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Rasch Analysis of Instrumen Resiliensi Akademik Siswa (IRAS) for Senior High School Students Based on ARS-30 Framework

Khansa Meradaputhi[1*], Tina Hayati Dahlan[2], Idat Muqodas[3], Reggi Prathama[4]
[1,2,3]Universitas Pendidikan Indonesia, Bandung, Indonesia
[4]Politeknik Negeri Subang, Subang, Indonesia

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ABSTRACT

In recent years, adolescents face increasing academic demands and evaluative pressures that can affect their ability to persevere and adapt positively to learning difficulties. Within this context, the need for accurate measurement of academic resilience has become increasingly important in educational psychology research. This study seeks to evaluate the psychometric quality of an academic resilience instrument developed from the conceptual framework of the Academic Resilience Scale (ARS-30) and adapted to reflect the Indonesian cultural context. The instrument comprises 36 items and was administered to a sample of 100 senior high school students in West Java. Item analysis was carried out using the Rasch model to assess item fit, reliability, person–item separation, response category functioning, and the overall measurement structure. The findings indicate that the majority of items performed adequately in capturing the construct of academic resilience. The instrument demonstrated good internal consistency (Cronbach's alpha = 0.88) and showed an adequate ability to differentiate students' response patterns. In addition, the results of the unidimensionality analysis support the assumption that the instrument consistently measures a single underlying construct. Overall, these findings suggest that the instrument possesses satisfactory measurement properties and is appropriate for assessing academic resilience among senior high school students in Indonesia.

INTRODUCTION

Adolescence is a developmental stage marked by substantial biological, social, and emotional changes that occur alongside increasing academic demands and evaluation pressures (Steinberg, 2018; Sawyer et al., 2018). During this period, high school students are expected not only to achieve academic success but also to adapt to various challenges such as examinations, workload, performance expectations, and social adjustment within the school environment. These conditions make adolescents more vulnerable to academic stress and learning difficulties, highlighting the importance of students' ability to cope with and recover from academic setbacks (Pascoe et al., 2020; Compas et al., 2017).

In educational psychology, this adaptive capacity is commonly referred to as academic resilience. Academic resilience describes students' ability to persist, recover, and maintain positive engagement in learning despite experiencing academic difficulties, pressure, or failure (Martin & Marsh, 2006; Cassidy, 2016). The construct reflects not only persistence in completing academic tasks but also emotional regulation, self-reflection, and adaptive responses when facing obstacles in learning. Previous studies have consistently shown that students with higher academic resilience tend to demonstrate stronger academic engagement, lower academic burnout, and better psychological well-being (Stockinger et al., 2025; Kao, 2024). Conversely, low

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academic resilience is associated with academic anxiety, disengagement, and decreased achievement motivation (Pascoe et al., 2020).

One of the most widely recognized frameworks for measuring academic resilience is the Academic Resilience Scale (ARS-30) developed by Cassidy (2016). The ARS-30 was constructed based on the conceptualization of academic resilience proposed by Martin and Marsh (2006), who defined academic resilience as students' capacity to effectively deal with setbacks, stress, and pressure in academic settings. Building upon this framework, Cassidy operationalized academic resilience into three empirically derived factors: perseverance, reflective and adaptive help-seeking, and negative affect and emotional response. These factors represent cognitive, behavioral, and emotional responses that emerge when students encounter academic adversity, such as poor grades or negative feedback.

Although several other instruments overlap with the measurement of resilience, many of them do not specifically capture resilience within academic contexts. For example, the Academic Buoyancy Scale developed by Martin and Marsh (2008) focuses primarily on students' responses to routine academic challenges rather than more substantial experiences of academic failure. Likewise, general resilience instruments such as the Connor–Davidson Resilience Scale (CD-RISC) and the Resilience Scale for Adolescents (READ) assess psychological resilience more broadly and are not specifically designed to measure learning-related adaptive processes in school settings (Connor & Davidson, 2003; Hjemdal et al., 2006). Consequently, these instruments may be less sensitive in identifying the specific cognitive, emotional, and behavioral characteristics associated with academic resilience among students.

The ARS-30 framework was selected as the conceptual basis for this study for several reasons. First, it explicitly situates resilience within academic experiences, making it highly relevant to the context of high school learning. Second, the framework uses academic failure scenarios that reflect situations commonly encountered by students, allowing respondents to provide contextually meaningful responses. Third, its factor structure has been empirically validated and includes dimensions closely related to perseverance, emotional regulation, self-reflection, and adaptive support-seeking behaviors, all of which are essential components of successful learning adaptation.

