Original Article

Translation and psychometric evaluation of the Persian version of the role model apperception tool (RoMAT) in undergraduate nursing students

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Abstract

Role modeling is one of the most influential components of teaching professional behaviors to nursing students. The Role Model Apperception Tool (RoMAT) was designed in the Netherlands to measure role modeling behaviors in clinical educators. The aim of this study was assess the psychometrics of the Persian version of this tool.

In a methodological study, the Persian version of the RoMAT tool was developed using the forward-backward translation method. Face validity was confirmed through cognitive interviews, and content validity was done by a panel of 12 experts. Construct validity was assessed through exploratory factor analysis (n = 200), and confirmatory factor analysis (n = 142) was evaluated after the tool was completed online by undergraduate nursing students. Reliability was confirmed using internal consistency and test and retest methods. Furthermore, ceiling and floor effects were assessed.

The two components of "professional competencies" and "leadership competencies" emerged with a cumulative variance of 62.01%, a reliability with Cronbach's alpha of 0.93 and 0.83, and an intraclass correlation of 0.9 and 0.78, respectively.

It was concluded that the Persian version of the Role Model Apperception Tool is a valid and reliable tool and can be used to investigate the role modeling behaviors of clinical instructors of nursing students.

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Introduction

The main purpose of nursing education is to train qualified nurses who have the necessary knowledge and skills to maintain and improve the quality of care provided to patients (1). Training can immensely affect job productivity, job satisfaction, job motivation, promotion and personal growth, and therefore it is very important to ensure monitoring and assessment in order to apply quality training measures to the evaluation process (2). Among the characteristics of an effective clinical instructor are being a good, positive and, above all, functional role model (3).

A role model is a person whose behavior is praised or imitated by others, and this process is known as role modeling. In the educational context, role modeling is a unique teaching method for transferring knowledge, skills and values of the medical profession as well as promoting academic achievements (4). Jenkins et al. stated in their research that the term role modeling was first coined by sociologist Merton in a 1950 study of the socialization of medical students. People compare themselves to a reference group (5, 6). Horsburgh and Ippolito used Bandura's theory of social learning to study the process of learning from role models in clinical settings. In his study, he stated that role modeling relies mainly on imitation and observation, which is one of the basic tenets of Bandura's social learning theory. According to proponents of the social learning theory, the most important type of human learning is observational learning, and it can be concluded that learning from role models in clinical environments is a very challenging process (7). In a qualitative study of spirituality-based education by role model nursing educators, Mokhtari Nouri et al. acknowledged that role modeling is a method that is based on modeling and providing basic and practical examples. In this method, the teacher tries to initiate appropriate behavior from the learner's perspective in order to create the necessary conditions for modeling and imitation of his/her role (2).

The findings of Khan et al.'s study showed that interestingly, clinical educators are not always aware of the role modeling process and there is a risk of transmitting negative behavior. Therefore, the instructor's awareness of the process will result in improved role modeling behavior (8).

Many studies have been done on the importance of role models in nursing education, including qualitative research by Mokhtari Nouri et al. on the

experiences of role model instructors and nursing students about the facilitating factors of the role modeling process. According to this study, role modeling is among the most important functions of nursing teachers and a sign of professional competency. Being a role model is one of the 12 essential roles of a teacher (9). Nursing educators believe that the role modeling teaching method is the most effective approach to developing students' experiences and professional attitudes in clinical settings. Role models not only teach professional thinking, behaviors and attitudes, but also facilitate the development of learner beliefs and practices, which will increase the quality of care in the future. It is believed that the development of students' skills and self-confidence in the field of nursing is influenced by having good role model teachers (10).

