Original Article

Design and evaluation of professional commitment development model in nursing students using structural equation modeling

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Abstract

Background & Objective: Professional commitment plays an essential role in the improvement of the performance and professional behaviors of nurses and a major part of it is formed and developed during university education. In this regard, the present research aimed to design and evaluate the development model of professional commitment in nursing students.

Materials & Methods: The present applied research was quantitative in terms of data type and descriptive in terms of survey-correlation type. The data were collected through a researcher-made questionnaire from 305 participants who were selected using a simple random method from nursing students of Islamic Azad University, Karaj Branch, Iran between 2020 and 2021. Data analysis was performed based on factor analysis and structural equation modeling in SPSS (version 26) and Smartpls 3 software.

Results: Sampling adequacy and factors affecting the development of professional commitment were confirmed using exploratory factor analysis in the form of eight factors (individual, structural, socio-cultural, educational, managerial, economic, legal, and spiritual) and 60 components. Furthermore, the factor load of each factor was determined by confirmatory factor analysis. The final model designed by the structural equation method was evaluated as a very good model.

Conclusion: There is a lack of an efficient nursing workforce and the development of professional commitment affects the desire of nurses to remain in their profession and provide quality and safe care. Therefore, it is necessary to consider the approved model resulting from this research as a valid framework in the policy-making of the nursing profession.

Keywords: Model, Nursing students, Professional commitment, Structural equation

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Introduction

Students are among the most important human resources that play an essential role in the development of societies. Hence, internalizing professional principles in them and preparing them for their future professions is an important part of the responsibilities of universities and higher education institutions (1,2). The mission of nurses is to provide the necessary health, care, and treatment services at the highest standard level to maintain and improve the health of society. Accordingly, nursing students as future professionals play a key role in the achievement of this goal (3-5). However, despite the increasing training of nursing students, the lack of nurses is the most important challenge in healthcare and treatment systems. Most nurses leave their professions within a few years after starting work due to problems with the nature and environment of their profession. Accordingly, many countries will face serious shortages of professional nurses in the future; therefore, the need for specialized and committed nurses will greatly increase (6,7).

The concept of professional commitment is an important factor in the nursing profession and one of its

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qualifications and ethical codes which leads to the provision of safe care by nurses and their longevity in this profession. One of the main concerns of nursing managers is how to create suitable conditions for their employees to help them attend to their duties with a sense of responsibility and commitment and observe the ethical principles governing their profession (8,9). The appearance of professional and specialized behaviors in nurses depends on their level of professional commitment. As a result, a committed nurse is responsible and follows their professional duties and provides safe and efficient care without discrimination, and attention to place and time, and possesses the required knowledge and expertise for clinical decisions.

Researchers and experts also mention professional commitment as one of the main components that lead the workforce to the achievement of their professional goals and prevent them from leaving the profession (10-12). In this regard, Huang et al. (2022) reached the conclusion in their research that nurses with more professional commitment provide better quality clinical care (13). Moreover, the findings of the studies performed by Duran et al. (2021) during the COVID-19 pandemic emphasized that there is a positive and direct relationship between the desire to leave the profession and the level of professional commitment of nurses. In addition, they found that factors, such as family support, selection of profession based on interest, social and supportive relationships, professional satisfaction, and education of specialized skills are effective in the development of professional commitment (14).

Results of the studies performed by Amini et al. (2020) indicated the effect of professional commitment on the level of care provided by nursing students (15). Moreover, the results of the research conducted by Phuekphan et al. (2021) emphasized that professional commitment is associated with burnout and job satisfaction in nurses, and the sense of satisfaction and professional commitment helps nurses to remain in their profession and act professionally. Nursing managers can promote professional values by relying on their supportive role and creating opportunities for professional development. Moreover, they can increase commitment, create satisfaction, and enhance the desire of nurses to stay in their profession by creating a sense of value in them (6).

Therefore, regarding the mentioned factors, professional commitment refers to the practical and social dimensions of ethics, which causes an emotional desire to respect the rights of others in the form of moral rules and accepted professional values (10). The idea of commitment is an issue and a basic value in management that educational and clinical managers can rely on to improve performance and increase the longevity of their employees in their professions (16). Therefore, the existence of a comprehensive and evaluated model of factors affecting the development of professional commitment that can be generalized is absolutely necessary. In this regard, the present study aimed to design and evaluate the structure of a professional commitment development model in nursing students of the Islamic Azad University, Karaj Branch, Iran. Its results can be used as a guiding framework to improve performance and increase the number of specialized and committed nurses in the educational and clinical environment of the profession.

Materials & Methods

Design and Setting (s)

The current research was applied in terms of purpose, quantitative in terms of data type, and survey-correlation in terms of the implementation and manipulation of variables. The purpose of the research was applied as it seeks to solve a specific problem and provide innovative solutions for issues related to an individual, group, or society, and its findings provide an answer to solve existing practical problems and meet the needs in the real world with scientific methods. Furthermore, this study was descriptive since its purpose was to describe and interpret the existing conditions and relationships. In addition, the research strategy was survey-correlation since its data collection was performed by examining the views, beliefs, and opinions of a group of members of society, and the relationship between variables was analyzed based on the purpose of the research (17).

Participants and Sampling

The statistical population in this research consisted of nursing students of the Islamic Azad University, Karaj Branch during the years 2020 to 2021. The number of samples was calculated at 305 subjects according to the determination of the sample size in the structural equation modeling (SEM) and the formula of at least five samples per the number of main structures of the model. The samples were selected from among the nursing students in the fifth to eighth semesters with at least one year of experience in the clinical environment who were willing to participate in the research. All the samples were with the researcher until the end of the research.

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Tools/Instruments

The required data were collected through a researcher-made questionnaire that was scored based on a five-point Likert scale. The questionnaire was designed in two parts; the first part measures the demographic characteristics, and the second part measures the factors affecting the development of professional commitment.

This questionnaire was designed based on library studies and research background and interviews conducted with experts and professors of the nursing profession. It evaluated the factors affecting the development of professional commitment in the form of eight individual, structural, cultural-social, educational, managerial, economic, and legal factors.

After preparing the questionnaire based on the extracted factors and components, the pre-implementation analysis of the test was performed to calculate the reliability of the researcher-made questionnaire. The questionnaire was distributed among 30 participants and its internal correlation was calculated at 0.99 Cronbach's alpha which indicated a strong correlation between the items of the questionnaire. The face and content validity of this questionnaire was examined through the opinions of experts. The panel of experts included eight nursing managers who unanimously confirmed the face validity of the questionnaire and declared that the items of the questionnaire followed the purpose of the research.

The selection of the most correct content was ensured through the Content Validity Ratio, known as the Lawshe test. In this test, the criterion was based on the number of experts who evaluated the items of the questionnaire and determined their necessity and usefulness. