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Cultural adaptation and psychometric evaluation of the Persian version of the motivation for nursing student scale (MNSS)

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Abstract

Background Motivation is a critical factor in the success of nursing students, as it significantly influences their ability to acquire the necessary knowledge and skills for the nursing profession. Insufficient motivation can result in a lack of engagement with learning activities, thereby impeding the development of essential competencies.

Aim This study aimed to translate the Motivation for Nursing Student Scale (MNSS) into Persian and evaluate its psychometric properties within the context of nursing students in Iran.

Method This methodological cross-sectional study involved a sample of 542 nursing students selected through convenience sampling. The MNSS was translated into Persian following the guidelines recommended by the World Health Organization. Exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and assessments of internal consistency were conducted to evaluate the validity and reliability of the instrument.

Results The EFA and CFA validated the structure of the instrument, identifying four factors and 20 items, which explained 58.68% of the total variance. The CFA results indicated a well-fitting model with the following indices: CFI = 0.91, GFI = 0.93, IFI = 0.946, TLI = 0.92, RMSEA = 0.061, and SRMR = 0.049. The Cronbach's alpha coefficient and Intraclass Correlation Coefficient (ICC) for the scale were 0.882 and 0.802, respectively.

Conclusion The Persian version of the MNSS demonstrates satisfactory reliability and validity, making it a dependable instrument for measuring the academic motivation of nursing students. This tool can be effectively used to assess the motivation of nursing students in Iran.

Keywords Nursing students, Motivation, Psychometric properties, Validity, Reliability

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Introduction

Nowadays, the nursing profession demands motivated and skilled nurses who, in addition to their scientific and practical abilities, embody moral values and beliefs rooted in the human sciences [1, 2]. Educating dedicated and high-quality nursing students is essential, as they represent the future of the nursing profession [2]. To encourage nursing students to enhance their skills and knowledge, it is crucial to motivate them to broaden their capabilities and strive for continuous improvement in the quality of their practice [3, 4].

Motivation is a crucial factor influencing nursing students' learning and progression. High motivation is associated with educational success, while low motivation can lead to stress, dissatisfaction, and poor mental health [5, 6]. It may also increase turnover rates and lower care standards, negatively impacting patient outcomes [7, 8]. Therefore, nursing schools must create motivating environments for nursing students to ensure they acquire the knowledge and skills needed for quality healthcare [9, 10].

Academic motivation plays a vital role in nursing education by enhancing students' learning experiences, promoting active participation, and resulting in improved knowledge and skills [11, 12]. A lack of motivation can lead to lower engagement and increased dropout rates [13, 14]. Understanding what drives students' motivation is essential for teachers to enhance educational outcomes through effective teaching and engaging activities [15].

Academic motivation is shaped by a multitude of factors. Various studies have demonstrated that elements such as educational quality [16], contentment with the chosen field [17], prospects of future careers and student welfare [15], contemporary pedagogical approaches like flipped learning [18], blended learning [16], and gamification [19], as well as the influence of clinical educators [20], educational policies [21], and academic self-efficacy [22], significantly impact academic motivation.

In light of the critical importance of academic motivation, it is essential to have a comprehensive and reliable tool to assess this phenomenon among nursing students [23]. A review of the relevant literature on academic motivation evaluation identified the Academic Motivation Scale (AMS) as a key instrument developed by Vallerand et al. [24]. This scale measures students' academic motivation based on Self-Determination Theory (SDT). However, since the AMS was not specifically designed for nursing students, its effectiveness in measuring their academic motivation may be limited. Consequently, there has been an ongoing recognition of the necessity for a tool that can accurately and comprehensively assess academic motivation in nursing students [25]. Addressing this gap, Bulfone et al. developed the Motivation for Nursing Student Scale (MNSS) in 2021. This scale contains 20 items categorized into four subscales: Intrinsic Motivation, Introjected Motivation, External Motivation, and Amotivation [22]. It was specifically designed to provide a detailed and comprehensive measure of academic motivation among nursing students [23, 25].

After thorough searches of scientific texts and databases, no reliable tool has been found that has been psychometrically tested in Iran and is suitable for measuring academic motivation among nursing students in this country. The different cultural and educational contexts between Italy and Iran make it necessary to adapt any instruments used for Iranian students. Thus, this study aimed to adapt and validate the Persian version of the MNSS for nursing students in Iran, following its successful psychometric evaluation in China.

Method

Design

This methodological cross-sectional study, conducted from February to December 2023, aimed to assess the psychometric properties of the Persian version of the MNSS among nursing students. The study was executed in two main phases: initially, the translation and cultural adaptation, and subsequently, the psychometric evaluation.

