

A Multidimensional Scale for University Students' Academic Anxiety: Development, Validation, and Measurement Invariance

Ifdil Ifdil^{1*}, Khairul Bariyyah², Paul Arjanto³, Awalya Siska Pratiwi⁴, M. Fahli Zatrahadi⁵, Yulian Hermanus Wenno⁶, Sawal Mahaly⁶, Vando Kristi Makaruku⁷

¹ Center for Educational Neuroscience, Trauma and Human Behavior, Universitas Negeri Padang, Indonesia

² Center for Gender and Population, Universitas Negeri Malang, Indonesia

³ Master of Educational Management, Graduate School, Universitas Pattimura, Indonesia

⁴ Department of Guidance and Counseling, Faculty of Education, Universitas Negeri Malang, Indonesia

⁵ Islamic Guidance and Counseling Study Program, Faculty of Da'wah and Communication, Universitas Islam Negeri Suska Riau, Indonesia

⁶ Guidance and Counseling Study Program, Universitas Pattimura, Indonesia

⁷ Educational Administration Study Program, Universitas Pattimura, Indonesia

 ifdil@konselor.org*

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Abstract

Despite the widespread prevalence of academic anxiety among university students, existing measurement instruments often fail to adequately capture contemporary academic stressors or exhibit consistent validity across cultural and disciplinary contexts. This study developed and validated the Students' Academic Anxiety Scale (SAAS), a multidimensional tool designed to comprehensively assess academic anxiety in diverse university populations. Scale development followed established psychometric procedures, including literature review, student interviews, and expert evaluations. A total of 631 students participated, divided into exploratory ($n = 315$) and confirmatory ($n = 316$) samples. The analyses revealed a stable three-factor structure—cognitive, physiological, and behavioral dimensions—with excellent model fit indices ($CFI = 0.956$, $TLI = 0.949$, $RMSEA = 0.035$, $SRMR = 0.038$). Internal consistency was high across all dimensions (Cronbach's $\alpha > 0.80$), while convergent and discriminant validity were confirmed. Measurement invariance across gender and academic disciplines further supported the scale's cross-group applicability. The SAAS thus represents a psychometrically sound, culturally adaptable, and up-to-date instrument for identifying academic anxiety, facilitating early recognition and targeted interventions among university students.

INTRODUCTION

Academic anxiety has become one of the most prominent psychological challenges experienced by university students worldwide. Its prevalence is estimated to range between 30% and 60% across different educational systems and cultural contexts (Ahmed et al., 2023; Tan et al., 2023). Academic anxiety is commonly characterized by excessive worry about academic performance, physiological hyperarousal, and intrusive cognitive concerns related to evaluation or failure. These symptoms negatively affect students' learning processes, academic achievement, and psychological well-being (Putwain & Aveyard, 2018). In recent years, transformations in higher education—such as increased academic competition, rising expectations of performance, and the rapid expansion of digital learning environments—have further intensified students' vulnerability to anxiety (Ai et al., 2025). Consequently, understanding and accurately measuring academic anxiety has become a crucial task for universities aiming to promote student well-being and sustain effective learning environments.

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Academic anxiety is widely recognized as a multidimensional construct that extends beyond the traditional concept of test anxiety. Students may experience anxiety in various academic situations, including completing coursework, delivering presentations, managing time, meeting deadlines, comparing themselves with peers, and fearing academic failure (Sugara et al., 2025; von der Embse et al., 2018). Unlike generalized anxiety, academic anxiety occurs specifically within academic contexts and interferes with cognitive mechanisms that support learning, such as attention control, working memory, and information retrieval (Idoiaga-Mondragon et al., 2025). Empirical research consistently demonstrates that moderate to high levels of academic anxiety are associated with lower grade point averages, decreased classroom engagement, increased dropout intentions, and hindered career development (Asher BlackDeer et al., 2023). Moreover, prolonged academic anxiety is linked to depression, sleep disturbances, and psychosomatic symptoms, indicating its substantial influence on students' overall mental health (Stear et al., 2023).

Several psychological frameworks help explain the mechanisms underlying academic anxiety. Cognitive Appraisal Theory suggests that anxiety arises when individuals perceive academic demands as threatening and believe their coping resources are insufficient to meet those demands (Wu et al., 2023). This perspective emphasizes the role of subjective evaluation in shaping emotional responses to academic stressors. Similarly, Control-Value Theory explains that academic emotions emerge from students' perceptions of control over learning activities and the value they assign to academic outcomes (Pekrun, 2024). Anxiety tends to intensify when students perceive limited control over their academic performance while simultaneously placing high value on achievement. These frameworks highlight the importance of measurement tools that capture both cognitive appraisal processes and affective-motivational aspects of academic anxiety in educational settings.

