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Academic Stress among University Students in Digital-Based Learning: The Roles of Social Support, Academic Self-Efficacy, and Subjective Well-Being

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Abstract

The rapid expansion of digital-based learning has increased academic demands and psychological challenges, leading to higher levels of academic stress among university students. This study aims to examine the roles of social support, academic self-efficacy, and subjective well-being in predicting academic stress in digital learning environments. This study employed a quantitative correlational approach using Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze data collected from 888 university students in Indonesia. The instruments included the Perception of Academic Stress Scale (PAS), the Multidimensional Scale of Perceived Social Support (MSPSS), a composite Subjective Well-Being Scale (SWLS and PANAS), and an Academic Self-Efficacy scale. The findings revealed that social support significantly enhances subjective well-being and academic self-efficacy while reducing academic stress. Academic self-efficacy demonstrated a paradoxical role, as it significantly increased academic stress while also functioning as both a mediator and a moderator. In contrast, subjective well-being did not have a significant effect on academic stress. In conclusion, academic stress in digital learning is shaped by complex interactions between external and internal factors, with self-efficacy acting as a double-edged construct. This study contributes by challenging the conventional assumption that self-efficacy is purely protective and highlighting its dual role in digital learning contexts.

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INTRODUCTION

The growth of blended and fully online lectures provides flexible access to materials and overcomes spatial and temporal obstacles (Adawiah, 2022; Blanco-García et al., 2025; Nikou & Aavakare, 2021; Valverde-Berrocoso et al., 2021; Wekerle et al., 2022) Students can cooperate across geographical boundaries, use varied learning resources, and improve their digital literacy, which are essential for global competitiveness (Huda, 2024; Leal Filho et al., 2021; Müller et al., 2023). However, this shift presents psychological challenges, including reduced direct interaction, technological pressure, and increased workloads, which have been linked to increased academic stress, anxiety, and learning fatigue (Ashraf et al., 2022; Orosová et al., 2021; Riaz et al., 2022; Teixeira et al., 2022; Tseng et al., 2025; Zhao & Song, 2022)

Academic stress in digital-based learning has been shown to increase from moderate to significant levels, owing to factors such as low self-efficacy, poor time management, unstable internet access, and excessive academic demands (Chandra, 2021; Han et al., 2024; Mabrouk et al., 2022; Piredda et al., 2025). Psychological distress in online learning is commonly associated with lower subjective well-being (SWB) and fewer social support networks. (Butnaru et al., 2021; Kumar & Nayar, 2021; Liu & Cao, 2022; Mulyadi et al., 2021). Ideally, digital-based lectures should promote flexibility while simultaneously protecting students' mental health. Subjective well-being allows students to retain emotional balance and contentment, whilst social support serves as an important buffer, mediating or moderating the relationship between academic stress and other psychological aspects (E. Diener et al., 2020; Lo et al., 2023). Similarly, academic self-efficacy boosts students' confidence in managing digital learning activities, potentially amplifying the favorable impact of social support on stress reduction (Pratama & Firmansyah, 2021; Zhao & Song, 2022).

However, these ideal conditions have not been fully achieved. Many students continue to feel significant academic stress, falling well-being, and inconsistent self-efficacy, exposing gaps in their ability to adapt to digital learning environments (Guppy et al., 2023; Mastuti et al., 2024; Richey et al., 2021; Sharif et al., 2021). This situation highlights an important research gap: we must better understand how subjective well-being and academic self-efficacy interact in the link between social support and academic stress. As a result, this study investigates subjective well-being as a mediator and academic self-efficacy as a moderator in predicting academic stress among university students engaged in digital learning. This study seeks to find paths for establishing psychologically healthy and long-term digital learning ecosystems by investigating these connections.

To further strengthen the conceptual foundation of this study, it is important to elaborate the theoretical perspectives that explain the relationships among the variables examined. Academic stress in students is a psychological state that occurs when scholastic obligations are believed to be beyond one's coping capacities (R. S. Lazarus, 1984). In the educational setting, it appears as emotional reactions to workload, exams, and time constraints (Misra & McKean, 2000). Academic stress rises during digital-based learning

due to the combined impact of academic, social, and technological factors (Bedewy & Gabriel, 2015; Ennajeh et al., 2025; Manca & Delfino, 2021). Students must adjust to new learning platforms, sustain motivation despite limited engagement, and deal with uncertainties created by internet instability and frequent performance demands (Chandra, 2021; Mabrouk et al., 2022). Previous research has shown that social support, subjective well-being (SWB), and academic self-efficacy are essential psychological resources for lowering stress in such situations (Barbayannis et al., 2022; Huang & Zhang, 2022).