Participants

Participants in this study were 542 nursing students from the nursing faculties in Kermanshah Province (Kermanshah City and Sonqor City) and Hamedan Province (Hamadan City and Tuyserkan City) located in western Iran. The nursing education system in Iran comprises both public and private sectors. The public system includes medical sciences universities affiliated with the Ministry of Health, Treatment, and Medical Education. On the other hand, the private system consists of various branches of the Islamic Azad University. Nursing education in Iran is primarily overseen by the Ministry of Health, Treatment, and Medical Education. This ministry regulates and accredits nursing programs and institutions, ensuring they meet national standards. Currently, nursing education in Iran offers a comprehensive range of programs. At the undergraduate level, students can pursue bachelor's degrees in nursing. For advanced study, master's programs are available in ten specialized fields, allowing nurses to deepen their expertise. Finally, doctoral programs provide the highest level of education for those seeking to contribute to nursing research and theory.

In this study, convenience sampling was conducted through a census method based on specific inclusion criteria, which included undergraduate nursing students in their second to fourth year who were willing to

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participate. Responses to the questionnaire that exhibited over 10% of incomplete data were excluded [26].

The translation and cultural adaptation phase

The Motivation for Nursing Student Scale (MNSS), developed by Bulfone et al. in Italy [22], is based on the Self-Determination Theory (SDT). The scale comprises four factors with a total of 20 items: Introjected Motivation (5 items), Intrinsic Motivation (6 items), External Motivation (4 items), and Amotivation (5 items). A 5-point Likert scale was utilized to assess each item, with responses ranging from 'strongly disagree' to 'strongly agree'. Scores range from 20 to 100, with higher scores indicating increased academic motivation among nursing students. The developers of the scale have effectively established its validity and reliability. The scale's Content Validity Index (CVI) was 0.90. The Cronbach's alpha values for the four factors were 0.78, 0.86, 0.73, and 0.74, respectively.

Forward-backward translation method

Firstly, after communicating with the questionnaire developers and obtaining permission to use it, the translation was conducted following the standard protocol of the World Health Organization using the forward-backward method [27].

Two proficient English individuals—one general translator and the other a medical text translation specialist—were asked to contribute to the study. At this stage, two independent Persian translations of the MNSS were created. Subsequently, these translations and their recorded equivalents were reviewed and revised, considering all options for word or phrase equivalence, culminating in a unified Persian version of the instrument. To ensure the Persian translation was fully aligned with the original tool and the items were clear, the initial translation was back-translated into English by two translators who had not seen the original questionnaire. Upon reviewing the English versions and making necessary corrections, a unified English version of the questionnaire was created and sent to the developers for final approval. Ultimately, the questionnaire was confirmed, and its psychometric properties were assessed using face, content, and construct validity.

The psychometric evaluation phase

During this stage, the research team conducted evaluations of the psychometric properties, which are elaborated upon in the subsequent segments.

Face validity assessment (qualitative and quantitative)

In this phase, a group of 30 nursing students, who were not part of the initial sample, evaluated the items of the instrument for understandability, clarity, and appropriate correlation [28]. During the quantitative phase, these nursing students rated the importance of each item using a 5-point Likert scale (1=Not important at all to 5=Very important). After calculating the impact score for each item, those with a score greater than 1.5 were retained [29].

Content validity assessment
Qualitative content validity assessment
In this stage, 14 experts in nursing and instrument development—six with PhDs in nursing, three with master's degrees, and five nurses employed in hospitals—evaluated the translated instrument's items for syntax, phrasing, clarity, and cultural compatibility with Iranian culture.

Quantitative content validity assessment
The Content Validity Ratio (CVR) and the Content Validity Index (CVI) were used to evaluate the instrument's Content validity. Fourteen experts assessed the necessity of each item on a 3-point Likert scale, which included options labeled 'Essential', 'Useful but not essential', and 'Unessential' for CVR calculation [30]. The Lawshe method was employed to calculate the CVR of the instrument based on the experts' ratings [31]. With a panel of 14 experts, the minimum acceptable CVR value was determined to be 0.51.

The CVI can be used to assess the relevance of the instrument's items at both the individual item level (I-CVI) and the overall scale level (S-CVI). To evaluate the relevance of the MNSS items, the same 14 experts rated the items using a 4-point Likert scale ranging from 1 to 4 (1=not relevant, 2=somewhat relevant, 3=quite relevant, 4=highly relevant). Also, The I-CVI was calculated by taking the ratio of experts who rated the relevance of items as 3 or 4 to the total number of experts. Items with a CVI value above 0.79 were considered suitable. Those with CVI values between 0.70 and 0.79 required modifications and items with CVI values below 0.70 were deemed unsatisfactory and excluded [32]. Furthermore, the S-CVI was determined by averaging the CVI values of all items. An S-CVI value of 0.9 or higher indicates good content validity for the scale [33].

Construct validity assessment
A test exhibits construct validity when its derived scores correlate with the intended concepts or theoretical constructs [31]. Exploratory and confirmatory factor analyses were utilized to assess the construct validity of the Persian version of the MNSS.

Out of the 542 nursing students, a subset of 205 was selected for Exploratory Factor Analysis (EFA) due to the importance of separating the samples at each stage of construct validation [34, 35]. The remaining 337 students were used for Confirmatory Factor Analysis (CFA).

