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Factor Structure and Validation of the Academic Self-Regulation Scale among Iranian Students: A Descriptive Study

Elahe Jafari[1], Nooshin Taghinejad[2]✉, Azita Amirfakhraei[3]

1. PhD Student, Department of Psychology, BA.C., Islamic Azad University, Bandar Abbas, Iran
2. Assistant professor, Department of Psychology, BA.C., Islamic Azad University, Bandar Abbas, Iran, noshin.taghinejad@iau.ac.ir
3. Associate Professor, Department of Psychology, BA.C., Islamic Azad University, Bandar Abbas, Iran

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ABSTRACT

Objective: To translate, culturally adapt, and psychometrically evaluate the Adolescent Self-Regulation Scale (ASRS) among university students in Bandar Abbas during the 2024–2025 academic year.

Methods: A descriptive cross-sectional psychometric study was conducted across five universities using stratified random sampling, with 1,181 students participating. The ASRS was translated and culturally adapted using a forward–backward method. Content validity was assessed through item-level Content Validity Ratio (CVR) and Content Validity Index (CVI). Concurrent validity was examined via Pearson's correlation with the Gómez Self-Regulation Questionnaire. Construct validity was evaluated using the Kaiser–Meyer–Olkin index, Bartlett's test of sphericity, exploratory factor analysis (principal component analysis with Varimax rotation), and confirmatory factor analysis (CFA) in LISREL. Reliability was examined using Cronbach's alpha, split-half analysis, and Guttman's Lambda coefficients.

Results: CVR and CVI values for the 30 items ranged from 0.83 to 0.96, indicating strong content validity. Pearson's correlation between the ASRS and the Gómez questionnaire was $r = 0.81$ ($p < 0.001$), supporting concurrent validity. Exploratory factor analysis identified five factors explaining 72.01% of total variance. CFA demonstrated acceptable fit indices, confirming the five-factor model. Internal consistency was high, with overall Cronbach's alpha of 0.918 and subscale alphas ranging from 0.820 to 0.933. Split-half reliability showed $\alpha = 0.906$ (first half) and 0.869 (second half), while Spearman–Brown and Guttman's Lambda coefficients ranged from 0.675 to 0.960.

Conclusions: The ASRS demonstrates strong validity and reliability among Bandar Abbas university students and is appropriate for assessing self-regulation in this population. Further longitudinal and cross-cultural studies using complementary assessment methods are recommended to enhance generalizability and reduce self-report bias.

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Introduction

Self-regulation, as one of the key components of effective learning, refers to an individual's ability to plan, monitor, control, and evaluate their own learning processes (Mammadov & Schroeder, 2023). This skill encompasses a set of cognitive, metacognitive, motivational, and behavioral processes that enable learners to effectively pursue and achieve their academic goals (Brenner, 2022). Scholars, including Zimmerman (1998), have identified self-regulation as a determinant of academic success, emphasizing its role in facilitating active engagement in the learning process through the purposeful use of learning strategies (Abavisani et al., 2024).

A substantial body of research supports the positive association between self-regulation and improved academic performance, increased resilience, enhanced mental health, and better emotional regulation (Larasati et al., 2025). For instance, studies have shown that students with stronger self-regulation skills demonstrate greater adaptability when facing academic and personal challenges and tend to achieve higher levels of academic success (Distefano et al., 2021; Nakhostin-Khayyat et al., 2024). These skills are also linked to higher levels of intrinsic motivation, improved stress management, and greater academic self-efficacy (Abavisani et al., 2024).

Given the critical role of self-regulation in the learning process, accurate assessment of this construct is essential for both educational interventions and research purposes. Numerous instruments have been developed to measure self-regulation; however, some have been criticized for issues such as excessive length, unclear factor structures, or limited cultural relevance across diverse educational contexts (Abavisani et al., 2024). Among these instruments, the *Academic Self-Regulation Scale* developed by Akhtar and Mahmood (2013) is considered a valid tool, offering a comprehensive assessment of self-regulation in students across five key components: planning, monitoring, self-instruction, self-evaluation, and self-reaction. This scale has been widely used in international studies and demonstrates acceptable psychometric properties, including reliability (Cronbach's alpha = 0.83) (Akhtar & Mahmood, 2013).

