20,21,22
	Exhaustion	23,24,25,26
	Academic Inefficacy	27,28,29
AI-Motivation Learning	Intrinsic Motivation	1,2,3,4
	Identified Regulation	5,6,7,8
	Introjected Regulation	9,10,11,12
	External Regulation	13,14,15,16
	Amotivation	17,18,19,20

Procedures and Data Analysis

The research was conducted using a Google Form containing the research instrument. The Google Form link was then sent to the person in charge of each class to be distributed to students. After the data was collected, the researcher reviewed it thoroughly and then transformed the data into Excel format. After that, the researcher analyzed the research data using SPSS version 23.0. To analyze the research data, the statistical tests used were percentages, correlations, multivariate analysis, and linear regression analysis with a path analysis approach. The significance level for all data analysis was 5%.

RESULT AND DISCUSSION

Level of Academic Stress, Academic Burnout, and AI-Motivation Learning

The descriptive analysis results in Table 3 show that overall, the student Academic Stress variable is at a very low level and the student Academic Burnout variable is at a low level. Furthermore, the AI-Motivation Learning variable is at a very high level.

Table 3. Percentage: Level of Academic Stress, Academic Burnout and AI-Motivation Learning among Respondent

Variable	Percentage	Category
Academic Stresss	42%	Very Low
Academic Burnout	55%	Low
AI-Motivation Learning	86%	Very High

Differences in Academic Stress, Academic Resilience, and Social Support based on Gender, Major and Years of Study

The results of the mean, SD, and multivariate analysis in Table 5 show that in the gender variable there is no significant difference between male and female students regarding academic stress, academic burnout and AI-motivation learning with a value of $F(3) = 1.586$, $p > .05$, and partial eta squared = .022. While in the major variable shows a significant difference

between students majoring in Primary Teacher Education, Guidance and Counseling, Mathematics Education, Indonesian Language and Literature Education, and International Business Management regarding academic stress, academic resilience and social support with a value of $F(12) = 2.239$, $p < .05$, and partial eta squared = .040. Then in the years of study variable shows no significant difference between first year, second year, and third year students regarding academic stress, academic burnout and AI-motivation learning with a value of $F(6) = 1.950$, $p > .05$, and partial eta squared = .027.

Table 4. Mean and SD of Academic Stress, Academic Burnout, and AI-Motivation Learning based on Gender, Major and Years of Study

Variable		Academic Stress		Academic Burnout		AI-Motivation Learning	
		M	SD	M	SD	M	SD
Gender	Male	20.3	5.4	85.3	13.1	85.2	9.1
	Female	18.8	4.7	79.1	12.9	86.7	8.1
Major	Primary Teacher Education	18.9	4.6	79.8	12.5	86.9	7.5
	Guidance and Counseling	21.5	6.5	81.3	18.3	81.1	14.6
	Mathematic Education	18.2	4.7	75.2	12.4	88.4	3.7
	Indonesian Language and Literatur Education	19.5	5.3	89.6	12.7	83.5	10.7
	International Business Management	18.6	4.4	78.4	9.6	88.7	3.8
Years of Study	1 st Year	19.6	5.2	79.8	10.2	85.6	9.2
	2 nd Year	18.8	4.1	94.9	80	87.5	6.2
	3 rd Year	18.1	4.6	94.1	81.3	87.4	7.7

Table 5. Multivariate Analysis: Differences in Academic Stress, Academic Burnout, and AI-Motivation Learning based on Gender, Major and Years of Study

Effect	Pillai's Trace	F Ratio	DF	Error DF	Sig of F	Partial Eta Squared
Gender	0.022	1.586	3.000	211.000	0.194	0.022
Major	0.121	2.239	12.000	424.000	0.009	0.040
Years of Study	0.054	1.950	6.000	639.000	0.072	0.027

Relationship between Academic Stress, Academic Burnout, AI-Motivation Learning and Academic Achievement

The results of the correlation analysis in Table 6 show that academic stress has a significant positive relationship with academic burnout ($p < .05$) and has a significant negative relationship with AI-motivation learning and academic achievement ($p < .05$). Then, academic burnout has a significant negative relationship with AI-motivation learning and academic achievement ($p < .05$). Meanwhile, AI-motivation learning has a positive and significant relationship with academic achievement ($p < .05$).