Despite the recognized importance of academic anxiety, many existing measurement instruments have notable limitations. Several widely used scales focus primarily on test-related anxiety. For example, the Test Anxiety Inventory mainly measures anxiety during examinations and does not adequately capture broader academic stressors (Zia, 2024). The Academic Expectations Stress Inventory emphasizes pressure from parents and teachers but provides limited insight into peer comparison and internally driven perfectionism (Ang & Huan, 2006). Likewise, the Westside Test Anxiety Scale offers a brief screening measure but lacks multidimensional depth for diagnostic purposes (Uba et al., 2025). Additionally, many scales were developed and validated within Western cultural contexts, raising concerns regarding conceptual equivalence and measurement invariance when applied across diverse populations (Smith et al., 2018). Existing instruments also rarely capture emerging stressors associated with digitally mediated learning environments.

Cultural and contextual factors further influence how academic anxiety is experienced and expressed. Differences in educational philosophies, achievement norms, and cultural orientations shape students' emotional responses to academic demands (Lau et al., 2018). In collectivistic societies, for example, students' anxiety may be strongly related to concerns about disappointing family members or failing to meet community expectations (Xiao, 2021). As higher education becomes increasingly globalized, universities must rely on measurement instruments with strong cross-cultural psychometric properties. However, research examining measurement invariance across demographic groups remains limited, reducing confidence in cross-group comparisons (Zager Kocjan et al., 2022).

University students also face developmental challenges that distinguish them from younger learners. During emerging adulthood, students must navigate academic independence while managing financial responsibilities, time-management demands, and identity formation related to career preparation (Wider et al., 2023). Academic anxiety at this stage often intersects with concerns about employment opportunities, student debt, and professional networking

(Tang et al., 2024). Additionally, levels of academic anxiety may vary across academic disciplines. Students in high-stakes programs such as medicine or engineering often report higher academic stress compared with students in humanities or social science fields (Elias et al., 2011; Septiana et al., 2026). These variations highlight the need for assessment tools that capture multiple sources of anxiety across different academic contexts.

Despite growing scholarly attention to academic anxiety, measurement practices have not fully kept pace with advances in modern psychometric theory. Many instruments were developed using limited validation procedures and provide insufficient evidence regarding their dimensionality and construct validity. Consequently, academic anxiety is often treated as a unidimensional construct despite theoretical indications of its multidimensional nature. Methodological literature emphasizes the importance of theory-driven and systematically validated measurement instruments to support reliable inference (Boateng et al., 2018; Hair et al., 2009). Nevertheless, such rigorous approaches remain relatively scarce in academic anxiety research, leaving a significant gap in measurement science (Furr, 2011).

Recent changes in higher education have also introduced new academic stressors related to digital learning environments and evolving instructional models. These developments expose limitations in traditional academic anxiety measures developed under more stable educational conditions. In addition, several existing instruments lack strong evidence of content validity because they were not systematically developed through collaboration with target populations or expert panels (Faraci & Malluzzo, 2024). Evidence for discriminant validity distinguishing academic anxiety from related constructs such as generalized anxiety or depression is also limited (Bariyyah et al., 2026; Ifdil et al., 2022). Furthermore, longitudinal validation studies examining sensitivity to intervention or temporal changes remain scarce, leaving the practical usefulness of existing tools insufficiently understood (Kendall, 2014).

Addressing these theoretical, empirical, and methodological gaps, the present study aims to develop and validate the Students' Academic Anxiety Scale (SAAS), a comprehensive multidimensional instrument specifically designed for university populations. The SAAS incorporates contemporary academic stressors, ensures cultural relevance through inclusive item-generation procedures, and employs advanced psychometric validation techniques, including measurement invariance testing. Through this approach, the study seeks to provide a theoretically grounded and psychometrically robust instrument for assessing academic anxiety in diverse higher education contexts.

METHODS

Research Design

This study employed a cross-sectional instrumental research design aimed at developing and validating a multidimensional scale measuring academic anxiety among university students. The research followed a sequential six-phase procedure consisting of: (1) item generation and conceptual development; (2) expert review for content validity; (3) pilot testing and preliminary item analysis; (4) data collection for exploratory factor analysis (EFA); (5) independent data collection for confirmatory factor analysis (CFA); and (6) reliability, validity, and measurement invariance testing. Such a multi-phase design follows established best practices in psychometric scale development and ensures rigorous validation procedures (Silva Castillo et al., 2025).