In recent years, efforts have been made in Iran to localize and examine the psychometric properties of self-regulation measures; however, most of these studies have focused on specific groups such as school students or teachers (Mohsenizadeh et al., 2019). Despite the widespread international use of the Academic Self-Regulation Scale (Akhtar & Mahmood, 2013; Cheung et al., 2024;

Ferreira et al., 2020; Yan, 2025), limited research has assessed its validity and factor structure among Iranian university students, particularly in diverse regions such as Bandar Abbas. This gap highlights an important area in need of systematic investigation.

In the digital era—where self-directed learning and self-regulation skills play an increasingly prominent role in academic success—the availability of culturally valid and reliable assessment tools is of particular importance (Soleimani & Sanjari, 2016). Findings from such assessments can inform the development of effective educational interventions, curriculum planning, and targeted educational policies (Mohamadi Soliemani et al., 2017). Therefore, the present study aims to validate the Academic Self-Regulation Scale among university students in Bandar Abbas, thereby facilitating its use within the Iranian cultural-educational context and contributing to the advancement of indigenous research in the field of educational psychology.

Material and Methods

This descriptive cross-sectional study with a psychometric approach was conducted to examine the factor structure and validity of the Academic Self-Regulation Scale among university students in Bandar Abbas during the 2023–2024 academic year. To obtain a representative sample, stratified random sampling was employed. Participating universities included: the University of Hormozgan, Hormozgan University of Medical Sciences, Islamic Azad University of Bandar Abbas, Payame Noor University of Bandar Abbas, and Razavi Non-Governmental Higher Education Institute.

Sample sizes for each phase of the psychometric analysis were determined based on well-established scientific recommendations: 200 participants for concurrent validity (exceeding the minimum of 100), 550 for exploratory factor analysis (20 times the number of items), 300 for confirmatory factor analysis (within the recommended range of 200–1000), and 200 for reliability assessment (above the minimum requirement of 40). In total, more than 1,250 students participated to ensure robust validation of the instrument (Sanjari et al., 2023).

Each university's student population was treated as a separate stratum. The required sample size for each stratum was calculated using the formula: $n_h = (N_h \times n) / N$,

where n_h is the number of participants needed from each university, N_h is the total student population of that university, n is the total sample size, and N is the overall student population

(Aliakbari Borovati et al., 2025). Participants were then selected randomly using student ID codes and Microsoft Excel. Recruitment was conducted in coordination with academic administrators, and students were fully informed about the study's goals, procedures, and data confidentiality. Participation was voluntary and based on informed consent.

Ethical Considerations

This study received ethical approval from the Ethics Committee of Islamic Azad University, Bandar Abbas Branch (Code: IR.IAU.BA.REC.1403.006) on June 15, 2024. Official permission was obtained from all participating universities. Before completing the questionnaire, participants electronically signed an informed consent form and received detailed information regarding the study's objectives and procedures (Torabi et al., 2022). All data were stored and analyzed anonymously and confidentially.

Inclusion and Exclusion Criteria

Participation was limited to students enrolled in the aforementioned universities who were willing to take part. The only exclusion criterion was incomplete questionnaire data.

Instruments

Academic Self-Regulation Scale (Akhtar & Mahmood, 2013): The primary instrument was the Academic Self-Regulation Scale developed and validated by Akhtar and Mahmood (2013). The scale consists of 30 items across five dimensions: personal planning, self-monitoring, self-instruction, self-evaluation, and self-reaction. Items are rated on a five-point Likert scale ranging from *strongly disagree* to *strongly agree*. Each item receives a score from 1 to 5, yielding a total score range of 30 to 150. Higher scores indicate greater use of self-regulation strategies in academic settings. Exploratory factor analysis previously confirmed the five-factor structure, explaining 43.94% of total variance, and the scale demonstrated acceptable reliability with a Cronbach's alpha of 0.83. Designed for university contexts, it is easy to administer and suitable for classroom use (Akhtar & Mahmood, 2013). The scale was translated into Persian and culturally adapted for use in this study.