Despite its strong conceptual foundation, psychological instruments developed in one cultural setting cannot automatically be assumed to function equivalently in different sociocultural contexts. Educational systems, classroom interaction patterns, social values, and communication styles may influence how students interpret academic difficulties and respond to psychological measurement items (Hambleton et al., 2005; Van de Vijver & Leung, 2011). In Indonesia, educational experiences are strongly shaped by evaluation-oriented practices, hierarchical teacher–student relationships, and collectivistic cultural norms that may influence emotional expression and help-seeking behavior among students (OECD, 2019). Research has also shown that collectivistic cultural values can strengthen the relationship between school climate and students' academic and emotional outcomes (Chan & Lam, 2023). These contextual differences suggest that direct use of the original ARS-30 items may not fully represent the lived experiences of Indonesian high school students.

For this reason, the present study adapted the conceptual framework and dimensions of the ARS-30 while developing a new set of contextually relevant items. All original items were substantially revised to ensure that the instrument reflected the

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language, educational experiences, and psychological meanings relevant to Indonesian high school students. In addition, the number of items was expanded to 36 in order to improve the representativeness of construct indicators and increase measurement sensitivity across varying levels of academic resilience (Boateng et al., 2018).

Another important consideration concerns the psychometric evaluation of the instrument. Previous studies on academic resilience have predominantly relied on Classical Test Theory (CTT), particularly Cronbach's alpha coefficients and item-total correlations. Although useful, CTT approaches have limitations because item characteristics are highly dependent on the sample used and provide limited diagnostic information at the item level (Bond & Fox, 2020; Boone et al., 2020). In contrast, the Rasch Model offers a more robust measurement framework by estimating respondent ability and item difficulty on the same logit scale. The Rasch approach also allows detailed evaluation of item fit, reliability, separation indices, response category functioning, and construct unidimensionality, thereby supporting more objective and comprehensive psychometric assessment (Linacre, 2019).

Based on these considerations, this study aims to examine the psychometric properties of the Student Academic Resilience Instrument (IRAS), a 36-item instrument developed from the conceptual framework of the ARS-30, using the Rasch Model among high school students in West Java, Indonesia. Specifically, the study evaluates item functioning, reliability, separation indices, rating scale performance, and the dimensional structure of the instrument. The findings are expected to contribute to the development of culturally relevant and psychometrically sound instruments for measuring academic resilience in Indonesian educational settings.

RESEARCH METHOD

This study employed a quantitative approach with an instrument development and psychometric analysis design to analyze the measurement quality of the Student Academic Resilience Instrument (IRAS) using the Rasch Model among high school students. The study sample consisted of 100 high school students in West Java who were selected using convenience sampling and served as the pilot sample for the instrument. Participation in this study was entirely voluntary, and no compensation or incentives were provided to participants. The demographic characteristics of the participants are shown in the table below:

	Frequency	%
Gender		
Female	63	63%
Male	37	37%
Grade		
10	44	44%
11	35	35%
12	21	21%
School Type		
Public	46	46%
Private	54	54%
Family Status		
Broken home	26	26%
Intact	74	74%

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The instrument used in this study is the Student Academic Resilience Instrument (IRAS), which was developed by adapting the constructional definition of academic resilience, the factor structure, and the key indicators formulated by Cassidy (2016). Conceptually, academic resilience is defined as a student's ability to persevere, recover, and adapt positively when facing academic failure and pressure. The instrument's factor structure follows the three main dimensions of the ARS-30: perseverance, reflective and adaptive help-seeking, and negative affect and emotional response, each operationalized into behavioral indicators relevant to the educational context and academic experiences of high school students in Indonesia. Each item is rated using a multi-point Likert scale. The psychometric quality of the instrument was analyzed using the Rasch Model, which aligns with the principles of Item Response Theory (IRT), to represent latent constructs through item characteristics, response patterns, and interactions between respondents and items (Bond & Fox, 2015; Linacre, 2019).

Data analysis was conducted using the Rasch Model with the assistance of Winsteps software. The first stage involved item fit analysis to ensure that each item functioned adequately in measuring academic resilience. Next, a Wright map analysis was performed to evaluate the distribution of respondents' ability levels and item difficulty levels on a single logit scale. Rating scale analysis was used to assess the functionality of response categories based on Andrich thresholds. Additionally, Differential Item Functioning (DIF) analysis was conducted to identify potential item bias across respondent groups. Further analysis included an evaluation of person fit, reliability, and person-item separation, as well as a test of unidimensionality via principal component analysis of residuals to ensure the internal consistency and measurement structure of the instrument.

