Interdisciplinary Journal of Virtual Learning in Medical Sciences

Original Article

Cross-Cultural Adaptation and Psychometric Validation of the Perceived Self-Regulation Skills Scale for Elementary Students in Temporary Online Learning Environments: A Cross-Sectional Study

Habibollah Barani[1], Azita Amirfakhraei[1]*, Mohammad Reza Mohammadi Soleimani[2], Seyyed Abdul Wahab Samavi[3]

[1]*Department of Psychology, Bandar Abbas Branch, Islamic Azad University, Bandar Abbas, Iran*
[2]*Department of Educational Sciences, Farhangian University, Tehran, Iran*
[3]*Department of Psychology, Hormozgan University, Bandar Abbas, Iran*

ABSTRACT

Background: With the rise of online education during temporary school closures, elementary students face self-regulation challenges. This study aimed to culturally adapt and validate the Perceived Self-Regulation Skills Scale (P-SRSS) for Iranian students.

Methods: This cross-sectional study, which involved transcultural adaptation and psychometric assessment, was carried out between November 2023 and August 2024 among fourth-grade elementary students in Bandar Abbas, Iran, who attended temporary online classes due to interruptions like power failures or air pollution. Using a multistage cluster sampling method, a total of 1,120 students from 20 public schools were selected. The P-SRSS was translated into Persian following the World Health Organization's forward–backward translation protocol. Ten experts evaluated face and content validity. Construct validity was examined using Exploratory Factor Analysis (EFA) with SPSS v24.0 and Confirmatory Factor Analysis (CFA) with LISREL v8.80. Concurrent validity was assessed through correlations with the Gómez and colleagues' self-regulation questionnaire. Reliability was evaluated using Cronbach's alpha, test–retest reliability, and the split-half method. Statistical significance was set at $P<0.05$.

Results: The findings confirmed that the P-SRSS demonstrated acceptable face and content validity (Content Validity Ratio (CVR) ranged from 0.80 to 1.00; Content Validity Index (CVI) ranged from 0.83 to 0.93). Concurrent validity was supported by a strong and significant correlation with the Gómez and colleagues' self-regulation questionnaire ($r=0.77$, $P<0.001$). The EFA identified three factors—"Planning the Learning Process," "Implementation of the Learning Plan," and "Focusing on the Target and Learning Task"—explaining 64.44% of the total variance. The CFA indicated a good model fit. Internal consistency was excellent (Cronbach's alpha=0.949), and test-retest reliability was also acceptable ($r=0.811$, $P<0.0001$).

Conclusion: The Persian version of the P-SRSS is a reliable and valid instrument for evaluating self-regulation in online learning among fourth-grade students, supporting research on engagement, learning outcomes, and related academic variables.

Keywords: Self-Regulation, Self-Control, Education, Distance, Psychometrics, Cross-Cultural Comparison, Students

*Corresponding author:
Azita Amirfakhraei, Department of Psychology, Bandar Abbas Branch, Islamic Azad University, Bandar Abbas, Iran.
Tel: +98 9139402060
Email: afakhraei2002@iauba.ac.ir

Please cite this paper as:
Barani H, Amirfakhraei A, Mohammadi Soleimani MR, Samavi SAW. Cross-Cultural Adaptation and Psychometric Validation of the Perceived Self-Regulation Skills Scale for Elementary Students in Temporary Online Learning Environments: A Cross-Sectional Study. Interdiscip J Virtual Learn Med Sci. 2025;16(3):2-16. doi: 10.30476/ijvlms.2025.107455.1341.

Received: 07-06-2025
Revised: 09-07-2025
Accepted: 26-08-2025

Introduction

In Iran, apart from challenges posed by infectious disease outbreaks, environmental and infrastructural issues such as seasonal air pollution, fuel consumption limits, and recurrent power outages often result in temporary school closures throughout the year (1, 2). As a result, students are required to continue their studies through online platforms (3). This situation becomes particularly acute during autumn and winter, when worsening air quality and declining temperatures compel schools across several cities to switch to virtual instruction to safeguard students' health and conserve energy (4, 5). However, weaknesses in internet infrastructure and frequent power outages—resulting in WiFi disconnections and poor internet quality—cause significant disruptions to online teaching and learning (6, 7). Students consequently struggle with challenges such as inability to follow lessons, delayed access to content, and reduced interaction with teachers (8).

In addition to these environmental and infrastructural issues, inadequate in-service training for teachers in online pedagogy, low levels of student digital literacy, and unequal access technological devices and high-speed internet further increase learners' reliance on schools and families for technical supports. This dependency reduces students' autonomy in virtual environments and underscores the importance of fostering self-regulation skills (3, 9-13).

Moreover, in elementary education—particularly fourth grade (ages 9–10)—students are in a developmental stage where they need to consolidate basic reading and writing skills while preparing for more autonomous learning (14-16). Enhancing selfregulation skills during this period can promote longterm academic success (17). Self-regulated learning refers to students' capacity to establish specific goals, plan effectively, continuously monitor and assess their progress, and modify their learning strategies as necessary to achieve their intended outcomes (18). In online learning environments, where students have more flexibility in managing their time and location, insufficient self-regulation skills may result in issues like distraction, reduced motivation, ineffective time management, and consequently, lower academic performance (16, 19, 20). This challenge becomes especially apparent during temporary online classes caused by power outages or pollution, when students must quickly adapt to virtual learning environments and overcome technical difficulties (8).

In Iran's collectivist context, where maintaining group harmony and showing respect toward teachers and parents are highly valued, strong parental involvement can sometimes lead to dependence instead of independence (21-24). Therefore, a Persian scale must emphasize "teacher or familysupported planning" to ensure cultural relevance and to guide learners toward gradual autonomy.

Despite the importance of this issue, few studies in Iran have focused on assessing and validating selfregulation skills among elementary students in temporary online learning contexts. Most research either examines selfregulation in facetoface settings or uses instruments that are not ageappropriate for fourth graders and lack validation in online learning environments (25-27).

Global shifts toward online learning—particularly following the COVID19 pandemic and climaterelated disruptions such as wildfires and hurricanes—underscore the universal need for selfregulation tools like the Perceived Self-Regulation Skills Scale (PSRSS) to maintain learning continuity under emergency conditions (28).

For instance, several scales currently used in Iran to measure selfregulation in elementary students have limitations (17). Many have numerous items or focus on only one dimension of selfregulation. The SelfRegulated Learning Interview Schedule (SRLIS) relies heavily on interviews, making it timeconsuming and difficult to use in school surveys (29). Other instruments, such as the Motivated Strategies for Learning

Questionnaire (MSLQ) (30) and the Learning and Study Strategies Inventory (LASSI) (31), are multidimensional; however, they were originally designed for adolescents and secondary school students, thereby limiting their applicability to younger populations.