Translation and Cultural Adaptation

The translation process followed the standard forward–backward translation method. First, two bilingual translators independently translated the original questionnaire into Persian. Then, two additional translators—unaware of the original version—back-translated the Persian text into

English. The final version was reviewed and compared with the original to ensure linguistic accuracy and cultural appropriateness (Monazah et al., 2024).

Gomes et al. Self-Regulation Questionnaire: This 16-item questionnaire developed by Gomes et al. (2019) includes four dimensions: external (items 1–4), identified (items 5–8), introjected (items 9–12), and intrinsic (items 13–16). Responses are scored on a five-point scale ranging from 0 (never) to 4 (always). Reported reliability indices include Cronbach's alpha of 0.89 and test–retest reliability of 0.92. Construct and content validity have been confirmed. In Iran, content validity ratios (CVR) ranged from 64% to 87%, the content validity index (CVI) was 0.73, concurrent validity with the Magno Self-Regulation Questionnaire was 0.68, and the four-factor structure was verified using both exploratory and confirmatory factor analysis (Abavisani et al., 2024). In the present study, Cronbach's alpha was 0.89.

Validity and Reliability Assessment

Content validity was evaluated using the judgments of 10 experts in education, psychometrics, and educational psychology, and CVI and CVR indices were calculated.

Convergent validity was assessed through correlations between the Academic Self-Regulation Scale and the Gomes Self-Regulation Questionnaire.

Construct validity was examined using exploratory factor analysis (EFA) with principal axis factoring and varimax rotation, and confirmatory factor analysis (CFA) using indices such as RMSEA, CFI, and GFI.

Reliability was assessed using Cronbach's alpha, split-half reliability, and two-week test–retest reliability.

Data Analysis

Statistical analyses were conducted using SPSS version 25 and LISREL version 8.8. Descriptive statistics were used to summarize demographic characteristics and central tendency and dispersion indices. Inferential analyses—including correlations, factor analyses, Cronbach's alpha, and test–retest analysis—were applied to evaluate validity and reliability. The significance level for all analyses was set at 0.05.

Results

Demographic characteristics of the sample—including academic level, gender, age, academic discipline, marital status, and participation stage in the validation process—are presented in Table 1. A total of 1,181 students participated in the study. As shown in the table, the sample comprised 768 females (65%) and 413 males (35%). Regarding academic level, most participants were undergraduate students (n = 595; 50%), while the smallest group consisted of graduate students and above (n = 164; 13%).

In terms of age distribution, the majority of participants were aged 20–25 years (n = 556; 47%), followed by those younger than 20 years (n = 425; 36%). The smallest group consisted of students older than 25 years (n = 200; 16%). Concerning academic discipline, half of the sample belonged to the humanities (n = 599; 50%). The next largest groups were basic sciences (n = 246; 20%) and engineering (n = 191; 16%). Arts (n = 106; 9%) and foreign languages (n = 39; 3%) had the lowest frequencies. Regarding marital status, most participants were single (n = 940; 79%), whereas 241 students (20%) were married. Participation across the validation stages varied, with the highest number in the exploratory factor analysis phase (n = 536; 45%) and the lowest in the reliability assessment phase (n = 171; 14%).

Table 1. Demographic Characteristics of Participants (n = 1181)

Variable	Category	Frequency	Percentage
Academic Level	Associate	422	35%
	Bachelor's	595	50%
	Master's & above	164	13%
Gender	Female	768	65%
	Male	413	35%
Age	< 20 years	425	36%
	20–25 years	556	47%
	> 25 years	200	16%
Academic Discipline	Arts	106	9%
	Foreign Languages	39	3%
	Humanities	599	50%
	Basic Sciences	246	20%
	Engineering	191	16%
Marital Status	Single	940	79%
	Married	241	20%
Validation Stage	Concurrent Validity	182	15%
	Exploratory Factor Analysis	536	45%
	Confirmatory Factor Analysis	292	24%
	Reliability Assessment	171	14%

Content Validity

All questionnaire items were approved by the expert panel. The content validity ratio (CVR) for the 20 items ranged from 0.80 to 1.00. According to Lawshe's table, for 10 experts, a CVR greater than 0.62 is required (DePoy & Gitlin, 2016). The content validity index (CVI) at the item level ranged from 0.83 to 0.96, all of which exceed the minimum acceptable threshold of 0.78 (Sanjari, Rafati et al., 2021; Yeganeh et al., 2021).

Concurrent Validity

A significant positive correlation was found between the Academic Self-Regulation Scale and the Self-Regulation Questionnaire by Gomes et al. ($r = 0.81$, $p < 0.001$), indicating satisfactory concurrent validity (Torabi et al., 2023).

Exploratory Factor Analysis

Prior to factor extraction, sampling adequacy was assessed. The Kaiser-Meyer-Olkin (KMO) index was 0.953, indicating excellent suitability of the data for factor analysis (Sanjari et al., 2022). Bartlett's test of sphericity was significant ($\chi^2 = 11{,}875.460$, $df = 435$, $p < 0.001$), confirming the appropriateness of the correlation matrix.

Communality values for all 30 items ranged between 0.645 and 0.818, indicating that each item contributed substantially to the factor solution and none required removal (Sanjari, Kamali et al., 2021).

Using Kaiser's criterion (Eigenvalues > 1), five factors were extracted with eigenvalues of 12.131 (40.438% variance), 3.722 (12.406%), 2.590 (8.634%), 1.667 (5.556%), and 1.492 (4.973%), collectively explaining 72.008% of the total variance (Barani et al., 2024).

After varimax rotation, the variance explained by each factor was redistributed as follows: 23.665%, 16.824%, 16.247%, 7.707%, and 7.563%, with a cumulative variance of 72.006%. The rotated factor loading matrix showed that each item had at least one loading greater than 0.40 on its respective factor (Widaman & Helm, 2023).

Factor loadings < 0.40 were suppressed (Sanjari et al., 2018). The five extracted dimensions included: Self-Performance (SP), Study Motivation (SM), Social Interaction (SI), Self-Emotion Regulation (SE) and Study Regulation (SR).

