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AI-Supported Education, Academic Self-Efficacy, and Psychological Well-Being: Examining The Mediating Role of Learning Engagement

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ABSTRACT

This study examined the relationship between AI-supported education, academic self-efficacy, and psychological well-being, with particular emphasis on the mediating role of learning engagement among university students in Pakistan. The increasing use of artificial intelligence in higher education has provided students with new opportunities to access learning resources, receive timely feedback, obtain personalized academic support, and manage different academic tasks. However, the effectiveness of AI-supported learning may also depend on students' confidence in their academic abilities and their active involvement in the learning process. Therefore, this study focused on understanding how AI-supported education is associated with academic self-efficacy and how academic self-efficacy contributes to students' psychological well-being through learning engagement. A quantitative cross-sectional research design was adopted for the study. Data were collected from 396 university students through an adopted structured questionnaire administered online using Google Forms. The questionnaire consisted of established measures assessing AI-supported education, academic self-efficacy, learning engagement, and psychological well-being. Participation was voluntary, and confidentiality of the respondents was maintained throughout the data collection process. The collected data were initially organized and screened in Microsoft Excel and were subsequently transferred to IBM SPSS for analysis. Descriptive statistics and reliability analysis were conducted to examine the characteristics and internal consistency of the study variables. Pearson Product-Moment Correlation was used to examine the relationship between AI-supported education and academic self-efficacy, while simple linear regression was used to determine the predictive relationship between academic self-efficacy and psychological well-being. Mediation analysis was further conducted to examine whether learning engagement explained the relationship between academic self-efficacy and psychological well-being. The findings indicated that AI-supported education was positively associated with academic self-efficacy, suggesting that effective use of AI-supported educational resources was related to stronger academic confidence among university students. Academic self-efficacy also positively predicted psychological well-being, indicating that students who had greater confidence in their ability to manage academic demands tended to report more positive psychological outcomes. Furthermore, learning engagement significantly mediated the relationship between academic self-efficacy and psychological well-being, demonstrating that active participation, effort, and involvement in learning may provide an important pathway through which academic confidence contributes to students' psychological well-being. Overall, the study highlights the interconnected role of technology-supported learning, academic confidence, and student engagement in promoting positive educational and psychological outcomes. The findings may be useful for educators, university administrators, and researchers in developing student-centered and technology-supported learning environments that not only facilitate academic learning but also encourage students' confidence, active engagement, and psychological well-being.

AI-Supported Education

Technology in education can be used in different parts of the learning process, including teaching, training, assessment, and providing learning materials. It is used across different levels of education and can support personalized learning. It can also provide students with quick feedback and additional support during their learning activities.

It also provides opportunities for learners to control when, where and how to achieve their learning goals (Mah et al., 2025). Studies have shown that use of AI in education helps learners to engage, and deepen their understanding of academic materials. It nudges students to interact with the academic content and facilitates the automation of academic tasks.

Positive effects of using AI in education go beyond academic tasks. It is postulated that using AI in education strengthens students' belief in their ability to achieve academic tasks. When students receive immediate feedback and explanations and support on academic tasks, they build the confidence to achieve academic goals and learn to perform academic tasks. Positive effects on academic self-efficacy, engagement and psychological well-being have been linked to use of AI in education. Studies show that AI in education has the potential to transform higher education (Mah & Groß, 2024).

Academic Self-Efficacy

Self-efficacy is the degree to which a student believes that they have the ability to perform academic functions, address academic challenges and attain academic goals. Self-efficacy influences students' perceptions regarding their capability to cope with the demands of learning as well as to remove or to resolves barriers they encounter during learning. Generally speaking, self-efficacy has a strong influence on students' academic behavior. Students who believe in their self-efficacy evaluate academic challenges and situations in a way that enhances their self-control, and influences their learning behavior. Research has shown a positive relationship between the self-efficacy of college students and their level of engagement in learning (Honicke & Broadbent, 2016).

The focus of this research is on the way in which students believe that self-efficacy influences their engagement with technology and academic functions, as well as how it impacts students' control over behavior when using technology in academic situations. Students are likely to adjust the way they use technology in academics depending on the level of self-efficacy that they have regarding academic functions (Schunk & DiBenedetto, 2022).

Researches have studied how the belief in one's capability to use academic skills to achieve academic goals (academic self-efficacy) is related to students' behavior when they are provided with intelligent tutoring systems (ITS). The results showed that academic self-efficacy plays an important role in understanding why students of varying levels of engagement accept the presence of ITS in their learning environment. In general, students with a well-established belief in academic self-efficacy tend to rely on their academic self-sufficiency and learned academic skills to employ different AI resources and stay engaged in academic activities.