Social support functions as a psychological buffer, allowing people to see stressful situations more positively (Zimet et al., 1988). It consists of emotional, informational, and instrumental support from family, peers, and lecturers (Cohen & Wills, 1985; Thoits, 2011). When physical connections are limited in online learning, social support becomes increasingly vital in maintaining emotional stability and academic persistence (Huang & Zhang, 2022). Empirical research indicates that students who feel stronger social support report improved well-being, self-efficacy, and lower academic stress (Liu & Cao, 2022; Lo et al., 2023). These findings support the idea that social support can help students reduce academic stress by increasing their psychological resilience and emotional fulfillment.

Meanwhile, academic self-efficacy is an internal belief system that influences how pupils address academic obstacles. Self-efficacy, which is based on Bandura's (1997) Social Cognitive Theory, measures people's confidence in organizing and carrying out actions to attain learning objectives. Students with strong self-efficacy have higher tenacity, problem-solving, and self-regulation skills, which minimizes academic stress and improves adaptive coping (Johnson et al., 2020; Schunk & Pajares, 2002). In theoretical terms, self-efficacy can act as both a mediator and a moderator: as a mediator, it explains how social support indirectly influences stress by strengthening coping beliefs; as a moderator, it amplifies the stress-reducing effect of social support among those with stronger efficacy beliefs (Berdida, 2023; Pajares, 1996).

In parallel, subjective well-being is an individual's overall cognitive and emotional assessment of life satisfaction and affective experiences (E. Diener, 1984; E. Diener et al., 2018). Students with higher levels of well-being are more likely to maintain optimism, emotional stability, and academic engagement under pressure (Clark & Tellegen, 1988; Harpaz & Itzkowitz, 2024). According to Subjective Well-Being Theory, SWB serves as a mediator between social support and academic stress (E. Diener et al., 2018; E. D. Diener et al., 1985). Students who feel supported report stronger SWB, which improves their adaptive capacity and lowers stress levels (Huang & Zhang, 2022; Lo et al., 2023). Thus, both self-efficacy and SWB are important methods by which social support affects stress management in digital learning. Integrating these theoretical approaches reveals the intricate interplay between external support networks and internal psychological resources that influences students' academic well-being in the digital age.

Furthermore, integrating these theoretical and empirical findings reveals the complexities of psychological dynamics in digital learning, where external resources such as social support interact with internal factors such as self-efficacy and well-being to

shape students' academic stress responses. Importantly, while academic self-efficacy is widely seen as a protective feature, its role may not always be widely beneficial in high-demand digital learning environments. Students with strong self-efficacy are more likely for determining ambitious objectives, take on more academic obligations, and feel more internal pressure to succeed. As a result, self-efficacy may function not only as a psychological resource but also as a potential source of stress under certain conditions. This highlights the importance of examining both mediating and moderating mechanisms simultaneously to gain a more comprehensive understanding of academic stress. In this study, subjective well-being is conceptualized as a mediating variable, while academic self-efficacy is treated as both a mediator and a moderator in the relationship between social support and academic stress.

The purpose of this study is to investigate the links between social support, academic self-efficacy, and subjective well-being in relation to academic stress among university students participating in digital-based learning, with subjective well-being serving as a mediator and academic self-efficacy as a moderator. This study offers a significant contribution by giving empirical evidence for the paradoxical role of academic self-efficacy as a dual-edged psychological construct. While self-efficacy strengthens the stress-buffering effect of social support, higher levels of self-efficacy may simultaneously increase academic stress due to elevated personal expectations and performance pressure in digital learning environments. This research challenges the common belief that self-efficacy is always a stress-reduction factor, and it emphasizes the complicated interplay between external support and internal psychological needs.

