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Psychometric properties of the educational leadership scale for nursing students

Amir Jalali[1], Ebrahim Ezzati[2], Fatemeh Hadadian[3], Shamsodin Rahmani[4], Amirhossein Naghibzadeh[5] and khalil Moradi[6*]

Abstract

Background Educational leadership plays a crucial role in the development of nursing students, significantly enhancing their clinical skills and preparing them to lead advancements in healthcare. This comprehensive educational approach ensures that nursing students are well-equipped to address contemporary healthcare challenges effectively.

Aim This study aimed to translate the Educational Leadership Scale for Nursing Students into Persian and evaluate its psychometric properties among Iranian nursing students.

Methods This cross-sectional methodological study was conducted in two phases: translation and cultural adaptation, followed by psychometric evaluation. After obtaining permission from the original scale developer, the scale was translated into Persian using the Pilot and Yang model. Face and content validity were assessed both qualitatively and quantitatively. Construct validity was evaluated through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). A convenience sample of 469 nursing students from nursing faculties in Kermanshah Province, Iran, completed the questionnaire. Internal consistency was evaluated using Cronbach's alpha and McDonald's omega coefficients. Test–retest reliability was assessed using the intraclass correlation coefficient (ICC) in a subsample of 47 nursing students.

Results Exploratory and confirmatory factor analyses confirmed the three-factor structure of the Persian version of the instrument, with 19 items accounting for 63.80% of the total variance. The model fit was excellent, as shown by the CFI, GFI, TLI, RMSEA, and SRMR values. The scale demonstrated acceptable internal consistency reliability, with Cronbach's alpha at 0.924 and McDonald's omega at 0.923. The ICC for the total score was 0.924 (95% CI: 0.910–0.936).

Conclusion The results of the present study indicate that the Persian version of the Educational Leadership Scale for Nursing Students possesses acceptable psychometric properties. The results of face, content, and construct validity, along with reliability indices (including internal consistency and test–retest reliability), indicate that this instrument is an effective tool for evaluating educational leadership characteristics among Iranian nursing students. However, to further confirm the validity and reliability of this scale, future studies with larger and more diverse samples of nursing students, including those in clinical settings, are recommended. Furthermore, examining the criterion validity and discriminant validity of this instrument could contribute to a better understanding of its psychometric characteristics.

Keywords Nursing student, Educational leadership, Psychometric properties, Validity, Reliability

*Correspondence:
khalil Moradi
moradi.khalil12@gmail.com
Full list of author information is available at the end of the article

Introduction

Nurses, as the largest segment of healthcare professionals, play a pivotal role in addressing the evolving health needs of communities in the contemporary era [1]. Effective nursing leadership is a cornerstone in ensuring optimal responses to these demands. Leadership is a fundamental component of the nursing profession, significantly influencing patient safety and outcomes [2, 3]. Consequently, incorporating leadership skills into nursing education is paramount for preparing the future nursing workforce to meet the challenges of modern healthcare [4].

A critical component of nursing education is the concept of educational leadership [5]. In academic discourse, educational leadership is commonly conceptualized as the capacity to influence others and stimulate their motivation, thereby facilitating the attainment of shared objectives [6]. Educational leadership among nursing students is a multifaceted construct encompassing a diverse array of skills and behaviors, including the ability to influence and inspire peers, establish supportive and effective learning environments, collaborate on group projects, and engage in interprofessional partnerships. Nursing students equipped with effective educational leadership skills can play a pivotal role in curriculum development, mentorship, and the integration of innovative teaching methodologies. By cultivating leadership skills in nursing students, educators contribute to the preparation of a skilled and competent workforce capable of improving the quality of patient care [7] while addressing the complexities of modern healthcare systems.

Educational leadership plays a pivotal role in shaping and advancing the nursing profession, influencing various aspects of nursing practice [8]. However, cultivating this leadership style requires capacity-building across all levels of nursing education to foster quality learning and performance. The significance of educational leadership is more pronounced than ever, necessitating substantial changes and reforms in educational systems to integrate this concept more fully into nursing curricula [8]. Consequently, given the importance of educational leadership among nursing students, assessing it can play a crucial role in identifying the strengths and weaknesses of related skills in this student cohort, ultimately enhancing the quality of nursing education [9].