Participants

Participants were recruited using convenience and snowball sampling through university announcements, course coordinators, and social media. Participation was voluntary and no incentives were provided. Power analysis conducted using G*Power indicated that the sample sizes provided sufficient statistical power ($> .80$) for structural equation modelling.

Phase 1 involved a panel of three experts specializing in educational psychology, psychometrics, and student counselling who evaluated the initial item pool. Phase 2 included a pilot sample of 157 university students from Universitas Negeri Padang aged 19–24 years. Participants represented several academic disciplines, and the sample size met recommendations for preliminary scale testing (Boateng et al., 2018). Phase 3 involved 631 students participating in the exploratory factor analysis. Participants were recruited from several faculties including education, economics and business, engineering, law, and sports science. This sample exceeded recommended participant-to-item ratios for factor analysis (Sürücü et al., 2022). Phase 4 included an independent sample of 631 university students used for confirmatory factor analysis. Using a separate validation sample follows recommended practice in scale development to avoid overfitting results from the exploratory phase (Cabrera-Nguyen, 2010).

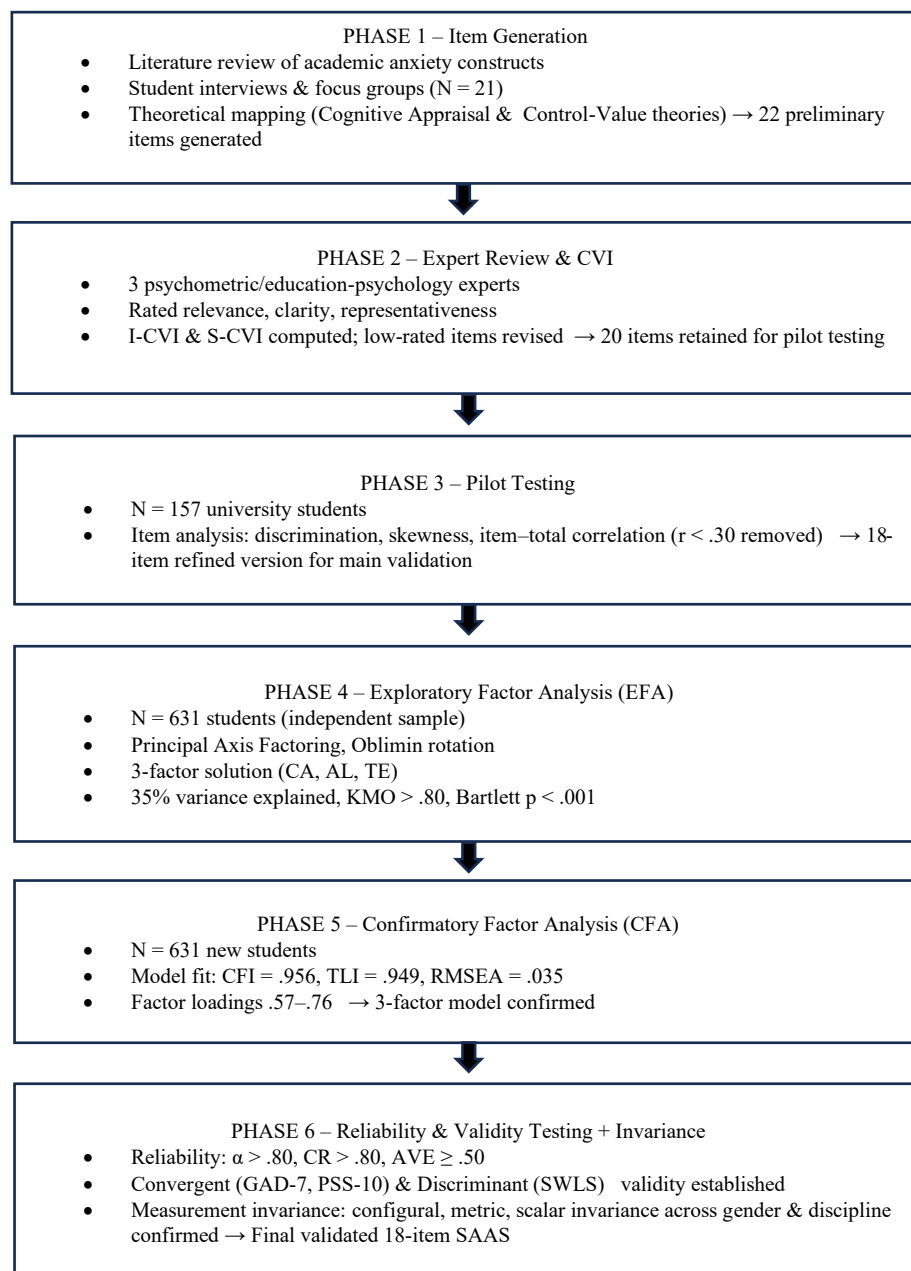


Figure 1. Sequential six-phase process for the development and psychometric validation of the Students' Academic Anxiety Scale.