To ground our work theoretically, this study adopted Zimmerman's (2000) threephase model of selfregulation—forethought (goal setting and strategic planning), performance (selfmonitoring and control), and selfreflection (selfevaluation and adaptation)—clarifying the mechanisms by which selfregulated learning supports autonomous online education (32).

Among these, Cavaş and colleagues (2016) developed the PSRSS specifically for use with fourth-grade students (28). This 26item, fourchoice questionnaire measures three main dimensions: "Planning the Learning Process," "Implementation of the Learning Plan," and "Focusing on the Goal and Task." Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) demonstrated that this scale explains about 39.61% of variance and possesses good psychometric properties (28). However, due to cultural and linguistic differences, direct use of this tool in Iran is not feasible (33) . Given the context of temporary online classes caused by power outages or pollution, it is necessary to culturally adapt ("transculturally") and psychometrically validate a Persian version of the PSRSS to ensure its suitability for this context.

Additionally, the P-SRSS comprises 26 items written in simple language and employs a four-point Likert scale designed to accommodate the cognitive and linguistic abilities of 9–10-year-old students, ensuring comprehension and reducing response burden.

After validation, the PSRSS can guide teachers in identifying specific selfregulation weaknesses, support targeted interventions (e.g., goalsetting workshops), and inform educational policies aimed at enhancing the quality and resilience of emergency online learning.

This study aimed to culturally adapt and psychometrically validate the Persian version of the PSRSS among fourthgrade students in Iran who were engaged in temporary online learning due to environmental (e.g., air pollution) or infrastructural (e.g., power outages) disruptions, ensuring that the instrument is both linguistically and culturally appropriate for 9–10-year-old students. Once validated, the Persian PSRSS will provide educators and policymakers with a reliable, ageappropriate tool to accurately assess students' selfregulation strengths and weaknesses, guide the design of targeted interventions (such as goalsetting workshops), and inform strategies to enhance the resilience and effectiveness of emergency online education.

Methods

Study Design and Setting

This cross-sectional study, carried out between November 2023 and August 2024, aimed to culturally adapt and psychometrically evaluate the Persian version of the P-SRSS among fourth-grade elementary students in Bandar Abbas, Iran. Data were collected from 20 randomly selected public elementary schools (10 for girls and 10 for boys) located within the two educational districts of Bandar Abbas city.

Participants and Sampling

The target population consisted of all fourth-grade students in public elementary schools in Bandar Abbas, Iran who had experienced at least one period of online instruction due to factors such as power outages, air pollution, or disease outbreaks. To achieve balanced gender and regional representation, 20 public schools—10 for girls and 10 for boys—were randomly chosen from the two educational districts of the city using a multi-stage cluster sampling approach. Initially, 20 public schools (clusters) were randomly selected—10 from each educational district. Then, two fourth-grade classes were randomly chosen from each school, and all students in these classes were invited to participate.

Sample sizes were determined following established psychometric standards for each

type of analysis: 200 students for concurrent validity (exceeding the minimum of 60) (27), 520 for EFA (calculated as 20×26=520) (34), 300 for CFA (within the recommended range of 200–1000) (35), and 100 for reliability testing (surpassing the minimum requirement of 80) (9, 36). Altogether, over 1120 students participated, allowing for high-precision validation of the instrument.

The inclusion criteria for participation in this study were as follows: (1) students had to be officially enrolled in the fourth grade of public elementary schools in Bandar Abbas during the 2023–2024 academic year; (2) they must have experienced at least one academic semester of temporary online learning due to external factors such as air pollution, power outages, or public health emergencies that necessitated school closures; and (3) both the students and their legal guardians were required to provide informed consent, indicating voluntary agreement to participate after being fully informed of the study's objectives and procedures. Exclusion criteria included: (1) failure to complete more than 20% of the questionnaire items, which would compromise data integrity and validity; and (2) voluntary withdrawal from the study at any point, regardless of the reason, in accordance with ethical guidelines emphasizing participants' autonomy.

Tools/Instruments

The primary outcome of this study was students' self-regulation in learning, assessed through the total and subscale scores of the P-SRSS, which measures learners' ability to plan, implement, and maintain focus during the learning process. For concurrent validity assessment, the Gómez and colleagues' self-regulation questionnaire (37) was employed as a secondary instrument to examine the correlation between the newly adapted Persian version of the P-SRSS and an established measure of self-regulation.

Translation process: The translation of the original scale (P-SRSS) followed the World Health Organization (WHO) guidelines (38). Initially, two independent translators—one an educational psychologist and the other an English language expert—translated the scale into Persian. The research team reviewed both translations to produce a harmonized version. Subsequently, a bilingual translator back-translated the Persian version into English. A panel of experts in elementary education and educational psychology compared the original and back-translated versions and made the necessary revisions to finalize the Persian version (39).

Perceived Self-Regulation Skills Scale (P-SRSS): Originally developed by Cavaş and colleagues (2016), this 26-item scale uses a 4-point Likert scale ranging from 1 ("Never") to 4 ("Always"), yielding a total score range of 26 to 104. The scale assesses three dimensions: Planning the learning process (12 items), Implementation of the learning plan (4 items), and Goal and task focus (10 items). Construct validity has been confirmed using EFA and CFA, with Cronbach's alpha values for the subscales ranging between 0.72 and 0.80 (28).

Gómez Self-Regulation Questionnaire: This 16-item scale comprises four subscales: External regulation (Items 1–4), Identified regulation (Items 5–8), Introjected regulation (Items 9–12), and Intrinsic regulation (Items 13–16). Responses are rated on a 5-point scale from 0 ("Never") to 4 ("Always"). The scale demonstrates strong psychometric properties, with a Cronbach's alpha of 0.89 and a test–retest reliability coefficient of 0.92. Both construct and content validity have been established (18). In Iranian studies, Content Validity Ratio (CVR) ranged from 64% to 87%, and Content Validity Index (CVI) was 0.73. Concurrent validity with the Magno Self-Regulation Questionnaire showed a correlation of 0.68, and factor structure was supported via both EFA and CFA with four confirmed factors (17). Cronbach's alpha ranged between 0.84 and 0.86, and split-half reliability coefficients were 0.71 and 0.72, respectively (17). In the present study, Cronbach's alpha was found to be 0.89. We utilized the 16-item Gómez Self-Regulation Questionnaire as our comparative standard

as it has been previously validated in similar cultural contexts, encompasses four core dimensions of self-regulation, and its readily available Persian version enabled a robust assessment of concurrent validity with the newly adapted P-SRSS (17).

Bias Control: To reduce selection bias, random sampling at both school and class levels was used. Response bias was minimized by ensuring confidentiality and anonymity (40). Data with more than 20% missing items were excluded (24). Questionnaire administration was standardized by trained staff.