Existing instruments for assessing nursing leadership have predominantly focused on nurses, with limited tools designed specifically for nursing students. For instance, the Self-Assessment Leadership Instrument (SALI) [10] was developed to measure leadership among nurses. This instrument, also available in Spanish [11], can enhance leadership skills and professional development in undergraduate nursing students. Similarly, Park et al. examined the validity and reliability of the Abbreviated Self-Leadership Questionnaire (ASLQ) in Korean for use among nursing students; their work resulted in a valuable tool for enhancing future nurses'competencies by strengthening students'self-leadership skills [12]. Additionally, Unsworth et al. developed the Leading and Managing Care (LMC) assessment tool to identify constructs relevant to assessing clinical leadership competencies in nursing students. This tool employs a structured approach to developing skills in prioritization, resources management, communication, and risk management [13]. However, none of these instruments can comprehensively or specifically assess educational leadership in nursing students.

Bloom's taxonomy (1956), widely recognized for its gradual classification of educational goals, serves to facilitate and systematize learning in nursing, as it does across all fields of science [14]. This theory, by systematically categorizing educational objectives into three key domains—cognitive, affective, and behavioral—serves as a theoretical foundation for developing self-reporting tools aimed at enhancing educational leadership competencies in nursing. These three dimensions form the foundational pillars of nursing practice. In this regard, Karaman et al. [9] addressed the critical gap in the availability of a comprehensive and specialized tool for assessing educational leadership among nursing students [9]. Building on Bloom's taxonomy [14] as a theoretical framework, Karaman et al. designed the Educational Leadership Scale for Nursing Students. This instrument comprises 19 items structured into three key leadership dimensions: visionary leadership, instructional leadership, and scientific leadership. Their work offers a comprehensive framework that encompasses the multifaceted dimensions of educational leadership and provides a structured approach for evaluating leadership competencies among nursing students. The subscales of"Scientific and Visionary Leadership"include items from the cognitive, affective, and behavioral domains'outcomes, while outcomes from the affective and behavioral domains are included in the"Instructional Leadership"subscale. By integrating the tool's subscales with Bloom's taxonomy, the scale systematically supports the cultivation of students'multidimensional competencies while fostering their professional growth and advancement [9].

Cultural contexts inherent to various societies serve as pivotal determinants in the development and psychometric evaluation of standardized instruments [15]. Factors such as curricula, educational systems, resource availability, national health priorities, and societal norms play a significant role in shaping the level, quality, and dimensions of educational leadership among nursing students across diverse countries. Consequently, the application

of instruments developed in this area to various countries and languages necessitates adaptation and psychometric evaluation to align with the cultural context and prevailing norms of the target populations. This process enhances the validity and reliability of results, ensuring that the instrument accurately reflects the educational leadership competencies of nursing students in different settings. Furthermore, by adapting and validating the Educational Leadership Scale for Nursing Students [9] to the cultural and social context of each country, the specific needs of nursing students in those regions can be appropriately addressed.

A comprehensive literature review revealed an absence of instruments designed to assess educational leadership among Iranian nursing students. This gap hinders the standardized and comprehensive evaluation of this critical concept. Iran's nursing education system, which has undergone significant changes in recent decades, plays a pivotal role in achieving the nation's health goals [16]. However, leadership concepts have not been adequately addressed in Iran's nursing curricula, highlighting the need for curricular reform [17]. The development of an instrument to assess educational leadership among nursing students in Iran—where curricula have historically paid limited attention to this concept—is of paramount importance. Evaluating educational leadership levels among students can reveal curricular strengths and weaknesses in addressing and applying this concept. Such an instrument could enhance reflective educational approaches, standardize leadership training frameworks across institutions, strengthen educators'capacity to meet national and international standards and support evidence-based active learning strategies. Consequently, curricular modifications could significantly improve educational quality, producing competent nurses capable of meeting modern societies'evolving and complex healthcare needs, and ultimately enhancing standardized care.

To address this gap and consider the growing importance of educational leadership in nursing, this study aimed to adapt, translate, and psychometrically evaluate the Persian version of the Educational Leadership Scale for Nursing Students for use in Iran. Moreover, the present study seeks to determine whether the Persian version of the instrument possesses acceptable validity and reliability.

Method

Design

This cross-sectional methodological study, conducted between April and July 2024, employed a psychometric evaluation of the Persian version of the Educational Leadership Scale for Nursing Students. The research design involved two primary phases: a translation and cultural adaptation process, followed by a rigorous assessment of the scale's psychometric properties.

