Academic resilience inventory: a psychometric study in Indonesia

Inventario de resiliencia académica: un estudio psicométrico en Indonesia

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Abstract

Introduction: Students with a high level of academic resilience can overcome various obstacles and dangers due to the problems they face in learning. Existing scales have not explicitly identified the academic resilience of senior high school students.
Objective: This study explored the psychometric properties of the academic resilience inventory. The scale consists of five aspects: social skills, problem-solving, self-efficacy, self-awareness, and aspiration goals.
Methodology: This study applied a quantitative approach to analyzing the questionnaire titled "Students' Academic Resilience Inventory" designed to measure students' academic resilience. The research sample consisted of 2093 students, 1018 of whom were male and 1075 of whom were female. This study uses the Confirmatory Factor Analysis (CFA) method to explore the psychometric properties of the Resilience Youth Development Module (RYDM) scale.
Results: Psychometric evaluation using Confirmatory Factor Analysis (CFA) shows that the academic resilience scale has good validity and reliability.
Conclusions: The findings showing good validity and reliability in this academic resilience scale provide a foundation for developing and improving a useful instrument for education.

Keywords

Academic resilience; inventory; online learning; RYDM; students.

Resumen

Introducción: Los estudiantes con un alto nivel de resiliencia académica pueden superar diversos obstáculos y peligros debido a los problemas que enfrentan en el aprendizaje. Las escalas existentes no han identificado explícitamente la resiliencia académica de los estudiantes de secundaria superior.
Objetivo: Este estudio exploró las propiedades psicométricas del inventario de resiliencia académica. La escala consta de cinco aspectos: habilidades sociales, resolución de problemas, autoeficacia, autoconciencia y metas de aspiración.
Metodología: Este estudio aplicó un enfoque cuantitativo para analizar el cuestionario titulado «Inventario de resiliencia académica de los estudiantes», diseñado para medir la resiliencia académica de los estudiantes. La muestra de investigación consistió en 2093 estudiantes, de los cuales 1018 eran hombres y 1075 eran mujeres. Este estudio utiliza el método de análisis factorial confirmatorio (AFC) para explorar las propiedades psicométricas de la escala del Módulo de Desarrollo de la Resiliencia Juvenil (RYDM).
Resultados: La evaluación psicométrica mediante el análisis factorial confirmatorio (CFA) muestra que la escala de resiliencia académica tiene una buena validez y fiabilidad.
Conclusiones: Los resultados que muestran una buena validez y fiabilidad en esta escala de resiliencia académica proporcionan una base para desarrollar y mejorar un instrumento útil para la educación.

Palabras clave

Resiliencia académica; inventario; aprendizaje en línea; RYDM; estudiantes.

Introduction

In online learning, active participation and interactive communication between teachers and students become crucial (Mayar et al., 2023). Nevertheless, not all students can participate enthusiastically in this distance learning. While this format has benefits, such as time flexibility and global access to materials, it also carries significant risks to students' mental and academic well-being. Many students face obstacles in adapting to the online learning format, which can affect their academic outcomes(Lah et al., 2024; Puja et al., 2024). High levels of academic stress are also a serious problem, with as many as 95.2% of students reporting experiencing stress while participating in online learning (Chiu et al., 2021; Hoi et al., 2021; Simatupang & Margaretha, 2023). In addition to stress, many students also face difficulties understanding the material presented online and feel overwhelmed by the assignments given (Elshami et al., 2021). Decreased direct interaction with teachers and classmates can also affect students' learning. The level of depression is also a serious concern, especially among high school students, where as many as 61.3% of the 1,093 respondents admitted to experiencing symptoms of depression (Pierce et al., 2021). These challenges show that implementing online learning is not an easy feat. Therefore, there is a need for practical support and solutions to mitigate the negative impacts of online learning and ensure that students remain engaged, helped, and supported in their educational journey.

To overcome the various challenges, it is essential to have an adaptive capacity to respond to any difficulties (Suyanto et al., 2024; Ziadat & Sakarneh, 2022). In this context, the concept of resilience plays an important role. Resilience refers to an individual's ability to respond, survive, and even thrive in the face of stresses or threats that may jeopardize their physical and psychological well-being (Afdal et al., 2023; Elewa & Khaled, 2019; Rutter, 2012; Wu et al., 2013). In education, the concept of resilience is known as academic resilience. Academic resilience refers to an individual's ability to overcome challenges in an academic context (Bryan, 2005; Haryanto et al., 2024; Ifdil et al., 2023; Syukur et al., 2025). This means individuals can learn effectively, interact well, and maintain optimism toward the future despite being faced with complex and adverse conditions (Andrianie et al., 2025; Ardi et al., 2019; Arifiyanti et al., 2025; Banatao, 2011).

Academic resilience is a concept that includes various aspects that contribute to an individual's ability to overcome challenges in an educational context (Benard, 2004; Ibrahim et al., 2025). These aspects include social skills (Salavera C & Usán P, 2021; Salimi et al., 2021), empathy (Aldrup et al., 2022; Andersen et al., 2020), problem-solving (Sari et al., 2021; Simanjuntak et al., 2021), self-efficacy (Al-Abyadh & Abdel Azeem, 2022; Ifdil et al., 2019), self-awareness (Carden et al., 2022; Demetriou et al., 2020), and aspiration goals (Chen et al., 2023; Davids et al., 2017; Hayford & Glick, 2023; van Egmond et al., 2020). Developing and validating a scale to measure academic resilience is essential in understanding and supporting students' ability to cope with learning challenges.

One tool that can be used to measure academic resilience is the Resilience Youth Development Module (RYDM) scale. This scale was developed to measure general resilience in adolescents (Hanson & Kim, 2007; Nicoll, 2014; Yoon et al., 2021). In the context of this study, our aim was to develop and validate a scale that could measure students' academic resilience at the senior high school level. This involved adapting the resilience indicators contained in the RYDM scale to fit the context and academic challenges faced by students at that level.

This study has significance in providing a more specific and relevant measurement tool to measure high school students' academic resilience. By having a valid and reliable scale, educators and counsellors can better understand the factors that influence students' academic resilience and develop strategies to support the development of such resilience. In addition, this study can also provide deeper insights into the concept of academic resilience in the school context, which can make an essential contribution to the development of educational programs that are more holistic and oriented towards the overall development of students.

Method

Research Design

This study applied a quantitative approach to analyzing the questionnaire titled "Students' Academic Resilience Inventory" designed to measure students' academic resilience. It was adapted from the Resilience Youth Development Module (RYDM) (Hanson & Kim, 2007; Kothari et al., 2021; Ramdani et al., 2020). This questionnaire was developed based on relevant theory, research, and literature (Ifdil et al., 2024; Lai, 2021; Vu & Dinh, 2022). Developing this instrument involved exploring pre-existing constructs in RYDM (Chuecas et al., 2024; Furlong et al., 2009, 2014; Jowkar et al., 2014; Kalaivani, 2021; Nearchou et al., 2014). The result of this process was an instrument component consisting of 14 items from an initial pool of 30 items. The concept of Academic Resilience was then broken down into five main aspects: social skills (SS), problem-solving (PS), self-efficacy (SE), self-awareness (SA), and goal aspiration (AG). Afterward, the instrument was checked and discussed by the research team to ensure that the final version was appropriate for the purpose and context of the study.

This questionnaire uses a 4-point Likert Scale as an answer choice. The range of answer options included "Very Appropriate," "Appropriate," "Inappropriate," and "Very Inappropriate." The results of the development and validation of this instrument indicate that the RYDM is compatible with Indonesian culture. However, minor revisions were required to ensure accuracy and consistency in measuring the constructs of academic resilience. Using this instrument in research significantly benefits measuring students' academic resilience at the high school level. Using an adapted and validated questionnaire, this study provides deeper insights into the factors that contribute to academic resilience and assist educators and counsellors in developing support strategies for students facing learning challenges.

Participants and Data Collection

The academic resilience scale developed in this study was tested on a group of students to produce a significant scale to identify the level of academic resilience. To do this, the questionnaire was piloted on students in senior high school to produce significant results. In Confirmatory Factor Analysis (CFA), the required sample size is usually at least five times larger than the number of observed variables (Hair et al., 2020; Meuleman & Billiet, 2009; Woods, 2006). In this study, 2093 respondents were used for CFA of 14 items in the academic resilience scale, which was considered to have met the established sample size. The respondents in this study came from various high schools and were randomly selected using the simple random sampling method (Alivi & Widihastuti, 2022; Rahman et al., 2022). The characteristics of the respondents involved in this study can be found in Table 1.

Table 1. Respondent Characteristics Data

Category	Frequency	Percentage
Gender:		
Male	1018	48.64
Female	1075	51.36
School Type:		
General	758	36.21
Vocational	1266	60.49
Religion	69	3.30

It is important to note that an adequate sample size in an analysis such as CFA is critical in ensuring the research results' validity and accuracy. By involving an adequate number of respondents, this study provides more representative and reliable results in analyzing the factor structure and understanding the concept of academic resilience in the context of high school students.

Ethics Approval

This study adheres to ethical principles by ensuring participant confidentiality. The participants consented to participate in this study and the publication of the results in accordance with ethical approval. Ethical approval Number: No.62.02/KEPKH-UNP/V/2024 was obtained from Lembaga Penelitian dan Pengabdian Kepada Masyarakat (LPPM) Universitas Negeri Padang, Indonesia

Data analysis

This study uses the Confirmatory Factor Analysis (CFA) method to explore the psychometric properties of the Resilience Youth Development Module (RYDM) scale. The data collection process was conducted with local school counsellors to ensure the procedures aligned with research ethics and guidelines. Prior to data collection, there were discussions with the counsellors regarding the information that should be conveyed to potential respondents. The counsellors clearly explained the purpose of the study to the students. Students' participation in the study was voluntary, and they were allowed to withdraw their participation without facing sanctions or negative consequences. Confidentiality and anonymity of the data were also guaranteed, following ethical research practices (Feldman et al., 2023; Ong & Weiss, 2000). During data collection, several statistical applications were used to support data analysis. Microsoft Excel and IBM SPSS Statistics 24 were used to tabulate the raw data, which is the first step in the analysis process (Sen & Yildirim, 2022). CFA was done using SmartPLS software version 4 (Alsaadi, 2022). SmartPLS is software often used for Structural Equation Modeling (SEM) analysis, including CFA. By using SmartPLS, this study analyzed the factor structure and the relationship between variables in the academic resilience scale.

Results

This study explores the psychometric properties of the developed academic resilience scale. The use of Confirmatory Factor Analysis (CFA) enabled the validity and reliability of the academic resilience scale to be tested. The scale was designed to identify and measure the level of academic resilience in high school students. The academic resilience scale developed in this study has been adapted to fit Indonesia's social and cultural conditions (Hudiyana et al., 2022). This scale consists of five main aspects that cover various dimensions in the context of academic resilience: social skills (SS), problem-solving (PS), self-efficacy (SE), self-awareness (SA), and aspiration goals (AG). By measuring these various aspects, this research seeks to provide deeper insights into the factors that influence students' ability to deal with the challenges of their education and learning environment. The scale is expected to provide a more comprehensive picture of students' academic resilience in Indonesia.

The validity and reliability of a scale is tested by guiding the standard Loading Factor value. Each scale item must have a Loading Factor value greater than 0.7 (Hair et al., 2020; Shrestha, 2021). Furthermore, it is necessary to see the Cross Loading value on all items to see the distinguishability of each scale item. After testing the scale's validity, a scale reliability test was conducted. Reliability testing is used to test the scale's reliability in measuring students' academic resilience. Composite Reliability scores were used to see the reliability of these scales (Dash & Paul, 2021; Ifdil et al., 2024; Raykov & Grayson, 2003), (Perez et al., 2009). The respective Composite Reliability score standard should be more than 0.6 to be reliable in identifying students' academic resilience (Hair et al., 2020; Rukmana & Ismiradewi, 2022). By following this procedure, we ensured that the instrument developed has strong integrity in measuring students' academic resilience. Details of the results of the validity and reliability calculations of the academic resilience scale can be seen in Table 2.

Table 2. Results of Calculation of Validity and Reliability of Academic Resilience Scale of Senior High School Students

Item	Outer Loading	Cronbach's Alpha Value	Composite Reliability
Social Skills (SS)			
SS1	0.815	0.433	0.779
SS2	0.782		
Problem-Solving (PS)			
PS1	0.746	0.682	0.825
PS2	0.833		
PS3	0.765		
Self Efficacy (SE)			
SE1	0.708	0.646	0.809
SE2	0.788		
SE3	0.798		
Self Awareness (SA)			
SA1	0.773	0.711	0.839
SA2	0.832		
SA3	0.783		