Based on theoretical studies and previous study findings, eight research hypotheses (H) can be created as follows:

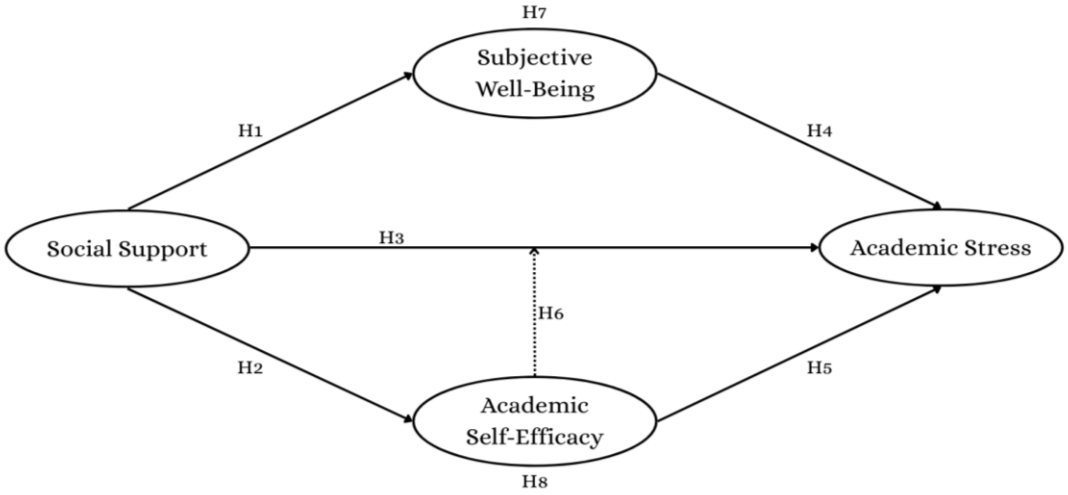

Figure 1. Research Hypotheses Model

H1 : Social support has a positive and significant correlation with subjective well-being.
H2 : Social support has a positive and significant correlation with academic self-efficacy.
H3 : Social support has a negative and significant correlation with academic stress.
H4 : Subjective well-being has a negative and significant correlation with academic

stress.

H5 : Academic self-efficacy has a significant relationship with academic stress.

H6 : Academic self-efficacy moderates the relationship between social support and academic stress, such that the negative effect of social support on academic stress is stronger at higher levels of self-efficacy.

H7 : Subjective well-being mediates the relationship between social support and academic stress.

H8 : Academic self-efficacy mediates the relationship between social support and academic stress.

METHOD

Research Design

This study employs a quantitative approach, including correlational methods and path analysis. The correlational method was used to investigate associations between variables (Creswell et al., 2014; Seeram, 2019), while path analysis is applied to assess the structural relationships, including direct and indirect (mediating) effects, as well as interaction (moderation) effects among variables (Ghozali & Latan, 2015). In this study, academic stress is treated as the dependent variable, while social support serves as the primary independent variable. Subjective well-being is modeled as a mediating variable, whereas academic self-efficacy is conceptualized as both a mediating and moderating variable. As a mediator, academic self-efficacy transmits the effect of social support on academic stress. As a moderator, it influences the strength of the relationship between social support and academic stress.

Research Participant

The participants in this study were university students in Indonesia, with a total of 888 respondents recruited through an online survey. This sample was selected to represent students actively engaged in digital-based learning environments. The comparatively large sample size increases the study's statistical power and robustness, especially when using PLS-SEM.

In addition, the participants were drawn from diverse demographic backgrounds, including variations in gender, type of university, region, field of study, academic year, and learning modes. This wide distribution of characteristics is important as it allows the findings to better capture the heterogeneity of university students in Indonesia (Ishtiaq, 2019). Such diversity strengthens the external validity of the study and improves the generalizability of the results across different student populations and digital learning contexts (Ferguson, 2004). The detailed demographic characteristics of the participants are presented in Table 1.

Table 1. Demographics of Research Participants

	Frequency	Percentage
Gender		
Male	377	42.5
Female	511	57.5
Tipe of University		
State-owned University	534	60.1
Private University	354	39.9
Region of Indonesia		
Western Indonesia	488	55.0
Central Indonesia	230	25.9
Eastern Indonesia	170	19.1
Age Group		
17-19	280	31.5
20-22	450	50.7
23 or older	158	17.8
Year of Study		
First Year	210	23.6
Second Year	250	28.2
Third Year	240	27.0
Fourth Year or Above	188	21.2
Field of Study		
Education and Humanities	240	27.0
Social Sciences and Business	230	25.9
Science and Engineering	300	33.8
Health	118	13.3
Cumulative GPA		
Less than 2.75	90	10.1
2.75-3.00	210	23.6
3.01-3.50	410	46.2
Above 3.50	178	20.0
Learning Mode		
Offline (in-person)	300	33.8
Online	120	13.5
Blended	468	52.7
Residence		
Urban	620	69.8
Rural	268	30.2
Employment Status		
Not Working	500	56.3
Part-time	320	36.0
Full-time	68	7.7
Scholarship Status		
Recipient	260	29.3
Non-recipient	628	70.7

Research Instrument

The instruments used in this study included the Perception of Academic Stress Scale (PAS) developed by Bedewy and Gabriel (2015), the Composite Subjective Well-Being measure combining the Satisfaction With Life Scale (SWLS) by E. Diener (1984) and the Positive and Negative Affect Schedule (PANAS) by Clark & Tellegen (1988),

the Multidimensional Scale of Perceived Social Support (MSPSS) developed by Zimet et al. (1988), and an Academic Self-Efficacy scale based on Bandura's (1997) three dimensions of self-efficacy.The study instruments were created after an in-depth review of relevant literature and conceptual frameworks for each variable. Each construct was then operationalized into several indicators, which served as the basis for developing the instrument items. Table 2 presents an overview of the research instruments. The Perception of Academic Stress Scale (PAS) uses a five-point response format. The response "Strongly Agree" is awarded a score of 5, "Agree" a score of 4, "Somewhat Agree" a score of 3, "Disagree" a score of 2, and "Strongly Disagree" a score of one. The Composite Subjective Well-Being Scale (SWLS and PANAS), the Multidimensional Scale of Perceived Social Support (MSPSS), and the Academic Self-Efficacy Scale based on Bandura's three dimensions all use the same five-point response structure.

Table 2. Outline of Research Instruments

Instrument	Variable	Indicators Used	Reference
Perception of Academic Stress Scale (PAS)	Academic Stress	1. Pressure to achieve 2. Workload and exams 3. Academic self-perception 4. Time constraints	Bedewy and Gabriel (2015).
Composite SWB combining SWLS (life satisfaction) and PANAS (affect)	Subjective Well-Being	1. Life satisfaction 2. Positive affect 3. Negative affect	Clark & Tellegen (1988) and E. D. Diener et al., (1985). For recent review: Diener, Lucas, and Oishi (2018).
Multidimensional Scale of Perceived Social Support (MSPSS)	Social Support	1. Family 2. Friends 3. Significant others	Zimet, Dahlem, Zimet, and Farley (1988).
Academic self-efficacy scale based on Bandura's three dimensions	Academic Self-Efficacy	1. Level or magnitude 2. Strength 3. Generalization	Bandura (1977). For applications in educational settings: Pajares, F. (1996).

In addition, Confirmatory Factor Analysis (CFA) was utilized to evaluate the research instruments' validity and reliability. The average loading factor is the conventional criterion for validity testing; an instrument is considered valid if its Average Loading Factor value exceeds 0.7 (Hair Jr et al., 2021). Cronbach's Alpha Value (CAV) was used to measure reliability. Instruments were rated dependable if their CAV exceeded 0.6. (Hair Jr et al., 2021). Table 3 summarizes the results of the instrument's validity and reliability tests. Based on the CFA calculation results, all of the research instruments had Average Loading Factor Values more than 0.7, indicating that they were all valid for measuring the variables under consideration. Furthermore, according to the computations, all instruments had CAVs greater than 0.6, indicating that all research instruments were accurate in measuring research variables.

Table 3. Validity and Reliability Test Results of Research Instruments

Instrument	Average Loading Factor	Cronbach's Alpha Value (CAV)
Academic Self-Efficacy Scale	.990	.990
Academic Stress Scale	.968	.978
Social Support Scale	.964	.962
Subjective Well-Being Scale	.984	.967

Data Collection and Data Analysis

Data were gathered through an online survey of Indonesian university students. The analysis was carried out utilizing the partial least squares-structural equation modeling (PLS-SEM) approach. The study was separated into two parts: evaluating the exterior model and evaluating the inside model. The variables in the analytical approach were coded as Academic Stress (AS), Subjective Well-Being (SWB), Social Support (SS), and Academic Self-Efficacy (ASE). Table 4 shows a full summary of variable coding and measurement. To assess model fit, the standardized root mean square residual (SRMR) was used as a key indication. The saturated model produced an SRMR value of 0.042, which is lower than the suggested threshold of 0.08, indicating that the expected correlations between social support, academic stress, subjective well-being, and academic self-efficacy fit the observed data well. In contrast, the estimated model had an SRMR of 0.104, which was slightly higher than the acceptable limit.

Table 4. Data Analysis

	Saturated model	Estimated model
SRMR	.042	.104
d_ULS	.137	.840
d_G	1.679	n/a
Chi-square	5824.904	n/a
NFI	.790	n/a

RESULTS AND DISCUSSION

Outer Model

Outer model evaluation examines the model's validity and reliability (J. Hair & Alamer, 2022). The validity test assessed the research variables' convergent and discriminant validity (Hair Jr et al., 2021). Furthermore, the reliability test was performed by computing the CAv and composite reliability value for each study variable (Ghozali & Latan, 2015). Figure 2 depicts the evaluation results for the outer research model.

Convergent Validity

The convergent validity test assesses the link between variable indicators and constructs. A loading factor value greater than 0.7 indicates that an indicator is valid for measuring its construct (Hair Jr et al., 2021). Table 5 displays the results of the convergent validity test.

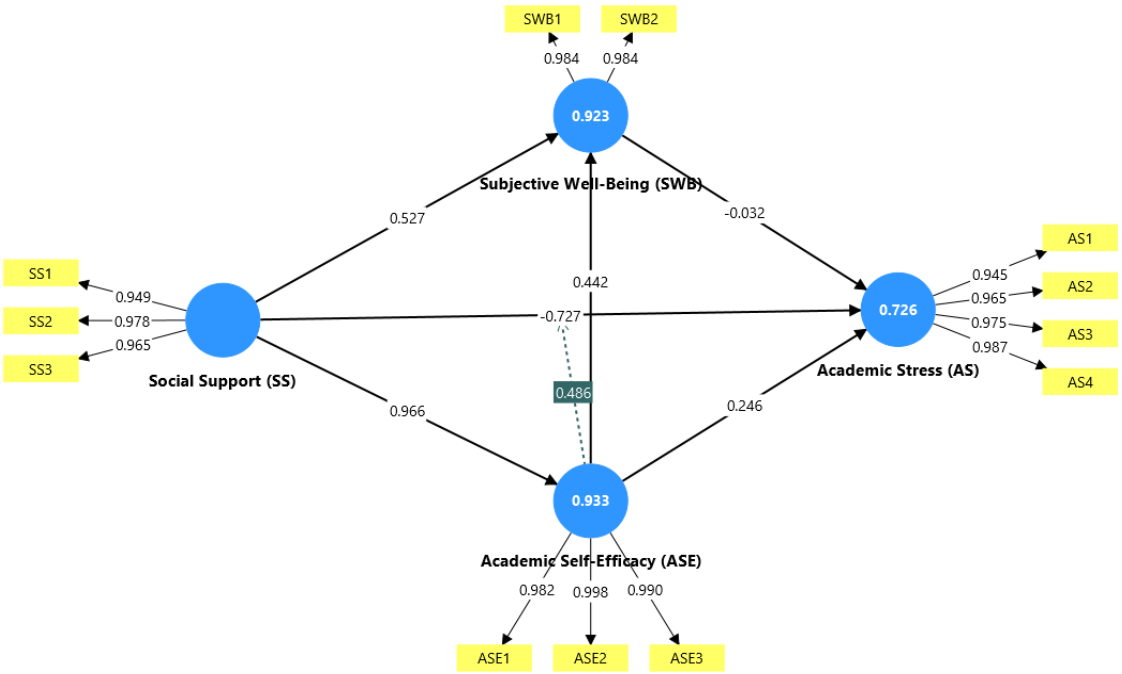

Figure 2. Outer Evaluation of the Research Model

Table 5. Convergent Validity Test Results

	Academic Self-Efficacy (ASE)	Academic Stress (AS)	Social Support (SS)	Subjective Well-Being (SWB)
AS1		0.945		
AS2		0.965		
AS3		0.975		
AS4		0.987		
ASE1	0.982			
ASE2	0.998			
ASE3	0.990			
SS1			0.949	
SS2			0.978	
SS3			0.965	
SWB1				0.984
SWB2				0.984

Table 5 demonstrates that all variable indicators have loading factor values greater than 0.7. This means that each indicator is effective at measuring its construct and can be used to test hypotheses.