Participants and setting

The study involved 469 nursing students enrolled in the nursing faculties of Kermanshah Province (Kermanshah City and Sonqor City), Iran. To ensure adequate sample sizes for both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), participants were allocated to these analyses based on the recommended ratios of 2 to 20 participants per item for EFA [18] and a sample size ranging from 150 to 500 for CFA [19]. Given the 19-item Educational Leadership Scale, the 469 nursing students were randomly divided into two groups: 160 for EFA and 309 for CFA. A convenience sampling method was utilized to recruit nursing students in their second to fourth years who fulfilled the inclusion criteria and provided consent to participate. Participants with more than 10% missing data were excluded from the analysis [20]. The final response rate was 91.6%.

Face validity was assessed using feedback from 20 nursing students, and content validity was evaluated by 14 experts. The intraclass correlation coefficient (ICC) was calculated using data from 47 students who participated in two phases 14 days apart. McDonald's Omega and Cronbach's Alpha reliability analyses were conducted using data from 309 participants in the CFA.

Study instrument

The study utilized the Educational Leadership Scale for Nursing Students, originally developed by Funda Karaman et al. in Turkey in 2023 [9]. This 19-item scale measures three dimensions of educational leadership: Visionary Leadership (10 items), Instructional Leadership (5 items), and Scientific Leadership (4 items). Respondents rate each item on a 5-point Likert scale ranging from 1 ("Never Disagree") to 5 ("Strongly Agree"). Total scores range between 19 and 95 points, with higher scores indicating progressively higher educational leadership levels among nursing students. The scale contains no inverse items. It demonstrates strong construct validity and a high Cronbach's alpha coefficient of 0.92, confirming excellent internal consistency [9].

Translation and cultural adaptation

Following permission from the original developers, the Educational Leadership Scale for Nursing Students was translated and culturally adapted using the Polit and Yang model [21]. The process involved the following steps:

- *Forward Translation:* Two Iranian translators fluent in Persian and English independently translated the scale from English to Persian.
- *Synthesis:* A single Persian version was synthesized after expert review of the translations.

- *Back-Translation:* Two additional bilingual translators, blinded to the original scale, back-translated the Persian version into English.
- *Reconciliation:* A refined final Persian version was developed through expert consultation.
- *Pre-testing and Cognitive Interviewing:* Clarity and relevance were assessed via interviews with 10 nursing students, who evaluated each item for difficulty, irrelevance, and ambiguity.

Psychometric evaluation

This phase assessed the validity (face, content, and construct) and reliability (internal consistency) of the Persian version of the scale.

Face validity assessment

Quantitative face validity was evaluated by having 20 nursing students complete the questionnaire. Respondents rated the importance of each item on a 5-point Likert scale ranging from"not important"to"completely important."The impact score for each item was calculated using the formula:

$$Impact\ Score = Frequency \times Importance$$

Items with an impact score above 1.5 were retained for further analysis [22].

Content validity assessment

Content validity was evaluated through qualitative and quantitative methods. For qualitative assessment, 14 experts (five nursing faculty members, five nursing managers with master's degrees, and four clinical nurses with master's degrees) reviewed the scale's items for grammatical accuracy, wording, item placement, clarity, scoring, and cultural relevance to Iran.

Quantitative content validity was determined using two indices:

- *Content Validity Ratio (CVR):* Experts rated item necessity on a 3-point scale ("necessary,""useful but not necessary,""not necessary") [23, 24]. The CVR was evaluated against Lawshe's table, with a minimum acceptable value of 0.49 for 14 experts [25]
- *Content Validity Index (CVI):* Experts rated item relevance on a 4-point scale ("not relevant" to "very relevant"). A CVI $\geq$0.79 was deemed excellent per Polit and Beck's criteria [26].
- *Construct Validity Assessment*

Exploratory Factor Analysis (EFA) was conducted with Varimax rotation. The Kaiser–Meyer–Olkin (KMO) and Bartlett's tests were used to evaluate sampling adequacy. A KMO value greater than 0.7 and a significant Bartlett's test ($p < 0.05$) indicated adequate sampling [27]. Factors with eigenvalues exceeding one and factor loadings above 0.5 were retained [28, 29].