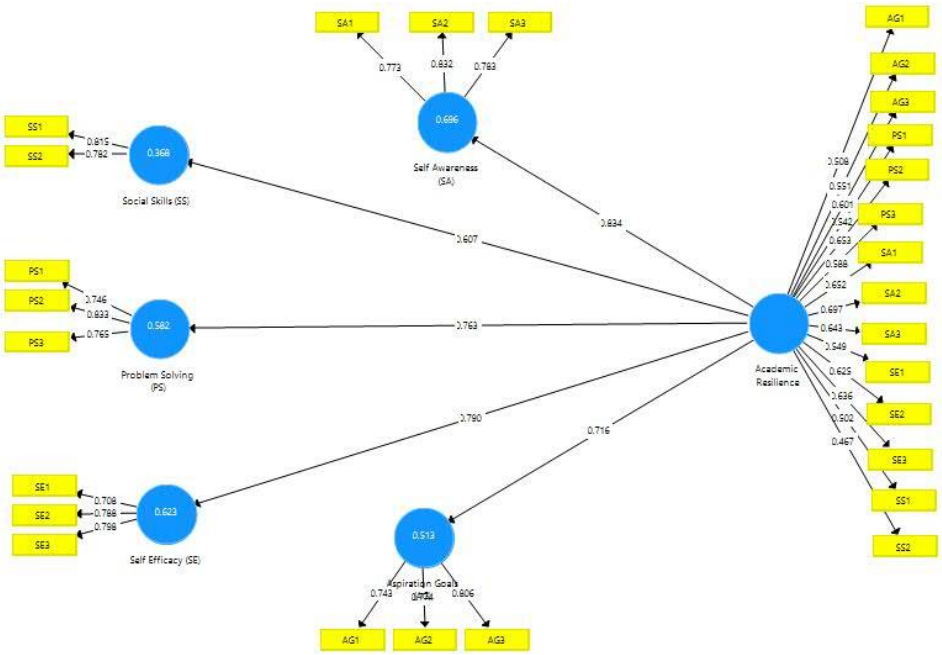
Aspiration Goals (AG)			
AG1	0.743	0.668	0.818
AG2	0.774		
AG3	0.806		

An in-depth analysis of the academic resilience scale's validity and reliability results in Table 2 has provided a clearer understanding of the instrument quality used in this study. The table reveals that all loading factor values on each scale item exceed the 0.7 threshold, which indicates that all questions in this scale effectively and consistently measure the dimensions of academic resilience students possess. In other words, the scale, carefully designed and based on the key aspects of academic resilience, has met the requirements of construct validity.

Furthermore, the table also provides an overview of this scale's reliability level in measuring students' academic resilience. The Composite Reliability values recorded for each sub-variable exceed 0.6, indicating that this scale has an adequate level of reliability. These results illustrate that this academic resilience scale is consistent in identifying and measuring the concept of academic resilience in various situations or times, so it can be relied upon to provide an accurate understanding of students' academic resilience levels.

Following the findings, the evaluation results of this academic resilience scale model are shown in Figure 1, visualizing the analysis results more clearly. Concerning the in-depth analysis and based on the validity and reliability standards followed, the conclusion can be drawn that this scale is a reliable instrument to measure students' academic resilience appropriately.

Figure 1. Structural Model of Academic Resilience Scale



The results of the discriminant validity of the academic resilience instrument through the cross-loading process in Table 3 are an interpretation of the extent to which each item on the scale has a stronger relationship with the factor it is supposed to measure than other factors that should not be related. This helps to ensure that the instrument that has been developed can distinguish the construct being measured from other constructs.

Table 3. Results of Discriminant Validity Calculation of Academic Resilience Instrument (Cross-Loading)

	Aspiration Goals (AG)	Problem Solving (PS)	Self Awareness (SA)	Self Efficacy (SE)	Social Skills (SS)
AG1	0.743	0.220	0.387	0.341	0.178
AG2	0.774	0.239	0.459	0.322	0.243
AG3	0.806	0.308	0.485	0.351	0.275
PS1	0.229	0.746	0.360	0.363	0.300
PS2	0.302	0.833	0.454	0.442	0.384
PS3	0.245	0.765	0.373	0.418	0.396
SA1	0.560	0.317	0.773	0.433	0.257
SA2	0.419	0.461	0.832	0.471	0.325
SA3	0.396	0.434	0.783	0.406	0.285
SE1	0.336	0.335	0.379	0.708	0.251
SE2	0.385	0.370	0.445	0.788	0.308
SE3	0.283	0.489	0.435	0.798	0.329
SS1	0.284	0.348	0.311	0.322	0.815
SS2	0.197	0.393	0.270	0.299	0.782