Role modeling is an important strategy in the learning process of nursing students. The existence of qualified role model instructors is essential to improving the nursing profession, and being one is a sign of competency and successful education (3). To reinforce this behavior, we need to be able to measure it properly. The Role Model Apperception Tool (RoMAT) was developed and its psychometric properties were examined in 2012 in the Netherlands by Jochemsen-van der Leeuw et al. (11). Also, the psychometric properties of the tool were assessed among clinical instructors of general practitioners and residents in the Netherlands (12, 13). This tool includes the features of positive role modeling, obtained from a systematic review in order to distinguish between positive and negative role modeling and to evaluate the performance of clinical instructors in this regard. RoMAT consists of 17 items obtained on a 5-point Likert scale and is divided into two components: "caring attitude" and "effectiveness". Both components contain an equal number of items that are related to personal, educational and clinical characteristics, and very high reliability (11). Hosseini M. et al. (2022) citing the research of Cook DR and Hatala R (2016) et al. found the use of valid and reliable tools in studies to be effective in increasing confidence in research results, and mention limited resources and the amount of time and money spent on research as another reason to support this view. It is important, however, to ensure that the tools are valid, reliable and trustworthy (14, 15). RoMAT is a tool that takes less than 5 minutes to complete, but it has not been translated into Persian and its psychometric properties have not been examined in Iran so far, although in previous studies, samples of this tool have been given to general medical interns and residents. Since role model clinical instructors of

undergraduate nursing students play an essential part in the nursing profession and providing care to patients, this study was carried out with the aim of translating and examining the psychometric properties of the Role Model Apperception Tool among nursing students in Iran.

Methods

This is a methodological study conducted from March to May 2020. Attempts were made to select universities with greater geographical dispersion in order to access the maximum variety of samples. Participants consisted of 342 undergraduate nursing students studying at the Islamic Azad University of Medical Sciences in Tehran and nursing schools affiliated to the Islamic Azad Universities of Fars Province, Bandar Abbas and Shirvan, selected via convenience sampling and based on inclusion criteria. The inclusion criteria were: being third semester nursing students or above, and having the willingness to participate in the study.

Introduction of the Tool

The main tool used in the present study was the Role Model Apperception Tool (RoMAT), designed in 2011 by Joachmson, a general practitioner and Ph.D. student at Amsterdam University of Medical Sciences in the Netherlands, based on a systematic review study in consultation with medical education experts and clinical instructors and trainees (11). The tool consists of a 5-point Likert scale with 17 items and responses ranging from "strongly disagree" to "strongly agree", assigned a score of 1 to 5, respectively, with a higher score indicating more agreement (13). This tool was accompanied by demographic questions on gender, age, marital status, semester, place of residence, and name of the university, distributed among the participants in the final stage of the research.

In most studies, the guidelines of the World Health Organization are used in order to translate and psychometrically evaluate the research tools, which was also the case in the present study. Implementation of this method includes the following steps: forward translation, expert panel back-translation, pre-testing and cognitive interviewing, and final version. First, RoMAT was translated into Persian using the forward-backward translation method (16 - 20). The developer obtained permission to use and translate RoMAT via email correspondence, which was done by two translators, one of whom was a translator of general texts and the other a professional translator of medical texts. After comparing the translations, the questions were matched in terms of meaning and

content and the most appropriate options were chosen, and finally a Persian version of this tool was developed. The original translation was then translated into English by two other professional English translators to ensure that the Persian translation matched the original text and that the Persian sentences were accessible. After comparing the English versions and making the necessary corrections, the final version of the English questionnaire was developed. The tool was then sent to the original designer, who made suggestions regarding items 5, 7, 8 and 13. Corrections were made accordingly, and the final Persian version of the tool was developed.

Validity

Face Validity: For a preliminary assessment of the comprehensibility of items, the Persian version of the questionnaire was delivered to 10 sophomore and junior students. They were asked for their ideas on legibility, writing style and grammar, clarity, spelling, and ease of completion of the tool. The completed questionnaires were reviewed, and two ambiguous items were modified.

Content Validity: In order to determine the content validity, the tool was examined both qualitatively and quantitatively. With regard to the qualitative evaluation, 8 experts specialized in psychometrics were asked to examine the tool and offer recommendations on appropriate wording in terms of grammar, cultural relevance, validity of translation and semantic convergence, and to provide the necessary feedback on the modifications they had made. In order to quantitatively evaluate the tool, the content validity ratio was used and 12 experts were asked to rate each phrase based on a three-part spectrum of "necessary", "useful but not necessary" and "not necessary", and the expressions were accepted according to the Lawshe table (21)

Item Analysis

After confirmation of face and content validity, a pretest was performed. At this stage, the instrument was completed by 30 undergraduate nursing students. Internal consistency was measured by calculating the Cronbach's alpha coefficient as well as inter-item correlation to determine which items needed to be removed because they did not correlate with other items and the whole tool. Following the loop method, it was established that each item was correlated with the sum of other items. It is expected that the correlation of each item with the total score be more than 0.3, and at least each item with the other two items is more than 0.3 (22).

Structural Validity: With regard to factor analysis, the minimum sample size required for each

subscale was determined at 5 to 10 people. For exploratory factor analysis (EFA) 200 undergraduate nursing students were included in the study and the principal component analysis test with Promax rotation was used. Munro recommended 20 to 30 samples per factor, therefore for confirmatory factor analysis (CFA), 142 students were evaluated after completing the tool online (23).

In general, the indicators that are used to check the fit of the model are divided into three general categories: 1) absolute fit: the root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), goodness-of-fit index (GFI), and chi-square; 2) comparative fit: comparative fit index (CFI), relative fit index (RFI), normed fit index (NFI), and Tucker-Lewis index (TLI); 3) affordable fit: parsimonious normed-fit index (PNFI), adjusted goodness-of-fit index (AGFI), which is commonly used in determining fit in confirmatory factor analysis (24). In order to evaluate the sampling adequacy, KMO[1] test and BTS[2] test were used to examine the inter-item correlation matrix (22).

Reliability

We used internal consistency (Cronbach's alpha) to ensure the reliability of the questionnaire, and the test-retest method to evaluate the relative and absolute stability. The Intra-Class Correlation Coefficient (ICCC) was implemented to assess relative stability with standard error of measurement (25). In order to assess repeatability, the test-retest method was used where 30 students were asked to complete the Persian version of the questionnaire within a two-week interval. An index between 0.7 and 0.8 indicated a desirable degree of stability (26).

Floor or ceiling effect (minimum and maximum percentage scores): This effect occurs when more than 15% of respondents get either the highest or the lowest achievable score (22) .

In order to analyze the data, SPSS statistical software version 16 and LISREL 8.8 were used.

Ethical Considerations

First, a written permission was obtained from the main designer of RoMAT, and then the ethical code IR.IAU.PS.REC.1399.283 was received from the ethics committee of Tehran Azad University of Medical Sciences. Written informed consent was obtained from all participants, and they were reminded that participation in the study was

[1] Kaiser-Mayer-Olkin of sampling adequacy

[2] Bartlett's Test of Sphericity

voluntary and that their information would remain private. The tool was delivered to the participants virtually using the Porsline application, and all participants received a link to the tool and were assured that their information would be kept confidential.

Results

The majority (67.9%) of the participants were female, the oldest being 21 to 22 years of age, and most were in the 6th semester (38.2%). A detailed description of other demographic characteristics of the subjects are shown in Table 1. In the first phase, the RoMAT questionnaire was completed by 30 nursing students, and an analysis of 17 items yielded a Cronbach's alpha of 0.92, which is very good. Table 2 shows the Cronbach's alpha for each item, if the item was removed. Since Cronbach's alpha for all items was less than the total Cronbach's alpha, the items in this tool were retained.

Face and Content Validity

Due to simplicity and clarity of the items, no changes were made in terms of face validity, and as for content validity, only two words were altered.

The content validity index (CVI) for the items of the tool was evaluated by 12 experts, and all items that had a value greater than 0.79 were accepted (21). Therefore, all items entered the next phase of the study.

Construct Validity

Exploratory Factor Analysis (EFA): In the present study, the KMO test result of the scale was 0.959, which is at a favorable level, and BTS result was 3823.805, which is statistically significant (P = 0.000). All items had a factor loading greater than 0.3. The tool consists of 17 items in a 5-point Likert scale, and as Figure 1 shows, two components were extracted: “professional competencies” (12 items: 4, 6, 5, 10, 1, 16, 8, 17, 2, 7, 3 and 12), and “leadership competencies” (5 items: 15, 14, 11, 9 and 13) with eigenvalues of 9.5 and 1.02, respectively. Some leadership competencies included: being aware of the status of one's role model, having leadership qualities, having self-confidence, having positive interaction with other health-care team members, being honest and having integrity. The rest of the items including teaching, personal and clinical characteristics were placed under the component of “professional competencies”, with responses ranging from “strongly agree” to “strongly disagree”. The results are shown in Table 3.