Also, academic self-efficacy plays a role in developing students' general psychological state. Students who are confident in their academic self-sufficiency are more likely to experience general control and satisfaction in their academic lives. Furthermore, there are positive correlations between students' academic self-efficacy and their psychological state and academic engagement. Given these findings, it can be concluded that academic self-efficacy has an impact on students' psychological state and their participation and engagement in the educational process (Meng & Zhang, 2023).

Learning Engagement

Learning engagement is about how deeply and in what ways students are emotionally and cognitively invested in learning activities. It encompasses students' behavioral, emotional and psychological experience with academic work, including the level of exerted effort and persistence as well as interest and involvement in academic work. Students learning engagement predict how much students will persist in and involve themselves in learning activities and how much effort they will exert in academic work. Positive learning engagement is a key ingredient of students' successful learning experience and is particularly relevant in the context of university learning. (Luo et al., 2023) Among other possibilities, intelligent agents and other AI applications will allow students to perform academic work in novel ways, and provide students' and teachers' feedback in different formats and modalities. With these changes in students' ways of academic work, it is possible that learning engagement will play an even greater role in educational settings (Carroll et al., 2021).

While the use of AI in education has benefited academic activities, the basis for student engagement may also lie in their perception regarding the use and control of AI in educational activities. Engagement in learning activities may be a behavioral

indicator of students' psychological well-being and may enable students to achieve a sense of progress and significance in learning. Many studies have indicated that learning engagement promotes students' self-efficacy and mental well-being. Therefore, to promote students' academic self-efficacy and emotional well-being, it is necessary to design intervention strategies to enhance students' learning engagement. Thus, psychological well-being may be one of the consequences of achieving academic self-efficacy via learning engagement. Considering learning engagement as a mediator may help explain the above mechanism.

Psychological well-being

Psychological well-being refers to how positively an individual is functioning in their personal and emotional life. It includes experiencing positive feelings, having a sense of purpose and meaning, and feeling that one is growing as a person. It also involves being able to adjust to different life situations, manage daily challenges, and maintain a sense of control over one's life. Of all the segments of the population within the purview of the higher education sector, university students are the most challenging to manage, mostly because of the multiple and competing demands of the academic, social and psychological aspects of their lives. Students may experience psychological stress, worries, and fears while trying to adjust to different academic demands and educational situations. These challenges can affect how they manage their studies, respond to academic pressure, and cope with everyday educational responsibilities (Ryff & Singer, 2013). Not all students benefit from the current educational environment. Some experience high levels of psychological tensions and worries. Negative emotions among university students may indicate lower levels of psychological well-being or higher levels of psychological distress. Frequent feelings such as worry, sadness, or stress can affect students' emotional health and their ability to cope with academic and daily challenges.

AI in education has positive effects on students' psychological well-being. Students' perception of the usefulness of educational technologies in addressing learning difficulties positively influences psychological well-being. Educational technologies and services that are integrated with AI are positively perceived by students. The educational uses of AI have the potential to positively affect psychological well-being and other positive academic and emotional outcomes (Weiss et al., 2016).

The behavioral dimensions of academic self-efficacy, in particular the willingness to engage in learning activities (academic self-efficacy behavior) and the intensity of learning behavior, may account for variance in students' psychological well-being when using learning environments that are integrated with AI. This is possibly due to the effects of self-efficacy on behavioral self-regulation. It is proposed that students with higher levels of academic self-efficacy may be actively engaged in learning and experience well-being due to a greater sense of achievement and positive evaluation (psychological well-being) compared to students with lower levels of academic self-efficacy. Incorporating the behavioral dimension of self-regulation, learning engagement may also explain the relationship between academic self-efficacy and psychological well-being (Winefield et al., 2012).

Research Objectives

- To examine the relationship between AI-supported education and academic self-efficacy among university students.
- To examine the relationship between academic self-efficacy and psychological well-being among university students.
- To investigate the mediating role of learning engagement in the relationship between academic self-efficacy and psychological well-being among university students.

Problem Statement

The use of Artificial Intelligence (AI) in higher education has increased and has allowed for various methods of teaching and communicating with students. Although the rapid acceptance of AI has been beneficial for higher education, the potential negative consequences for students' mental health are overlooked. Recent research has focused on the relationship between AI and student engagement and self-efficacy. Other research has focused on the negative consequences of integrating different technologies for learning and how they affect students' mental health (Erkal & Yıldız, 2026). One possible explanation for these findings is that other research has focused on AI and student engagement and learning in different ways. Given the preliminary nature of the integration of AI in higher education, it is likely that additional lines of research may complement and strengthen the body of knowledge in this area. The aim of this research is to fill a research gap by integrating various research lines to investigate the relationship of students' academic self-efficacy with mental health and well-being when AI is integrated in higher education (Kumaat, 2026).