RESULTS AND DISCUSSION

Item

Item Fit

Item fit, or Item Fit Order in the Rasch Model, refers to the degree of fit of an item, which is used to determine whether the item functions normally for measurement purposes (Sumintono and Widhiarso, 2015:71). The criteria used to examine the fit of outlier (non-conforming) or misfit test items, based on Boone's criteria (2014:164), are the MNSQ Outfit value, the accepted ZTSD Outfit value, and the accepted Point Correlation value. If an item is found to have MNSQ and Pt Measure Corr values that do not meet the criteria but the ZSTD value meets the criteria, then that item is still acceptable and considered a good fit, meaning the item can be retained without modification.

Items that fit or misfit can be identified by examining the INFIT MNSQ values for each item, then calculating the mean and standard deviation, and subsequently comparing these values to the logit values (Sumintono and Widhiarso, 2014:115). A logit value greater than this threshold indicates a misfit item or outlier. Based on Figure 4, the logit sum of item 36 from the mean and standard deviation is 1.00 + 0.27 = +1.27; therefore, based on this criterion, there are 6 items with higher INFIT MNSQ values, namely items 34, 24, 8, 26, 10, and 13. The results of the Rasch Model analysis of the student academic resilience instrument are presented in the following figure:

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Item	Infit MNSQ	OUTFIT MNSQ	OUTFIT ZSTD	Pt-Measure Corr
1	.80	.82	-1.2	.45
2	1.07	.99	.0	.50
3	.93	.93	-.04	.43
4	.84	.84	-1.1	.48
5	1.07	.99	.0	.50
6	.81	.74	-1.6	.49
7	.75	.72	-1.9	.57
8	1.40	1.62	4.3	.24
9	.99	1.02	.2	.48
10	1.49	1.42	2.6	.39
11	.75	.70	-2.2	.64
12	.63	.62	-3.0	.62
13	1.33	1.42	2.9	.41
14	.86	.85	-1.0	.46
15	.60	.64	-2.7	.60
16	1.07	.91	-.5	.55
17	.83	.85	-1.0	.53
18	.88	.93	-.4	.55
19	1.26	1.17	1.1	.44
20	1.09	1.08	.6	.47
21	1.15	1.07	.5	.42
22	1.12	1.14	1.0	.45
23	.66	.66	-2.5	.53
24	1.49	1.68	4.0	.18
25	.94	.92	-.5	.38
26	1.34	1.57	4.0	.27
27	.76	.67	-2.1	.58
28	1.03	.98	-.1	.58
29	.51	.50	-4.0	.65
30	.88	1.28	1.9	.11
31	.65	.64	-2.8	.57
32	1.15	1.02	.2	.42
33	1.17	1.07	.5	.44
34	1.58	2.23	6.9	-.28
35	.78	.81	-1.3	.44
36	1.22	1.26	1.8	.44

Item Map

Item maps and person maps are features of Rasch modeling that can be used to assess an instrument's ability to accommodate the diverse competencies of the respondents being measured (Widhiarso, 2016:50). The maps provided by the Rasch Model present two types of information: the distribution of items based on difficulty level and the distribution of individuals based on their measured ability levels. More specifically, the item map shows the difficulty level trends of the items in the instrument, as well as the most difficult and easiest items; in non-cognitive tests, this refers to the ease or difficulty level as perceived by the respondents

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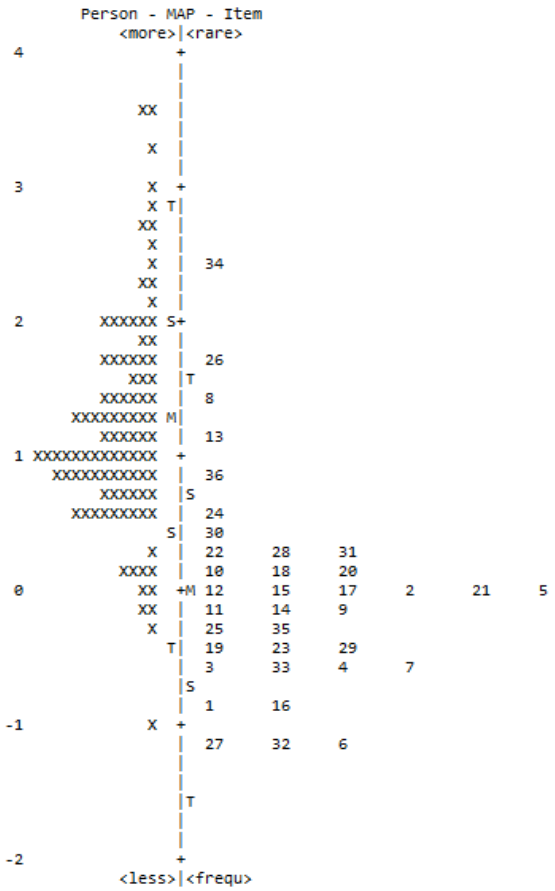

Based on the results of the Wright item map analysis, the distribution of item difficulty levels indicates that most items fall within a range appropriate to the respondents' abilities; thus, the instrument generally functions well in measuring the construct of academic resilience. Although there are some variations in difficulty levels between items, most items still meet the criteria for Rasch model fit, indicating that these items are able to consistently represent the construct being measured (Bond & Fox, 2015; Linacre, 2019). These findings support the assumption that the developed academic resilience instrument possesses adequate measurement quality at the item level.