The confirmatory factor analysis (CFA) conducted not only confirmed the validity and reliability of the scale, but also confirmed the structural clarity of the model. The cross-loading results (Table 3), which implicitly indicate correlations between latent constructs, confirm that the five aspects of Academic Resilience, namely Social Skills, Problem-solving, Self-Efficacy, Self-Awareness, and Aspirational Goals, are statistically distinct and unique dimensions. Clarity in the separation of these constructs is very important because it provides a strong basis for analyzing the relationships or correlations between the variables evaluated. Thus, this instrument can enrich our understanding of how each core variable contributes and interacts with one another in shaping students' overall Academic Resilience.

Discussion

This study focused on exploring the psychometric properties of the academic resilience scale aimed at high school students. The academic resilience scale developed in this study has the main purpose of identifying and understanding the level of academic resilience in adolescent students at the senior high school level. Focusing on adolescents in the context of upper secondary education is important because, at this stage, they face various academic and social challenges that can affect their development. This goal of identifying levels of academic resilience has significant implications for responding holistically to student needs. Adolescents who have low levels of academic resilience are at risk of facing negative impacts on mental well-being and academic achievement (Abubakar et al., 2022; Kothari et al., 2021; Martin, 2013). The developed scale can serve as a tool that can help identify students who may need extra support in facing educational challenges and maintaining their psychological balance. Students who have low levels of resilience are also prone to experiencing increased levels of stress and anxiety, especially about tasks and responsibilities in formal education (Budiono et al., 2025; Furlong et al., 2014; Nicoll, 2014). Increased academic demands at every stage of education today can have a significant impact on students' mental well-being. Exam-related anxiety and academic stress are also detrimental factors for students who do not have adequate resilience to cope with these pressures.

Building academic resilience in students is, therefore, important, given the complexity of academic challenges. Academic resilience helps students cope with stress and challenges that may arise in their educational journey (Kamaruddin et al., 2025). For this reason, it is very crucial to have an instrument that is able to measure academic resilience with high validity and reliability. A valid and reliable academic resilience scale will provide accurate guidance in identifying students needing extra support in dealing with academic stress and demands. This study's results significantly contribute to developing a valid and reliable academic resilience scale specifically for high school students. The findings on the validity and reliability of this scale demonstrate that this instrument is reliable in identifying students' academic resilience. By recognizing students who have low levels of academic resilience, appropriate intervention measures can be taken to provide appropriate guidance and counselling support in the school environment. Thus, this study provides a solid foundation for improving the mental and academic well-being of high school students and supporting their success in education.

Conclusions

The academic resilience scale designed consists of five important indicators: social skills, problem-solving, self-efficacy, self-awareness, and aspiration goals. These indicators comprehensively reflect various aspects of academic resilience relevant to high school students.

The psychometric evaluation process using Confirmatory Factor Analysis (CFA) to test the validity and reliability of the academic resilience scale was a very important step. The evaluation results revealed that the scale has good validity, meaning that it effectively measures the construct of academic resilience according to the predetermined indicators.

In addition to validity, the evaluation results prove that this scale has reliability. In other words, this scale provides consistent and reliable results in identifying the academic resilience of high school students. The reliability of this scale proves that this instrument can accurately measure the level of academic resilience, which can provide valuable guidance in supporting students' development in dealing with academic pressures and challenges. The findings showing good validity and reliability in this academic resilience scale provide a foundation for developing and improving a useful instrument for education.

Next, Our study finding is limited to five aspects of academic resilience and Indonesian culture. Further research can add other aspects according to the cultural context of the respective countries where the research is conducted. The scale we developed consists of five indicators which included social skills, problem-solving, self-efficacy, self-awareness, and aspiration goals. It is a very good step in measuring academic resilience in high school students. These indicators cover various important aspects contributing to students' ability to face educational challenges and respond effectively. A more in-depth study with more than six aspects is important. Expanding the scope of indicators can provide holistic insights into the factors that influence students' academic resilience. By digging deeper, the study can open up opportunities to understand other aspects that may play an important role in developing academic resilience. Through more detailed future research, we can continue improving and developing tools to help students better cope with academic challenges and build their overall well-being.

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