Previous studies have suggested that a sample size of 200 participants is often adequate for EFA as an absolute criterion [36]. It is generally recommended to have a sample size exceeding 200 participants for the CFA stage [37, 38]. Therefore, the number of participants in this study appears to be sufficient and appropriate.

EFA was conducted using Varimax rotation. Factors with eigenvalues greater than one and factor loadings above 0.5 were retained [39, 40]. The Kaiser-Meyer-Olkin (KMO) and Bartlett's tests were employed to assess sampling adequacy. KMO values should exceed 0.7, and Bartlett's test significance should be less than 0.05 ($p < .05$) [41].

CFA demonstrates each item's effectiveness in measuring the various factors of the scale. The model fit indices were assessed using the following criteria: the ratio of chi-square to its degrees of freedom ($\chi2/df$) < 3, Root Mean Square Error of Approximation (RMSEA) < 0.08 [42], Goodness of Fit Index (GFI) > 0.90, Comparative Fit Index (CFI) > 0.90, Tucker-Lewis Index (TLI) > 0.90, Incremental Fit Index (IFI) > 0.90, and Adjusted Goodness of Fit Index (AGFI) > 0.80 [43].

Reliability

Test-retest reliability was evaluated using the Intraclass Correlation Coefficient (ICC) on 10% of the sample size ($n = 55$ nursing students) on two separate occasions, 14 days apart [44]. Subsequently, the ICC for the test-retest was calculated, with values of 0.75 or above deemed acceptable reliability [45]. Additionally, internal consistency was assessed using Cronbach's alpha [46], with values above 0.7 deemed satisfactory [47].

Table 1 Demographic characteristics of participants in study

Variables		N (%)	
		EFA (205)	CFA (337)
Age		2.43 ± 22.63	2.15 ± 22.55
Gender	Male	107(52.2)	185(54.9)
	Female	98(47.8)	152(45.1)
Educational level	First year	57(27.8)	87(25.8)
	Second year	43(21)	94(27.9)
	Third year	55(26.8)	88(26.1)
	Fourth year	50(24.4)	68(20.2)
Martial Statue	Unmarried	194(94.6)	321(95.3)
	Married	11(5.4)	16(4.7)
Family monthly income	Less than500$	135(65.9)	177(52.5)
	500–800$	53(25.9)	131(38.9)
	800–1500$	17(8.2)	29(8.6)
Priority job/study	Only job	162(79)	269(79.8)
	Job with priority of study	22(10.7)	35(10.4)
	Study with priority of job	21(10.2)	33(9.8)

Data collection procedure

Data collection was conducted face-to-face, aligned with the students' academic schedules, following the conclusion of their classes, and in collaboration with the nursing faculty during classroom periods. Under the supervision of the researchers, the questionnaires were filled out anonymously within 7 to 8 min. Each questionnaire was then individually reviewed and assigned a sequential number. Among the distributed questionnaires, 542 met the inclusion criteria, while 56 were discarded, resulting in a regression rate of 90.4%.

Statistical analysis

Data was analyzed using SPSS (version 26.0) and LISREL (version 8.0) software. The statistical methods utilized included Cronbach's alpha, Intraclass Correlation Coefficient (ICC), and both exploratory and confirmatory factor analysis.

Results

Descriptive results

In the EFA phase of this study, 205 nursing students participated, with an average age of 22.63 ± 2.43 years, ranging from 20 to 37 years. Among the participants, 52.2% were male, 5.4% were married, and 65.9% reported a family income of less than $500 per month (Table 1).

In the CFA phase, 337 nursing students participated. The average age was 22.55 ± 2.15 years, ranging from 20 to 37 years. Among the participants, 54.9% were male, 4.7% were married, and the remainder were single. The average monthly family income for 52.5% of the participants was less than $500 (Table 1).

Face validity

In the qualitative face validity assessment, item 17 was identified as requiring modifications to eliminate any ambiguity. These revisions were subsequently made and incorporated into the questionnaire. In the quantitative face validity evaluation, all items recorded an impact score greater than 1.5, resulting in the retention of all items.

Content validity

During the qualitative content analysis, eight experts suggested modifications for five distinct items (items 2, 7, 15, and 19) to improve their clarity and comprehensibility. After the review process, these items were re-evaluated, and their appropriateness was confirmed. The quantitative content validity of the instrument was evaluated using the Content Validity Ratio (CVR) for the entire questionnaire, which was 0.88, falling within the acceptable range of 0.71 to 1. Furthermore, the Content Validity Index (CVI), determined by the Waltz and Bausell index, was 0.89, with individual scores ranging from 0.79 to 1.

EFA of construct validity

EFA was performed on a sample of 205 participants. The Kaiser-Meyer-Olkin (KMO) measure for sampling adequacy was 0.84, and the significance of Bartlett's test of sphericity was confirmed with a value of 1936.767 and a *p*-value<0.001. The KMO index, surpassing the recommended threshold of 0.8, validates the appropriateness of conducting a factor analysis [48].