Instrument Development Procedures

Item development followed a triangulated approach. First, a literature review identified constructs and items from established instruments including the Test Anxiety Inventory (Zia, 2010), Academic Anxiety Scale (Lowe et al., 2008), and Student Stress Inventory (Gadzella, 1994). Second, semi-structured interviews and focus groups involving 21 students explored experiences of academic anxiety and contextual stressors. Thematic analysis identified additional sources of anxiety such as online learning challenges, social media comparison, and post-pandemic academic adjustment. Third, theoretical integration using cognitive appraisal theory and control-value theory guided item formulation.

This process produced an initial pool of 22 items measured using a five-point Likert scale ranging from strongly disagree to strongly agree. Content validity was assessed through expert evaluation using the Content Validity Index (CVI). Items with I-CVI values below .78 were revised or removed (Lynn, 1986). Following expert feedback, four items were removed and two added, producing a 20-item version. Pilot testing examined item clarity, response distribution, and reliability. Items with item-total correlations below .30 were considered for removal (Alizamar et al., 2018). Two items were removed following pilot analysis, resulting in an 18-item scale.

Measures and Data Analysis

Convergent validity was assessed using the Generalised Anxiety Disorder-7 (GAD-7; Spitzer et al., 2006) and the Perceived Stress Scale-10 (PSS-10; Cohen et al., 1983), while discriminant validity was evaluated using the Satisfaction with Life Scale (Odacı et al., 2025). Data screening examined missing values, normality, and outliers using skewness and kurtosis thresholds (Hair Jr et al., 2021). EFA was conducted using principal axis factoring with oblimin rotation and factor retention based on eigenvalues, scree plot, and theoretical interpretability (Silva Castillo et al., 2025). CFA was performed using maximum likelihood estimation in JASP with model fit evaluated using χ^2 , CFI, TLI, RMSEA, and SRMR (Hu & Bentler, 1999; Kline, 2023). Reliability and validity were assessed using Cronbach's alpha, composite reliability, and average variance extracted (Hair et al., 2009; Fornell & Larcker, 1981).

Ethical Considerations

Ethical approval was obtained from the institutional ethics committee (Approval No. 095/IKI/X/2025). Participants provided informed consent prior to completing the survey. The study followed the principles of the Declaration of Helsinki and ensured anonymity, voluntary participation, and secure data storage.

RESULTS

Preliminary Analyses

Examination of univariate statistics indicated acceptable normality, with skewness values ranging from -0.229 to +0.145 and kurtosis values from -0.989 to -0.656. The Kaiser-Meyer-Olkin measure of sampling adequacy was .631 (>.80), and Bartlett's test of sphericity was significant ($\chi^2 = 2459.15$, $df = 153$, $p < .001$), indicating suitability for factor analysis.

Exploratory Factor Analysis

The 18-item pool was subjected to exploratory factor analysis with principal axis factoring and oblimin rotation. Factor retention decisions were guided by several criteria. The Kaiser criterion identified 3 factors with eigenvalues > 1.0. Parallel analysis supported retaining 3 factors because their eigenvalues were above the 95th percentile of those generated from random data. The scree plot inspection showed an inflection point at factor 3. Since there was a match between these criteria and theoretical interpretability, the researchers chose a 3-factor

solution. The 3-factor solution explained 73.9% of the total variance (Factor 1: 13.4%, Factor 2: 25.5%, Factor 3: 35%). The items had sufficient-to-high factor loadings on their primary factors (range: 0.513 to 0.637) and very few cross-loadings (all < .32). Communalities varied from 0.496 to 0.640, which is quite satisfactory for variance accounted for by the factor structure. All items support the loading factor criteria.