Item mapping results indicate that items 27, 32, and 6 are the items most easily agreed upon by respondents. This indicates that the behaviors or attitudes represented by these items are relatively common and reflect aspects of academic resilience that are already well-developed among high school students, such as basic perseverance and the ability to maintain academic engagement in challenging situations (Cassidy, 2016). Conversely, statement item number 34 emerged as the item most difficult for respondents to agree with, indicating that this item measures aspects of resilience that require more complex emotional regulation and adaptation capacities—aspects that tend to be more challenging for respondents (Herdiansyah & Fauziah, 2024). This finding is consistent with the literature indicating that emotional responses and social support are key factors influencing variations in academic resilience among students (Nuha, 2024).

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Rating Scale

Rating scale analysis examines whether respondents understand the rating scale or not (Sumintono & Widhiarso, 2014). This test analyzes the fit between the items and the rating scale used, thereby providing a logit score that measures the respondents' level of understanding of the given scale. The results of the rating scale test are presented in the following table based on the observed average and the Andrich Threshold.

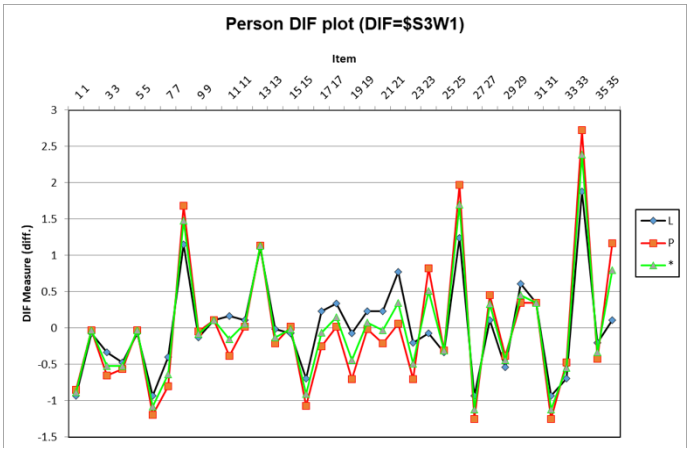
Category	Observed Count	Observed Average	Outfit MnSq	Andrich Threshold
1	162	-.17	1.46	None
2	464	.16	.89	-1.18
3	1646	1.08	.77	-.53
4	1328	1.94	2.09	1.70

Based on the results of the ordinal scale test using Rasch modeling analysis, the observed average scores on the student academic resilience instrument showed a sequential increase in scale values, with logit values ranging from -0.17 to 1.94. These scale test results indicate that respondents were able to distinguish between the different response options. Another measure, the Andrich Threshold, showed a sequential increase from NONE to 1.70, indicating that the response scale of this student academic resilience instrument is valid and suitable for use with respondents.

Item Bias

Detecting bias in an instrument is crucial because it helps determine whether the items presented to respondents contain bias toward specific respondent categories, such as gender or other demographic factors (Sumintono and Widhiarso, 2014:124). To determine whether items contain gender bias, the DIF feature with the specification $SxWx is used. To identify statement item bias based on gender, one can examine the probability value. If the probability value is less than 0.05 or 5%, it can be confirmed that the statement item is gender-biased, meaning that men and women tend to provide different responses (Sumintono and Widhiarso, 2014:125).

Person Classes	Prob.	Mean-Square	Item
2	0.0199	2.6893	22
2	0.0044	4.0859	24
2	.0088	3.4231	26
2	.0035	4.2874	34
2	0.0006	6.0569	36