EFA utilizing the Maximum Likelihood (ML) analysis method and Varimax orthogonal rotation yielded a four-factor solution with eigenvalues exceeding 1.0, accounting for 58.68% of the total variance (Supplementary Tables 1 & 2). As indicated in Table 2, all 20 items on the scale had factor loadings above 0.50 and were loaded onto four factors: 5 items in Factor 1, 6 items in Factor 2, 4 items in Factor 3, and 5 items in Factor 4. Furthermore, the scree plot confirmed the scale's four-factor structure, as illustrated in Fig. 1.

CFA of construct validity

A Confirmatory Factor Analysis (CFA) employing a four-factor model was conducted on data from 337 nursing students, indicating a satisfactory fit. The fit indices were as follows: $\chi2=367.18$, *P*-value=0.0001, RMSEA=0.061, NNFI/TLI=0.92, CFI=0.91, GFI=0.93, SRMR=0.049, df=164, $\chi2/df=2.23$. The path diagram and the factor loadings from the CFA are illustrated in Fig. 2. Furthermore, as shown in Table 3, Pearson's correlation test revealed a significant and positive correlation between the subscales and the overall scale.

The computed values for all first and second-order factor loadings exceeded 1.96, signifying statistical significance at the 95% confidence level. Furthermore, the Lambda coefficient, representing a specific value, is derived from the aggregate of the factor loadings of all variables within that factor (Table 4).

Reliability tests
Internal consistency
The Cronbach's alpha for the overall MNSS was 0.882 and ranged between 0.774 and 0.836 for each factor (Table 4). These findings demonstrate suitable reliability for the entire scale.

Test-retest reliability
The ICC for the total score on the MNSS was 0.802 (95% CI: 0.753–0.847), indicating the high reliability of the scale (Table 4).

Discussion

In the present study, the MNSS, initially developed by Bulfone et al. [22], was translated and subjected to cultural psychometric evaluation within the Iranian context. This process resulted in a four-factor instrument encompassing 20 items. The factors explained 58.68% of the variance, indicating a satisfactory model fit based on the