Content Validity: To assess content validity, a panel of 10 experts in educational psychology and elementary education was consulted (All ten experts consulted were full-time faculty members at accredited Iranian universities, each holding a PhD in educational psychology or elementary education. They possessed at least four years of postgraduate research and teaching experience in self-regulated learning and psychometric assessment, ensuring a rigorous, contextually informed evaluation of item clarity, relevance, and cultural appropriateness). Using Lawshe's method, both the CVR and CVI were calculated for each item. Experts rated each item's necessity on three levels ("Essential," "Useful but not essential," and "Not essential") and also evaluated clarity, simplicity, and relevance (16). Items with CV ≥0.62 and CVI ≥ 0.79 were deemed acceptable based on established standards (41).

Construct Validity: To determine factor structure, data suitability was tested using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity. A KMO value above 0.70 and a significant Bartlett's test ($P<0.05$) indicated that factor analysis was appropriate. Principal Axis Factoring with Varimax rotation was used, and a minimum factor loading of 0.40 was set for item retention (42).

The proposed three-factor model was evaluated using AMOS version 24. Model fit was assessed with multiple indices: Comparative Fit Index (CFI>0.90), Goodness of Fit Index (GFI>0.90), Adjusted Goodness of Fit Index (AGFI>0.80), Root Mean Square Error of Approximation (RMSEA<0.08), and Chi-square/degree of freedom ratio (CMIN/df<3). Modification indices were applied as needed to improve model fit (9).

Concurrent Validity: Pearson's correlation was calculated between the total scores of the P-SRSS and the Gómez Self-Regulation Questionnaire. A correlation coefficient of 0.50 or higher was considered as indicative of satisfactory concurrent validity.

Reliability: Internal consistency was evaluated using Cronbach's alpha for each dimension and the total score. A value of ≥ 0.70 was considered acceptable (43). To assess temporal stability, 72 students completed the P-SRSS again after two weeks (Test-retest reliability). The Intraclass Correlation Coefficient (ICC) was calculated, with values ≥0.75 indicating satisfactory stability (11). For supplementary reliability assessment, the split-half method was used, and Spearman–Brown coefficients were calculated.

Data Analysis

Data were coded and analyzed using SPSS version 24. Descriptive statistics (means, standard deviations, frequencies, and percentages) were calculated. For construct validity, KMO and Bartlett's tests were performed. The EFA was conducted using Principal Axis Factoring with Varimax rotation in SPSS. CFA was performed using Lisrel version 8.80, and model fit indices were reported. Pearson's correlation coefficient was used for concurrent validity analysis. Reliability was assessed using Cronbach's alpha, split-half reliability, and test–retest ICC. The significance level for all statistical tests was set at 0.05.

Ethics - This study was approved by the Research Ethics Committee of Islamic Azad University, Bandar Abbas Branch, Iran. Prior to questionnaire distribution, the study's purpose and procedures were explained to school administrators and teachers, and both verbal consent from legal guardians and verbal assent from students were obtained.

Participation was voluntary, and students could withdraw at any stage. Confidentiality was assured, and results were reported in aggregate form only.

Results

A total of 1,098 fourth-grade students participated in the study, comprising 544 girls (49.5%) and 554 boys (50.5%), with ages ranging from 10 to 11 years (Mean±SD=10.5±0.5 years). An overview of parents' employment and educational status for the entire sample (N=1098) revealed that 999 mothers (91.0%) were homemakers, while 99 (9.0%) were employed. Among fathers, 898 (81.8%) were employed, 162 (14.8%) were retired, and 38 (3.5%) were deceased. Regarding educational background, 854 fathers (77.8%) had a diploma or lower qualification, and 244 (22.2%) held a university degree (associate, bachelor's, or higher). Similarly, 837 mothers (76.2%) had a diploma or lower, whereas 261 (23.8%) had completed university education. Table 1 summarizes these demographic characteristics across the "Concurrent" (concurrent validity survey), "Exploratory" (exploratory factor analysis), "Confirmatory" (confirmatory factor analysis), and "Reliability" (reliability assessment) phases.

All questionnaire items underwent expert review to confirm their content validity. The CVR for the 26 items ranged from 0.80 to 1.00, surpassing Lawshe's minimum acceptable value of 0.62 for a panel of 10 experts. Additionally, the Item-Level Content Validity Index (I-CVI) values fell between 0.83 and 0.93, all of which exceed the minimum acceptable threshold of 0.78. All 26 initial items were subjected to expert review, and none were eliminated during the content validity assessment (CVR≥0.62; CVI≥0.78).

An analysis comparing the P-SRSS with Gómez and colleagues' self-regulation questionnaire revealed a strong, statistically significant positive correlation (r=0.77, P<0.001). Therefore, the academic self-regulation scale demonstrates solid concurrent validity.

In this study, EFA was conducted on the dedicated EFA subsample (N=517) to determine the underlying dimensions of the P-SRSS. The KMO value was 0.958, exceeding the recommended threshold of 0.60, indicating sufficient intercorrelations among items for factor extraction. Bartlett's test of sphericity was highly significant

Table 1: Parents' employment and education by section

	Variable	Total (n=1098)	Concurrent (n=195)	Exploratory (n=517)	Confirmatory (n=291)	Reliability (n=95)
Gender	Female	544 (49.5%)	96 (49.2%)	259 (50.1%)	151 (51.9%)	38 (40.0%)
	Male	554 (50.5%)	99 (50.8%)	258 (49.9%)	140 (48.1%)	57 (60.0%)
Mother's Employment Status	Housewife	999 (91.0%)	171 (87.7%)	474 (91.7%)	268 (92.1%)	86 (90.5%)
	Employed	99 (9.0%)	24 (12.3%)	43 (8.3%)	23 (7.9%)	9 (9.5%)
Father's Employment Status	Retired	162 (14.8%)	27 (13.8%)	76 (14.7%)	48 (16.5%)	11 (11.6%)
	Deceased	38 (3.5%)	10 (5.1%)	19 (3.7%)	7 (2.4%)	2 (2.1%)
	Employed	898 (81.8%)	158 (81.0%)	422 (81.6%)	236 (81.1%)	82 (86.3%)
Mother's Education	Diploma and below	837 (76.2%)	154 (79.0%)	393 (76.0%)	212 (72.9%)	78 (82.1%)
	University Degree (≥Associate)	261 (23.8%)	41 (21.0%)	124 (24.0%)	79 (27.1%)	17 (17.9%)
Father's Education	Diploma and below	854 (77.8%)	152 (78.0%)	409 (79.1%)	227 (78.0%)	66 (69.5%)
	University Degree (≥Associate)	244 (22.2%)	43 (22.0%)	108 (20.9%)	64 (22.0%)	29 (30.5%)

*N=1098; "Diploma and below" includes primary school, middle school, sub-diploma, literacy classes, and diploma; "University degree" includes associate's, bachelor's, and higher degrees.

