

Developing Mobile Educational Technology for Academic Stress Detection: Evidence-based SEM Analysis

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Abstract—Academic stress has become a critical issue affecting the well-being and learning performance of university students in the digital era. This study aims to examine the predictive relationship between academic self-efficacy, digital competence, subjective well-being, and academic resilience on academic stress among Indonesian university students by integrating psychological factors with educational technology. The research employed a quantitative explanatory design involving 888 students from several universities in West Sumatra. Data were collected online using informed consent and the Strevo application, an educational technology platform designed to identify learning problems and academic stress. The measurement model was analyzed using Partial Least Square–Structural Equation Modeling to assess both outer and inner models. The findings revealed that all four variables significantly predicted academic stress, with an R-square value of 0.847, indicating a strong explanatory power of the model. Academic self-efficacy and digital competence showed the strongest negative effects on academic stress, while subjective well-being and academic resilience acted as important psychological buffers. These results highlight the need for integrated strategies to strengthen psychological and digital resources through educational technology to reduce academic stress in higher education. The study also emphasizes the potential of digital applications such as Strevo as effective tools for early identification and intervention of academic stress.

Keywords—academic stress, academic self-efficacy, digital competence, subjective well-being, academic resilience, educational technology

I. INTRODUCTION

In higher education, the learning process should ideally take place in an academic atmosphere that supports the intellectual, social, and emotional development of students [1–4]. Students should be able to actively participate in learning, manage academic demands well, and utilize technological resources to support academic achievement [5–7]. Higher education institutions are expected to be a safe space for students to develop into independent learners who have mental resilience, collaborative skills, and competent digital skills [8–11]. In this context, student success is not only determined by cognitive intelligence but also by the ability to manage academic pressure [12, 13], develop personal competencies [14], and build adaptation to the increasingly complex dynamics of learning [15–17].

However, in reality, many students face challenges that are

far from ideal conditions. Various international studies describe the increasing academic burden and pressure that directly impact students' psychological well-being [18–21]. For example, a critical study shows that academic stress among students in the United States is related to task pressure, competition, and difficulty adapting to the campus environment [22]. In Africa, one study reported that first-year students experienced high levels of stress accompanied by significant symptoms of anxiety and depression [23]. A study in the Middle East found that students facing significant academic burdens reported decreased sleep quality and eating patterns [24]. During the COVID-19 pandemic, cross-country research showed that the shift to online learning, limited social interaction, and changes in assessment methods were new sources of stress for students [25].

In Indonesia, data shows that academic stress among students remains very high [26]. Studies in Indonesia by Ramadani [27] indicate that the prevalence of students experiencing academic stress ranges from 36.7 to 71.6 percent. A regional study found that around 72.8 percent of students in Aceh were in the moderate academic stress category [28]. These findings confirm that academic stress is not only a global phenomenon but also a pressing reality in Indonesia.

The Issue of academic stress Is Important to note not only because of its high level but also because of its negative consequences for the learning process and mental health of students [29–33]. Prolonged academic pressure correlates with decreased learning engagement, increased dropout rates, and deteriorating psychological well-being among students [34]. Moreover, in the context of rapidly developing digital learning, students are required not only to understand the material but also to master learning technology, manage flexible learning time, and adapt to the dynamics of online learning [35–37]. This increases the urgency to understand the factors that can explain the emergence of academic stress and to design appropriate education technology-based interventions.

Within the framework of this study, there are several factors that are thought to have a significant correlation with students' academic stress levels. The first factor is academic self-efficacy, which refers to students' belief in their academic abilities [38]. Research shows that self-efficacy plays a protective role against academic pressure and

psychological problems [39–42]. The second factor is digital competence, which refers to students' ability to use digital technology to support the learning process [43, 44]. Students with good digital competence tend to be better able to access, understand, and manage digital learning resources, thereby reducing pressure due to technical barriers and digital adaptation [45, 46]. Third is the factor of subjective well-being, which describes an individual's state of happiness, life satisfaction, and psychological well-being. Students with high levels of subjective well-being tend to have better resilience to academic pressure [45–49]. The fourth factor is academic resilience, which is the ability of students to persevere and recover from academic difficulties such as heavy workloads or academic failure. Resilience allows students to remain engaged in the learning process despite facing obstacles [50–52].