Discriminant Validity

The discriminant validity test assesses the distinctness of each variable's concepts. The discriminant validity is assessed using the Fornell-Lacker criteria. A variable has strong discriminant validity if its Fornell-Lacker value is greater than or different from that of other variables (Afthanorhan et al., 2021). The results of the discriminant validity test are shown in Table 6.

Table 6. Discriminant Validity Test Results (Fornell-Lacker Criteria)

	Academic Self-Efficacy (ASE)	Academic Stress (AS)	Social Support (SS)	Subjective Well-Being (SWB)
Academic Self-Efficacy (ASE)	.990			
Academic Stress (AS)	-.812	.968		
Social Support (SS)	.966	-.840	.964	
Subjective Well-Being (SWB)	.951	-.799	.954	.984

The discriminant validity test with the Fornell-Lacker criterion demonstrates that each variable has sufficient distinctiveness to be employed for hypothesis testing.

Reliability

The research variable reliability test assesses the dependability of each variable. A variable is considered reliable if its CAv and composite reliability value above 0.7 (Hair et al., 2021). The findings of the study variable reliability test are shown in Table 7.

Table 7. Research Variable Reliability Test Results

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Academic Self-Efficacy (ASE)	.990	.990	.993	.980
Academic Stress (AS)	.978	.978	.984	.937
Social Support (SS)	.962	.962	.975	.929
Subjective Well-Being (SWB)	.967	.968	.984	.968

According to the analysis's variable reliability test results, all variables have sufficient reliability values to proceed hypothesis testing.

Inner Model

The goal of inner model evaluation is to determine causality between variables. The inner model is evaluated by determining the research model's r-squared value. Furthermore, hypothesis testing is conducted using the bootstrapping method (Hair Jr et al., 2021).

R-Square

The R-squared value is used to assess the independent factors' combined effect on the dependent variable (Hair Jr et al., 2021). Table 8 shows the model's R-squared value.

Table 8. R Square Value

	R Square	Adjusted R Square
Academic Self-Efficacy (ASE)	.933	.933
Academic Stress (AS)	.726	.724
Subjective Well-Being (SWB)	.923	.923

According to the table, the R-square value of Academic Self-Efficacy (ASE) is 0.933, indicating that 93.3% of the variance in ASE can be explained by the independent variables included in the model, with the remaining 6.7% impacted by factors outside the model. Furthermore, Academic Stress (AS) has an R-square value of 0.726, indicating that the independent variables account for 72.6% of the variance in AS, with the remaining 27.4% explained by factors not included in the model. Finally, the R-square value of Subjective Well-Being (SWB) is 0.923, indicating that the independent variables explain for 92.3% of the variance in SWB, with the remaining 7.7% impacted by factors outside the model.

Hypothesis Testing

The bootstrapping method was used for hypothesis testing, employing SmartPLS 4.0 software as a tool. A study hypothesis is supported if the coefficient or direction of the variable connection matches the hypothesis. Furthermore, the hypothesis is accepted if the t-statistic value exceeds 1.96 and the probability value is less than 0.05 (Hair et al., 2021). Based on the results of hypothesis testing, one hypothesis is rejected. The fourth hypothesis (H4) has not been accepted. Table 9 shows the results of hypothesis testing using the bootstrapping approach.