(approximate χ^2=10 205.55, df=325, P<0.001), indicating that the correlation matrix differed significantly from an identity matrix, thereby supporting the suitability of the data for factor analysis. The sample size of 517 also met standard criteria (e.g., at least 5–10 respondents per item or an absolute minimum of 300), further supporting the stability of the solution. Principal axis factoring with Varimax rotation revealed three factors that together accounted for 64.44% of the total variance: Factor 1 – "Planning the Learning Process" (items i1–i12; 29.93% variance), Factor 2 – "Implementation of the Learning Plan" (items i17–i26; 24.26%), and Factor 3 – "Focusing on the Target and Learning Task" (items i13–i16; 10.26%) (Table 2; Figure 1). During EFA, all 26 items were retained in the factor solution with no removals.

Table 2: Rotated Factor Matrix for Perceived Self-Regulation Skills Scale

Items	Factor 1	Factor 2	Factor 3
• I make my daily todo list with the help of my teacher or my parents.	0.781		
• I plan my learning tasks with assistance from my teacher or my parents.	0.780		
• I take notes to remind myself of my assignments and responsibilities.	0.759		
• Before I begin studying, I plan my approach to learning with help from my teacher or my parents.	0.788		
• I check to make sure I'm completing my learning tasks correctly.	0.774		
• Even when I don't have any specific homework, I still review my course material.	0.780		
• I review whether I'm carrying out the tasks I've planned for my lessons.	0.787		
• I think about the best way to study a subject in order to learn it more effectively.	0.811		
• I am eager to learn new things.	0.794		
• I concentrate fully on whatever I'm studying at the moment.	0.761		
• No matter the subject, I always find a way to learn it.	0.785		
• With help from my teacher or my parents, I set up a suitable study environment (necessary tools, lighting, noise level, etc.) at school, at home, or elsewhere.	0.788		
• If my teacher or someone else is not satisfied with my work, I stop studying.			0.790
• Sometimes I forget to do my assignments.			0.737
• I hurry to finish my studying as quickly as possible.			0.758
• If I find the material too difficult, I give up studying.			0.775
• If I can't learn a lesson, I change my method with help from my teacher or my parents.		0.767	
• I make an effort to succeed in my lessons.		0.753	
• After studying a lesson, I reflect with my teacher or my parents on whether I've mastered it.		0.782	
• If I can't learn a lesson, I think about the reasons why with help from my teacher or my parents.		0.762	
• I recognize when I'm unable to learn a lesson.		0.768	
• When the teacher asks me to do a study activity in class, I complete it on my own.		0.781	
• I use different study methods for different subjects or topics.		0.757	
• I submit my assignments at home or at school on time.		0.758	
• I ask my teacher or my parents to help me set learning goals for each lesson.		0.768	
• I bring the necessary materials (books, notebook, colored pencils, ruler, etc.) to school.		0.772	
Factor 1: Factor Planning of the Learning Process. Factor 2: Implementation of the Learning Plan. Factor 3: Focusing on the Target and Learning Task.			

*Extraction Method: Principal Axis Factoring; Rotation Method: Varimax with Kaiser Normalization (converged in 5 iterations).

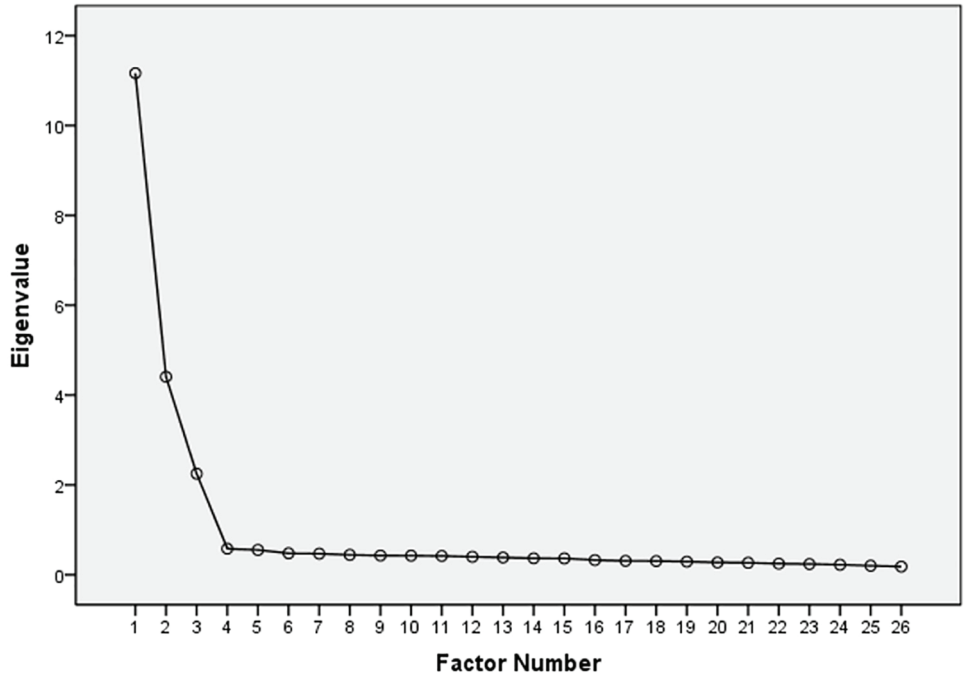

Figure 1: Scree Plot of Exploratory Factor Analysis (EFA)