Although these four factors have been extensively researched, there are several research gaps that need to be addressed. First, the majority of previous studies were conducted in developed countries, while the context of Southeast Asia, especially Indonesia, is still underrepresented. Second, studies that combine these four variables in a single structural model to understand academic stress in Indonesia are still very limited. Third, studies linking digital competence directly to academic stress are still limited, even though digital competence is relevant to the modern learning ecosystem. Fourth, previous studies generally stopped at understanding the relationship between variables without developing a basis for practical interventions based on educational technology. This study aims to examine the direct effects of academic self-efficacy

and digital competence on academic stress, as well as the moderating roles of subjective well-being and academic resilience in shaping these relationships within digitally intensive learning environments. The results of this study are expected to not only contribute theoretically to educational psychology studies but also serve as a basis for designing mobile applications to detect and intervene in student learning problems and academic stress. Thus, the urgency of this study lies in the effort to create a more adaptive, responsive, and supportive digital learning ecosystem for student mental health.

In digitally intensive learning environments, psychological resources such as subjective well-being and academic resilience are not only independent predictors but also conditional factors that shape how academic self-efficacy and digital competence are associated with academic stress. Therefore, examining the interaction effects among these variables is essential to capture variations in students' stress experiences.

The Ideal picture of learning in higher education, the real challenges of widespread academic stress, and relevant protective factors in the context of educational technology form the basis for this study. It is important to note that psychological resources such as subjective well-being and academic resilience do not always function solely as protective buffers. In digitally intensive learning environments, these factors may conditionally strengthen the relationship between academic demands and academic stress, depending on the level of students' engagement and responsibility. Fig. 1 below shows the conceptual framework of the relationship between variables in the study.

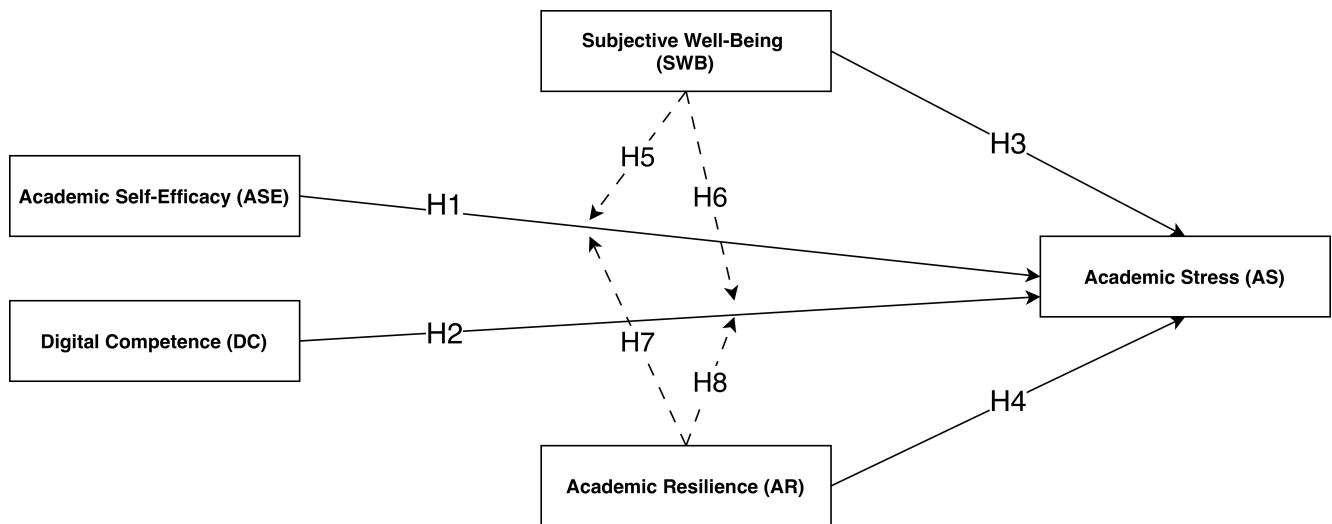


Fig. 1. Conceptual framework.

The research hypothesis is:

H1: Academic self-efficacy has a negative effect on academic stress.

H2: Digital competence has a negative effect on academic stress.

H3: Subjective well-being has a negative effect on academic stress.

H4: Academic resilience has a negative effect on academic stress.

H5: Subjective well-being interacts with academic self-efficacy in moderating academic stress.

H6: Subjective well-being interacts with digital

competence in predicting academic stress.