Table 2. Rotated Component Matrix for the Academic Self-Regulation Scale

Item	Statement	Factor 1: SP	Factor 2: SM	Factor 3: SI	Factor 4: SE	Factor 5: SR
1	I consciously make sure that my attendance does not fall below 80%.	0.792	0.174	0.134	0.073	0.124
2	I can complete all classroom activities assigned by the instructor well.	0.792	0.164	0.154	0.116	0.095
3	I take notes from teachers' classroom presentations.	0.795	0.189	0.157	0.062	0.102
4	I compete with the top students in the class.	0.811	0.158	0.128	0.092	0.143
5	I set goals to earn grades in the class.	0.792	0.196	0.098	0.089	0.118
6	I regularly attend class because I am aware of the course dropout rules.	0.818	0.097	0.149	0.096	0.103
7	I strive to achieve first place in the class.	0.814	0.158	0.128	0.088	0.078
8	I always submit my written assignments earlier than other students.	0.777	0.198	0.109	0.112	0.088
9	I always arrive five minutes before class starts.	0.820	0.109	0.099	0.122	0.088
10	I only put effort into this course to pass it.	0.821	0.165	0.155	0.094	0.009
11	I am aware of the disciplinary and academic regulations of the term system.	0.186	0.778	0.161	0.108	0.208
12	I am familiar with promotion (advancement) rules within the term system.	0.185	0.783	0.185	0.064	0.139
13	My good performance in class is the result of the teacher's motivation.	0.170	0.800	0.200	0.123	0.079
14	I am familiar with the GPA (Grade Point Average) scoring system.	0.168	0.789	0.236	0.096	0.038
15	I know how I am evaluated within the term system.	0.189	0.805	0.163	0.081	0.090
16	My good performance in class results from my family's and friends' support.	0.242	0.784	0.171	0.043	0.121
17	Using technical terms in class is sometimes difficult but helpful for understanding the lesson.	0.199	0.787	0.150	0.113	0.110
18	The method of assigning homework is very boring and useless in the learning process.	0.202	0.138	0.770	0.128	0.122
19	I leave out or ignore the difficult parts of course materials.	0.148	0.189	0.795	0.078	0.094
20	I usually memorize the material.	0.150	0.141	0.779	0.091	0.151
21	I like group study because it increases my learning ability.	0.182	0.143	0.753	0.071	0.137
22	I can locate the study resources that the instructor assigns.	0.087	0.205	0.784	0.174	0.109
23	I use techniques such as highlighting, titling, segmentation, and other tools.	0.158	0.167	0.784	0.042	0.104
24	Completing the assignments given by the instructor on time is difficult for me.	0.102	0.244	0.754	0.182	0.089
25	I hesitate when speaking or participating in classroom discussions.	0.197	0.165	0.229	0.121	0.828
26	I hesitate when asked to present an assigned task in class.	0.207	0.253	0.172	0.090	0.778
27	I am not satisfied with my performance in class.	0.193	0.188	0.279	0.110	0.803
28	I participate in class discussions only to attract the teacher's attention and get a grade.	0.183	0.144	0.214	0.832	0.075
29	I usually study according to the study plan I have set myself.	0.203	0.163	0.183	0.800	0.086
30	My good performance in class is the result of my own personal efforts.	0.179	0.126	0.162	0.831	0.130

Confirmatory Factor Analysis (CFA)

In the confirmatory factor analysis of the five-factor model of the Academic Self-Regulation Scale, model fit indices were evaluated according to standard criteria. The chi-square to degrees of freedom ratio was 1.42 ($\chi^2 = 561.10$, df = 395), which is below the reference threshold of 3 (and certainly below 5), indicating a good model fit (Ali et al., 2023). The Goodness-of-Fit Index (GFI = 0.89) and the Adjusted Goodness-of-Fit Index (AGFI = 0.87) were found to be within the acceptable range, with AGFI approaching the 0.90 cutoff (Panahifar et al., 2022).

Other fit indices—including the Normed Fit Index (NFI = 0.97), Comparative Fit Index (CFI = 0.99), and Incremental Fit Index (IFI = 0.99)—all exceeded the recommended threshold of 0.90, indicating an excellent model fit (Mohamadi Soliemani et al., 2017). Additionally, the Non-Normed Fit Index (NNFI/TLI = 0.99) and the Root Mean Square Error of Approximation (RMSEA = 0.035) both fell within the optimal range (Sanjari & Soleimani, 2017). The Standardized Root Mean Square Residual (SRMR = 0.037) also demonstrated minimal discrepancy between the observed and model-estimated covariance matrices. Finally, all standardized factor loadings in the final model exceeded 0.80, indicating strong item–factor convergence and supporting the construct validity of the instrument (Howard, 2023). Overall, the CFA results confirmed the structural validity and adequate fit of the five-factor model of the Academic Self-Regulation Scale for students in Bandar Abbas.

Table 3. Overall Model Fit Indices for the Academic Self-Regulation Scale among Students in Bandar Abbas

Results	CMIN/DF	GFI	AGFI	NFI	CFI	IFI	PNFI	RMSEA
CFA Data	1.42	0.89	0.87	0.97	0.99	0.99	0.88	0.035
Acceptable Fit (Sanjari & Soleimani, 2024)	< 5	> 0.90	> 0.90	> 0.90	> 0.90	> 0.90	> 0.50	< 0.10