Table 2 Item factor loadings from exploratory factor analysis

| Factor	Items	Mean (SD)	Factor				Communality
			1	2	3	4	
Intrinsic Motivation	Q5.	3.69(1.1)	0.850	−0.095	0.264	−0.104	0.811
	Q6.	3.98(1.06)	0.871	−0.122	0.279	0.071	0.824
	Q13.	4.01(1.06)	0.875	−0.017	0.216	0.006	0.806
	Q14.	3.98(1.03)	0.810	−0.068	−0.012	0.183	0.724
	Q18.	3.99(0.99)	0.752	−0.068	−0.109	0.284	0.695
	Q21.	3.97(1.01)	0.716	−0.032	0.158	0.189	0.617
Introjected Motivation	Q1.	3.21(1.23)	0.150	0.218	0.643	0.287	0.574
	Q11.	31.3(1.22)	0.322	0.109	0.697	0.187	0.644
	Q15.	2.34(1.42)	0.059	0.354	0.505	0.025	0.410
	Q16.	3.05(1.34)	0.054	0.137	0.752	0.168	0.566
	Q17.	3.22(1.33)	0.208	0.086	0.641	0.311	0.564
External Motivation	Q2.	2.98(1.27)	−0.020	0.140	0.188	0.591	0.441
	Q7.	3.63(1.21)	0.242	−0.088	0.230	0.660	0.553
	Q22.	2.5(1.65)	−0.002	0.158	0.220	0.527	0.406
	Q24.	3.86(1.08)	0.293	−0.003	0.046	0.624	0.530
Amotivation	Q3.	2.63(1.5)	−0.019	0.606	0.153	0.101	0.407
	Q4.	2.36(1.42)	−0.096	0.724	0.258	−0.117	0.563
	Q10.	2.04(1.38)	−0.188	0.738	0.270	0.055	0.629
	Q12.	2.61(1.37)	0.060	0.609	0.079	0.076	0.421
	Q20.	2.62(1.44)	−0.169	0.817	−0.090	0.115	0.620
Eigenvalue			4.379	2.773	2.679	1.907	
Percentage of the variance %			21.895	13.864	13.394	9.539	
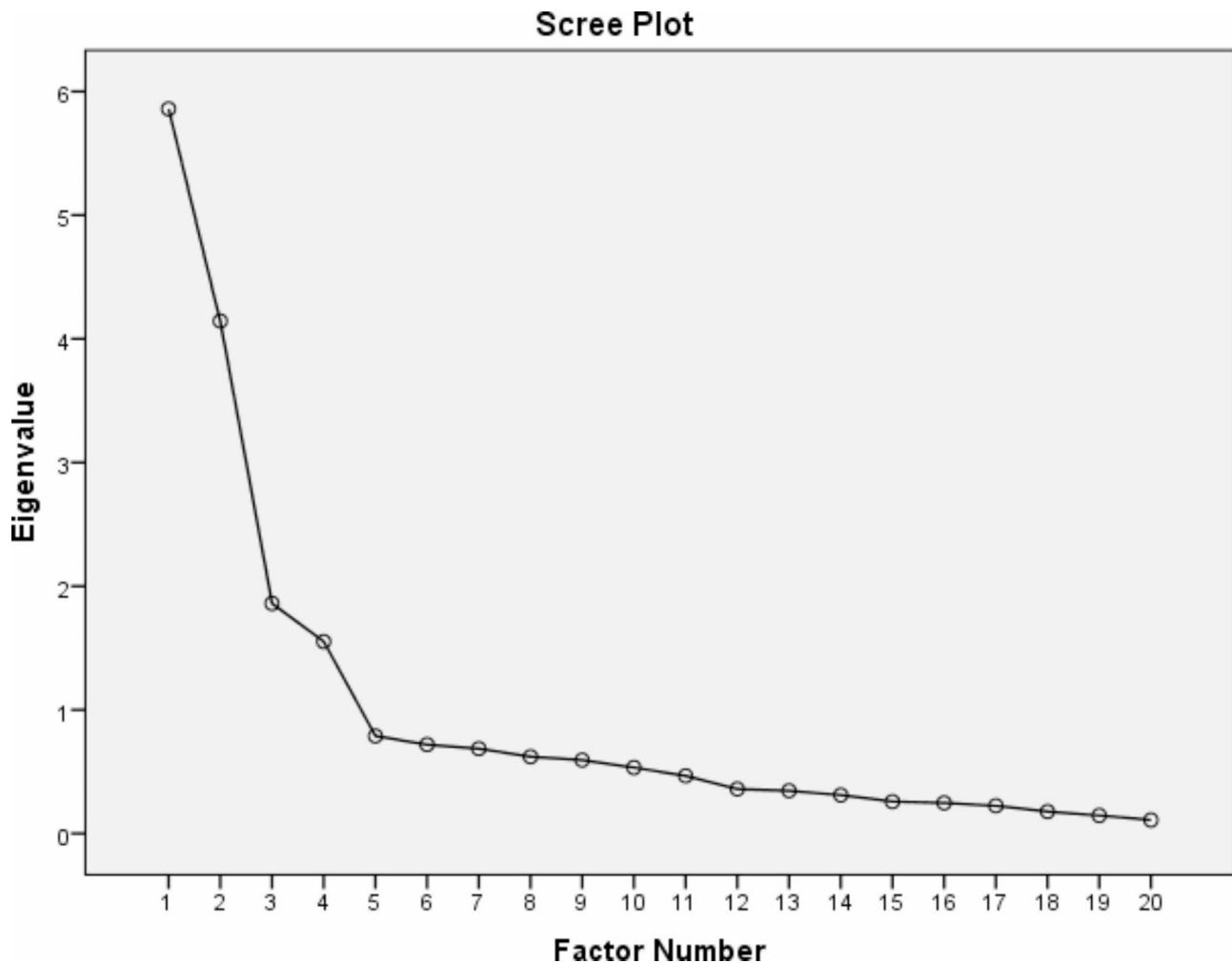
Scree Plot

Fig. 1 Scree plot of exploratory factor analysis for Persian Version of the motivation for nursing student scale (MNSS)

assessed indices. In addition to our research, Li et al. [49] translated the instrument into Chinese and conducted a psychometric evaluation, revealing a cumulative variance of 62.2%. A comparative analysis of these variances indicates that the translated items effectively measure the target construct in both Iranian and Chinese contexts.

Within the scope of the study's components, Component 1, termed 'Intrinsic Motivation,' accounted for the largest proportion of the variance explained by the instrument, independently contributing 21.89% of the total variance. Correspondingly, Bulfone et al. [22] found that 'Intrinsic Motivation' similarly accounted for the largest percentage of variance at 16.4% in their study. The significant variance explained by the 'Intrinsic Motivation' component underscores its importance and relevance to the motivational constructs of nursing students. This component primarily assesses factors such as perceived usefulness, altruism, direct engagement, caregiving, and support for individuals in need. Intrinsic motivation, characterized as the most self-determined form of

motivation, is defined by the performance of activities for personal gratification rather than external outcomes [50]. Intrinsic motivation posits that task engagement is intrinsically linked to the individual's choice and the internalization of the activity [50–52]. This motivational orientation propels individuals towards activities that foster the enjoyment of learning and enhance personal achievement. Inherently motivated students exhibit a heightened capacity to surmount obstacles and demonstrate increased adaptability [51]. Such students are more likely to persevere in the face of adversities [53], culminating in elevated levels of satisfaction [54] and superior academic outcomes [22].

The second component of the instrument, known as 'Amotivation,' contributed to 13.86% of the total variance in this study, making it the second most significant factor in measuring motivation among nursing students. This component comprises five items dedicated to probing the reasons and circumstances surrounding individuals' entry into the nursing field, such as the incidental
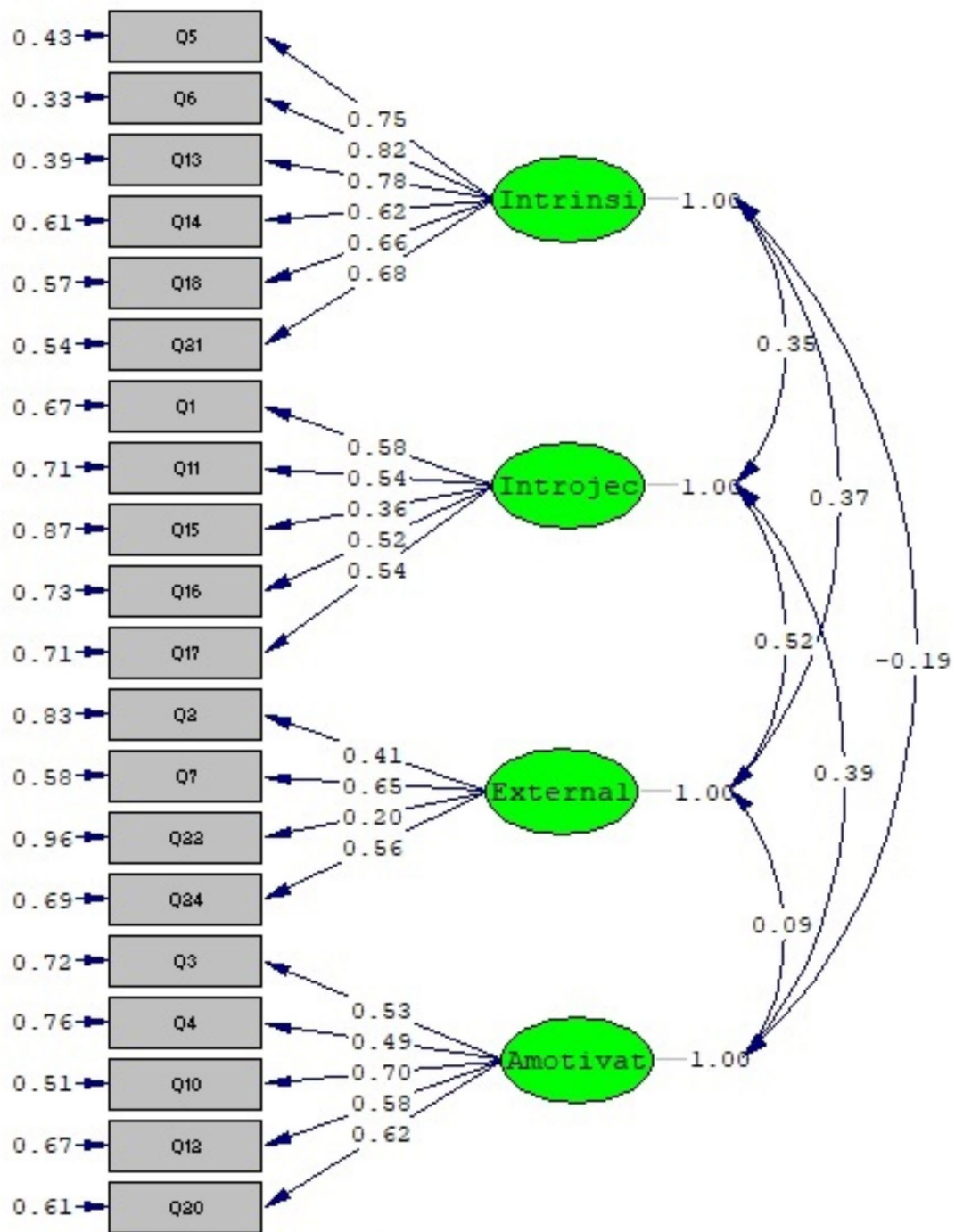
Fig. 2 Four-factor model of the motivation for nursing student scale (MNSS) (Standard)

nature of selecting the specialty and the lack of alternatives due to non-admission into other disciplines. In terms of scoring rules, experts suggest that the Amotivation component uses a reverse scoring system, which differs from the original scale [49]. Therefore, this component in the Chinese and Persian versions of the MNSS adopts reverse scoring. Amotivation is considered the lowest level of motivation. Students characterized by

Table 3 T-value, Pearson correlation coefficient, factor loadings, ICC and Cronbach Alpha of the motivation for nursing student scale (MNSS)