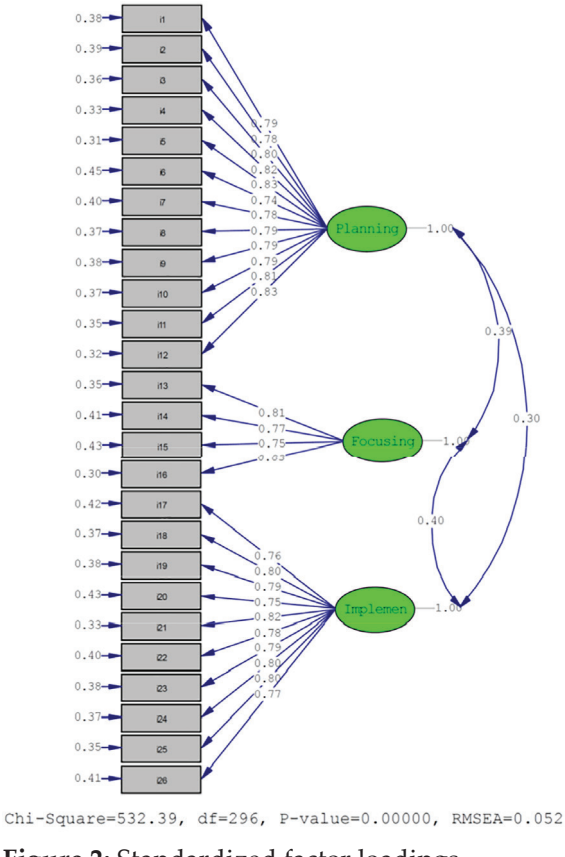

Figure 2: Standardized factor loadings

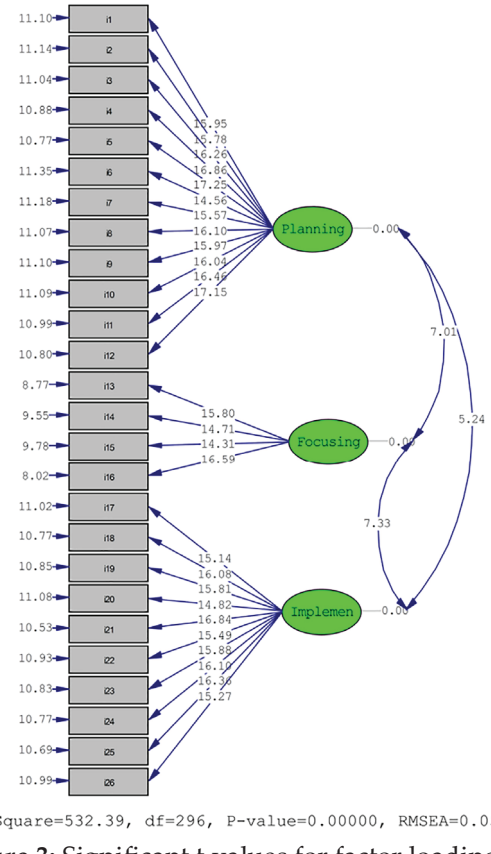

Figure 3: Significant t-values for factor loadings

The CFA results indicated that the three-factor model provided a good fit to the data: $\chi^2(296)=552.28$, P<0.001, CMIN/df=1.87 (below 3); Standardized Root Mean Squared Residual (SRMR)=0.052 (90% CI: 0.045–0.060; P-value of Close Fit (PCLOSE)=0.28; below 0.08); SRMR=0.039 (below 0.08); CFI=0.98 (above 0.90); NFI=0.97 (above 0.90);

GFI=0.88 (marginally below 0.90, but acceptable given the sample size); AGFI=0.85 (above 0.80). All standardized factor loadings were high and significant (ranging from 0.82 to 0.91, t-values > 14), confirming that items i1–i12 load on Factor 1 ("Planning the Learning Process"), items i17–i26 load on Factor 2 ("Implementation of the Learning Plan"), and items i13–i16 load on Factor 3 ("Focusing on the Target and Learning Task"). Figure 2 illustrates the standardized coefficients, demonstrating the close alignment between the hypothesized three-factor structure and the observed covariances. Additionally, Figure 3 presents the corresponding *t*-values for each factor loading, confirming the statistical significance and supporting the overall validity of the model. In CFA, the full set of 26 items was tested without exclusion, confirming the robustness of the threefactor model (RMSEA=0.052; CFI=0.98).

The internal consistency of the 26-item scale was excellent: Cronbach's alpha for the entire scale was 0.949. When examined by factor, "Planning the Learning Process" (items i1–i12) yielded α=0.949, "Focusing on the Target and Learning Task" (items i13–i16) yielded α=0.870, and "Implementation of the Learning Plan" (items i17–i26) yielded α=0.968. Split-half reliability, based on dividing the 26 items into two halves (i1–i13 vs. i14–i26), produced α=0.941 for the first half and α=0.951 for the second half; the correlation between these two halves was 0.455 (Spearman–Brown coefficient=0.625; Guttman split-half=0.625). Removal of any single item did not increase the overall Cronbach's alpha, indicating that all items contributed positively to the scale's internal consistency. The test-retest results were 0.811 (P<0.0001). All 26 items showed positive contributions to internal consistency and test–retest reliability. Deleting any item did not result in an increase in Cronbach's alpha.

Discussion

This research aimed to adapt and psychometrically validate the Persian version of the P-SRSS for use during temporary online instruction among Iranian students. Recent global shifts in online education—first driven by the COVID19 pandemic and now intensified by climaterelated disruptions such as wildfires, floods, and extreme airquality events—have made selfregulation skills a cornerstone of elementary learners' success worldwide (44). Post2020 surveys in North America and Europe report that remote and hybrid learning models remain prevalent, with digital selfmanagement viewed as essential for engagement and achievement (45). Similarly, in regions facing climateinduced school closures—from the bushfires of Australia to monsoonrelated flooding in Southeast Asia—educators emphasize adaptive planning and motivational strategies to sustain learning continuity (46). Positioned within this global context, the Persian P-SRSS not only responds to local challenges such as air pollution and power outages but also contributes to a broader international framework that supports the development of transferable self-regulation skills among young learners in diverse online learning environments.

All 26 items of the P-SRSS demonstrated strong content validity (CVR=0.80–1.00; CVI=0.83–0.93). This indicates that Iranian experts unanimously recognized the scale items as both linguistically clear and culturally pertinent for young learners' online planning and monitoring strategies. Since all values surpassed Lawshe's recommended thresholds, it can be inferred that none of the items were considered redundant or culturally irrelevant—a result not always achieved in cross-cultural adaptations (8, 28, 47). In contrast, some versions developed for older student populations required minor item removals to enhance cultural alignment (17), underscoring the success of our forward–backward translation approach in preserving conceptual equivalence.

The strong correlation with Gómez and colleagues' selfregulation questionnaire (r=0.77, P<0.001) indicates that fourth-grade students' perceptions of their online self-regulation are closely aligned with broader measures of academic regulation. This finding extends

the theoretical framework of selfefficacy (48) into the elementary online context, indicating that students who feel capable in digital selfmanagement also exhibit broader regulatory competencies. By comparison, work with secondary students often yields moderate correlations ($r \approx 0.60–0.70$) (49); the higher coefficient observed here may be due to the more homogeneous temporaryonline setting and the narrower age range, which help minimize the extraneous variance.

The EFA revealed three coherent dimensions—"Planning the Learning Process," "Implementing the Learning Plan," and "Focusing on the Target and Learning Task"—jointly explaining 64.4% of variance. These dimensions mirror adult and university findings (32, 50), yet the distinct clustering of "Focusing on the Target" items (i13–i16) suggests that elementary students more sharply differentiate goalorientation from metacognitive planning than older learners do. Nonparallel studies with younger cohorts sometimes find selfreflection items diffused across factors (51, 52), but our CFA confirmed a robust threefactor model (RMSEA=0.052; CFI=0.98), indicating that cultural adaptation can enhance structural clarity in a developing population.

In the Iranian context, deeply rooted collectivist values and deep respect for authority significantly influence elementary students' selfregulation in online settings. Children are accustomed to teachercentered instruction and strong parental oversight, which can both support and constrain independent planning and monitoring behaviors. For instance, parents often organize study routines and regularly track their children's progress, while teachers are regarded as the main decision-makers rather than guides promoting autonomy. Such cultural norms may enhance the "Implementation of the Learning Plan" dimension—since external structures are readily provided—but can limit students' initiatives in "Planning the Learning Process" and "Focusing on the Target" when left entirely to their own devices. Recognizing these influences, the Persian PSRSS adaptation emphasized item wording that frames selfregulatory tasks as supported by adults (e.g., "I plan my learning tasks with assistance from my teacher or my parents.") to ensure cultural relevance and to foster gradual development of independent skills within familiar social frameworks.