H7: Academic resilience interacts with academic self-efficacy in predicting academic stress.

H8: Academic resilience interacts with digital competence in predicting academic stress.

II. MATERIALS AND METHODS

A. Research Design

This study uses a quantitative approach with an explanatory design to examine the relationship between academic self-efficacy, digital competence, subjective

well-being, and academic resilience on academic stress among university students. This approach was chosen because it is suitable for analyzing causal relationships and predictive power between variables that have been formulated in the conceptual model. The explanatory design provides a strong basis for understanding the extent to which these four variables can explain the variation in academic stress among university students. This study is also based on a structural model developed to be tested using Partial Least Squares Structural Equation Modeling analysis, which allows for comprehensive testing of direct and moderating relationships between variables in a single model. This approach is in line with contemporary research trends in educational psychology and learning technology that combine psychological and digital aspects to understand the dynamics of academic stress in higher education environments.

B. Population and Sample

The population in this study was undergraduate students from various study programs at public and private universities in West Sumatra. Sample selection was conducted using cluster random sampling techniques to ensure proportional representation of various university clusters, fields of study, and cohorts. The total number of participants in this study was 888 active students who met the inclusion criteria, namely being at least 17 years old, currently enrolled as active students, and willing to participate in the study by signing a consent form. Data collection was conducted online and offline, allowing for the involvement of participants from various academic backgrounds. This approach aimed to obtain a broad and diverse picture of student characteristics in relation to academic stress in the era of digital learning. Table 1 presents the demographic profile of the research participants.

The demographic table shows that the research participants came from very diverse groups in terms of gender, type of university, age, field of study, GPA, and learning mode. Most respondents were between 20 and 22 years old and came from public universities. This broad representation strengthens the external validity of the study because the analysis results can reflect the real conditions of university students in West Sumatra. The diversity of the sample also supports the research objective of developing an academic stress diagnosis-prognosis model that can be applied to the heterogeneous context of higher education in Indonesia.

In this study, cluster random sampling was applied by defining clusters based on universities and fields of study. Several public and private universities in West Sumatra were first identified as primary clusters, from which study programs were randomly selected. A total of eight clusters were included in the sampling process. Within each selected cluster, participants were recruited proportionally according

to field of study and year of study to ensure balanced representation across categories.

Table 1. Research respondent demographics

Variable	Category	Frequency	Percentage
Gender	Male	377	42.5
	Female	511	57.5
Type of University	State-owned University	534	60.1
	Private University	354	39.9
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.
	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
Learning Mode	Offline (in-person)	300	33.8
	Online	120	13.5
	Blended	468	52.7
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

C. Research Instruments

This study used five standardized instruments that have been widely used in international research. These instruments included the Academic Stress Scale, Academic Self-Efficacy Scale, Digital Competence Scale, Subjective Well-Being Scale, and Academic Resilience Scale. These instruments were selected because they have a strong theoretical and empirical basis and are relevant to the context of learning in higher education.

Before use, all instruments underwent a process of adaptation to the Indonesian language and culture, as well as content validity testing by three experts in the fields of guidance and counseling and educational psychology. This process was carried out to ensure that each statement item was appropriate to the context of Indonesian students. Measurements were made using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). An outline of the research instruments is shown in Table 2.

Table 2. Research instrument outline

No	Instrument Name	Main Indicators	Reference
1	Academic Stress Scale	Academic workload pressure, time and task pressure, academic expectations, psychological fatigue	[34]
2	Academic Self-Efficacy Scale	Belief in handling academic tasks, belief in managing study time, belief in handling difficulties	[42]
3	Digital Competence Scale	Technology literacy, digital communication, digital content creation, digital security	[46]
4	Subjective Well-Being Scale	Life satisfaction, positive affect, negative affect (reverse), emotional balance	[49]
5	Academic Resilience Scale	Perseverance in the face of difficulties, adaptability, emotional regulation in academic situations	[52]

After the adaptation process, a pilot test was conducted on 120 students to assess the validity and reliability of the

instruments. The results of the pilot test are summarized in Table 3 (in this section), which shows that all instruments meet the validity and reliability criteria. The item-total correlation coefficient is above 0.30, and the Cronbach's

alpha value for all instruments is above 0.90, indicating excellent internal consistency. Thus, the instrument is suitable for use in primary data collection.