Table 6. Intercorrelation among Academic Stress, Academic Burnout, AI-Motivation Learning, and Academic Achievement

Variable	Mean	SD	1	2	3
Academic Stress	19.03	4.86	-	-	-
Academic Burnout	80.17	13.14	0.419**	-	-
AI-Motivation Learning	86.47	8.26	-0.632**	-0.714**	-
Academic Achievement	3.59	0.30	-0.525**	-0.771**	0.807**

** $p < .01$

Mediating Effect of AI-Motivation Learning in the Relationship between Academic Stress and Academic Burnout with Academic Achievement

Chart 1 explains the mediating effect of AI-motivation learning on the relationship between academic stress and academic burnout with academic achievement using a path analysis model in SPSS. The results of the study in step 1 show that academic stress can significantly predict AI-motivation learning, with an effective value of -.403 ($p < .05$). Then

academic burnout can also significantly predict AI-motivation learning, with an effective value of $-.545$ ($p < .05$). The R^2 value = 0.644 and the e^2 value = 0.597 . This means that academic stress and academic burnout contribute 64.4% to AI-motivation learning, while other factors contribute 57.7%. In step 2, it shows that academic stress cannot significantly predict academic achievement, with an effective value of $-.047$ and $p > .05$. Then academic burnout can significantly predict academic achievement, with an effective value of $-.400$ ($p < .05$). AI-motivation learning can also significantly predict academic achievement, with an effective value of $.491$ ($p < .05$). The R^2 value = 0.730 and the e^2 value = 0.519 . This means that academic stress, academic burnout and AI-motivation learning contribute 73% to academic achievement, while other factors contribute 51.9%. The results in step 3 show that AI-motivation learning significantly mediates the relationship between academic stress and academic achievement, with a mediation value of $-.198$ which is greater than the direct effect. Then AI-motivation learning cannot significantly mediate the relationship between academic burnout and academic achievement, with a mediation effect value of $-.268$ which is smaller than the direct effect. Furthermore, the results in step 4 show that overall the influence of academic stress on academic achievement, both directly and indirectly, is $-.245$. While the overall influence of academic burnout on academic achievement, both directly and indirectly, is $-.668$.

Chart 1. Mediator effects of AI-Motivation Learning on the relationship between Academic Atress, Academic Burnout and Academic Achievement

DISCUSSION

The findings of this study indicate a substantial correlation between academic stress and academic burnout and learning motivation supported by AI-motivated learning. This observation confirms that the psychological factors experienced by students in dealing with academic stress and study-related fatigue are crucial determinants of how they adopt and utilize AI in educational activities. Furthermore, this investigation also revealed that AI-based learning motivation significantly contributes to improving student academic achievement. Therefore, the integration of AI in educational environments goes beyond the purely technological dimension and is also closely related to the psychological state and motivational level of learners.

These findings indicate that academic stress is a significant predictor of motivation to learn using AI, with a negative correlation. This means that increasing levels of academic stress among students correlate with decreasing motivation to integrate AI for learning purposes. These findings illustrate that excessive academic workload does not necessarily encourage students to be more flexible in adopting technology, but rather has the potential to reduce their mental readiness to utilize AI effectively. Theoretically, these findings can be interpreted through the Transactional Model of Stress framework by Lazarus & Folkman (1984), which states that stress arises when individuals perceive environmental demands exceeding their adaptive capacity. In the academic realm, students facing pressure related to assignments, performance expectations, and significant academic workloads are potentially experiencing cognitive and affective fatigue. This situation can result in a decrease in students' intrinsic drive to seek innovative learning methods, including the use of AI as an educational tool. These

findings also align with the Self-Determination Theory developed by Deci & Ryan (2020), which emphasizes that learning motivation will develop optimally when individuals feel competent, autonomous, and connected to their environment. When students experience high levels of academic stress, their sense of competence and self-control tend to decrease. Consequently, they become less motivated to utilize AI as a learning tool.