Factor	No	value a t	b(λ)	Rc	ICC	Cronbach Alpha
Intrinsic Motivation	Q5.	15.45	0.75***	0.87**	0.831(0.801-0.858)	0.846
	Q6.	17.45	0.82***	0.91**		
	Q13.	16.27	0.78***	0.90**		
	Q14.	12.06	0.62***	0.86**		
	Q18.	12.89	0.66***	0.81**		
	Q21.	13.51	0.68***	0.81**		
Introjected Motivation	Q1.	9.46	0.58***	0.79**	0.746(0.664-0.818)	0.778
	Q11.	8.83	0.54***	0.80**		
	Q15.	5.76	0.36***	0.68**		
	Q16.	8.41	0.52***	0.80**		
	Q17.	8.81	0.54***	0.81**		
External Motivation	Q2.	6.06	0.41***	0.76**	0.666(0.529-0.776)	0.833
	Q7.	9.14	0.65***	0.77**		
	Q22.	2.98	0.20***	0.75**		
	Q24.	8.12	0.56***	0.75**		
Amotivation	Q3.	9.09	0.53***	0.75**	0.812(0.77-0.858)	0.774
	Q4.	8.22	0.49***	0.79**		
	Q10.	12.36	0.70***	0.81**		
	Q12.	9.97	0.58***	0.70**		
	Q20.	10.83	0.62***	0.81**		
The motivation for nursing student scale (MNSS)					0.802(0.753-0.847)	0.882

***$P<0/001$; **$P<0/01$; *$P<0/05$

a- The calculated values for all factor loadings of the first and second orders are greater than 1.96 and are therefore significant at the 95% confidence level, b- The specific value, which is denoted by the Lamda coefficient and the statistical symbol λ, is calculated from the sum of the factors of the factor loads related to all the variables of that factor, C. Pearson Correlation coefficient

Table 4 Pearson correlations for MNSS domain scores

Factor	1	2	3	4	Motivation
1. Intrinsic Motivation	1				
2. Amotivation	− 0.03	1			
3. Introjected Motivation	0.376**	0.308**	1		
4. External Motivation	0.343**	0.236**	0.458**	1	
Motivation	0.62**	0.61**	0.782**	0.692**	1

Note. Correlations are latent factor correlation estimates from the CFA model. All correlations were statistically significant at $p<.001$

amotivation typically exhibit a diminished inclination to engage in actions, attributing this to a lack of control over their behaviors [50]. Amotivation within nursing— a profession intimately connected with human life—not only presents challenges for nurses but also has profound negative implications for public health, resulting in the squandering of substantial resources. Such a lack of motivation may lead to nursing students being less engaged in patient care, avoiding academic tasks, and having a higher likelihood of dropping out [55–57].

Selecting an academic discipline and career path is a pivotal decision in an individual's life. This decision necessitates substantial investments of time and resources into professional education and training.

Hence, the decision-making process for choosing a university major should be undertaken with increased diligence and reflection [58]. In recent years, significant global shifts have been observed in the admissions processes for medical and nursing programs. It has become broadly acknowledged that, beyond selecting students who are comprehensively suited for the profession, it is essential for candidates to make informed and insightful decisions regarding their specialization [59]. Given the centralized mechanism of student recruitment via the national university entrance examination in Iran, it is posited that augmenting educational counseling services in schools and engaging accomplished nurses to acquaint students with the nursing profession and its significance may contribute to refining the nursing student selection process within the country.

The third component identified in the instrument is 'Introjected Motivation,' which represents 13.39% of the total explained variance. This component encompasses factors related to an individual's positive caregiving experiences, voluntary engagements, and intrinsic inclination towards participation in these activities. Introjected motivation is influenced by prior experiences. In this condition, individuals are guided by internalized expectations and are inclined to take actions that align with these previous experiences. At its core, the process involves

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individuals adopting external values as their own, which motivates them to participate in an activity due to a sense of responsibility or feelings of guilt [50, 60].

The fourth component of the instrument, known as 'External Motivation,' accounted for 9.53% of the total variance. This component assesses the influence of external factors such as the opportunity to find a good job, recommendations from acquaintances and friends, and having similar job experiences among family members. Distinct from intrinsic motivation, external motivation is influenced by the rewards and deterrents present in the external environment [51, 61]. Within this framework, an individual's choice of academic major is considered essential for achieving valuable outcomes such as accelerated employment or career advancement [50].

In the current study, both exploratory and confirmatory factor analyses were conducted. The results from the confirmatory factor analysis supported a four-factor structure in the selected sample, which aligned with the original instrument. Each item was loaded onto a corresponding factor. Additionally, the computation of fit indices for the instrument demonstrated favorable alignment, with the index values indicating a robust fit for the proposed model. In the study conducted by Li et al. [49], which assessed the cultural validity of the instrument in a Chinese context, confirmatory factor analysis yielded model fit indices that were deemed satisfactory ($\chi^2/df = 2.738$, RMSEA$=0.073$, SRMR$=0.0719$, CFI$=0.914$, IFI$=0.915$, NFI$=0.872$, RFI$=0.849$). These results show that the relationship between the items and factors is congruent [62] and consistent with the theoretical model of Self-Determination Theory (SDT) [50].