Confirmatory Factor Analysis (CFA) was employed to assess the effectiveness of each item in measuring the scale's factors. The following model fit indices were evaluated: $\chi^2/df < 3$, RMSEA < 0.08 [30], GFI > 0.90, CFI > 0.90, TLI > 0.90, IFI > 0.90, and AGFI > 0.80 [31, 32].

Reliability assessment

The internal consistency of the scale was evaluated using Cronbach's alpha and McDonald's ω coefficients. Both coefficients were deemed acceptable when exceeding 0.70 [33]. Test–retest reliability was assessed using the Intraclass Correlation Coefficient (ICC) on a subset of 10% of the sample ($n = 47$ nursing students) over two occasions, 14 days apart [34]. An ICC of 0.75 or higher was deemed indicative of acceptable test–retest reliability [35].

Data collection

This study used a demographic form to collect data on age, gender, marital status, and education level. The Educational Leadership Scale for Nursing Students was also administered. Data were collected in person at the nursing school, following the students'academic schedules. Collaboration with nursing faculty ensured questionnaire administration within classrooms. For students engaged in clinical rotations (fourth-year) who were not present on campus, researchers visited their respective hospitals to facilitate questionnaire completion by participants.

Statistical analysis

Data were analyzed using SPSS (version 26.0) and LISREL (version 8.0). Normality was assessed via skewness and kurtosis. For the Educational Leadership Scale for Nursing Students, skewness and kurtosis values for all items ranged from −2 to 2, indicating approximately symmetrical distributions. Statistical techniques included Cronbach's alpha, McDonald's ω, Intraclass Correlation Coefficient (ICC), and exploratory and confirmatory factor analyses.

Results

Descriptive results

A total of 160 nursing students participated in the EFA phase. The sample had a mean age of 23.19 years ($SD = 2.84$), ranging from 20 to 33 years. The majority of participants were male (51.2%), single (96.9%), and in their second year of undergraduate studies (41.2%).

For the CFA phase, the sample size consisted of 309 nursing students. The mean age was slightly higher at 23.52 years ($SD = 2.36$), with an age range of 20 to

Table 1 Demographic characteristics of participants in the study

Variables		N (%)	
		EFA (160)	CFA (309)
Age (years)		23.19 ± 2.84	23.52 ± 2.36
Gender	Male	82 (51.2)	142 (46)
	Female	78 (48.8)	167 (54)
Marital Status	Single	155 (96.9)	295 (95.5)
	Married	5 (3.1)	14 (4.5)
Educational Level	Second Year	66 (41.2)	116 (37.5)
	Third Year	48 (30)	75 (24.3)
	Fourth Year	46 (28.8)	118 (38.2)

33 years. Most participants were female (54%), single (95.5%), and in their fourth year of undergraduate studies (38.2%). A detailed breakdown of the demographic characteristics for both phases is presented in Table 1.

Face validity

The qualitative face validity assessment identified items 8 and 11 as requiring clarification to eliminate ambiguity. Following the necessary revisions, all items were retained for further analysis in the quantitative face validity evaluation, as each item recorded an impact score greater than 1.5.

Content validity

Qualitative content analysis identified the need for modifications in three items (4, 13, and 17) to enhance clarity and comprehensibility. Following expert review and revisions, these items were deemed appropriate. The quantitative content validity of the scale was assessed using the CVR, which was found to be 0.87. This value falls within the acceptable range of 0.71 to 1. Additionally, the CVI, calculated using the Waltz and Bausell index, was 0.95, with individual item scores ranging from 0.86 to 1. Supplementary Table 1.

EFA of construct validity

EFA was conducted on a sample of 160 participants to examine the construct validity of the scale. The Kaiser–Meyer–Olkin (KMO) measure, a widely used indicator of sampling adequacy, was found to be 0.897. Bartlett's test of sphericity was also conducted to assess the appropriateness of factor analysis. The test yielded a significant result ($\chi^2 = 2220.637$, $p < 0.001$), confirming that the correlation matrix is not an identity matrix.

The EFA, using the Maximum Likelihood (ML) method and Varimax rotation, identified a three-factor solution with eigenvalues greater than 1.0, accounting for 63.80% of the total variance. As shown in Table 2, all 19 items on the scale had factor loadings above 0.50 and were assigned to the three factors: Visionary Leadership (10 items), Instructional Leadership (5 items), and Scientific Leadership (4 items). Three factors were selected for analysis, identified by retaining only those with eigenvalues greater than, the scree plot, presented in Supplementary Fig. 1, visually confirms the three-factor structure of the scale.