Previous research also supports these findings. Studies have shown that high academic stress is associated with decreased student learning engagement and academic motivation (Pascoe et al., 2020; Zhang et al., 2024). Other research has also found that prolonged academic stress leads to decreased self-regulation skills and lowers students' readiness to utilize digital learning technologies (AlAteeq et al. (2020). In the context of AI use, these findings suggest that the success of AI implementation in education depends not only on the availability of technology but also on the psychological well-being of students. Students experiencing excessive academic stress may view AI not as a helpful tool, but rather as an additional new demand that requires cognitive adaptation. Therefore, it is important for educational institutions to create a more supportive learning environment so that students can utilize AI more optimally.

Furthermore, the findings of this study also show that academic burnout significantly predicts AI-motivated learning, with a stronger negative relationship than academic stress. This suggests that academic burnout significantly impacts students' decreased motivation to use AI for learning. Academic burnout is characterized by emotional exhaustion, cynicism toward academic activities, and a decreased sense of academic competence. When students experience burnout, their psychological energy becomes severely limited, leading them to lose interest in trying new learning approaches, including the use of AI. These findings can be explained by Hobfoll's (1989) Conservation of Resources Theory, which explains that individuals strive to preserve their psychological resources. When students experience burnout, their emotional and cognitive resources are depleted, leading them to avoid activities perceived as requiring additional effort. Under these conditions, the use of AI, which should aid learning, may instead be perceived as complicated or tiring. This research aligns with studies that found academic burnout is associated with low student engagement and motivation (Salmela-Aro & Upadaya, 2020). Furthermore, research shows that students with high levels of academic burnout tend to experience decreased academic self-efficacy, which then impacts their attitudes and acceptance of AI-based learning technologies and digital learning (Wang, Zhang, Wang, 2024). These findings demonstrate that students' psychological aspects need to be a primary concern in the implementation of AI technology in higher education. The use of AI cannot be separated from students' mental readiness. If students experience severe academic burnout, then no matter how sophisticated the technology, it will not be able to optimally increase their learning motivation.

Overall, the research results show a coefficient of determination ($R^2 = 0.644$), indicating that academic stress and academic burnout together contribute 64.4% to AI-motivated learning. This figure indicates a significant contribution and confirms that academic psychological factors are the primary determinants in shaping students' motivation to use AI. These findings suggest that student motivation to utilize AI is not only influenced by technological capabilities or digital access, but is also strongly influenced by students' emotional and psychological states. Students who feel stressed and fatigued academically tend to experience decreased motivation to explore AI as a learning tool. From the perspective of modern educational psychology, learning motivation is influenced by the interaction between internal and external factors. Academic stress and burnout are internal psychological factors that can weaken students' ability to maintain learning motivation. Therefore, the integration of AI in higher education needs to be accompanied by psychological support for students.

The results of the study indicate that academic stress cannot significantly predict academic achievement. This finding is interesting because it suggests that academic pressure does not always have a direct impact on students' academic achievement. Theoretically, this result can be explained through the concepts of eustress and distress. Not all stress is negative. To a certain extent, academic stress can be a driving force that motivates students to be more focused and responsible in their academic tasks. Therefore, the effect of stress on academic

achievement often depends on students' coping and self-regulation skills. Research by Putwain et al. (2018) shows that academic stress does not always reduce academic achievement if students have good coping skills. Students who are able to manage academic stress adaptively can still maintain their academic performance. Furthermore, the insignificant direct effect of academic stress on academic achievement in this study indicates that there are other variables that act as mediators, one of which is AI-motivation learning. In other words, academic stress may not directly affect academic achievement, but it does influence students' motivation in using AI, which ultimately impacts academic achievement.

Unlike academic stress, research results show that academic burnout significantly predicts academic achievement, with a negative relationship. This means that the higher the burnout experienced by students, the lower their academic achievement. This finding is consistent with previous studies showing that academic burnout is a major predictor of decreased student achievement. Burnout causes students to experience mental fatigue, loss of concentration, decreased motivation, and low academic engagement. A meta-analysis by Madigan and Curran (2021) showed that academic burnout has a strong negative relationship with both student and student academic achievement. When students experience burnout, their cognitive capacity decreases, making the learning process less effective. Furthermore, burnout also impacts students' ability to utilize learning technology. Students experiencing burnout tend to lack the psychological energy to explore digital learning resources, including AI. This condition worsens the quality of learning and ultimately lowers academic achievement.

Furthermore, the research results show that AI-motivation learning can significantly predict academic achievement with a positive relationship. This means that the higher a student's motivation in using AI for learning, the higher their academic achievement. This finding suggests that AI can be an effective learning tool if students are highly motivated to utilize it. AI allows students to gain rapid access to information, personalized learning, instant feedback, and more flexible learning support. These results align with the Technology Acceptance Model (Davis, 1989), which explains that the perception of the benefits of technology will increase motivation to use it and impact individual performance. Students who view AI as a useful tool tend to be more active in using the technology to support learning. Research by Chan & Hu (2023) shows that the use of AI in education can increase student learning engagement, motivation, and academic outcomes if supported by technological readiness and good internal motivation. Another study by Zawacki-Richter et al. (2019) also explains that AI has great potential to improve the quality of learning through personalization and adaptation to student learning needs. These findings demonstrate that motivation to use AI is a crucial factor in successful learning in the digital era. AI is not just a technological tool, but can be a medium that strengthens the learning process if students have adequate psychological readiness and motivation.

The coefficient of determination ($R^2 = 0.730$) indicates that academic stress, academic burnout, and AI-motivated learning collectively contribute 73% to student academic achievement. This figure demonstrates that the research model has very strong predictive power in explaining variations in student academic achievement. This finding indicates that academic achievement is not only influenced by intellectual ability alone, but also by students' psychological state and their motivation in utilizing AI as a learning medium. Academic stress and academic burnout represent negative psychological conditions that can hinder learning performance, while AI-motivated learning is a positive factor that can increase learning effectiveness. The large contribution of these three variables shows that the dynamics of learning in the digital era are greatly influenced by the interaction between students' mental health and technological readiness. Students who are highly motivated in using AI tend to be able to optimize the learning process, while students who experience burnout or heavy academic pressure are more susceptible to declining academic achievement.

Based on the mediation effects, the research findings show that AI-motivation learning significantly mediates the relationship between academic stress and academic achievement, whereas the mediation of the relationship between academic burnout and academic achievement is not significant. This finding indicates that when facing academic stress,

students' motivation to utilize AI can serve as a mechanism that helps optimize learning resources, such as obtaining explanations, feedback, and problem-solving support. This is consistent with findings that the use of AI in education can enhance learning motivation and achievement, although its effectiveness is influenced by pedagogical design and the context of its use (Badarudin et al., 2024; García-Martínez et al., 2023; Çoğaltay & Gençdal, 2026). The study by Liu et al. (2026) also shows that academic stress is associated with the use of or dependence on generative AI through certain psychological mechanisms, so AI can function as a source of support as well as a less adaptive coping strategy. In contrast, burnout reflects a more complex condition, encompassing exhaustion, cynicism, and reduced efficacy, so motivation to use AI may not necessarily be sufficient to overcome its impact on academic achievement. The meta-analysis by Madigan & Curran (2020) shows a negative relationship between burnout and academic achievement, while Romano et al. (2021) position burnout as a form of maladjustment that can disrupt academic trajectories. Thus, the differences in mediation results indicate that academic stress and academic burnout have different psychological mechanisms. AI-motivation learning is more likely to play a role when students still have the capacity to activate learning strategies, whereas burnout requires more comprehensive psychological and pedagogical support.