Significance of the Study

This study is significant because it provides a better understanding of how AI-supported education may relate to students' academic self-efficacy, learning engagement, and psychological well-being. The findings may help university teachers and educational institutions understand the importance of students' confidence and active engagement when integrating AI into learning environments. The study may also assist educators in developing learning practices that encourage students to participate actively, strengthen their academic confidence, and support positive psychological experiences. For researchers, the study provides an integrated framework for examining the mediating role of learning engagement and may serve as a useful foundation for future studies on AI-supported education and student well-being.

Literature Review

Artificial Intelligence Supported Education in Higher Education

Technology is becoming an important part of education and is increasingly used in different areas of the learning process. Research suggests that technology-based educational support can have positive effects on students' behavior, emotions, and thinking. It can also help students take greater interest in learning activities and participate more actively in their education. Some positive effects of AI interventions, however, are offset by negative consequences, including possible over-reliance by students on such technological interventions and decreased students' critical thinking (Crompton & Burke, 2023). AI-based interventions in the field of education are continuously advancing, and it is expected that in the near future they will have a profound and positive impact on education and engage students in different ways, beyond the expectations of current interventions.

The application of AI in education offers various psychological and academic advantages for students. Researchers such as Yovich (2025) and Tanveer et al. (2024) investigate the effects of using AI tools on students' academic self-confidence and behavior. The studies show that when using AI in education, teachers and researchers should be aware of the effects this may have on students' confidence in academic self-reliance and their self-regulated learning. Moreover, the effects of AI tools in education should be assessed in terms of students' learning and academic outcomes (Zion et al., 2025).

Several studies suggest that the use of AI in education helps students develop their self-perceived academic competence and self-sufficiency. For example, Cheung et al. (2025) noted that the use of AI in education enhances students' academic self-efficacy. In a similar study, noted that when students use different AI tools, self-efficacy is developed in students' academic self-reliance.

Academic Self-Efficacy and Students' Educational Experiences

Students' confidence in their academic skills and abilities is referred to as academic self-efficacy. This can motivate students to initiate and persist in the completion of academic goals. Wang and Zhang (2024) documented positive relationships between academic self-efficacy and learning engagement of 1,032 Chinese undergraduates. Their findings indicated that psychological resilience and work-related commitment positively correlated with academic self-efficacy and learning engagement. The role of self-efficacy in training and improving academic outcomes of students is further corroborated by research conducted in Pakistan. Self-efficacy training enhanced academic thriving and engagement of college students in Pakistan (Shabbir et al., 2026). Similarly, other researchers found academic self-efficacy, mental well-being and engagement to be positively correlated (Chikampa et al., 2025). Based on the abovementioned studies, academic self-efficacy is postulated to be a psychological resource available to university students to optimize their academic involvement as well as other allied psychological wellness conditions.

Academic self-efficacy can have a positive effect on students' psychological well-being. This is because students' ability to manage their academic requirements helps students to feel they have control, achieved a goal, and have the ability to address and overcome academic concerns. Positive academic self-efficacy influences psychological well-being, as revealed in a study conducted. Another study, conducted by Cabana-Villca et al. (2024) showed the interrelation of self-efficacy, anxiety, psychological well-being, and academic engagement. Students who believe they have the ability to be successful are more likely to continue being actively engaged in academic activities. Borzone Valdebenito (2017) showed the importance of academic self-efficacy in relation to students' psychological well-being and their engagement in academic activities, respectively. Therefore, academic self-efficacy is vital in elaborating the extent to which psychology of students is impacted by their perception of academic self and confidence.

Learning Engagement as a Key Student Learning Process

Learning engagement refers to the degree to which students are mentally, emotionally, and behaviorally involved in their learning activities. Engaged students are more likely to participate actively in academic tasks, stay focused during learning activities, and remain committed when facing academic challenges. They also tend to show greater effort and persistence in achieving their educational goals. In their study, Boekaerts (2016), indicated positive and significant relationship between the academic self-efficacy and the learning engagement of 1,032 college students. Furthermore, in another study Lo (2024) indicated behavioral, emotional and cognitive engagement as essential elements to analyze students' interaction with Artificial Intelligence (AI) in academic setting.

Learning engagement positively influences students' psychological wellbeing. Recent studies in medical education have demonstrated the positive impact of academic self-efficacy and learning engagement in students' psychological wellbeing. Moreover, the findings from these studies indicated that engagement should be considered as an elemental bridge that connects students' psychological resources to students' well-being.

The importance of learning engagement in this study is based on the positive influence of academic self-efficacy on learning engagement. If academic self-efficacy is positively associated with learning engagement, it is expected that learning engagement may be associated with other psychological resources as well. The findings of McClenney et al. (2012), indicated academic self-efficacy was associated to learning engagement. However, the authors of the study focused on psychological resilience and professional commitment as connecting elements. (2025) assessed academic self-efficacy and psychological well-being, as well as academic engagement. They showed that these constructs are inter-related.