The overall Cronbach's alpha ($\alpha=0.949$) and subscale alphas (0.870–0.968) denote exceptional internal consistency. Compared to original reports ($\alpha \approx 0.88$) and other contexts (53), our results reflect an improvement likely due to careful item phrasing and relevance to students' lived online experiences. The splithalf (Spearman–Brown=0.625) and test–retest reliability ($r=0.811$, $P<0.0001$) further demonstrate that the Persian PSRSS produces stable scores over time, highlighting its suitability for both crosssectional surveys and longitudinal monitoring of students' online selfregulation development.

In summary, the Persian P-SRSS demonstrates strong psychometric properties and offers valuable insight into how elementary students plan, implement, and sustain attention during periods of online learning. This instrument enables the design of targeted interventions to strengthen particular aspects of self-regulation and serves as a useful resource for future studies on academic engagement and performance in digital learning contexts.

Limitations and Suggestions

This study has several limitations that should be considered when interpreting the findings. First, the research was conducted solely in Bandar Abbas, so its generalizability to other regions and fourth-grade populations across different geographic areas may be limited. Future studies are recommended to include larger, more diverse samples from various urban and rural areas throughout Iran to shed light on cultural and local influences on students' self-regulation. Second, data collection relied exclusively on a questionnaire administered to 9–10-year-old children, whose cognitive and linguistic characteristics may make abstract self-regulation concepts

difficult to grasp, potentially causing them to interpret items differently than older students. Therefore, subsequent research should use mixed methods—such as in-depth interviews and direct behavioral observations—in addition to quantitative instruments, to explore children's genuine understanding of the questionnaire items and identify any semantic discrepancies. Furthermore, it is advisable to develop versions of the instrument for higher educational levels and to conduct cross-cultural studies—particularly in countries with similar educational structures—to verify the consistency of results beyond national boundaries. Third, parental marital status was not collected among the demographic variables, as the study primarily focused on factors more directly related to children's learning contexts (e.g., age, gender, parents' education, and employment). Future studies should take marital status into account, as family dynamics might influence the development of children's self-regulation abilities and their learning experiences.

Conclusion

This research aimed to adapt and psychometrically validate the P-SRSS for fourth-grade students in Bandar Abbas under temporary online instruction. The results showed that the Persian P-SRSS demonstrated acceptable content validity (CVR and CVI exceeding recommended thresholds), satisfactory concurrent validity (strong correlation with Gómez and colleagues' academic self-regulation scale), robust construct validity (three factors—Planning the Learning Process, Implementing the Learning Plan, and Focusing on the Target and Learning Task—together explaining 64.444% of the total variance), and high internal consistency reliability (Cronbach's alpha=0.949 overall; $\alpha > 0.87$ for each subscale), as well as acceptable split-half and test–retest stability. Thus, the P-SRSS can be utilized as a reliable and valid instrument for assessing perceived self-regulation skills among fourth-grade students in online learning environments. It can also be valuable for examining associations with academic engagement, digital literacy, motivation, and learning outcomes.

Abbreviations

AGFI: Adjusted Goodness of Fit Index
CFA: Confirmatory Factor Analysis
CFI: Comparative Fit Index
CVI: Content Validity Index
CVR: Content Validity Ratio
EFA: Exploratory Factor Analysis
GFI: Goodness of Fit Index
ICC: Intraclass Correlation Coefficient
I-CVI: Item-Level Content Validity Index
KMO: Kaiser–Meyer–Olkin Measure of Sampling Adequacy
NFI: Normed Fit Index
P-SRSS: Perceived Self-Regulation Skills Scale
PCLOSE: P-Value of Close Fit
RMSEA: Root Mean Square Error of Approximation
SRLIS: Self-Regulated Learning Interview Schedule
SRMR: Standardized Root Mean Squared Residual

Acknowledgements

The authors express their gratitude to all individuals who contributed to this research, with special thanks to Mr. Azizollah Mohammadi Soleimani, Ms. Sana Lotfi Mehravi, Mr. Hasan Azarshab, and Mr. Najat Konarouyeh.

Authors' Contribution

HB drafted the manuscript, MRMS performed the statistical analysis and validation, and AA and SAWS reviewed and approved the final manuscript.

Conflict of Interest

The authors declare that they have no competing interests.

Ethical Considerations

This research was conducted in accordance with ethical principles and with the permission of the Research Ethics

Committee of Islamic Azad University of Bandar Abbas Branch (registration number IR.IAU.BA.REC.1402.003). The research samples were obtained with the written knowledge and consent of the participants and there was no risk for them during the research. The research methodology was also designed and implemented based on the rules and regulations of the university.

Funding/Support

No outside funding or support was provided for this work.

Availability of Data and Materials

The datasets and supplementary materials, including analysis scripts or codes utilized in this study, are available from the corresponding author upon a reasonable request.

References

1 M, Erguler K, Ahmady-Birgani H, Al-Hmoud ND, Fears R, Gogos C, Hobbhahn N, Koliou M, Kostrikis LG, Lelieveld J, Majeed A, Paz S, Rudich Y, Saad-Hussein A, Shaheen M, Tobias A, Christophides G. Climate change and human health in the Eastern Mediterranean and Middle East: Literature review, research priorities and policy suggestions. Environ Res. 2023;216(Pt 2):114537. doi: 10.1016/j.envres.2022.114537. PubMed PMID: 36273599; PubMed Central PMCID: PMC9729515.

2 Abbass K, Qasim MZ, Song H, Murshed M, Mahmood H, Younis I. A review of the global climate change impacts, adaptation, and sustainable mitigation measures. Environ Sci Pollut Res Int. 2022(28):42539-42559. doi: 10.1007/s11356-022-19718-6. PubMed PMID: 35378646; PubMed Central PMCID: PMC8978769.

3 Sanjari S, Soleimani MM. Validation of the Persian Version of the Engagement in E-Learning Scale in Students of the School of Nursing and Midwifery in Iran. Middle East J Rehabil Health Stud. 2023;10(3):e134881. doi: 10.5812/mejrh-134881.

4 Mohamed S, Rodrigues L, Omer S, Calautit JK. Overheating and indoor air quality in primary schools in the UK. Energy Build. 2021;250:111291. doi: 10.1016/j.enbuild.2021.111291.

5 Omidifar R, Mazari E, Ostadalidehaghi R. Investigating the Impact of Virtual Education on Air Pollution Indicators in Tehran during the COVID-19 Outbreak. Pollution. 2023;9(4):1914-24. doi: 10.22059/poll.2023.360774.1951.