Table 3. Results of the research instrument trial

No	Instrument Name	Number of Items	Average Factor Loading Value	Cronbach's Alpha	Validity Status	Reliability Status
1	Academic Stress Scale	12	0.968	0.978	Valid	Reliable
2	Academic Self-Efficacy Scale	10	0.990	0.990	Valid	Reliable
3	Digital Competence Scale	12	0.950	0.965	Valid	Reliable
4	Subjective Well-Being Scale	8	0.970	0.967	Valid	Reliable
5	Academic Resilience Scale	10	0.964	0.962	Valid	Reliable

D. Data Collection

Data collection was conducted online to reach students from various universities in West Sumatra. Before filling out the questionnaire, participants were asked to agree to informed consent explaining the purpose of the study, data confidentiality, and participant rights. This study also obtained research ethics approval from the university ethics

committee so that the process was in accordance with research ethics principles.

The data collection process used Strevo, a higher education application developed to identify student learning problems and academic stress. Through Strevo, participants could access and fill out the questionnaire directly from their digital devices, making the data collection process fast, practical, and well-documented (Fig. 2).

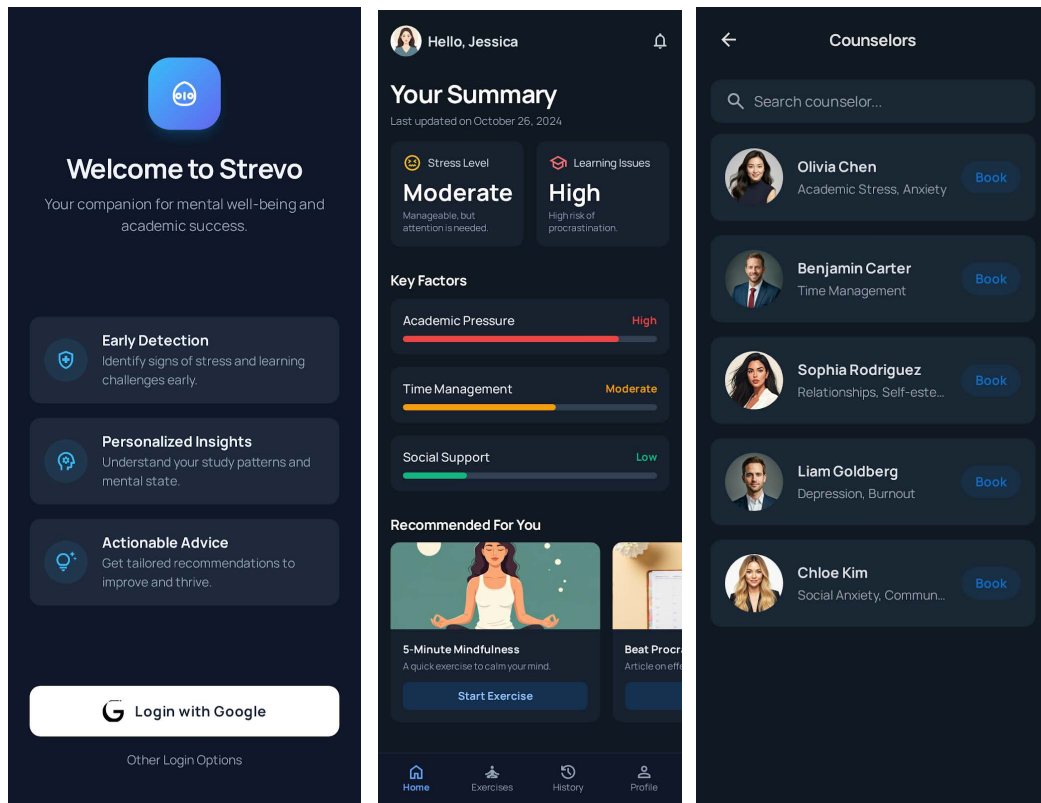


Fig. 2. Strevo mobile application prototype.

After completion, the data is automatically stored in an encrypted database and then exported for analysis. The use of Strevo helps ensure that data is collected efficiently, accurately, and securely.

To reduce the potential impact of common method variance, several procedural remedies were implemented, including anonymous participation, voluntary consent, and the use of validated and conceptually distinct measurement instruments. Participants were informed that their responses would be kept confidential and used solely for research purposes, thereby minimizing evaluation apprehension and response bias.

E. Data Analysis

Data analysis was performed using the Partial Least Square-Structural Equation Modeling (PLS-SEM) approach to test the direct and moderating relationships between variables in the research model. This method was chosen because it is suitable for predictive models involving several latent constructs at once [53]. The analysis process was carried out in two main stages, namely testing the outer model to ensure the validity and reliability of the constructs, and testing the inner model to test the structural hypotheses. The model's feasibility was assessed using the Standardized Root Mean Square Residual (SRMR) value as the main indicator. The model was declared to have a good fit if the SRMR value was less than 0.08 [53]. The analysis results showed that the SRMR value in this study was 0.061, so the model could be

said to meet the model fit criteria and was feasible to proceed to the hypothesis testing stage.

The sample size of 888 participants exceeds the minimum requirements recommended for Partial Least Squares Structural Equation Modeling, particularly for models involving multiple predictors and interaction effects. Prior methodological guidelines suggest that large samples enhance the stability and predictive accuracy of PLS-SEM estimates, and similar sample sizes have been commonly used in studies examining academic stress and psychological resources in higher education contexts.

III. RESULT AND DISCUSSION

A. Result

The analysis of the research results began with presenting the conceptual model that had been evaluated using the Partial Least Square–Structural Equation Modeling (PLS-SEM) approach. This stage was important to provide an overview of the relationships between variables and the direction of influence of the constructs studied. This model became the basis for further analysis of validity, reliability, and hypothesis testing.

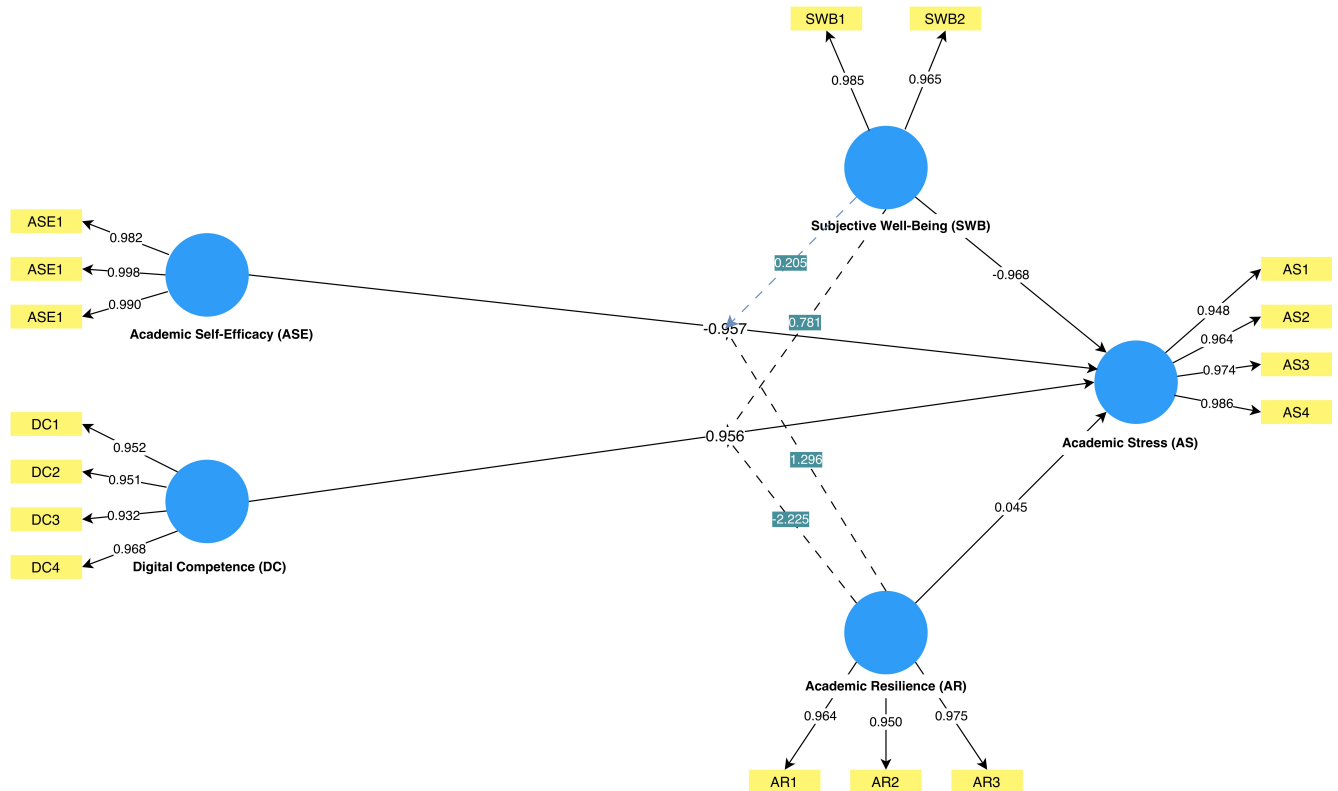


Fig. 3. Results of conceptual framework evaluation.