Another study that assessed self-efficacy, engagement in learning, and psychological well-being of 237 medical students, offered evidence for engagement in learning as a mediator of the relationship between self-efficacy and psychological well-being. Although the existing study adds to the field of research on emotional self-efficacy of medical students, the current study is the first to address the self-efficacy beliefs of students in a higher education context where learning is mediated by artificial intelligence (AI). Therefore, the study aimed to assess engagement in learning as a mediating factor of the relationship between self-efficacy and psychological well-being of students (Harrington et al., 2021).

Relationship Between AI-Supported Education and Academic Self-Efficacy

Existing literature indicates that students' experiences with AI-supported learning may be associated with their academic confidence. Alqurni (2026) found positive relationships between perceived AI ability and academic self-efficacy, while Ria et al. (2025) specifically examined the association between AI-tool use and students perceived academic self-efficacy. These findings provide support for investigating whether AI-supported education is related to students' beliefs about their academic capabilities.

Relationship Between Academic Self-Efficacy and Psychological Well-Being

Research shows that students' academic self-efficacy and psychological well-being are related in a positive way. Asghari et al. (2014) showed how university students experienced positive academic self-efficacy and psychological well-being and how these are related. In addition, Alvarez-García et al. (2024) showed that with academic self-efficacy and psychological well-being, students experience anxiety and engaged in different forms of academic behavior that enhance their academic performance and self-regulation.

Relationship Between Learning Engagement and Psychological Well-Being

Learning engagement is the behavioral and psychological pathway which links students' academic skills and well-being. Chaudhry et al. (2024) showed positive associations between academic engagement and self-efficacy and psychological well-being. Regarding medical students, it has been shown that learning engagement plays a mediation role between academic self-eff efficacy and psychological well-being. Thus, the importance of learning engagement as a mediation role is confirmed and it becomes necessary to analyze this in the context of medical education and other allied health professions, especially within AI enhanced learning.

Research Gap

Study of AI-augmented education has focused largely on the psychology of academic experiences. One important area that is still largely unexplored is the interrelated psychology of academic self-efficacy, learning engagement and psychological well-being in the context of AI-augmented education. Several recent studies have investigated students' beliefs and attitudes towards the deployment of AI in academic contexts. In these studies, academic self-efficacy and/or academic motivation served as either a mediator or a moderator. Other researchers have studied beliefs about the capabilities of AI and their relationships to academic self-efficacy and learning engagement (Zaid et al., 2026). Still other researchers have examined the role of academic self-efficacy and academic engagement in relation to psychological well-being. Still other researchers have explored the role of learning engagement to integrate self-efficacy and psychological well-being, in the context of medical students and other learners. The overall body of research suggests that integration of the elements of AI-supported education with academic self-efficacy, learning engagement and psychological well-being of students is justified. Given this context, the goal of the present study is to integrate these elements within a unified framework (Riaz et al., 2026).

Hypotheses

- **H1:** There is a significant relationship between AI-supported education and academic self-efficacy among university students.
- **H2:** Academic self-efficacy significantly predicts psychological well-being among university students.
- **H3:** Learning engagement significantly mediates the relationship between academic self-efficacy and psychological well-being among university students.

Conceptual Framework

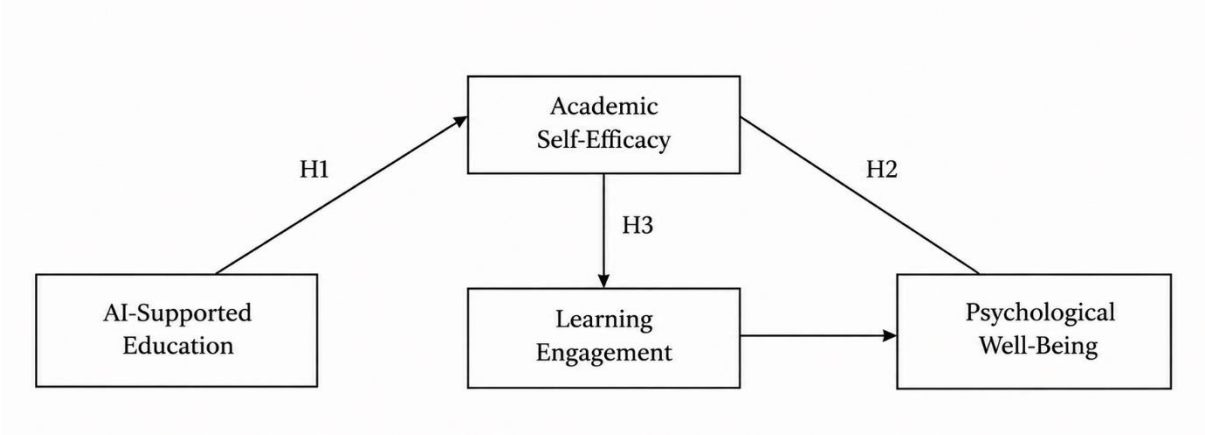


Fig 1: Conceptual Framework

Methodology

Research Design

This study used a quantitative cross-sectional research design to investigate the relationships of students using AI in education, students' academic self-efficacy, students' engagement in learning, and students' psychological well-being. The research instrument was a self-administered questionnaire. The questionnaire contained closed-ended questions, and the majority of the items were measured by using a Likert scale.

Population

The study population consisted of students who were enrolled in undergraduate programs in all of the universities in Pakistan. The researchers visited and collected data from students in universities in the provinces of Punjab and Sindh, for example, students from Bahauddin Zakariya University, the Islamia University of Bahawalpur, and Emerson's University and Women's

University in Multan. Other universities in the provinces of Punjab and Sindh were included in the study. Only students who have used AI in their education were included in the study.

Sampling method

Students in the higher education institutions in Pakistan who were in undergraduate programs and who were in the research units were identified as the research population, and a request was made to them to participate in the study. The researchers used an on-line convenient sampling method to collect data.

Sample Size

The researchers collected data from 396 students. The participants represented students from all of the higher education institutions in the provinces of Punjab and Sindh

Data Collection

Data were collected through an adapted structured questionnaire developed using Google Forms. The questionnaire was distributed through university mailing lists and student groups to reach participants from different academic disciplines and backgrounds. Before completing the survey, participants were informed about the purpose of the study and assured that their responses would remain confidential. The questionnaire included measures of educational experiences, academic self-efficacy, learning engagement, and psychological well-being. Measures of AI-supported education were based on previously created instruments of perception of and experience with AI in learning and educational support. Academic self-efficacy was measured with the Academic Self-Efficacy Questionnaire. Learning engagement was assessed with the engagement scale, which measures the workplace emotions of vigor and dedication. Absorption was also assessed. Psychological well-being was measured with the psychological well-being scale. Items of all the scales were edited to reflect the context of university students and AI in education.

Data Analysis

Responses collected were entered and structured in Microsoft Excel. Data editing and coding were done and analysis done in SPSS. Descriptive statistics were computed to determine and present the characteristics of the respondents and the variables in the study. Other analyses included determining the scale's reliability and correlation. The correlation analysis was done to determine the degree of association between AI-aided learning and academic self-efficay. Finally, the analysis explored the relationship between academic self-efficacy and psychological well-being. Simple Linear Regression was used to determine the degree of association between the two variables and to predict the level of psychological well-being based on academic self-efficacy. Mediation analysis using the PROCESS Macro Model 4 was done to evaluate learning engagement and determine the degree to which it explains the relationship between the two variables. Mediation analysis and bootstrapping is a reliable and valid approach in educational research.

Table 1: Demographic Characteristics of the Respondents (N = 396)

Demographic Variable	Category	Frequency (f)	Percentage (%)
Gender	Male	178	44.9
	Female	218	55.1
Age	18–22 years	184	46.5
	23–27 years	156	39.4
	28 years and above	56	14.1
Study Level	Undergraduate	226	57.1
	Graduate	128	32.3
	Postgraduate	42	10.6
Area of Residence	Urban	248	62.6
	Rural	148	37.4

Demographic Variable	Category	Frequency (f)	Percentage (%)
Academic Discipline	Social Sciences	142	35.9
	Management Sciences	96	24.2
	Education	82	20.7
	Other Disciplines	76	19.2
Total Respondents	—	396	100.0

Demographic data of the study participants (396) is shown in Table 1. The analysis showed that, 55.1% (218) of the respondents were female while 44.9% (178) were male. The age distribution showed that 46.5% (184) of the respondents were between 18-22 years, 39.4% (156) were between 23-27 years, and 14.1% (56) were 28 years and above. With respect to level of study, 57.1% (226) of the respondents were undergraduates, 32.3% (128) were graduates and 10.6% (42) were postgraduates. A larger portion of the respondents, 62.6% (252) was from urban areas, while 37.4% (147) was from rural areas. With respect to the field of study, 35.9% (144) was in the Social Sciences, 24.2% (95) was in the Management Sciences, 20.7% (83) was in Education and 19.2% (76) was in other Fields. The findings indicated that the participants in the study cut across various age groups, levels of study, residential areas and fields of study.

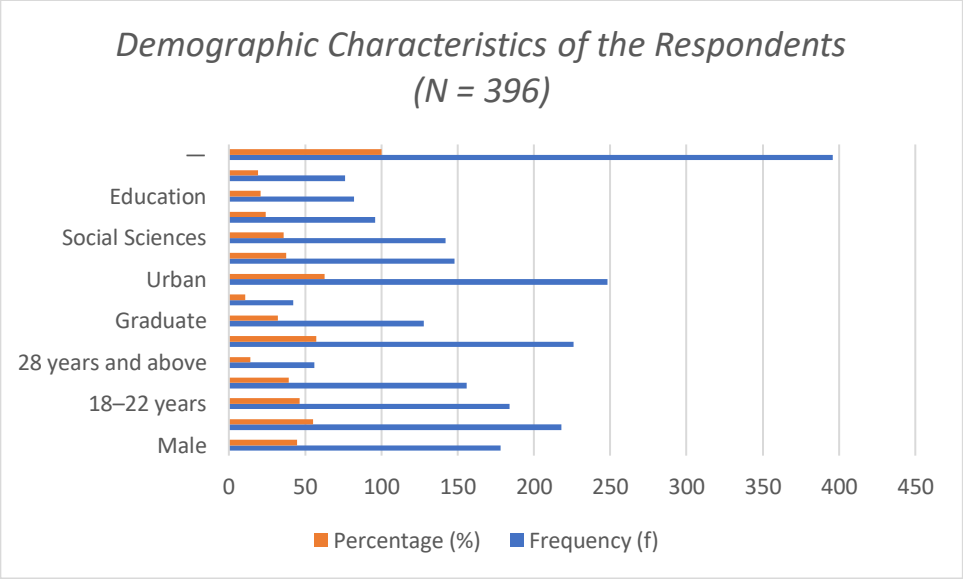


Fig 2: Demographic Characteristics of the Respondents (N=396)

Table 2: Reliability Statistics, Means, and Standard Deviations of Study Variables (N = 396)

Variables	No. of Items	Cronbach's Alpha (α)	Mean (M)	Standard Deviation (SD)
AI-Supported Education	8	0.884	3.71	0.68
Academic Self-Efficacy	8	0.879	3.64	0.65
Learning Engagement	9	0.892	3.76	0.63
Psychological Well-Being	8	0.887	3.69	0.66

Reliability statistics for study variables and descriptive data are shown in Table 2. Cronbach's alpha ranged from 0.879 to 0.892, indicating high internal consistency for all study variables. Among all study variables, Learning Engagement (M = 3.76, SD = 0.63) showed the highest average score. AI-supported Education (M = 3.71, SD = 0.68) showed the next highest average score, followed by Psychological Well-being (M = 3.69, SD = 0.66) and Academic Self-Efficacy (M = 3.64, SD = 0.65). Thus, the overall findings indicated that the measurement scales used in the study were adequately reliable to be used in further statistical processes.

Table 3: Pearson Product-Moment Correlation Between AI-Supported Education and Academic Self-Efficacy (N = 396)

Variables	M	SD	1	2
1. AI-Supported Education	3.71	0.68	1	.462**
2. Academic Self-Efficacy	3.64	0.65	.462**	1

Pearson Product-Moment correlation coefficients between AI-Supported Education and Academic Self-Efficacy are presented in Table 3. Results showed that AI-Supported Education and Academic Self-Efficacy are positively related, $r = .462$, $p < .01$. Hence, students who reported making use of AI-supported education more, also reported higher academic self-efficacy. The results further indicated that the use of AI-Supported Education was related to Academic Self-Efficacy.