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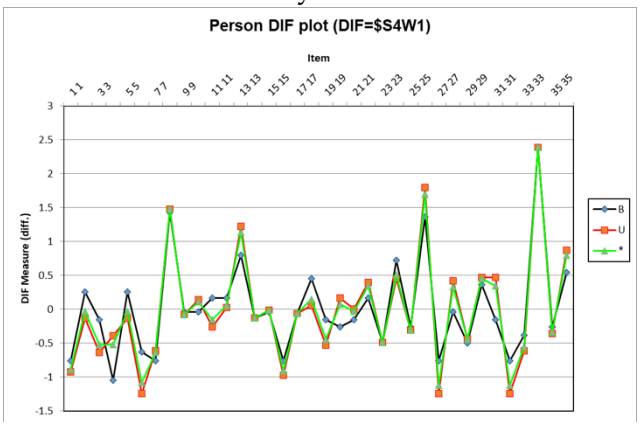
Based on the results of the DIF analysis, it was found that items 22, 24, 26, 34, and 36 had probability values below 0.05. These findings indicate that these items contain gender bias, resulting in systematic differences in the responses of male and female students at relatively similar levels of academic resilience. Such differences in item functioning may reflect variations in academic experiences, emotional regulation styles, and coping strategies influenced by gender-specific developmental and sociocultural characteristics (Boone et al., 2020; Van de Vijver & Leung, 2011).

Based on the DIF graph, response differences primarily emerged in the dimensions of Reflection and Adaptive Help-Seeking as well as Negative Affect and Emotional Response. On items 22 ("I seek support when my motivation to study declines") and 24 ("I study more diligently after receiving a poor grade on an exam"), there are differences in response tendencies between male and female students regarding reflecting on academic failure and adopting adaptive strategies. The literature indicates that females tend to be more open to self-reflection and seeking social support in academic contexts, whereas males more frequently rely on internal coping strategies or problem-focused approaches without explicitly involving external help (Pascoe et al., 2020).

Meanwhile, for items 26 ("I easily panic when faced with difficult tasks") and 36 ("I have trouble calming myself down when facing academic pressure"), the differences in responses were more pronounced in the area of negative emotion regulation. These findings align with research showing that adolescent girls generally report higher intensity of negative emotions and greater sensitivity to academic stress compared to boys, whereas boys tend to express stress externally or through avoidant behavior (Compas et al., 2017; Sawyer et al., 2018). These differences in emotional regulation patterns have the potential to influence how students interpret and respond to items related to anxiety, panic, and academic pressure.

Conceptually, differences in item functioning based on gender do not necessarily indicate a weakness in the academic resilience construct, but rather underscore that the expression and manifestation of resilience can be influenced by developmental and social factors. Therefore, the presence of DIF bias in items 22, 24, 26, 34, and 36 highlights the need for further evaluation of the wording and context of these items. Item revisions or adjustments can be made to ensure that the developed academic resilience instrument functions equitably and fairly for both male and female students, without losing the representativeness of the construct dimensions being measured (Boateng et al., 2018; Boone et al., 2020). Furthermore, the table below shows that there are no items that are biased based on family circumstances.



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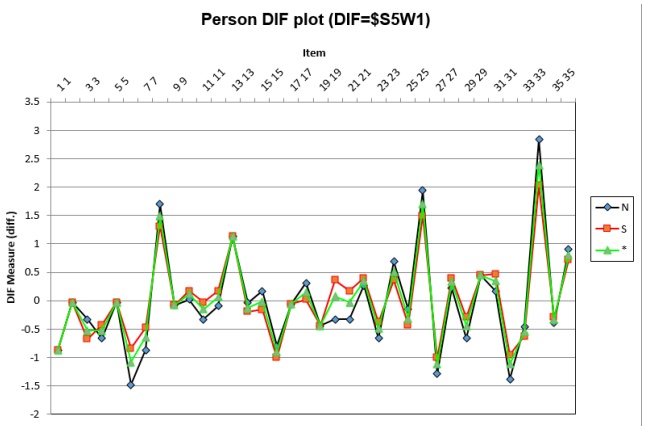
Based on the graph, it was found that all items had a significance level above 0.05 or 5%. This means that none of the items were biased based on the respondents' family status demographics. Thus, differences in perception between respondents from intact families and those from broken homes do not influence responses to each statement item; therefore, this instrument can be considered free of bias and possesses good measurement quality regarding family status.

These results reinforce the instrument's internal validity, particularly in the context of use among populations with diverse family status backgrounds. The instrument can be considered fair and free of bias based on family status, making it suitable for comparing groups of respondents from intact families and broken homes without the risk of measurement distortion. These findings align with the principle of cross-group measurement invariance, which asserts that a high-quality instrument must demonstrate item equivalence across different demographic groups (AERA et al., 2018; Tennant & Küçükdeveci, 2023).