Table 9. Research Hypothesis Test Results

Direct Effect	Original Sample	Sample Average	STDEV	T Statistic	P Values	Hypothesis Result
Social Support (SS) -> Subjective Well-Being (SWB)	.527	.525	.026	20.563	.000	Hypothesis 1 Accepted
Social Support (SS) -> Academic Self-Efficacy (ASE)	.966	.966	.003	384.479	.000	Hypothesis 2 Accepted
Social Support (SS) -> Academic Stress (AS)	-.727	-.729	.033	22.295	.000	Hypothesis 3 Accepted
Subjective Well-Being (SWB) -> Academic Stress (AS)	-.032	-.032	.028	1.125	.261	Hypothesis 4 Rejected
Academic Self-Efficacy (ASE) -> Academic Stress (AS)	.246	.249	.039	6.267	.000	Hypothesis 5 Accepted
Moderating Effect						
Academic Self-Efficacy (ASE) x Social Support (SS) -> Academic Stress (AS)	.486	.488	.059	8.288	.000	Hypothesis 6 Accepted
Indirect Effect						
Social Support (SS) -> Subjective Well-Being (SWB) -> Academic Stress (AS)	-.017	-.017	.015	1.115	.265	Hypothesis 7 Rejected
Social Support (SS) -> Academic Self-Efficacy (ASE) -> Academic Stress (AS)	.238	.241	.038	6.207	.000	Hypothesis 8 Accepted

Discussion

This study provides a comprehensive understanding of students' psychological dynamics in the context of digital learning, specifically regarding academic stress. Overall, the findings reveal that social support has a critical role in influencing students' psychological conditions, both directly and through the moderating and mediating functions of academic self-efficacy, whereas subjective well-being shows a limited role.

The first finding provides evidence that social support is favorably and significantly related to subjective well-being (H1 accepted). This indicates that students who receive strong support from family, friends, and significant others tend to experience higher life satisfaction and more stable positive emotions. Students who have great support from family, friends, and loved ones report better levels of life satisfaction and more consistent pleasant emotions (Azpiazu Izaguirre et al., 2021). This assistance gives emotional comfort while enhancing resilience to academic obstacles (Warshawski, 2022). These findings are consistent with the work of E. Diener et al., (2018) and Huang & Zhang (2022) who highlight the importance of supportive relationships in maintaining subjective well-being. In practice, campus interventions can help students develop their social links by facilitating peer support communities or discussion groups (Kirby et al., 2022; Pointon-Haas et al., 2024).

The second study demonstrates that social support is positively associated with academic self-efficacy (H2 accepted). This implies that external assistance not only provides emotional comfort, but also boosts pupils' confidence in their academic ability. Students with strong social networks are more confident in confronting academic challenges because they feel supported by motivation, guidance, and practical aid (Martono et al., 2023; Warshawski, 2022). This result aligns with Bandura's hypothesis (1997), as well as the work of Johnson et al., (2020) and Pajares (1996) which demonstrates that external support can boost an individual's confidence in their academic abilities. Practically, this emphasizes the need of lecturers and mentors taking an active part in offering assistance that promotes students' academic self-confidence, rather than just emotional support (Amerstorfer & Freiin von Münster-Kistner, 2021; Beals et al., 2021).

Furthermore, social support has been shown to have a large and negative impact on academic stress (H3, acknowledged). This research demonstrates that social support has a direct protective effect against academic stress. This suggests that students who feel encouraged tend to have less academic stress (Hoferichter et al., 2022). This lends support to Zimet et al.'s (1988) Social Support Theory, which views social support as a crucial buffer in decreasing psychological load. The practical relevance is that counseling services can create peer counseling or community-based academic mentorship programs to help students manage stress (Nabors et al., 2022).

However, the fourth hypothesis (H4), which posited that subjective well-being reduces academic stress, was not supported. This indicates that higher levels of well-

being do not necessarily translate into lower academic stress in digital learning contexts. Students with high well-being levels experienced stress comparable to those with lower well-being. These results contrast with E. Diener et al. (2009) and Moksnes et al. (2016) who found that well-being serves as a protective factor against stress. This discrepancy can be interpreted through Lazarus and Folkman's (1985) transactional model of stress, emphasizing that stress responses depend more on situational demands than general emotional states. This suggests that, in digital learning contexts, external academic pressures such as workload, deadlines, and technological demands may override the protective role of internal emotional states. Therefore, higher education institutions should address the structural and academic design factors in digital learning rather than focusing solely on students' emotional well-being (Douwes et al., 2023; Thornby et al., 2023).