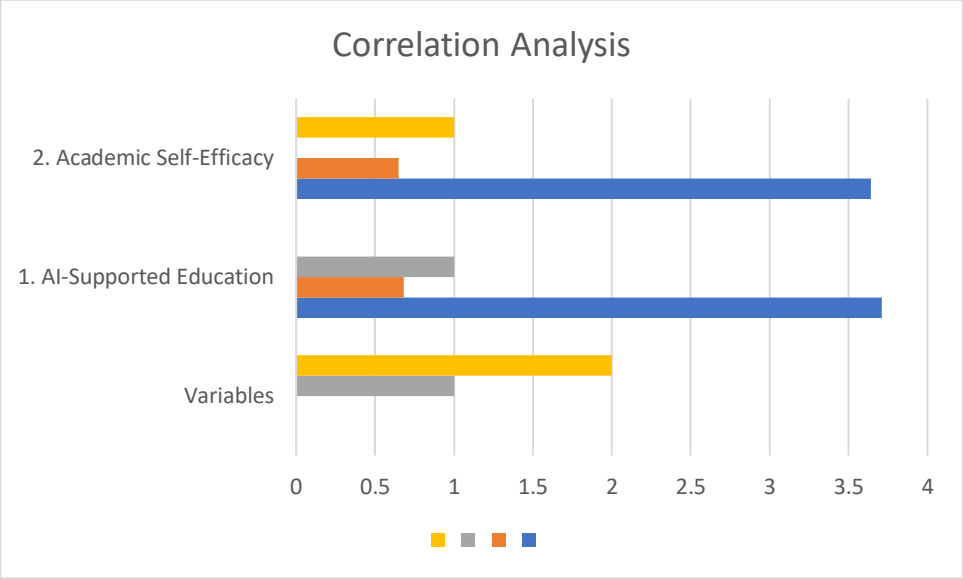


Fig 3: Correlation Analysis

Table 4: Simple Linear Regression Analysis of Academic Self-Efficacy Predicting Psychological Well-Being Among University Students (N = 396)

Predictor	B	SE	β	t	p
Constant	1.214	0.184	—	6.598	< .001
Academic Self-Efficacy	0.681	0.049	0.573	13.898	< .001

The result of simple linear regression shown in the table 4 provides evidence that academic self-efficacy is a positive and significant predictor of Psychological Well-Being ($\beta = .573$, $t = 13.898$, $p < .001$). The regression model accounts for a 32.8% of the variance in Psychological Well-Being ($R^2 = .328$). Consequently, it can be interpreted that university students who have high academic self-efficacy also have high psychological well-being.

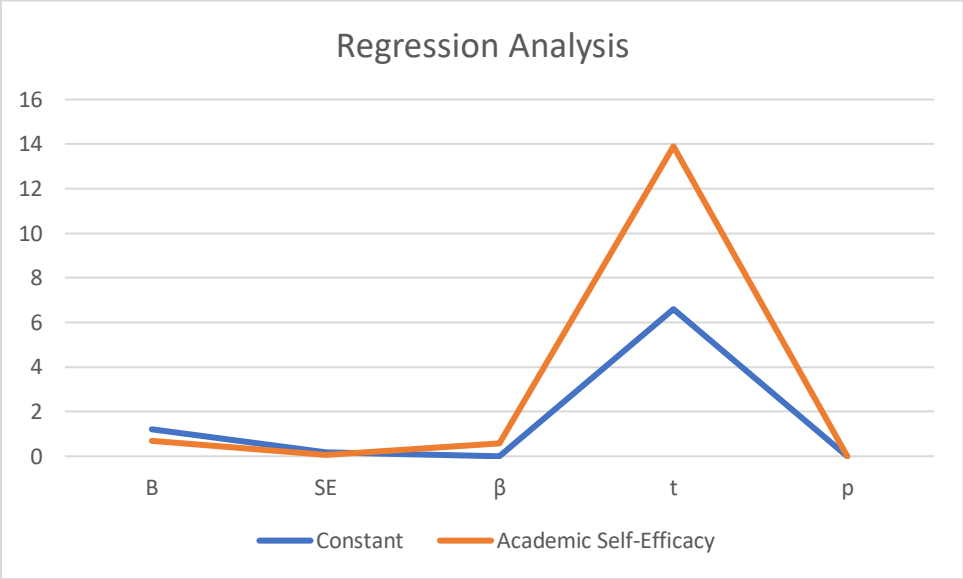


Fig 4: Linear Regression Analysis

Table 5: Mediation Analysis of Learning Engagement in the Relationship Between Academic Self-Efficacy and Psychological Well-Being Among University Students (N = 396)

Effect	B	SE	β	t	p
Academic Self-Efficacy → Learning Engagement	0.612	0.045	0.565	13.60	< .001
Learning Engagement → Psychological Well-Being	0.438	0.061	0.392	7.18	< .001
Academic Self-Efficacy → Psychological Well-Being (Total Effect)	0.681	0.049	0.573	13.90	< .001
Academic Self-Efficacy → Psychological Well-Being (Direct Effect)	0.413	0.052	0.348	7.94	< .001
Indirect Effect through Learning Engagement	0.268	0.041	—	—	95% CI [0.191, 0.353]

The analysis of mediation of Learning Engagement between Academic Self-Efficacy and Psychological Well-being is shown in Table 5. It was found that Academic Self-Efficacy was positively related to Learning Engagement (β = .565, p < .001). Learning Engagement was also positively related to Psychological Well-being (β = .392, p < .001). The direct effect of Academic Self-Efficacy on Psychological Well-being was .348 (p < .001), showing the effect was mediated. The indirect effect was through Learning Engagement, and was 0.268. The 95% confidence interval was 0.191 and 0.353. Since the o interval does not include 0, it was concluded that Learning Engagement mediated the relationship between Academic Self-Efficacy and Psychological Well-being of university students.