Additionally, the table below shows that item no. 20, "I seek support from those closest to me when facing learning difficulties," from the "Reflecting and Adaptive Help-Seeking" factor, and item no. 34, "I need extra encouragement to stay focused on my studies when facing obstacles," from the "Negative Affect and Emotional Response" factor, indicate a bias toward school status (public/private). The specification used is $S5W1, which groups respondents based on school status (Public/Private) in the 5th column and for a single column only (W1, where the column width is one). The results of the instrument bias detection analysis based on school status are presented in Figure 7 as follows:

Person Classes	Prob.	Mean-Square	Item
2	0.0293	2.4210	20
2	0.0042	4.3554	34



The bias on item number 20 indicates a difference in students' perceptions regarding their tendency to seek social support when facing learning difficulties. This difference may be influenced by variations in classroom learning conditions, including differing opportunities for teacher-student interaction across schools. Research shows that teacher-student interactions are more intense in smaller classes, where teachers have more frequent opportunities to provide individual support to students, thereby creating a learning environment more conducive to students actively seeking academic help (Kalmuratova, 2025).

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Meanwhile, the bias on item 34 indicates that the need for additional encouragement to maintain focus on learning is perceived differently by students based on school status. Findings from the meta-analysis indicate that teacher support has a strong association with students' academic emotions, including their ability to cope with stress and manage emotional responses in learning contexts (Lei, Cui & Chiu, 2018). This underscores that variations in social support systems and school climate can influence how students experience and respond to obstacles in the learning process.

Although only two items were identified as having bias based on school status, these findings are important as a basis for further evaluation of the instrument's quality. In the development of Rasch Model-based instruments, the identification of items with differential item functioning (DIF) allows researchers to consider revising, separating the interpretation of, or controlling the use of those items so that the instrument continues to meet the principles of equity and cross-group measurement invariance (OECD, 2025; Tennant & Küçükdeveci, 2023).

Person

Item Fit

Items that fit or misfit can be identified by examining the INFIT and MNSQ values for each item, then calculating the mean and standard deviation, and subsequently comparing these values to the logit (Sumintono and Widhiarso, 2014:115). A logit value greater than this threshold indicates a misfit item or outlier. Based on Figure 4, the sum of the logit values of the items from the mean and standard deviation is 1.00 + 0.27 = +1.27; therefore, based on this criterion, there are 6 items with higher INFIT MNSQ values, namely items 34, 24, 8, 26, 10, and 13.

Person	INFIT MnSq	Outfit MnSq	Outfit Zstd	Pt. Measure Corr.
18LU	4.55	7.24	9.9	-.50
28LU	2.87	1.76	1.5	.45
98LB	2.20	2.15	3.8	.35
78PU	2.15	1.34	1.2	.73
38PU	1.98	1.75	2.7	.59
68PB	1.87	1.63	2.2	.51
20LU	1.86	1.81	2.8	.50
22LU	1.79	1.74	2.7	.29
90LB	1.75	1.72	2.6	.17
86PU	1.71	1.58	2.2	.69
19PU	1.63	1.70	2.6	.33
03PU	1.68	1.70	2.6	.51
46PU	1.66	1.61	2.3	.52
99LU	1.66	1.58	2.2	.49
64PU	1.59	1.46	1.8	.57
04PB	1.53	1.17	.6	.51
13PU	1.50	.72	-.5	.64
17PU	1.48	1.39	1.5	.75
08PU	1.45	1.18	.8	.73
76PU	1.44	1.35	1.4	.29
75PU	1.42	1.10	.5	.73
44PU	1.40	1.37	1.5	-.07
73PU	1.25	1.40	1.6	.36
#0LB	1.39	1.11	.5	.55
60PU	1.39	.98	.0	.76
69PB	1.36	1.26	1.1	.12

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Person	INFIT MnSq	Outfit MnSq	Outfit Zstd	Pt. Measure Corr.
88PB	1.35	1.16	.6	.53
16LU	1.31	1.34	1.4	.51
55PB	1.30	1.26	1.1	.35
37PU	1.28	.93	-.1	.60
43PU	1.27	1.22	.9	.21
01PU	1.26	1.17	.8	.49
27PU	1.22	1.21	.9	.21
35PB	1.22	1.04	.2	.72
74LU	1.21	1.09	.4	.50
21LU	.83	.79	-.9	.27
58PU	.82	.75	-1.0	.59
05PU	.80	.74	-1.1	.08
96LB	.78	.79	-.9	.47
72PU	.75	.75	-1.1	.64
34LU	.74	.68	-1.5	.34
54PU	.73	.73	-1.2	.62
95PU	.71	.72	-1.3	.34
85PU	.68	.71	-1.3	.62
14PU	.71	.70	-1.4	.73
32LU	.70	.66	-1.6	.45
93LB	.68	.70	-1.4	.56
49LB	.65	.70	-1.4	.56
15PU	.68	.69	-1.4	.36
80PU	.67	.68	-1.5	.71
50PU	.67	.64	-1.7	.79
25PU	.61	.65	-1.7	.52
77PU	.64	.65	-1.6	.61
92PU	.64	.65	-1.6	.62
02PB	.63	.64	-1.7	.68
70LU	.63	.62	-1.8	.43
42LU	.60	.61	-1.9	.80
36PU	.55	.59	-2.0	.70
56LU	.52	.55	-2.2	.47
30LU	.51	.50	-2.5	.34
81LB	.51	.48	-2.7	.57
06PU	.49	.51	-2.5	.73
48LB	.45	.48	-2.7	.41
62LU	.46	.45	-2.9	.46
61LB	.42	.44	-3.0	.45
63PU	.40	.41	-3.2	.41
26LU	.38	.41	-3.3	.74
66PU	.39	.40	-3.2	.59
07LB	.37	.36	-3.6	.56
24PB	.33	.36	-3.7	.57
57PU	.35	.36	-3.6	.53
41PU	.34	.36	-3.6	.55
45PU	.23	.25	-4.6	.74
82PU	.21	.21	-5.0	.67
Mean	1.22			
S.D	0.80			