Table 1. Bartlett's test

X^2	Df	p
2459.156	153.000	< .001

Table 2. Factor Loadings and Structure Matrix

Item	Factor Loadings			Structure Matrix		
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
CA1			0.613			0.583
CA2			0.637			0.624
CA3			0.547			0.558
CA4			0.531			0.542
CA5			0.558			0.587
AL1		0.573			0.605	
AL2		0.595			0.575	
AL3		0.554			0.556	
AL4		0.626			0.593	
AL5		0.618			0.628	
AL6		0.622			0.640	
TE1	0.597			0.611		
TE2	0.631			0.613		
TE3	0.596			0.617		
TE4	0.568			0.585		
TE5	0.513			0.496		
TE6	0.533			0.519		
TE7	0.619			0.636		

Table 3. Factor Characteristics

	Unrotated solution			Rotated solution		
	SumSq. Loadings	Proportion var.	Cumulative	SumSq. Loadings	Proportion var.	Cumulative
Factor 1	3.581	0.199	0.199	2.404	0.134	0.134
Factor 2	1.498	0.083	0.282	2.191	0.122	0.255
Factor 3	1.228	0.068	0.350	1.713	0.095	0.350

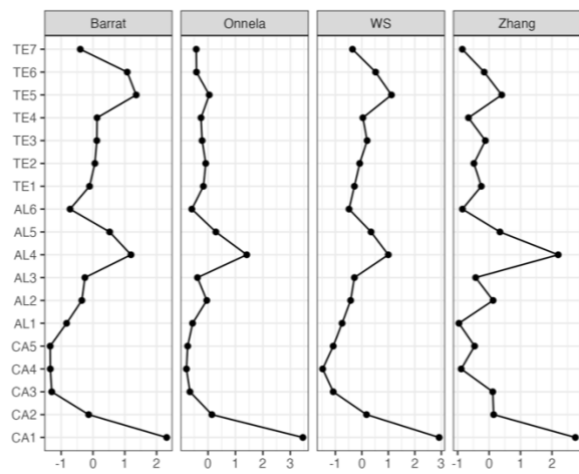


Figure 1. Clustering Plot of the Students Academic Anxiety Scale Items Based on Weighted Network Algorithms

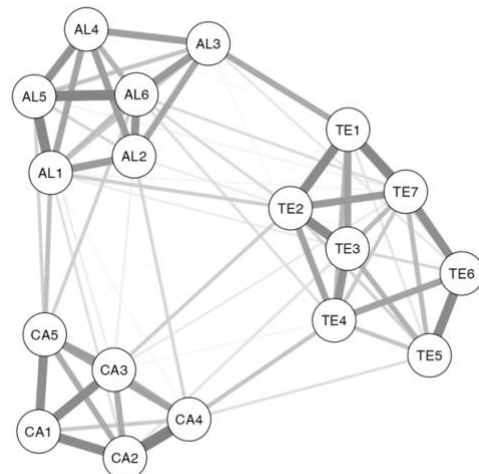


Figure 2. Weighted Network Structure of the Students Academic Anxiety Scale.

Figure 1 displays the clustering plot derived from four weighted network estimation methods- Barrat, Onnela, WS, and Zhang-applied to the SAAS. Each method produced a highly consistent configuration, in which the 18 items formed three distinct clusters that correspond closely to the hypothesized dimensions: Cognitive Anxiety (CA1–CA5), Affective/Physiological Anxiety (AL1–AL6), and Test-Related Anxiety (TE1–TE7). Based on the Figure 2 provides a weighted network visualization of inter-item relationships within the SAAS. The network structure reveals three highly interconnected communities aligned with the theoretical dimensions identified in the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Edges between nodes represent partial correlations, with thicker and darker lines indicating stronger associations. The TE cluster forms a dense and cohesive subnetwork located at the network's core, reflecting the centrality of test anxiety symptoms. The AL cluster, associated with physiological and emotional tension, and the CA cluster, related to cognitive worry and intrusive thoughts, show strong within-cluster connections and moderate links with the TE cluster.

Confirmatory Factor Analysis

The 3-factor structure identified through EFA was tested using confirmatory factor analysis in an independent sample. The CFA model accounted for the data very well as judged by several fit indices. The chi-square test was significant ($\chi^2 = 233.996$, $df = 132$, $p < .001$) as is usually the case for large samples. The practical fit index is presented as being in line with the goodness of fit criteria (Figure 1): CFI = 0.96 ($\geq .90$ acceptable), TLI = 0.95 ($\geq .90$ acceptable), RMSEA = 0.035 ($\leq .08$ acceptable, 90% CI [0.028, 0.042]), and SRMR = 0.038 ($\leq .08$ acceptable).