Fig. 3 shows that all constructs in the model are interconnected according to the conceptual framework. The direction and strength of the relationships indicate that the predictor variables contribute significantly to students' academic stress, so the model is considered feasible for further testing.

1) Outer model

a) Convergent validity

The next step is to test convergent validity to ensure that each indicator adequately represents the construct. Table 4 shows the results of the convergent validity test based on the factor loading values of each construct indicator.

Table 4. Convergent validity test results (factor loading values)

Indicator	Academic Resilience (AR)	Academic Self-Efficacy (ASE)	Academic Stress (AS)	Digital Competence (DC)	Subjective Well-Being (SWB)
AR1	0.964				
AR2	0.950				
AR3	0.979				
AS1			0.948		
AS2			0.964		
AS3			0.974		
AS4			0.986		
ASE1		0.982			
ASE2		0.998			
ASE3		0.990			
DC1				0.952	
DC2				0.951	
DC3				0.932	
DC4				0.968	
SWB1					0.983
SWB2					0.985

In Tables 4 and 5, the indicator labels represent the measurement items for each construct. AR refers to Academic Resilience, ASE refers to Academic Self Efficacy, AS refers to Academic Stress, DC refers to Digital Competence, and SWB refers to Subjective Well Being. The numbers following each label indicate the specific measurement items used to represent each construct.

The results in Table 4 show that all indicators have a loading factor value above 0.70, which means that all

indicators meet the convergent validity criteria and can be used in further model testing [54].

2) Discriminant validity

After convergent validity was met, a discriminant validity test was conducted to ensure that each construct had clear differences from one another. Table 5 presents the results of the discriminant test using the Fornell-Larcker criteria.

Table 5. Discriminant validity test results (Fornell-Larcker criteria)

Construct	Academic Resilience (AR)	Academic Self-Efficacy (ASE)	Academic Stress (AS)	Digital Competence (DC)	Subjective Well-Being (SWB)
Academic Resilience (AR)	0.964				
Academic Self-Efficacy (ASE)	0.967	0.990			
Academic Stress (AS)	-0.795	-0.815	0.968		
Digital Competence (DC)	0.984	0.964	-0.778	0.951	
Subjective Well-Being (SWB)	0.964	0.951	-0.801	0.950	0.984

Table 5 shows that the AVE root value of each construct is greater than the correlation between constructs, so that all constructs meet the criteria for discriminant validity and can be said to be independent of each other [55].

3) Inner model

a) Hypothesis result

After the measurement model has been validated, the next step is to test the hypotheses. Table 6 presents the path coefficients, T-statistic values, and significance values of each relationship between constructs in the model.

Table 6. Hypothesis test results

Hypothesis	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values	Decision
Academic Self-Efficacy (ASE) -> Academic Stress (AS)	-0.837	-0.841	0.099	8.469	0.000	H1 Accepted
Digital Competence (DC) -> Academic Stress (AS)	0.956	0.953	0.149	6.407	0.000	H2 Accepted
Subjective Well-Being (SWB) -> Academic Stress (AS)	-0.968	-0.970	0.089	10.876	0.000	H3 Accepted
Academic Resilience (AR) -> Academic Stress (AS)	0.045	0.056	0.152	0.299	0.765	H4 Rejected
Subjective Well-Being (SWB) x Academic Self-Efficacy (ASE) -> Academic Stress (AS)	0.205	0.206	0.236	0.869	0.385	H5 Rejected
Subjective Well-Being (SWB) x Digital Competence (DC) -> Academic Stress (AS)	0.781	0.785	0.247	3.166	0.002	H6 Accepted
Academic Resilience (AR) x Academic Self-Efficacy (ASE) -> Academic Stress (AS)	1.296	1.293	0.247	5.246	0.000	H7 Accepted
Academic Resilience (AR) x Digital Competence (DC) -> Academic Stress (AS)	-2.225	-2.228	0.270	8.235	0.000	H8 Accepted

Based on Table 6, most of the relationships between constructs proved to be significant. Academic self-efficacy, digital competence, and subjective well-being have an influence on academic stress. Several moderating interactions are also significant, indicating the role of psychological and digital factors in influencing students' academic stress. Positive interaction coefficients indicate that the moderating variables conditionally strengthen the relationship between the predictor variables and academic stress, rather than reducing stress directly.