6 Ahiaku PKA, Uleanya C, Muyambi GC. Rural schools and tech use for sustainability: the challenge of disconnection. Educ Inf Technol. 2025;30(9):12557-71. doi: 10.1007/s10639-024-13311-9.

7 Mohamadi Soliemani MR, Sanjari S, Dortaj F, Delavar A, Shokry H. A Model for Ranking the Quality of Educational Services in Medical Sciences Universities. Iranian Journal of Medical Education. 2017;17(0):132-44. [In Persian]

8 Barani H, Mohammadi Soleimani MR, Amirfakhraei A, Wahab Samavi SA. Transcultural Adaptation and Psychometric Evaluation of the Online Learning Self-Efficacy Scale among High School Seniors in Bandar Abbas City. Interdiscip J Virtual Learn Med Sci. 2024;15(1):62-75. doi: 10.30476/ijvlms.2023.100230.1258.

9 Aliakbari Borovati F, Mohammadi Ahmadabadi N, Sanjari S, Keikha A, Bameri A, Panahi G, Mohamadi Soliemani M. Development and Validation of the Academic Self-Handicapping Scale for Nursing and Midwifery Students: A Study of Reliability and Agreement. Interdiscip J Virtual Learn Med Sci. 2025; 16(1): 8-23. doi: 10.30476/ijvlms.2025.105011.1324.

10 Bahmaniar S, Amirfakhraie A, mohamadisoliemani M, E Z. The Development and Validation of a Job Burnout Questionnaire for Iranian Nurses: A Case Study of Nurses Working in Hormozgan Province. J Crit Care Nurs. 2025;17(3):37-48. doi: 10.30491/

JCC.17.3.37. [In Persian]
11 Sanjari S, Tavan A, Abbasi H, Salajegheh A, Mohammadi Soliemani MR. Development and Psychometric Evaluation of the Tehran Adolescent Aggression Scale: A Mixed-Methods Study. Iran J Psychiatry Behav Sci. 2025;19(3):e153646. doi: 10.5812/ijpbs-153646.
12 Mohammad Mohammadi S, Shahrzad S. Provide a model for ranking the job performance of midwives in provide the prenatal care in health centers of Kerman province. Journal of Psychometry. 2017;5(20):105-20. [In Persian]
13 Sanjari S, Soleimani M. Validation of the Knowledge Sharing Behavior Scale Among Nursing and Midwifery Faculty Members in Iran: Psychometric Properties and Cross-Cultural Adaptation. Middle East J Rehabil Health Stud.2023;11(1):e134886. doi: 10.5812/mejrh-134886.
14 Bayat Mokhtari L, Sanjari S, Kikha A, Mohammadi Soliemani MR, Abbasi H, et al. A Cross-sectional Study of the Correlations of Sleep Quality, Anxiety, and Social Support with Academic Engagement: The Mediating Role of Mental Health. Shiraz E-Med J. 2025;26(10):e160489. doi: 10.5812/semj-160489.
15 Sun L, Kangas M, Ruokamo H, Siklander S. A systematic literature review of teacher scaffolding in game-based learning in primary education. Educ Res Rev. 2023;40:100546. doi: 10.1016/j.edurev. 2023(40).100546. doi: 10.1016/j.edurev.2023.100546.
16 Sanjari S, AmirFakhraei A, Soleimani MRM, Alidousti K. Validation of the Slade Fear of Childbirth Scale for Pregnancy in a Sample of Iranian Women: A Cross-sectional Study. Crescent J Biol Med Sci. 2022;9(3):138-46. doi: 10.34172/cjmb.2022.24.
17 Abavisani M, Taghvaei D, Pirani Z. Factor structure and validity of Gomez and colleagues' electronic self-regulation questionnaire among high school students. Fundamentals of Mental Health. 2024;26(4):223-33. doi: 10.22038/jfmh.2024.78227.3116. [In Persian]
18 López-Angulo Y, Sáez-Delgado F, Gaeta ML, Mella-Norambuena J, González-Robaina Y, Muñoz-Inostroza K. Validation of the self-regulation of learning instrument for undergraduates. Front Educ. 2024;9:1464424. doi: 10.3389/feduc.2024.1464424.
19 Kara A, Ergulec F, Eren E. The mediating role of self-regulated online learning behaviors: Exploring the impact of personality traits on student engagement. Educ Inf Technol. 2024;29(17):23517-46. doi: 10.1007/s10639-024-12755-3.
20 Alhazbi S, Hasan MA. The Role of Self-Regulation in Remote Emergency Learning: Comparing Synchronous and Asynchronous Online Learning. Sustainability. 2021;13(19): 11070. doi: 10.3390/su131911070.
21 Alizadeh A, Mahmoodi F, Adib Y, Imada T. Dominant Culture in Iran's Primary School Textbooks: A Comparison Between Individualism and Collectivism. IJCE. 2024;7(1):2895-916. doi: 10.22034/ijce.2023.406204.1508.
22 Shahbazian S, Amirfakhraei A, Sanjari S. Psychometric Validation of the Hypersexual Behavior Scale in University Students in Bandar Abbas, Southern Iran. Iran J Psychiatry Behav Sci. 2025;19(3):e152425. doi: doi.org/10.5812/ijpbs-152425.
23 Sajadi Monazah H, Mohammadi Soleimani MR, Jahan F. Development of a coping skills educational package and its effectiveness on awareness, attitude, and behavior regarding group conflicts among male adolescents. JFMH. 2024;26(6):363-72. doi: 10.22038/jfmh.2024.79244.3122.
24 Bayat Mokhtari L, Tavan A, Sanjari S, Mohammadi Soliemani MR, Salajegheh A. The Impact of Peer Relationships, Moral Development, and Family Relationships on Collective Violence with the Mediating Role of Psychological Security. Middle East J Rehabil Health Stud. 2025;12(1):e151732. doi: 10.5812/