When a respondent is identified as a misfit, this indicates that their response pattern differs from that of most other respondents, particularly in their ability to distinguish between the difficulty levels of individual items (Walker & Wind, 2020). Nevertheless,

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since the majority of respondents exhibit response patterns that are consistent with the model, this academic resilience instrument can still be considered effective in measuring the construct of academic resilience among students.

Person Map

Item maps and person maps are features within Rasch modeling that can be used to assess an instrument's ability to accommodate the diverse competencies of the respondents being measured (Widhiarso, 2016:50). The maps provided by the Rasch Model present two types of information: the distribution of items based on difficulty level and the distribution of individuals based on their measured ability levels. More specifically, the item map shows the difficulty level trends of the items in the instrument, as well as the most difficult and easiest items. In a non-cognitive test, the level of ease or difficulty refers to the extent to which respondents agree with the items. Based on the data below, it can be explained that respondents with code 18LUS were the most reluctant to agree with the items. Meanwhile, respondents with codes 13PUN and 28LUS were the most likely to agree with the items.

```
Item - MAP - Person
  <rare>|<more>
4         +
          |
          |
          |  13PUN  28LUS
          |
          |  74LUS
          |
3         +  37PUN
          |T 04PBN
          |  71PUS  78PUN
          |  88PBN
        X |  60PUN
          |  40LBN  75PUS
          |  68PBN
2         +S 01PUN  08PUS  35PBN  38PUN  58PUS  65LUS
          |  36PUN  90LBN
        X |  09PUS  31LUS  50PUN  73PUS  76PUN  97LUS
          T|  16LUN  22LUS  44PUN
        X |  21LUS  26LUS  27PUS  55PBS  72PUS  77PUN
          |M 02PBS  06PUN  12PUN  14PUS  42LUN  54PUS  79PUN  84LUN  86PUN
        X |  03PUN  48LBS  52PUS  67LUN  91PUN  96LBS
1         +  10PUN  11LBN  32LUS  41PUN  46PUS  47LUS  53PUN  56LUS  63PUS
             80PUS  89PBN  93LBN  95PUN
        X |  15PUS  17PUS  33LUS  34LUS  43PUS  49LBS  62LUS  64PUS  70LUS
             81LBN  87PUN
          S|  20LUS  30LUS  39PUN  66PUN  69PBS  85PUN
        X |  05PUN  07LBN  23PUS  45PUS  51PBN  82PUS  92PUN  94LUN  98LBS
        X |S
      XXX |  19PUN
      XXX |  40PUN  57PUS  61LBS  99LUS
0  XXXXXX M+  25PUS  29LBS
      XXX |  24PBS  59PUS
       XX |  83LUS
      XXX |T
     XXXX |
          S|
       XX |
-1        +  18LUS
      XXX |
          |
          |
          T|
          |
          |
-2        +
    <frequ>|<less>
```

These differences do not merely reflect variations in individual responses; rather, they may reflect differences in how students interpret their school environment. Various factors, such as family background, social values, and the dynamics developing within the school, have the potential to influence students' differing perceptions of the learning environment they experience (Yang et al., 2013; Bradshaw et al., 2021).

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Instruments

Reliability and Unidimensionality

Reliability	Mean of Logit (SD)	Separation	Relianility	α
Person	1.22	2.43	.86	.88
Item	0.00	4.52	.95	

Based table, the Cronbach's Alpha value is 0.88, indicating that the overall interaction between respondents and items is in the "very good" category; thus, the instrument can be said to have high reliability. The person reliability value of 0.86 indicates that the consistency of respondents' answers falls into the good category. Meanwhile, the item reliability of 0.95 falls into the excellent category, indicating that the quality of the items in the instrument is very good and capable of consistently maintaining the hierarchy of item difficulty levels when the instrument is used on comparable samples (Bond & Fox, 2015; Boone et al., 2020).