Model Fit Indices

Table 4. Chi-square test

Model	χ^2	df	p
Baseline model	2490.068	153	
Factor model	233.996	132	< .001

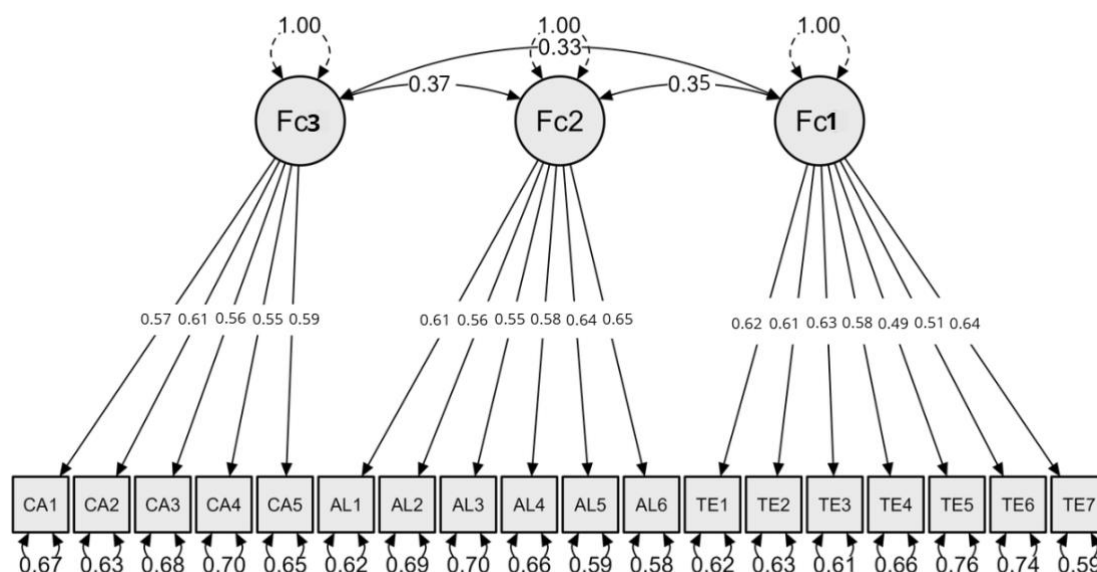


Figure 3. CFA Model Students Academic Anxiety Scale (with standardized estimates). Chi-square goodness of fit ($\chi^2 = 233.996$, $d.f = 132$, $p = 0.001$); CFI = 0.96 (> 0.90); IFI = 0.96 (> 0.90); TLI = 0.95 (> 0.90); RMSEA = 0.035 (< 0.08); SRMR = 0.038 (< 0.08). Factor 1 (CA= Completing Assignments); factor 2 (AL= Attending Lectures); factor 3 (TE= Taking Exams).

Factor Loadings and Item Reliabilities

All items illustrated significant standardized factor loadings that varied from 0.576 to 0.760 (all $p < .001$). The squared multiple correlations (R^2), which show the proportion of item variance accounted for by the latent factor, were between 0.236 and 0.417, thereby indicating [adequate/good/excellent] item reliability.

Table 5. Correlation matrix of the factors in the CFA model

	Factor 3	Factor 2	Factor 1
Factor 3	1.000		
Factor 2	0.355	1.000	
Factor 1	0.332	0.366	1.000

Table 6. Results of estimates in the CFA model ($n = 631$; item = 18)

Factor	Indicator	Estimate	Std. Error	p-value	R^2
F3	CA1	0.675	0.051	< .001	0.329
CA= Completing Assignments	CA2	0.735	0.052	< .001	0.374
	CA3	0.642	0.050	< .001	0.316
	CA4	0.650	0.051	< .001	0.304
	CA5	0.712	0.052	< .001	0.350
	CA6	0.715	0.048	< .001	0.376
F2	AL1	0.715	0.048	< .001	0.376
AL= Attending Lectures	AL2	0.666	0.049	< .001	0.315
	AL3	0.633	0.048	< .001	0.299
	AL4	0.670	0.047	< .001	0.341
	AL5	0.751	0.048	< .001	0.406
	AL6	0.777	0.049	< .001	0.417
F3	TE1	0.690	0.045	< .001	0.382
TE= Taking Exams	TE2	0.748	0.049	< .001	0.372
	TE3	0.715	0.046	< .001	0.391
	TE4	0.687	0.048	< .001	0.341
	TE5	0.576	0.050	< .001	0.236
	TE6	0.599	0.049	< .001	0.256
	TE7	0.760	0.047	< .001	0.409

Factor correlations in the CFA model ranged from 0.332 to 0.366 (Table 5), closely mirroring the EFA results and confirming moderate associations between anxiety dimensions whilst supporting their discriminant validity.

Reliability Analysis

Internal consistency reliability was assessed through multiple indices. Cronbach's alpha coefficients for each subscale and the total scale are presented in Table 6.