CFA of construct validity

A CFA was conducted on a sample of 309 nursing students to validate the three-factor structure of the scale. The results indicated a satisfactory model fit, with $\chi^2 = 337.19$, $p < 0.0001$, RMSEA = 0.07, NNFI/TLI = 0.94, CFI = 0.90, GFI = 0.90, SRMR = 0.048, and df = 149 (χ^2/df = 2.26).

The path diagram and factor loadings from the CFA are depicted in Fig. 1. Additionally, Pearson's correlation analysis revealed significant and positive relationships between the subscales and the overall scale, as shown in Table 3. All first- and second-order factor loadings were statistically significant at the 95% confidence level ($|\lambda| > 1.96$). The Lambda coefficients (λ), which represent the standardized factor loadings for each factor, are presented in Table 4.

Reliability tests

Internal consistency

The Cronbach's alpha coefficient for the overall scale was 0.924, indicating excellent internal consistency. For the individual factors, Cronbach's alpha ranged from 0.711 to 0.903, demonstrating acceptable reliability for all factors (Table 4). Similarly, McDonald's omega coefficient for the total scale was 0.923, and values for the three factors ranged from 0.710 to 0.903, further supporting the scale's reliability. These findings collectively demonstrate strong internal consistency.

Test–retest reliability

The Intraclass Correlation Coefficient (ICC) for the total score of the scale was 0.924 (95% CI: 0.910–0.936), indicating high test–retest reliability (Table 4).

Discussion

The present study aimed to adapt and validate the Persian version of the Educational Leadership Scale for Nursing Students. The results confirmed the three-factor structure of the scale, namely Visionary Leadership, Instructional Leadership, and Scientific Leadership, which accounted for 63.80% of the total variance. Exploratory and confirmatory factor analyses demonstrated a good model fit, indicating that this scale effectively measures

Table 2 Item factor loadings from exploratory factor analysis of the Persian version of the educational leadership scale for nursing students

Factors	Items	Mean (sd)[a]	Factors			communality
			1	2	3	
Scientific Leadership	Q1	3.65(1.15)	.170	.122	.765	.629
	Q2	3.63(1.07)	.195	.178	.793	.698
	Q3	3.40(1.17)	.212	.213	.757	.663
	Q4	3.69(1.03)	.367	.256	.558	.511
Instructional Leadership	Q5	3.97(1.11)	.350	.798	.117	.773
	Q6	4.11(1.06)	.360	.733	.233	.721
	Q7	4.12(1.02)	.387	.711	.226	.707
	Q8	3.95(1.12)	.260	.769	.226	.711
	Q9	4.07(1.09)	.215	.812	.190	.742
Visionary Leadership	Q10	3.95(1.08)	.622	.177	.280	.497
	Q11	4.10(1.04)	.747	.126	.216	.621
	Q12	4.10(1.00)	.732	.285	.156	.641
	Q13	4.05(1.02)	.738	.351	.111	.680
	Q14	4.07(1.04)	.752	.298	.140	.675
	Q15	4.26(.95)	.630	.290	.167	.509
	Q16	4.13(.98)	.592	.242	.253	.473
	Q17	3.99(1.15)	.725	.283	.214	.652
	Q18	4.07(1.02)	.789	.222	.168	.699
	Q19	3.61(1.22)	.642	.254	.216	.523
Eigenvalue			9.219	1.456	1.448	
Percentage of the Variance (%)			48.523	7.664	7.620	

[a] The mean and deviation of each item's score

the intended constructs. These findings align with research by Karaman et al. on the original version of the scale [9], which reported 58.64% explained variance. This comparison suggests that the Educational Leadership Scale for Nursing Students exhibits cross-cultural generalizability and can reliably measure educational leadership constructs in both Iranian and Turkish contexts.

An essential aspect of evaluating an instrument is examining its validity. In this study, the face and content validity of the Educational Leadership Scale for Nursing Students were rigorously assessed. The qualitative face validity assessment identified the need for clarification in certain items. After making revisions, all items achieved impact scores greater than 1.5 during the quantitative face validity evaluation, confirming their acceptability. This finding is consistent with Daud's study [36], where face validity was established post-revision. For content validity, expert feedback was incorporated, yielding a CVR of 0.87 and a CVI of 0.95. These values correspond with Samad's study [37], which reported CVR and CVI values of 0.78 and 0.89, respectively. The results confirm strong content validity and comprehensive coverage of the target constructs. Ensuring face and content validity enhances participant comprehension and alignment with research objectives, thereby bolstering the instrument's credibility [37].

Reliability is another critical psychometric property. The Educational Leadership Scale for Nursing Students demonstrated high internal consistency, with a Cronbach's alpha coefficient of 0.924 for the total scale and subscale values ranging from 0.711 to 0.903. These results align with prior studies on educational leadership [38]. For instance, Aldighrir [39] reported a Cronbach's alpha of 0.89 for a similar instrument among faculty members. Additionally, the McDonald's omega coefficient ($\omega = 0.923$) further confirmed the reliability of the scale in this study. Test–retest reliability, assessed via intraclass correlation coefficient (ICC), yielded a total score ICC of 0.924 (95% CI: 0.910–0.936), consistent with Gustafsson's findings [40] (ICC range: 0.70–0.96). The high ICC underscores the scale's temporal stability, a vital feature for longitudinal and intervention studies [41]. Collectively, these results validate the scale's reliability and internal consistency, reinforcing its utility in educational leadership research.

Among the identified factors,"Scientific Leadership" emerged as the most influential, explaining 48.523% of the total variance. This underscores the critical role of scientific

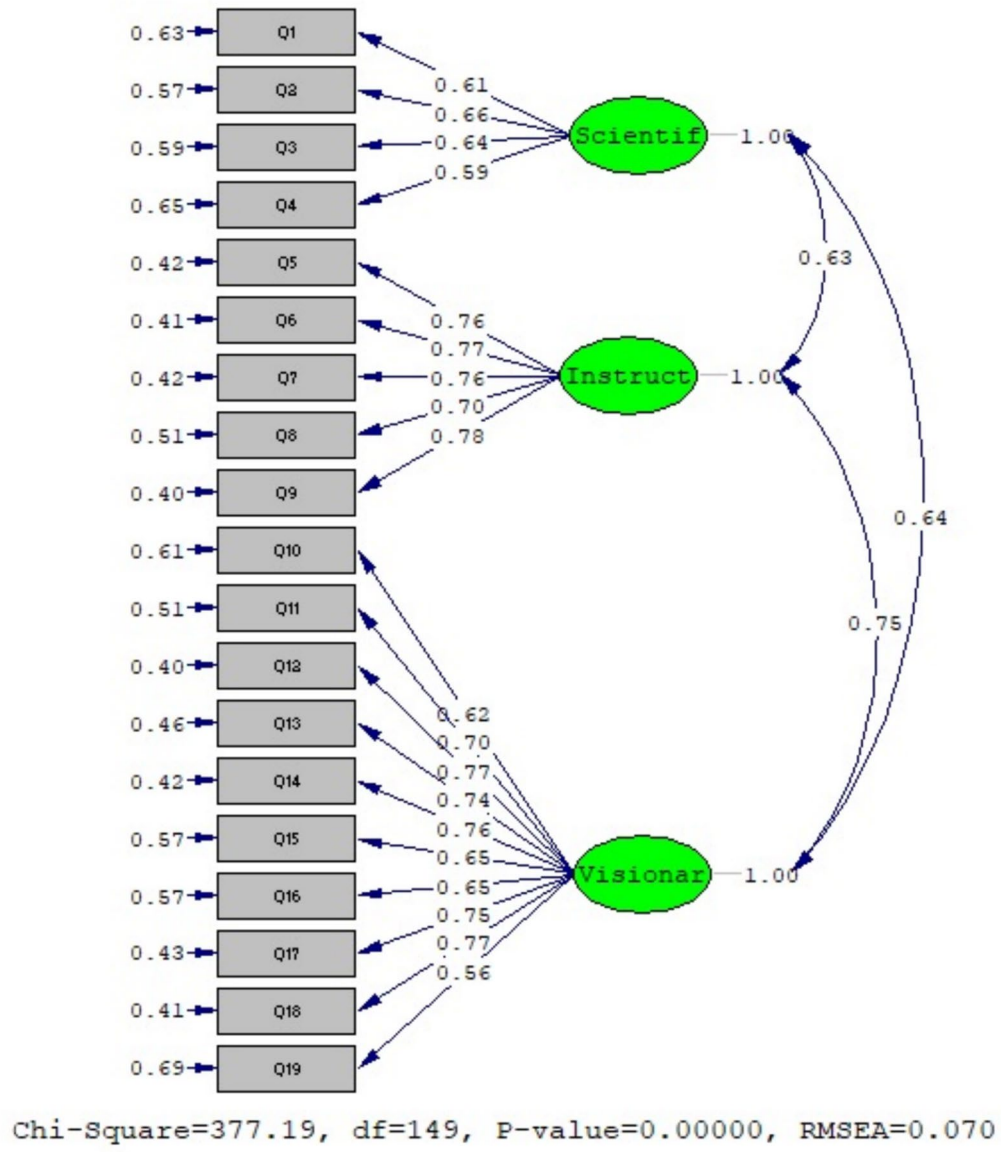

Fig. 1 Final measurement model of the Persian version of the educational leadership scale for nursing students derived from confirmatory factor analysis

leadership in preparing nursing students for clinical settings. Studies have demonstrated that scientific leadership empowers nurses to effectively apply their scientific and leadership abilities in complex clinical situations [42]. Research in other fields, such as medical education, has identified scientific leadership as a key factor in improving the quality of education and learning [43]. These skills enable nurses to make informed decisions in complex clinical scenarios [44, 45], contribute to enhancing healthcare quality, and improve patient outcomes [42, 46]. To address complex clinical challenges effectively, students must cultivate their scientific and leadership skills [4, 44, 45]. The"clinical

Table 3 The correlations between the Persian version of the educational leadership scale for nursing students and its subscales

3	2	1	Factor