In the present study, we evaluated internal consistency using Cronbach's alpha, resulting in a coefficient of 0.882 for the entire instrument and an intracluster correlation index of 0.802, both considered acceptable. Furthermore, each subscale of the instrument demonstrated a Cronbach's alpha coefficient exceeding 0.75. Correspondingly, the study conducted by Bulfone et al. [22] reported Cronbach's alpha coefficients for the constructs of Intrinsic Motivation, Introjected Motivation, External Motivation, and Amotivation as 0.78, 0.86, 0.73, and 0.74, respectively. In the study by Li and colleagues [49], Cronbach's alpha coefficient for the entire instrument was reported as 0.869, and the split-half reliability was estimated at 0.727. However, for one of the subscales of the instrument (Extrinsic Motivation), Cronbach's alpha coefficient was estimated at 0.69 [49]. Overall, Cronbach's alpha coefficient in the current study indicates that the Persian version of the MNSS is a reliable tool for measuring academic motivation among nursing students.

Academic motivation is conceptualized as both a mental state and a dynamic process [49]. Motivational states are recognized to exist along a continuum, ranging from Amotivation to Introjected, External, and Intrinsic motivation [22]. As nursing students progress through their educational journey, their levels of orientation, empathetic behaviors, and attitudes toward the discipline are subject to change; these changes can manifest as either positive or negative developments [63, 64]. It is important to note that the results obtained from applying this assessment tool reflect the student's academic motivation at a specific moment and may not indicate long-term patterns. The key strength of the questionnaire lies in its ability to measure the academic motivation of nursing students with cultural specificity and psychometric reliability within the Iranian context, which is particularly valuable as it offers educational stakeholders a tool that can guide curriculum development tailored to student needs. Another strength is its utility for periodic assessments, enabling educators to track changes in motivation over time. The primary function of the instrument is to assess the level of academic motivation among nursing students. The data obtained from this tool can be instrumental in identifying students with lower motivation levels. Based on these insights, educators can intervene with targeted strategies to foster motivation, such as curriculum redesign, motivational workshops, personalized support, or mentoring programs.

Limitations
The primary limitation of this study is its reliance on a convenience sample of nursing students at four colleges within two western Iranian provinces, which restricts the generalizability of the findings to the entire nursing student population. Additionally, the study's cross-sectional design—measuring variables at only one point in time—limits the ability to capture changes over time or establish causal relationships. While the questionnaire effectively assesses the level of motivation, it does not provide direct pathways or actionable strategies for enhancing that motivation. Although the study has undertaken a careful cultural adaptation process, it is crucial to recognize that cultural differences may influence how respondents interpret and answer survey items beyond mere translation accuracy. Cultural contexts can influence responses in ways that may not be entirely captured by the translation process alone. Therefore, future studies should investigate the impact of cultural differences on academic motivation measurement and explore how these differences might influence responses, which will ensure that the instrument is culturally valid and reliable across diverse settings.

Conclusion
This study has successfully psychometrically evaluated the MNSS, which is a valid and reliable instrument to assess the academic motivation of nursing students

within the Iranian cultural context. The utilization of this instrument represents a significant advancement in the quantitative measurement of academic motivation among nursing students. Periodic assessments of academic motivation throughout the educational journey can assist faculty in identifying students who may be at risk of diminished motivation, thereby providing opportunities for timely interventions to support their educational success. Furthermore, this instrument offers researchers and administrative bodies a robust tool for advancing motivational studies and enhancing strategic planning in nursing education in Iran.

We suggest conducting long-term studies to monitor changes in motivation over time and validate the instrument across different cultures. Such research will enhance understanding of how academic motivation evolves throughout the nursing education experience and how cultural differences may influence motivational drivers. Therefore, future research should investigate the instrument's adaptability across more diverse populations. Additionally, to gain a better understanding of fluctuations in academic motivation over the four-year educational period, longitudinal studies should be conducted.

Abbreviations

MNSS	Motivation for Nursing Student Scale
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/s12909-024-06101-x.

Supplementary Material 1

Supplementary Material 2

Author contributions
All authors participated and approved the study design. K, M; A, S and A, J contributed to designing the study, E, E; K, B; S, R; and F, C collected the data, and data analyses were done by A, J and A, S and K, M The final report and article were written by A, J; K, M; A, S; S, R; F, C; K, B; and E, E; and all authors read and approved the final manuscript.

Data availability
The data analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
This study was approved by the Ethics Committee of Kermanshah University of Medical Sciences with code [IR.KUMS.REC.1402.453]. The students' participation was voluntary and anonymous, and informed consent was obtained from all study subjects. Before the commencement of the study, participants received a detailed explanation of the research methodology and objectives. We emphasized the confidentiality of their data and their right to withdraw from the study at any point. Throughout the research process, from design to dissemination of findings, we strictly adhered to the ethical guidelines outlined in the Helsinki Declaration.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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