mejrh-151732.
25 Azizi M. Effectiveness of Group Self-Control Instruction on Self-Regulatory Learning Skills and Resilience in sixth-grade Elementary Students. REEK. 2021;2(4):22-31. doi: 20.1001.1.26765500.1399.2.4.3.6.
26 Jamali Paghale S, Khademi Ashkzari M, Akhavan Tafti M, Abedi A. Effectiveness of Early Educational Interventions on Self-Regulation Skills in Preschool Children. IJLM. 2018;1(1):31-41. doi: 10.22034/iepa.2018.77424.
27 Sanjari S, Soleimani M, Keramat A. Development and Validation of an Electronic Scale for Sexual Violence Experiences in Iranian Women. Crescent J Biol Med Sci. 2022;10:27-35. doi: 10.34172/cjmb.2023.05.
28 Çavaş P, Arslan Cansever B, Ünver G. Developing the Perceived Self- Regulation Skills Scale for Fourth Grade Students. Croat J Educ. 2020;22(3). doi: 10.15516/cje.v22i3.3623.
29 Erdogan T, Senemoglu N. Development and validation of a scale on self-regulation in learning (SSRL). Springerplus. 2016;5(1):1686. doi: 10.1186/s40064-016-3367-y. PubMed PMID: 27733987; PubMed Central PMCID: PMC5042915.
30 Morais E, Santos AC, Mouraz A. Validation and proposal of a short version of the Motivated Strategies for Learning Questionnaire (MSLQ) for Portuguese adolescent students. Front Educ. 2025;10:1445548. doi: 10.3389/feduc.2025.1445548.
31 Weinstein CE, Palmer DR, Schulte AC. Learning and Study Strategies Inventory (LASSI): User's Manual. 2nd ed. Clearwater (FL): H&H Publishing Company; 1987.
32 Zimmerman W, Kulikowich J. Online Learning Self-Efficacy in Students With and Without Online Learning Experience. Am J Distance Educ. 2016;30:180-91. doi: 10.1080/08923647.2016.1193801.
33 Jongen C, McCalman J, Bainbridge R. Health workforce cultural competency interventions: a systematic scoping review. BMC Health Serv Res. 2018;18(1):232. doi: 10.1186/s12913-018-3001-5. PubMed PMID: 29609614; PubMed Central PMCID: PMC5879833.
34 Sajadi Monazah H, Mohammadi Soliemani MR, Jahan F. Investigating the Factor Structure and Validation of the Multidimensional Scale of Acceptance of Collective Violence Among Teenagers: An Exploratory and Confirmatory Factor Analysis. Iran J Psychiatry Behav Sci. 2024;18(2):e137999. doi: 10.5812/ijpbs-137999.
35 Sanjari S, Kamali A, AmirFakhraei A, Mohammadi Soleimani MR, Karimi Afshar E. Construction and validation of a self-report violence scale in Iranian women. Fundamentals of Mental Health. 2021;23(3):181-9. doi: 10.22038/jfmh.2021.18583.
36 Katayoun Alidousti Ali Hosseini Nasab SS, Mohammad Reza Mohammadi Soleimani. An investigation into the effects of COVID-19 vaccines on Iranian women's menstrual cycle. Ital J Gynaecol Obstet. 2023;36(1):81-9. doi: 10.36129/jog.2023.113.
37 Gomes M, Monteiro V, Mata L, Peixoto F, Santos N, Sanches C. The Academic Self-Regulation Questionnaire: a study with Portuguese elementary school children. Psicologia: Reflexão e Crítica. 2019;32(1):8. doi: 10.1186/s41155-019-0124-5.
38 Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine (Phila Pa 1976). 2000;25(24):3186-91. doi: 10.1097/00007632-200012150-00014. PubMed PMID: 11124735.
39 Jalali A, Naghibzadeh A, Mohammadi MM, Rahmani S, Moradi P, Taghvostani NM, Moradi K. Translation and psychometric evaluation of the Persian version of the learning behavior questionnaire among undergraduate nursing students. BMC Med Educ. 2025;25(1):1230. doi: 10.1186/s12909-025-07867-4. PubMed PMID:

40886000; PubMed Central PMCID: PMC12398173.
40 Torabi B, Amirfakhraei A, Gazaki PR, Soleimani MRM. Predicting the Psychological well-being of Working Children Based on Work Anxiety, School Anxiety and Hope for Education in Bandar Abbas. JPEN. 2023;9(4):44-51. doi: 10.22034/JPEN.9.4.44. [In Persian]
41 Karimian Z, Chahartangi F. Development and validation of a questionnaire to measure educational agility: a psychometric assessment using exploratory factor analysis. BMC Med Educ. 2024;24(1):1284. doi: 10.1186/s12909-024-06307-z.
42 Yeganeh H, Parvaresh H, Dehghani Ghanataghestani M, Mohammadi Soleimani M. Validation of the HSE Assessment Tools in the Kerman Province Steel Industry Complex: A Case Study. SJSPH. 2023;20 (4):423-34. [In Persian]
43 Tavakol M, Dennick R. Making sense of Cronbach's alpha. Int J Med Educ. 2011;2:53-55. doi: 10.5116/ijme.4dfb.8dfd. PubMed PMID: 28029643; PubMed Central PMCID: PMC4205511.
44 Aristovnik A, Karampelas K, Umek L, Ravšelj D. Impact of the COVID-19 pandemic on online learning in higher education: a bibliometric analysis. Front Educ. 2023;8(1). doi: 10.3389/feduc.2023.1225834.
45 Singh J, Steele K, Singh L. Combining the Best of Online and Face-to-Face Learning: Hybrid and Blended Learning Approach for COVID-19, Post Vaccine, & Post-Pandemic World. J Educ Technol Syst. 2021;50(2):140-71. doi: 10.1177/00472395211047865.
46 Dai J, Azhar A. Collaborative governance in disaster management and sustainable development. Public Adm Dev. 2024;44(4):358-80. doi: doi.org/10.1002/pad.2071.
47 Khojasteh L, Karimian Z, Farahmandi AY, Nasiri E, Salehi N. E-content development of English language courses during COVID-19: a comprehensive analysis of students' satisfaction. J Comput Educ. 2023;10(1):107-33. doi: 10.1007/s40692-022-00224-0.
48 Bandura A. Self-Efficacy in Changing Societies. New York: Cambridge University Press; 1995.
49 Huang J, Cai Y, Lv Z, Huang Y, Zheng XL. Toward self-regulated learning: effects of different types of data-driven feedback on pupils' mathematics word problem-solving performance. Front Psychol. 2024;15:1356852. doi: 10.3389/fpsyg.2024.1356852. PubMed PMID: 39411557; PubMed Central PMCID: MCPMC11473304.
50 Yavuzalp N, Bahcivan E. A structural equation modeling analysis of relationships among university students' readiness for e-learning, self-regulation skills, satisfaction, and academic achievement. RPTEL. 2021;16(1):15. doi: 10.1186/s41039-021-00162-y.
51 Morosanova VI, Bondarenko IN, Fomina TG. Conscious Self-regulation, Motivational Factors, and Personality Traits as Predictors of Students' Academic Performance: A Linear Empirical Model. Psychol Russ. 2022;15(4):170-187. doi: 10.11621/pir.2022.0411. PubMed PMID: 36761715; PubMed Central PMCID: PMC9903235.
52 Vohs KD, Schmeichel BJ. Self-regulation and the extended now: controlling the self alters the subjective experience of time. J Pers Soc Psychol. 2003;85(2):217-30. doi: 10.1037/0022-3514.85.2.217. PubMed PMID: 12916566.
53 Opdenakker MC. Developments in early adolescents' self-regulation: The importance of teachers' supportive vs. undermining behavior. Front Psychol. 2022;13:1021904. doi: 10.3389/fpsyg.2022.1021904. PubMed PMID: 36506985; PubMed Central PMCID: PMC9728101.