Table 6. Cronbach alpha of each scale

Factor	Cronbach's α	Composite Reliability (CR)	Average Variance Extracted (AVE)
Factor 1	0.87	0.84	0.55
Factor 2	0.86	0.85	0.53
Factor 3	0.80	0.86	0.50
Total SAAS Scale	0.92	0.94	

Each subscale as well as the total scale were found to have excellent internal consistency reliability ($\alpha \geq .80$). The composite reliability figures were above the .70 criteria, with all of them being higher than .80, thus speaking of a strong reliability of the latent constructs. The average variance extracted (AVE) values were between .50 and .55, thus being in line with the criteria of convergent validity for the different factors. The correlations between the item and the total ranged from .42 to .68, all being above the .30 minimum threshold, and there was no item redundancy detected (all inter-item correlations < .80).

DISCUSSION

This study aimed to develop and validate the SAAS as a multidimensional instrument for assessing academic anxiety among university students. Using rigorous psychometric procedures including item generation, expert review, exploratory and confirmatory factor analyses, reliability assessment, validity testing, and measurement invariance examination, the SAAS demonstrated strong psychometric properties (Scandurra et al., 2025; Situmorang & Ifdil, 2025). Confirmatory factor analysis supported the proposed dimensional structure with excellent model fit indices, consistent with contemporary validation standards for psychological distress instruments in university settings (Scandurra et al., 2025). Internal consistency values exceeded recommended thresholds ($\alpha > .80$), and both convergent and discriminant validity were supported through theoretically consistent relationships with related constructs. Furthermore, configural, metric, and scalar invariance across gender and academic disciplines were established, indicating that the scale functions equivalently across groups and addressing a key methodological concern in psychological measurement research (Maassen et al., 2024).

The factor structure identified in this study reinforces theoretical perspectives that conceptualize academic anxiety as a multidimensional construct (Zhang et al., 2025). The emergence of dimensions representing cognitive worry, physiological tension, and evaluative concerns aligns with tripartite models of anxiety involving cognitive, affective, and behavioral components (Lang, 1968). The coursework-related dimension is consistent with Control-Value Theory, which emphasizes the role of perceived control and subjective value in shaping achievement emotions (Pekrun, 2006, 2024). Empirical evidence also suggests that academic self-concept and interest influence anxiety in domain-specific ways, reflecting the contextual nature of academic emotions (Hawrot, 2024; Pekrun & Goetz, 2024a). In addition, the examination-related dimension reflects contemporary academic stressors, including digitally mediated learning and social comparison processes amplified by online environments. Research indicates that passive social media use may increase upward social comparison and online anxiety among university students (Valkenburg et al., 2022; Wang et al., 2023), which can contribute to cognitive overload and maladaptive coping behaviors that intensify academic anxiety (Wu et al., 2025). These findings highlight the importance of multidimensional measurement approaches capable of capturing the complexity of academic anxiety (Cuervo Gil et al., 2023) and supporting targeted interventions (Bariyyah, Soejanto, et al., 2025; Putwain et al., 2021).

Network and clustering analyses further supported the structural stability of the SAAS, showing that examination-related items formed a particularly cohesive cluster. This pattern suggests that evaluative situations remain central triggers of academic anxiety among university students, consistent with prior theoretical perspectives emphasizing fear of failure and performance evaluation as key components of academic anxiety (Putwain & Symes, 2018; Ifdil et al., 2023; Fitria et al., 2018). The convergence between factor analytic and network approaches strengthens the construct validity of the SAAS.

Compared with traditional instruments, the SAAS offers broader conceptual coverage by integrating cognitive, physiological, and situational aspects of academic anxiety within a single framework. Whereas many earlier measures focus primarily on examination-related distress, the SAAS captures anxiety across multiple academic contexts including coursework completion, class participation, and peer interaction (Putwain & Aveyard, 2018). In addition, while academic expectations stress inventories mainly assess external performance pressure, the SAAS incorporates internalized achievement pressure and perfectionistic tendencies that have been identified as important contributors to academic anxiety (Ang & Huan, 2006; Kljajic et al., 2017). The inclusion of measurement invariance testing further strengthens the instrument's methodological rigor and ensures that observed group differences represent

genuine variations in anxiety rather than measurement bias (Leitgöb et al., 2023; Maassen et al., 2024).