The moderating results indicate that subjective well-being and academic resilience influence how students respond to academic demands in digital learning contexts. These interaction effects suggest that the relationships between academic self-efficacy, digital competence, and academic

stress are context-dependent and vary according to students' psychological resources.

4) R-square

To examine the overall strength of the model, an R-square test was conducted on the academic stress construct. The R-square value indicates how much of the variation in academic stress can be explained by the predictor variables in the model. The test results are shown in Table 7.

Table 7. R-square

Endogenous Variable	R-square	Adjusted R-square
Academic Stress (AS)	0.847	0.845

The R-square value of 0.847 and the adjusted R-square value of 0.845 indicate that this research model has high

predictive power. Thus, the predictor constructs in this study are able to explain most of the variation in students' academic stress [56].

B. Discussion

The findings of this study show that academic stress is a real and complex phenomenon in higher education in Indonesia. The results of the analysis indicate that academic self-efficacy, digital competence, subjective well-being, and academic resilience have a significant relationship with students' academic stress. These relationships indicate that academic pressure is not only influenced by learning demands, but also by psychological and digital factors that interact in the learning process. These findings reinforce various international studies showing that the academic experiences of modern students are greatly influenced by their ability to manage available psychological and educational technology resources [54–56].

One important finding in this study is the strong role of academic self-efficacy in reducing academic stress levels. Students who have high confidence in their ability to complete academic tasks show lower levels of stress. This is in line with previous studies showing that self-efficacy acts as a buffer against stress by providing a sense of control over academic challenges [57–59]. Self-efficacy encourages students to have more confidence in their abilities, so that heavy academic burdens are not immediately translated into psychological pressure [60–62]. In the context of digital learning, self-efficacy also makes students more adaptive to technological changes and independent learning strategies.

In addition to self-efficacy, digital competence also shows a significant contribution to reducing students' academic stress. Students with good digital competence are able to utilize learning technology to organize tasks, access learning resources, and communicate effectively with lecturers and classmates. These findings are consistent with various studies that state that the ability to manage technology is one of the important keys in reducing learning pressure in the digital era [45]. When students feel comfortable and confident with the technology used in the learning process, their anxiety about academic tasks will decrease [63–65]. This provides a strong signal that digital literacy and competence need to be continuously developed in higher education curricula.

Subjective well-being has also been shown to have a negative relationship with academic stress. Students with high subjective well-being tend to have stable positive emotions, good life satisfaction, and the ability to manage stress in a healthier way. These results reinforce the findings which show that subjective well-being plays a protective role against psychological pressure in the context of higher education [66–69]. Subjective well-being allows students to have a more positive perception of their learning experiences. Students with high well-being are not only more resilient in stressful situations, but also tend to be more productive and actively involved in the learning process [70, 71].

Students with high subjective well-being or resilience may be more actively involved in academic and digital learning activities. While this engagement is beneficial, it may simultaneously increase academic expectations, workload, and self-imposed performance pressure, resulting in higher perceived academic stress.

In addition, academic resilience also plays an important role in explaining variations in academic stress. Students who have the ability to bounce back from academic difficulties, adapt to change, and maintain motivation in difficult conditions show lower levels of stress. These findings reinforce prior studies by Genç *et al.* [72, 73] research, which shows that academic resilience functions as a psychological protector against pressure in the context of higher education. In digital learning, which often demands independence and rapid adaptation to change, resilience is crucial so that students are not easily overwhelmed by the dynamics of learning [74].

The moderating findings related to H5–H8 indicate that subjective well-being and academic resilience conditionally shape the relationships between academic self-efficacy, digital competence, and academic stress. These results suggest that the effects of academic and digital competencies on stress are context-dependent and influenced by students' psychological resources, consistent with theoretical perspectives on conditional and interaction-based models of academic stress.