The fifth finding (H5) indicates that academic self-efficacy has a significant positive effect on academic stress. This result highlights the paradoxical nature of academic self-efficacy as a double-edged psychological construct in digital learning environments. Students with high self-efficacy tend to set more ambitious goals, take on greater academic responsibilities, and experience stronger internal pressure to succeed (Galindo-Domínguez & Bezanilla, 2021; Putwain et al., 2010). As a result, while self-efficacy enhances motivation and persistence, it may also intensify stress under high academic demands. This finding is consistent with Bandura's (1997) theory, which suggests that individuals with high self-efficacy are more engaged but may also experience increased pressure in challenging environments such as digital learning.

Furthermore, the study's findings indicate that academic self-efficacy acts as a moderator of social support and academic stress (H6, approved). This suggests that the intensity of the association between social support and academic stress is proportional to students' self-efficacy. Students with high self-efficacy can use social support more successfully to relieve stress, but those with low self-efficacy cannot reap the full benefits of such assistance (Warshawski, 2022). This finding is consistent with Bandura's (1997) theory, which emphasizes that self-efficacy not only influences individual behavior but also shapes how individuals respond to environmental resources. In this context, academic self-efficacy moderates the relationship between social support and academic stress by strengthening its stress-buffering effect. Importantly, academic self-efficacy also demonstrates a dual role in this study. While it moderates the relationship between social support and academic stress, it also directly increases academic stress, indicating its function as a double-edged psychological construct. Therefore, interventions should not only enhance students' self-efficacy but also ensure that it is accompanied by realistic expectations and adaptive coping strategies (Dinh & Bonner, 2023).

Meanwhile, the seventh hypothesis (H7), which proposed that subjective well-being mediates the relationship between social support and academic stress, was not validated. However, the eighth hypothesis (H8) was statistically supported, indicating

that academic self-efficacy plays an important role in mediating the relationship between social support and academic stress. Higher levels of self-efficacy may increase stress rather than decrease it, as students with great efficacy set higher internal standards. Thus, academic self-efficacy operates differently across roles: as a moderator (H6), it strengthens the effectiveness of social support, while as a mediator (H8), it explains how social support translates into changes in stress levels. These findings suggest that, while subjective well-being does not explain the relationship between social support and stress, academic self-efficacy serves as a paradoxical mediator, enhancing the connection while potentially increasing stress severity.

Overall, the findings of this study highlight two distinct mechanisms: a mediating pathway and a moderating mechanism involving academic self-efficacy. Social support remains a crucial psychological buffer that fosters subjective well-being and self-efficacy while lowering stress levels. However, the paradox of self-efficacy shows that excessive internal demands may counteract these benefits. Academic self-efficacy demonstrates a complex dual role, as it directly increases academic stress while simultaneously functioning as both a mediator and a moderator in the relationship between social support and academic stress. As a mediator, it explains how social support influences academic stress, whereas as a moderator, it strengthens the stress-buffering effect of social support. Subjective well-being, on the other hand, has no significant direct effect on stress, indicating that academic pressure in digital learning is driven more by structural and performance-related demands than by emotional factors. Therefore, universities should develop integrative approaches that combine academic policy, counseling, and peer support to foster adaptive self-efficacy and maintain students' psychological balance in digital learning environments (Hamka et al., 2025).

CONCLUSION

This study highlights that academic stress in digital learning environments is shaped by the interaction between social support, academic self-efficacy, and subjective well-being. While social support consistently reduces stress, academic self-efficacy demonstrates a paradoxical role by both increasing and buffering academic stress. These findings suggest that fostering adaptive self-efficacy should go beyond simply increasing students' confidence, by encouraging realistic academic expectations, effective time management, and balanced goal-setting. Practically, higher education institutions can implement structured mentoring programs, stress management workshops, and guided academic planning sessions. Thesis advisors and lecturers are encouraged to provide not only motivational support but also constructive feedback to help students calibrate their academic goals and workload. Strengthening peer-support systems and collaborative learning environments is also essential in maintaining students' psychological well-being. Despite the robustness of the large sample and analytical approach, this study is limited by its cross-sectional design, which may not fully capture dynamic changes over time.

Therefore, future research is encouraged to adopt longitudinal or experimental designs and explore additional variables to provide a more comprehensive understanding of academic stress in digital learning contexts.

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