In addition, the separation value indicates the instrument's ability to group respondents and items based on response tendency and item difficulty. The higher the separation value, the better the instrument's ability to distinguish between respondent groups and item groups (Sumintono & Widhiarso, 2014). This grouping is determined using the strata (H) formula as follows:

$$H=\{(4xSEPARATION)+1\}/3$$
$$H\ person=\{(4x2.44)+1\}/3=3.586=4$$
$$H\ item=\{(4x4.52)+1\}/3=6.36=6$$

Based on the calculation results, the person H value was found to be 4 and the item H value was 6. A person H value of 4 indicates that respondents can be grouped into four levels of response tendency, ranging from those who find it most difficult to agree with the statements to those who find it easiest to agree. This suggests that the instrument clearly identifies variations in students' academic resilience levels.

Meanwhile, the H-item value of 6 indicates that the 36 items in the instrument can be grouped into six levels of difficulty, ranging from the items that are most difficult for respondents to agree with to those that are easiest to agree with. Thus, the instrument possesses adequate variation in item difficulty levels, enabling it to distinguish respondents' responses more accurately and supporting the quality of the resulting academic resilience measurements.

Unidimensionalitas

Standardized Residual Variance	Eigen Value	Variance Unecplained (%)
Total raw variance in observations	55.1	100%
Raw variance explained by measures	19.1	34.6%
Raw unexplained variance (total)	36.0	65.4%

The results of the unidimensionality test indicate that the academic resilience instrument developed explains 34.6% of the raw variance, while the unexplained variance in each contrast is below 15%. An instrument can be considered unidimensional if the raw variance explained by the measurement exceeds 20% and the unexplained variance is below 15% (Sumintono & Widhiarso, 2015). Based on these criteria, the analysis results indicate that the academic resilience instrument meets the assumption of unidimensionality.

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This finding indicates that the instrument is capable of accurately and specifically measuring the construct of academic resilience, despite encompassing several interrelated dimensions—namely perseverance, reflective and adaptive help-seeking, and negative affect and emotional response—as formulated by Cassidy (2016). Furthermore, the raw variance explained by the measurement exceeding the ideal threshold—that is, more than 37%—further reinforces that this instrument is effectively capable of representing the construct of high school students' academic resilience within a single coherent measurement dimension.

CONCLUSION

Fundamental Findings: This study indicates that the Academic Resilience Instrument (IRAS), developed based on the conceptual framework of the Academic Resilience Scale (ARS-30), demonstrates good psychometric qualities. The instrument demonstrates adequate item and respondent reliability, a well-functioning response scale structure, and meets the assumption of unidimensionality, indicating that it can consistently and accurately measure academic resilience among high school students in the Indonesian educational context. **Implications:** The findings suggest that the IRAS can be used as a valid and reliable instrument to assess students' academic resilience and can support educators and researchers in identifying students' adaptive responses to academic challenges. This study also emphasizes the importance of cultural adaptation of psychological instruments in local educational contexts. **Limitations**: This study is limited by the relatively small number of respondents (N = 100), as the sample was primarily intended for instrument testing. Therefore, the findings may not be fully representative of the broader student population. **Future Research:** Future studies are recommended to involve larger and more diverse samples, as well as conduct cross-group validity testing based on demographic characteristics such as gender or grade level to strengthen the instrument's generalizability.

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*Khansa Meradaputhi**
Educational Psychology, School of Postgraduate Studies
Department of Technology Education Faculty of Science and Technology,
Universitas Pendidikan Indonesia,
Jl. Dr. Setiabudi No. 229 Bandung, Indonesia
Email: khansamerada@upi.edu

Tina Hayati Dahlan
Educational Psychology, School of Postgraduate Studies
Department of Technology Education Faculty of Science and Technology,
Universitas Pendidikan Indonesia,
Jl. Dr. Setiabudi No. 229 Bandung, Indonesia
Email: tinadahlan_psi@upi.edu

Idat Muqodas
Educational Psychology, School of Postgraduate Studies
Department of Technology Education Faculty of Science and Technology,
Universitas Pendidikan Indonesia,
Jl. Dr. Setiabudi No. 229 Bandung, Indonesia
Email: idatmuqodas@upi.edu

Reggi Prathama
Program DIII Keperawatan, Mental Health Nursing Department,
Politeknik Negeri Subang
Jl. Brigjen Katamso No. 37, Dangdeur, Kec. Subang, Kabupaten Subang, West Java.
Email: reggi.prathama@polsub.ac.id