Although academic resilience is widely conceptualized as a protective factor, the non-significant direct effect observed in this study suggests that resilience may not independently reduce academic stress in digitally demanding learning environments. Instead, resilience appears to function more strongly as a conditional resource that shapes how students respond to academic demands when combined with other psychological and digital competencies.

The findings regarding the contribution of these four factors have important theoretical implications. First, the results of this study broaden our understanding of academic stress not only as a response to conventional learning pressures, but also as a multidimensional phenomenon influenced by psychological and digital factors. Second, this study reinforces the theoretical framework that states that self-efficacy, digital competence, subjective well-being, and academic resilience are psychological resources that interact with each other in coping with academic pressure. Third, these results demonstrate the importance of an integrative approach in understanding academic stress in an increasingly complex era of digital learning.

The practical implications of this study are also highly relevant for higher education administrators and counseling practitioners. These findings indicate that intervention programs to reduce academic stress are not sufficient in merely reducing academic workload, but also need to strengthen students' psychological resources. Efforts to develop self-efficacy can be done through training in independent learning strategies, providing constructive feedback, and increasing students' experiences of success in completing tasks [75–79]. Strengthening digital competence can be done through technology literacy training and the integration of accessible and user-friendly learning technologies [80].

Additionally, subjective well-being should be viewed as an important aspect of campus policy. Mental health support programs, counseling services, and self-development activities can help students improve their psychological well-being [79, 80]. Academic resilience can also be built through adaptive learning approaches, academic mentoring, and

activities that encourage students to learn from their experiences of failure [81, 82]. In this way, students will be better prepared to face the dynamics of lectures and evolving academic challenges.

This study also provides practical contributions through the use of the Strevo application in the data collection process. The use of this educational technology shows great potential in detecting learning problems and academic stress quickly and in a targeted manner. The application can be used by universities to identify students at high risk of academic stress, so that interventions can be made earlier. This technological approach expands the scope of counseling and academic guidance services to be more responsive and efficient. These findings support the importance of integrating digital technology into psychological service practices on campus.

Although these findings make an important contribution, this study has several limitations that should be noted. Data collection was conducted in a specific geographical context, so generalization to other contexts should be done with caution. In addition, the cross-sectional research design cannot fully confirm the causal relationship between variables. Therefore, further research with a longitudinal design involving student populations from various regions would be very useful. Experimental research could also provide a stronger understanding of the effectiveness of technology-based interventions in reducing academic stress.

Considering the research results and their limitations, it can be concluded that managing academic stress in the era of digital learning requires a multidimensional approach that takes into account psychological and digital factors. Strengthening self-efficacy, developing digital competencies, improving subjective well-being, and strengthening academic resilience have proven to be important components in reducing student academic pressure. The results of this study are expected to form the basis for the development of policies and intervention programs in higher education that are more responsive to the psychological needs of students.

This study also emphasizes the importance of utilizing educational technology to support students' mental health. Digital applications such as Strevo can be strategic instruments for detecting, monitoring, and responding to academic pressure more quickly and accurately. The integration of this technology has the potential to strengthen the campus psychological service ecosystem, make campuses more adaptive to modern academic challenges, and help create a healthy learning environment for students. These findings provide a strong foundation for further research and higher education policy practices oriented toward student mental health and well-being.

IV. CONCLUSION

This study confirms that academic stress among students is a multidimensional issue influenced by psychological and digital factors. The findings show that academic self-efficacy, digital competence, subjective well-being, and academic resilience play an important role in reducing students' academic stress levels. The research model tested provides a more comprehensive understanding of how these four variables interact in the context of digital learning. The implications of these findings highlight the importance of

strategies to strengthen psychological resources and digital competence through learning programs, training, and counseling support in higher education. In addition, the use of technology such as Strevo can be a strategic tool for detecting and responding to academic pressure more quickly and effectively. These findings provide a strong foundation for the development of technology-based policies and interventions to support the psychological well-being of students in higher education settings.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

All authors contributed actively to this research. Zadrrian Ardi was responsible for the research design, instrument development, and writing of the main manuscript. Ade Herdian Putra and Muhammad Oceano Fauzan were involved in data collection and research database management. Khairul Alfahani and Indah Sari Rahmaini contributed to data analysis and interpretation of findings. Salsabila Nasution was involved in literature review, manuscript editing, and refinement of the article structure in accordance with journal guidelines. All six authors have read and approved the final manuscript for submission.

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