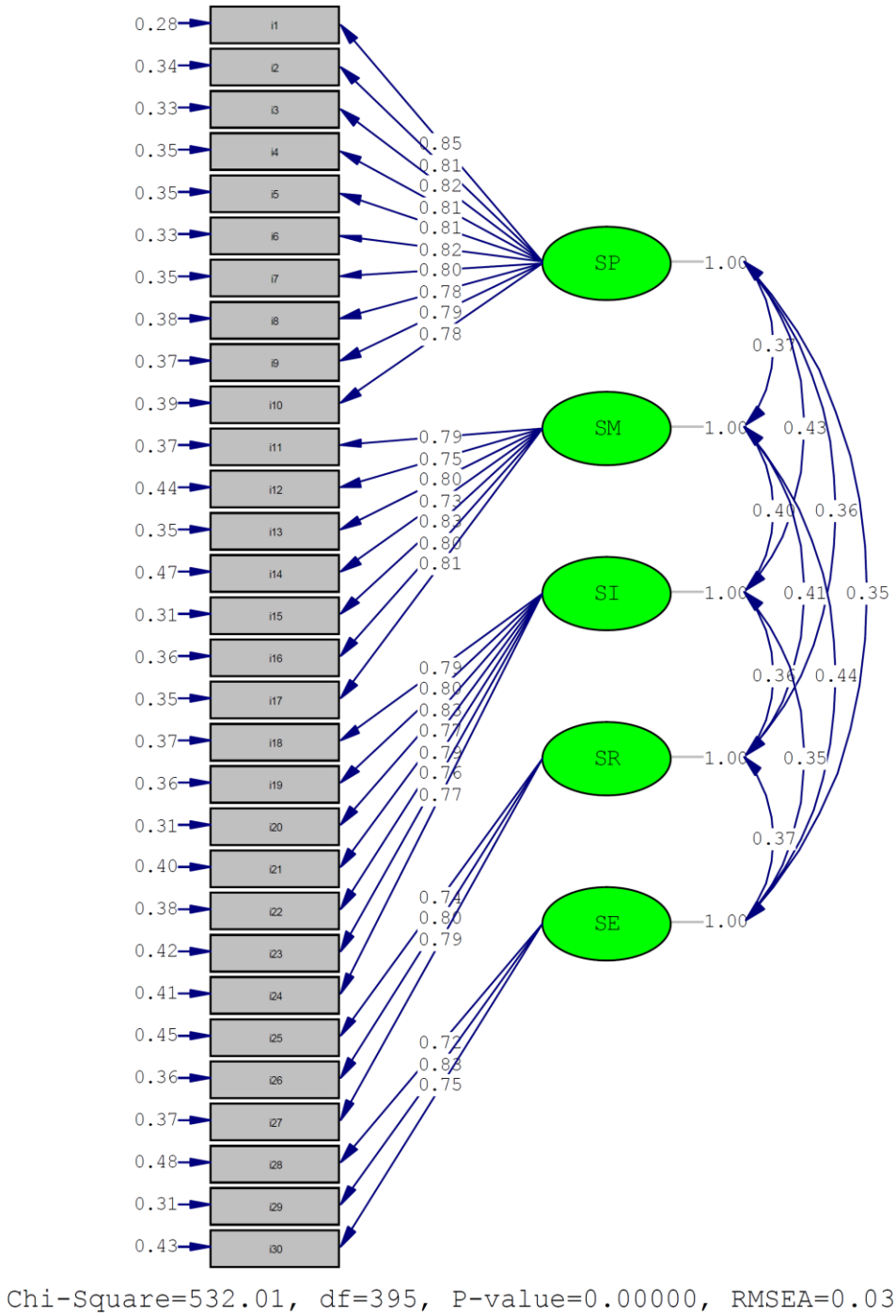

Figure 1. Standard coefficient model in the academic self-regulation scale among students in Bandar Abbas city

Reliability Analysis

The Academic Self-Regulation Scale demonstrated excellent reliability in this study. The Cronbach's alpha for the total scale was 0.918. The alphas for Factors 1 to 5 were 0.920, 0.922, 0.933, 0.820, and 0.827, respectively, indicating strong internal consistency across subscales.