Confirmatory Factor Analysis (CFA): As shown in Table 4 and Figure 2, the goodness-of-fit index values of the final model and the fit of 17 items are

good. The results showed that CFA based on the two-component model extracted from EFA with the obtained data also has a good fit.

Reliability

Cronbach's alpha coefficient for all items of the RoMAT tool was 0.92. In order to measure the stability of the instrument, the total intra-class correlation coefficient was calculated as 0.89 in a range of 0.95 - 0.76, which is within the acceptable limit and indicates that if the instrument is used at different times, the same results will be obtained (Table 5).

As Table 6 shows, the correlation between component 1 and 2 is 0.798, while the correlation between component 1 and the total score is 0.985, and the correlation between component 2 and the total score is 0.891, which indicates a high correlation.

In addition, the ceiling and floor effects were good and acceptable since the floor effect was 0.3% and the ceiling effect was 5.3%, which are both below 15%.

Table 1. Distribution of the demographic characteristics of the participants (n = 342)

Variable		N	%
Gender (Missing: 10)	female	233	67.9
	male	100	29.2
University (missing: 10)	Fars	200	58.4
	Tehran	65	19
	Shirvan	18	5.2
	Bandar Abbas	50	14.6
Age (missing: 21)	19 - 37	mean: 22.38	standard deviation: 2.46
Semester (missing: 20)	3 - 8	mean: 5.5	Standard deviation: 1.4297

Table 2. Item analysis

Item	Corrected Item-Total Correlation	Cronbach's Alpha if the Item Was Deleted
Q1	0.817	0.911
Q2	0.698	0.915
Q3	0.496	0.920
Q4	0.763	0.913
Q5	0.465	0.920
Q6	0.582	0.918
Q7	0.685	0.915
Q8	0.685	0.915
Q9	0.678	0.915
Q10	0.644	0.916
Q11	0.611	0.917
Q12	0.541	0.919
Q13	0.333	0.923
Q14	0.651	0.916
Q15	0.404	0.924
Q16	0.622	0.917
Q17	0.807	0.912

Table 3. Structural validity of the Persian version of the professional and leadership competencies

Components	Items	Factor Loading	% Variance	Eigenvalue
Professional Competencies	4. Understands learners' needs and is committed to the growth of learners	0.97	56	9.5
	6. Has a positive attitude toward learners	0.94		
	5. Establishes rapport with learners	0.88		
	10. Makes learning exciting and stimulating	0.86		
	1. Has excellent clinical reasoning skills	0.75		
	16. Is nice and easy to work with	0.72		
	8. Is patient	0.69		
	17. Is professionally competent in difficult clinical situations and able to cope with adversity	0.56		
	2. Conveys empathy to patients	0.52		
	7. Demonstrates enthusiasm for his/her work	0.51		
	3. Communicates well with patients and their relatives	0.45		
	12. Is available for learners	0.44		
Leadership Competencies	15. Is aware of his/her role model status	0.96	6.02	1.02
	14. Has leadership qualities	0.79		
	11. Has self-confidence	0.72		
	9. Has a positive interaction with other health-care workers	0.51		
	13. Is honest and has integrity	0.42		

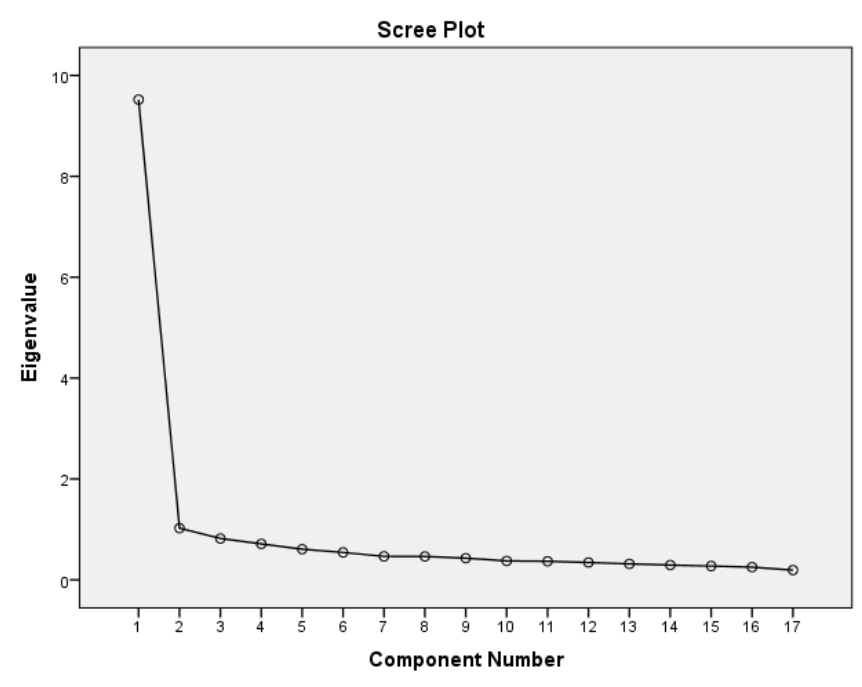

Figure 1. Scree plot for the RoMAT scale

Table 4. Goodness of fit indicators of confirmatory factor analysis of a 17-item RoMAT

Name and Index Abbreviation for goodness of fit	Normal Limit for goodness of fit	Results in the Present Study
(X^2) *P*-value (Chi-squared *P*-value)	> 0.05	397.80 (*P* = 0.0)
RMSEA (Root Mean Square Error of Approximation)	good < 0.08, medium < 0.08 to 0.1, poor < 0.1	0.084
SRMR (Standardized Root Mean Square Residual)	< 0.1	0.043
PNFI (Parsimonious Normed-Fit Index)	> 0.5	0.84
NFI (Normed-Fit Index)	> 0.9	0.97
AGFI (Adjusted Goodness-of-Fit Index)	> 0.8	0.84
GFI (Goodness-of Fit Index)	> 0.9	0.88
RFI (Relative Fit Index)	> 0.9	0.97
TLI (Tucker-Lewis Index)	> 0.9	0.98
CFI (Comparative Fit Index)	> 0.9	0.98
CMIN/DF (Minimum Discrepancy Function Divided by Degree of Freedom)	good < 3, acceptable < 5	3.1