Discussion

This study has examined the relationships between AI-Supported Education, Academic Self-Efficacy, Learning Engagement and Psychological Well-being among university students. The results of the study supported that AI-supported education helped build Academic Self-efficacy and Positive Academic Self-beliefs further enhanced Psychological Well-being of the students and Learning Engagement mediated the relationship between Academic Self-Efficacy and Psychological Well-being. The results indicate that

University students, while interacting with AI for academic tasks, enhanced their confidence to accomplish academic duties and helped them face academic challenges, and further positive Academic Self-beliefs helped students to develop their psychological wellness (Jeilani & Abubakar, 2025). The results of the study further supported the positive relationship between AI-supported education and Academic Self-Efficacy of the students, and University students interacting with AI for academic duties, enhanced University Students' confidence to accomplish Academic duties. Many other studies also supported the findings of this study and concluded that the use of AI in Higher Education reinforced students' self-belief and helped students achieve academic well-being (Olatunbosun et al., 2026).

This does not mean that the integration of AI in education systems necessarily increases students' academic confidence. Analysis shows the educational potential of AI is largely determined by the student's ability to utilize technological innovations and by the context in which AI is used to supplement students' own intellectual effort. Reliance on AI to an excessive degree may adversely affect students' creativity and independent thinking. Therefore, the present findings reflect the use of AI in educational contexts in which the technology provides complementary functions and allows students to maintain behavioral control of their own learning (Erkal & Yıldız, 2026).

Results showed that academic self-efficacy is related to psychological well-being. Students who believe in their abilities to fulfill their academic duties and responsibilities are likely to perceive that they are in control in approaching and responding to challenges. Students who do not believe in their abilities to achieve their academic goals are likely to perceive that academic demands are very challenging and difficult. Therefore, students who have academic self-efficacy are likely to act in a way that they are able to understand how to achieve their academic goals; they are less likely to feel academic failures (Alwahaishi & Ahmed, 2026). These results are supported by prior studies that examined the close relationship between academic self-efficacy, student engagement, and overall well-being of students.

The results also showed that learning engagement mediated the relationship between academic self-efficacy and psychological well-being. Students who are academically confident are likely to be involved, active and engaged in achieving their academic goals. Because of their academic self-efficacy, students believe that they are able to attain their goals and achieve academic success. Being actively involved in and engaged with their academic activities strengthens students' sense of achievement, progress, and general well-being. This is especially true for students who believe in their academic abilities. Similarly, Xin et al. (2025) found in a sample of 1,032 college students that academic self-efficacy of students is associated with learning engagement.

Further analysis found the participation of students with high academic self-efficacy to be influenced by behavioral and emotional factors. Aldbyani et al. (2026) studied University-level EFL students, analyzing both academic self-efficacy and learning engagement, and explored psychological and educational conditions of this relationship. The results add to the current study by supporting the significance of students' awareness of their academic potential and skills in relation to their participation in learning.

Collectively, the results add to the existing knowledge about students' psychological and pedagogical conditions while studying in an environment enhanced by Artificial Intelligence (AI). The results suggest that AI-supported learning strengthens students' academic self-efficacy and psychological well-being. Learning Engagement was also part of this relationship. Therefore, this study supplements other recent studies by presenting all these variables in the same research context.

Conclusion

The study found that students who received greater educational support reported higher levels of academic self-efficacy. In addition, students with stronger academic self-efficacy were more likely to experience better psychological well-being. These findings suggest that confidence in one's academic abilities plays an important role in supporting students' overall well-being. Therefore, university students who are self-efficient academically are most likely to have favorable conditions in their psychological well-being. Some university students may have inadequate self-efficacy academically due to lack of resources and information to support them academic responsibilities. A whole chapter on academic self-efficacy addresses psychological well-being of students by incorporating technology into learning, thereby creating a learning environment that nurtures students' psychological well-being and attending to students' academic needs. From the findings of the study, psychological well-being was found to be dependent on academic self-efficacy and learning engagement, which was mediated by learning involvement. University students are advised to take control of their academic responsibilities which may help to improve psychological well-being. This demonstrates that using AI to assist University students' education impacts students' academic self-efficacy, students' learning engagement, and ultimately psychological well-being of students in a higher education environment. Thus,

psychologically-oriented uses of technology in higher education is found to strengthen engagement and reinforce a range of other activities to improve overall educational experiences of students.

Future Implications

Future studies should examine different factors that may affect students' academic performance and psychological well-being. Research can be conducted in different universities, regions, and fields of study to gain a broader understanding of students' experiences. Future researchers should also explore these relationships over a longer period of time to better understand their lasting effects.The effects of students' use of AI in education on students' psychological well-being should also be considered. Future studies should also consider other factors that might help explain the use of AI in higher education, such as students' motivation to learn and students' perception of competence with regard to AI. Finally, future studies should also use various methods to study students' use of AI in education.

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