In the split-half reliability assessment, the alpha coefficient for the first half of the scale was 0.906, and for the second half 0.869. The Pearson correlation between the sums of the two halves was 0.511. Both the Spearman–Brown coefficient and Guttman split-half coefficient were 0.676 and 0.675, respectively, indicating strong structural stability.

Furthermore, Guttman's lambda coefficients were $\lambda_1 = 0.887$, $\lambda_2 = 0.924$, $\lambda_3 = 0.918$, $\lambda_4 = 0.675$, $\lambda_5 = 0.902$, and $\lambda_6 = 0.960$, suggesting minimal variability across different reliability estimation methods. Overall, these results confirm the high level of reliability for the Academic Self-Regulation Scale and its subcomponents (Cho, 2016).

Discussion

The results of the content validity assessment indicated that all items of the Academic Self-Regulation Scale were approved by a panel of experts. The Content Validity Index (CVI) and Content Validity Ratio (CVR) for all items exceeded the acceptable thresholds (Sanjari & Mohammadi Soleimani, 2024), demonstrating that each item adequately and effectively captures its intended theoretical dimension (Aliakbari Borovati et al., 2025). Numerous international studies also confirm the strong content validity of this instrument across diverse samples and cultural contexts (Akhtar & Mahmood, 2013; Cheung et al., 2024; Ferreira et al., 2020; Yan, 2025).

Concurrent validity analysis also showed that the Academic Self-Regulation Scale had significant positive correlations with other well-established related measures, further supporting the instrument's precision in assessing the expected dimensions (Mokhtari et al., 2025). These findings are consistent with previous research and demonstrate the questionnaire's robustness across different populations and cultural settings (Akhtar & Mahmood, 2013; Cheung et al., 2024; Ferreira et al., 2020; Yan, 2025), thereby reinforcing its global credibility and widespread applicability.

In the exploratory factor analysis, the five-factor structure of the Academic Self-Regulation Scale accounted for a substantial portion of the observed variance. Confirmatory factor analysis further

verified the adequacy of this five-factor model, showing strong model fit indices. These results align with theoretical foundations discussed in international literature and with reports from different versions of the instrument across various countries (Akhtar & Mahmood, 2013; Cheung et al., 2024; Ferreira et al., 2020; Yan, 2025).

In addition to validity assessments, the reliability indices confirmed that the Academic Self-Regulation Scale possesses strong internal consistency and high stability. Cronbach's alpha coefficients, split-half correlations, and other reliability estimates indicated satisfactory performance (Sanjari & Soleimani, 2024). These results are consistent with previous studies and affirm the strong reliability of the instrument across different research contexts (Akhtar & Mahmood, 2013; Cheung et al., 2024; Ferreira et al., 2020; Yan, 2025).

Despite these strengths, the present study has several limitations that should be considered. First, the cross-sectional design may not fully capture the dynamic nature of self-regulation over time. Therefore, longitudinal research is recommended to examine fluctuations in students' cognitive self-regulation across continuous intervals, providing deeper insights into its developmental trajectory. Second, the sample was drawn exclusively from universities in Bandar Abbas, which may limit the generalizability of the findings to other populations and cultural settings. Future research should include more diverse samples from various universities and cities to enhance representativeness. Third, although efforts were made to culturally adapt the translated instrument, some linguistic or cultural nuances may not have been fully addressed. Cross-cultural studies are thus recommended to evaluate the scale's validity and reliability in different societies. Finally, the use of self-report measures may involve response bias. To reduce this error and improve accuracy, complementary assessment methods—such as semi-structured interviews and direct observations—are recommended.

The findings of the present study indicate that the Academic Self-Regulation Scale possesses strong content, concurrent, and construct validity, and that its five-factor structure is supported by both exploratory and confirmatory factor analyses. Additionally, the overall reliability of the scale and its subscales is excellent. Therefore, the instrument can be considered a valid and reliable measure for assessing academic self-regulation among student populations.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by ethics committee of Islamic Azad University.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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