		1	F. 1 Visionary Leadership
	1	.677**	F. 2 Instructional Leadership
1	.496**	.52**	F. 3 Scientific Leadership

Correlations represent latent factor correlation estimates derived from the CFA model. All correlations were statistically significant at $p < .01$

** $P < 0.01$

Table 4 T-value, Pearson correlation coefficient, factor loadings, McDonald's ω, and Cronbach's Alpha of the Persian version of the educational leadership scale for nursing students

Factor	No	t_{value}[a]	(λ)[b]	R[c]	McDonald's ω	ICC	Cronbach's Alpha
Factor 3 Scientific Leadership	Q1	10.27	.61***	.55**	.71	.711 (CI:.654—.76)	.711
	Q2	11.3	.66***	.604**			
	Q3	11.03	.64***	.629**			
	Q4	9.96	.59***	.678**			
Factor 2 Instructional Leadership	Q5	15.14	.76***	.751**	.833	.831 (CI:.798—.86)	.831
	Q6	15.41	.77***	.773**			
	Q7	15.21	.76***	.781**			
	Q8	13.54	.70***	.738**			
	Q9	15.54	.78***	.72**			
Factor 1 Visionary Leadership	Q10	11.06	.62***	.67**	.903	.903 (CI:.886-.919)	.903
	Q11	13.61	.70***	.699**			
	Q12	15.7	.77***	.75**			
	Q13	14.61	.74***	.75**			
	Q14	15.42	.76***	.764**			
	Q15	12.54	.65***	.704**			
	Q16	12.54	.65***	.68**			
	Q17	15.22	.75***	.755**			
	Q18	15.64	.77***	.722**			
	Q19	10.26	.56***	.66**			
The Persian version of the Educational Leadership Scale for Nursing Students					.923	.924 (CI:.91-.936)	.924

*** $P < 0.001$; ** $P < 0.01$; * $P < 0.05$

[a] The calculated values of all factor loadings, both first-order and second-order, exceed 1.96, indicating statistical significance at the 95% confidence level

[b] The specific value, represented by the Lambda coefficient (λ), is calculated as the sum of the factor loadings for all variables associated with that factor

[c] Pearson Correlation Coefficient

problem-solving"and"professional identity"subscales of other scales correlate with this factor, highlighting the importance of problem-solving and decision-making skills in clinical practice [47, 48]. These skills empower nurses to address common and complex challenges in clinical settings innovatively and effectively [49]. Clinical judgment and nursing performance involve the ability to assess clinical situations, identify patient needs, prioritize care, implement appropriate interventions, and evaluate patient responses to treatment [43].