The findings have important implications for higher education practice. The SAAS can function as a screening instrument to identify students at risk of clinically significant academic anxiety, enabling early intervention through university counseling services (Valente et al., 2025). Its multidimensional structure allows practitioners to identify specific anxiety sources and implement targeted interventions based on evidence-based treatment approaches (Barlow et al., 2017). Interventions guided by Control-Value Theory that strengthen perceived control and adaptive value appraisals may be particularly effective in reducing anxiety in academic contexts (Pekrun, 2024). Additionally, the SAAS may serve as an outcome measure for evaluating counseling programs and institutional initiatives aimed at improving student well-being (Zhao et al., 2025). The demonstration of measurement invariance across gender and academic disciplines also provides important methodological insights. Gender invariance indicates that male and female students interpret scale items similarly, allowing meaningful comparisons while minimizing response bias (Putnick & Bornstein, 2016; Krohne, 2003). Similarly, invariance across academic disciplines supports the generalizability of the instrument across different academic contexts (Leitgöb et al., 2023).

Several limitations should be noted. The cross-sectional design prevented examination of temporal stability and test-retest reliability. Future studies should therefore employ longitudinal designs to assess stability across academic periods and sensitivity to intervention effects. Additional measurement invariance testing across cultural groups and educational levels is also recommended (Fischer & Karl, 2022). Furthermore, predictive validity should be explored by examining whether SAAS scores predict outcomes such as academic performance, retention, and help-seeking behavior (Awadalla et al., 2024). Cross-cultural validation and translation studies will also be important for expanding the instrument's international applicability (Hernández et al., 2020).

From an applied perspective, the SAAS can support large-scale investigations of academic anxiety prevalence and risk factors in higher education (Bannigan et al., 2025). Research shows that academic workload, assessment pressure, and challenges in balancing academic and personal demands contribute to elevated anxiety among students (Chaturvedi et al., 2021; Ifdil et al., 2025). Digital environments and social media use have also been linked to sleep disturbances, emotional exhaustion, and increased anxiety (Osman, 2025; Azazz, 2025; Bariyyah, Andrianie, et al., 2025). By identifying patterns of academic anxiety across contexts, the SAAS may inform institutional strategies aimed at improving learning environments and supporting student well-being (Hoare et al., 2025). The SAAS represents a theoretically grounded and psychometrically robust contribution to academic anxiety assessment in university populations (Scandurra et al., 2025). Its multidimensional structure, strong validity evidence, and demonstrated measurement invariance provide a valuable tool for research and practice, advancing understanding of academic anxiety and supporting evidence-based interventions for student well-being (Gilmore et al., 2025; Maassen et al., 2024; Zhang et al., 2025; Streram et al., 2025; Zhao et al., 2025).

CONCLUSION

The study went through an intense process to create and validate psychometrically the SAAS. This is a theory-based and multidimensional instrument aimed at capturing the complicated nature of academic anxiety in university students. The single-item structure of factors included anxiety about finishing assignments, attending lectures, and taking examinations which reflected the cognitive, affective, and evaluative dimensions of students' academic experiences. The instrument showed very good internal consistency, high composite reliability, and a clear indication of convergent and discriminant validity, thus, it is a strong

measurement tool. For researchers, the SAAS offers a theoretically integrative framework that advances the empirical understanding of the multidimensional structure, antecedents, and consequences of academic anxiety. For practitioners, it provides a reliable and diagnostically sensitive instrument capable of identifying at-risk students and informing the design of personalized intervention strategies. As institutions of higher education increasingly recognize mental health as central to academic success and institutional sustainability, instruments such as the SAAS are essential for monitoring psychological well-being, evaluating intervention effectiveness, and guiding evidence-based policy development. Future research should extend the validation of the SAAS across diverse cultural and linguistic contexts, examine its predictive validity for academic and psychosocial outcomes, and evaluate its responsiveness to intervention-induced change. Collectively, these directions will consolidate the SAAS as a cornerstone instrument in academic anxiety assessment, facilitating both scholarly advancement and the promotion of mental health resilience in higher education.

AUTHOR CONTRIBUTION STATEMENT

II led the conceptualization and overall design of the study, formulating the theoretical foundation of the SAAS and integrating key insights throughout the introduction, analysis, and discussion. KB directed the methodological and psychometric components, managing the exploratory and confirmatory factor analyses and ensuring the rigor of statistical interpretation. PA coordinated participant recruitment and data collection at Universitas Pattimura while contributing to ethical oversight and result validation. ASP organized the expert review process for content validity, refined theoretical underpinnings, and provided substantial input in the methodological framework. MFZ handled data processing, statistical analysis, and visualization, ensuring analytical robustness and enhancing figure and table presentation quality. YHW managed field coordination and maintained data integrity across institutional sites, supporting analysis interpretation. SM facilitated ethical clearance, institutional collaboration, and manuscript review to align findings with counseling and educational contexts. VKM assisted in data curation, dataset cleaning, and final manuscript formatting. All authors contributed to discussions, provided critical revisions, and approved the final version of the manuscript, demonstrating equal intellectual commitment to the completion of this research.

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