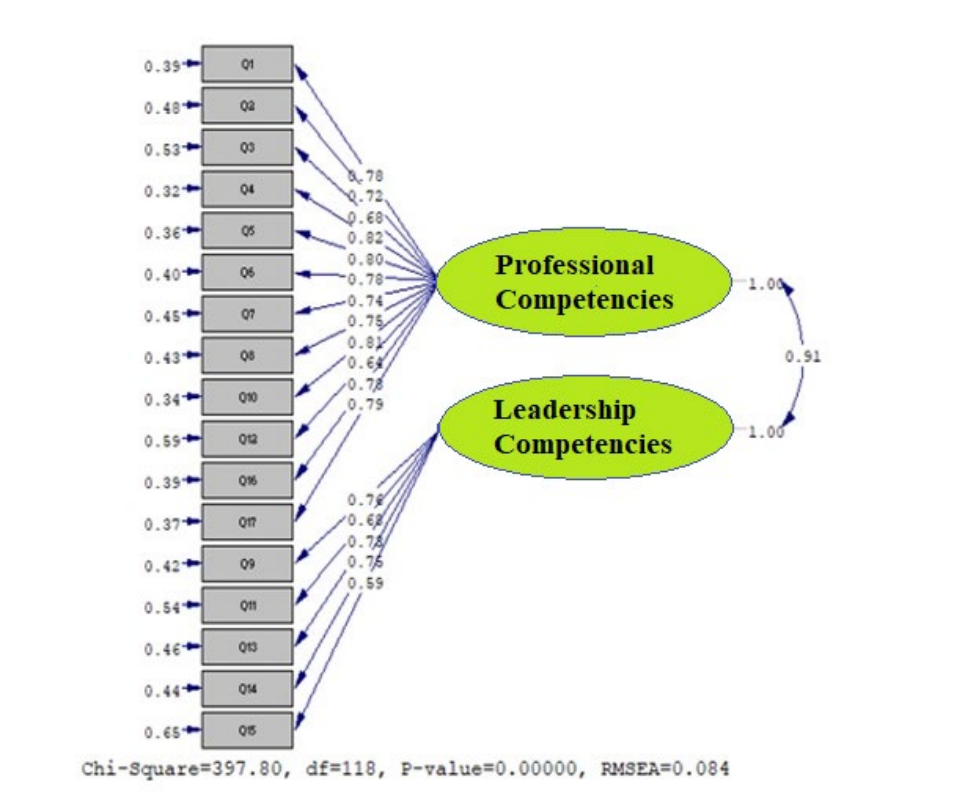

Figure 2. Confirmatory factor analysis results of the main components of "professional competencies" and "leadership competencies"

Table 5. The internal consistency and relative and absolute reliability

Components	Components	Mean (Standard Deviation)	Cronbach's Alpha	Intraclass Correlation Coefficient (ICC)	Confidence Interval	Standard Error of Measurement (SEM)
1	Professional Competencies (12 items)	43.2 (6.5)	0.93	0.90	0.77 - 0.95	2.08
2	Leadership Competencies (5 items)	20.11 (2.8)	0.83	0.78	0.52 - 0.90	1.31
Total		67.21 (9.7)	0.95	0.89	0.76 - 0.95	3.21

Table 6. Pearson's correlation between factors and the total score

	Component 1	Component 2	Total
Component 1	1	0.798	0.985
Component 2	0.798	1	0.891

Discussion

The present study was the first attempt to psychometrically evaluate the Persian translation of Jochemsen's RoMAT tool among nursing undergraduate students, with focus on the role-modeling of their clinical instructors. The findings showed that the Persian version of the Role Model Apperception Tool enjoys high validity and reliability, as well as internal correlation and construct validity. After factor analysis of a total of 17 items of the Role Model Apperception Tool (RoMAT), two components emerged: "professional competencies" and "leadership competencies", with a Cronbach's alpha of 0.93 and 0.83, respectively, and a total Cronbach's alpha of 0.95. Jochemsen et al. designed this tool in the Netherlands and assessed its psychometric properties with clinical instructors of medical students, and came up with two components of "caring attitude" and "effectiveness" with high reliabilities of 0.92 and 0.84, respectively (11). Also, Said et al used this tool online on first to last year medical residents with focus on their role model clinical instructors, and the same two components of "caring attitude" and "effectiveness" emerged with a Cronbach's alpha of 0.940 and 0.93, respectively (27). It must be added that the present study had high reliability, which confirms the repeatability of this tool.

In the present study, "professional competency" is primarily about the clinical instructor's relationships and interactions with students, and then his/her teaching skills and personality traits, and finally his/her interactions with patients and their relatives. In contrast to “leadership competency”, “professional competency” includes awareness of being a role model, leadership characteristics of the clinical instructor, good interaction with staff and positive moral qualities. “Professional competency” had a higher variance compared to “leadership competency”, which, as discussed elsewhere, shows that from the perspective of Iranian undergraduate nursing students, the most important component of the role model clinical instructor is having a positive interaction with the students, and the other traits come next in their order of preference. However, in Jochmsen et al.’s study, equal amounts of items were allocated to personality traits (heart), teaching (head) and clinical (hand) skills, and therefore, it determined the competency in the form of (3 Hs), indicating the positive role modeling conditions. Although this tool was designed to identify role model instructors, the characteristics of students were also influential in the process as shown in other studies. There was a significant difference between students with more experience and caring attitude score, thus, beginning trainees tended to focus on the personal characteristics of their clinical mentors and the learning environment, while more experienced trainees tended to focus on the professional competence and teaching skills of their clinical mentors. However, novice trainees' greater attention to personal characteristics did not fully explain the higher caring attitude scores these trainees assigned to their mentors. (11). In the study by Said et al. the component of "caring attitude" covers a set of items including the relationship between clinical instructors and patients, residents and others. The component of "effectiveness" is a set of items related to the ability of the clinical instructors to meet the needs of patients and residents (27). This issue highlights the importance of the good rapport the nursing students expect from their clinical instructors. Moreover, in this tool, the student's personality traits should also be taken into account.