The results of the study showed that the total effect of academic stress on academic achievement was -0.245, while the total effect of academic burnout on academic achievement was -0.668. These findings indicate that burnout has a significantly greater negative impact on academic achievement than academic stress. Conceptually, academic stress can still be adaptive to a certain degree, while burnout is a more serious and harmful condition of chronic fatigue that is detrimental to the learning process. Burnout not only affects emotional aspects but also impacts students' motivation, concentration, self-efficacy, and academic engagement. These findings demonstrate the importance of educational institutions' attention to student mental health. Universities need not only provide AI-based learning technology facilities but also need to build psychological support systems capable of preventing and mitigating academic burnout.

This research has implications for the study of educational psychology and learning technology, showing that the use of AI in education is strongly influenced by students' psychological factors. AI-motivation learning has been proven to be an important variable that bridges the relationship between academic psychological conditions and academic achievement. This research also provides implications for the development of digital education policies. The integration of AI in higher education should be carried out humanely by considering students' emotional readiness, rather than merely focusing on technological transformation. In addition, the results of this research have implications for higher education institutions, namely emphasizing that AI-based educational transformation in higher education needs to be understood not merely as a matter of technology adoption, but as a process of changing the learning ecosystem. The successful implementation of AI depends on the integration of technological readiness, AI literacy competencies, pedagogical design, and students' psychological conditions. This perspective positions students not only as technology users, but as learners who need cognitive, pedagogical, and psychological support so that AI can be used meaningfully in the educational process. In addition, this research certainly has several limitations that need to be considered. First, this research uses a quantitative approach with a cross-sectional design, so the relationships between variables can only be explained in terms of predictive relationships, rather than absolute causal relationships. Longitudinal research is needed to understand the dynamics of academic stress, academic burnout, AI-motivation learning, and academic achievement more deeply. Second, this research has not considered other factors, so future research can examine them in greater depth. Third, this research was conducted in a specific context, so the generalizability of the research findings remains too limited. Therefore, future research can examine broader populations.

CONCLUSION

Based on the research results, it can be concluded that academic stress and academic burnout are two psychological factors that play a significant role in shaping AI-motivation

learning in students. Both variables have been shown to have a negative and significant effect on AI-motivation learning, meaning that the higher the level of academic stress and academic burnout experienced by students, the lower their motivation to utilize AI to support the learning process. However, academic burnout showed a stronger influence than academic stress. These findings confirm that prolonged emotional, mental, and academic exhaustion can reduce students' enthusiasm, interest, and readiness to use AI technology as a learning tool. Together, academic stress and academic burnout contributed significantly to AI-motivation learning, amounting to 64.4%, thus indicating that academic psychological conditions are closely related to AI-based learning motivation.

Furthermore, the research results also show that academic stress does not have a significant direct influence on academic achievement. This means that the academic stress experienced by students does not directly determine their academic achievement. Conversely, academic burnout has been shown to have a negative and significant influence on academic achievement. This indicates that students experiencing academic burnout tend to experience a decline in academic performance and achievement. On the other hand, AI-motivated learning has a positive and significant influence on academic achievement. These findings indicate that the higher a student's motivation to utilize AI for learning, the better their academic achievement. These three variables simultaneously contribute 73% to academic achievement, indicating that the combination of academic psychological conditions and AI-based learning motivation is a crucial factor in determining students' academic success.

In the mediation test, this study found that AI-motivated learning significantly mediated the relationship between academic stress and academic achievement. This suggests that the influence of academic stress on academic achievement occurs primarily through changes in students' motivation to use AI for learning. In other words, as academic stress increases, AI-based learning motivation tends to decrease, which in turn impacts student academic achievement. These findings indicate that AI-motivated learning is an important psychological mechanism that bridges the relationship between academic stress and academic achievement. In contrast to these results, AI-motivated learning was not shown to mediate the relationship between academic burnout and academic achievement more strongly than its direct effect. These results indicate that academic burnout has a more dominant direct impact on decreasing student academic achievement. Thus, prolonged academic burnout not only affects motivation for AI-based learning but also directly weakens students' ability to achieve optimal academic performance.

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AUTHOR CONTRIBUTION STATEMENT

DM, AB: Conceptualization, design, data analysis, and writing. SF, IS: Proofreading and revising the manuscript. KU, MDSH: Providing ideas and concepts.

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