The second identified factor,"Instructional Leadership," accounted for 7.664% of the total variance, ranking second in the measurement of educational leadership. This finding aligns with the study by Karaman et al., in which this factor was also ranked second in importance [9]. This factor comprises items related to instructional applications and leadership abilities in educational settings. The significance of instructional leadership in nursing is particularly evident in its ability to motivate students and enhance their clinical skills [50, 51]. In other disciplines, such as teacher education, instructional leadership has been recognized as a potent factor in creating positive learning environments and fostering student motivation [52]. This type of leadership empowers teachers and nurses to challenge students through innovative methods and engage them in more active learning processes [50–52].

The third factor,"Visionary Leadership,"contributed 7.620% of the total variance and encompasses items focused on creating a vision and motivating nursing students. This factor signifies the ability of nurses to inspire and motivate others toward shared goals [53, 54]. In studies on educational leadership across various disciplines, visionary leadership has been recognized as a crucial skill in enhancing service quality and fostering teamwork [55]. This type of leadership empowers nurses to guide clinical teams toward shared objectives by establishing a common vision, thereby improving healthcare quality [52]. Visionary leadership also equips nurses to respond swiftly and make resilient decisions in emergency and unexpected situations [56]. In essence, visionary leadership is a pivotal skill for improving healthcare quality and advancing the standard of healthcare services [52].

Limitations

This study employed a cross-sectional design and utilized convenience sampling to recruit nursing students from a western province in Iran. The investigation focused on evaluating the psychometric properties of the Persian version of the Educational Leadership Scale for Nursing Students. However, the inherent limitations of the cross-sectional design and the specific nature of the sample may restrict the generalizability of the findings. Additionally, while the content and construct validity of the scale were assessed, criterion-related validity—including measures such as concurrent and predictive validity—was not examined. Furthermore, the extent to which cultural and contextual factors influence responses to the scale remains unclear. Future research should explore the cultural adaptation of this instrument in more diverse populations to better understand the influence of culture on educational leadership and address the unique needs of nursing students across different regions of a country.

Conclusion

This study successfully developed and validated a culturally appropriate instrument for assessing educational leadership among Iranian nursing students. The tool can serve as a valuable resource for educational and clinical administrators to evaluate and enhance educational leadership competencies among students. Researchers and research managers may also use this instrument to conduct further studies on educational leadership within Iran, contributing to broader efforts to improve nursing education and practice.

Abbreviations

CVI	Content Validity Index
CVR	Content Validity Ratio
KMO	Kaiser-Meyer-Olkin
EFA	Exploratory Factor Analysis
CFA	Confirmatory Factor Analysis
TLI	Tucker-Lewis Index
NFI	Normed Fit Index
GFI	Goodness of Fit Index
RMSEA	Root Mean Square Error of Approximation
PC	Principal Components
SRMR	Standardized Root Mean Square Residual
KUMS	Kermanshah University of Medical Sciences

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12909-025-07269-6.

Supplementary Material 1.

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Authors' contributions

All authors participated and approved the study design. K, M; F, H and A, J contributed to designing the study. E, E; S, R; and A, N collected the data. Data analyses were performed by A, J; F, H; and K, M. The final report and article were written by A, J; K, M; A, N; S, R; E, E; and F, H. All authors read and approved the final manuscript.

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Data availability

The data analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

This research study received ethical approval from the Ethics Committee of Kermanshah University of Medical Sciences (Ethics code: IR.KUMS.REC.1402.257). Written permission was obtained from the scale's developers for its use. All participants provided written informed consent before participation. The study was conducted in accordance with the principles outlined in the Declaration of Helsinki. All research procedures adhered to relevant guidelines and regulations.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

[1]Substance Abuse Prevention Research Center, Research Institute for Health, Kermanshah University of Medical Sciences, Kermanshah, Iran. [2]Department of Prehospital Emergency, School of Paramedical, Kermanshah University of Medical Sciences, Kermanshah, Iran. [3]Department of Medical-Surgical Nursing, School of Nursing & Midwifery, Kermanshah University of Medical Sciences, Kermanshah, Iran. [4]Department of Emergency and Critical Care Nursing, School of Nursing and Midwifery, Urmia University of Medical Sciences, Urmia, Iran. [5]Student Research Committee, Kermanshah University of Medical Sciences, Kermanshah, Iran. [6]Department of Emergency and Critical Care Nursing, School of Nursing and Midwifery, Kermanshah University of Medical Sciences, Kermanshah, Iran.

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