As shown in the review study by Mohammadi et al. there are three main issues with regard to improving role modeling in clinical educators: 1) the characteristics of a good role model, consisting of educational, clinical and interpersonal skills, 2) self-improvement role modeling, and 3) faculty development programs (28). In the study by Vohra et al. interviews with students and general

practitioners showed that role models were the key factor influencing the participants' lived experiences and personal relationships with people, and had a lasting effect on their choice of specialty (29). Therefore, clinical instructors should develop teaching, clinical and communication skills in themselves, because the improvement of these skills helps in the improvement of the "leadership competencies" component. Reid and Alberti consider role modeling as an important part of the informal curriculum in leadership learning, stating that the fallibility (admitting one's own mistakes and errors) of leaders can have a positive effect on learning (30). Naturally, leadership competency is influenced by the policies formulated by relevant organizations and universities. Perhaps one of the reasons why this component is more prominent in Iran is that the development of leadership competency characteristics as well as modeling are possible through an exemplary role modeling of a clinical instructor, but this component has not been reflected in other studies.

In the study by Said et al. the psychometrics of RoMAT yielded a low internal correlation, which they believed was probably due to the similarity of the responses (27). On the contrary, in the present study, a good internal correlation of the instrument was obtained, because students completing the questionnaire were from different Iranian universities. In our study, item 1 had a high correlation with item 17 (0.82), indicating that from the perspective of the students, item 1 (Has excellent clinical reasoning skills) and Item 17 (Is professionally competent in difficult clinical situations and able to cope with adversity) mean the same; nevertheless, both items were retained. In the study by Said et al. items 7 and 17 both referred to the same component, with item 17 falling under the component of "caring attitude" (27), while in the initial study of this tool it was related to the "effectiveness" component. (11) However, in the present study, items 17 and 1 were part of the "professional competencies" component, which indicates that item 17 is mainly influenced by students' personal opinion of their clinical instructor, and also the "professional competencies" component had more weight than "leadership competencies". Professionalism training is not the same as transferring a technical clinical set of skills, and professionalism is transmitted to health-care students during their course of study (31). In a systematic review study of the impact of role modeling on the future work of general practitioners, Lamb et al. found role modeling to be very important in medical education, and also very effective on the future

workforce of general practitioners in both primary and secondary care. An arrangement that has the potential to shape perceptions, attract or deter people to or from the profession, and support their advancement as professionals is indeed very important (32). Also the study by Mackie and Alberti showed that the role model general practitioner teacher and the experience of consulting patients promote a sense of efficacy in students, which will in turn inspire them to become the general practitioner of the future (33). Therefore, clinical educators should pay attention to the fact that their professional behaviors are effectively observed and modeled by students, so the right techniques for transmitting professionalism should be used alongside leadership competency workshops. However, in other studies the "effectiveness" component was more important than the "caring attitude" component (27), which is probably due to the importance that nursing students and clinical instructors attach to clinical competency characteristics. Therefore, professionalism is not a single skill, but a multidimensional competency that is built with many different components (34). Probably due to the cultural, social and economic differences between Iran and the Netherlands, the components of the present study are different from those of the mentioned studies, while one other possible reason may be the samples of the previous two studies of medical students. They have been somewhat different in terms of educational planning in the clinical environment and the type of relationship with clinical educators. The clinical instructors' awareness of their being role models promotes role modeling characteristics, and the present tool is helpful in this regard as well.

In general, based on the findings of the present study, the Persian version of the RoAMT enjoys an acceptable validity and reliability in the study population consisting of undergraduate nursing students. It should be added that one of the advantages of this tool is the small number of questions, which makes it a user friendly and efficient one.

One limitation of this study was that the instrument was completed online, although previous studies showed no difference in evaluation of psychometric properties between paper-based and web-based administration of the tool (27). Also, psychometric studies of this instrument have been performed only in the Netherlands, which limited the comparison of findings.

Conclusion

RoMAT is a valid and reliable tool in examining the role modeling behaviors of clinical nursing instructors. Academic managers such as vice chancellors for academic affairs and heads of departments can use RoMAT to develop clinical instructors' awareness of their position as role models. Clinical instructors can also use RoMAT to understand the dimensions of their professional behavior and try to improve them.

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Conflict of Interests

The authors declared no conflicts of interest regarding the publication of the present article.

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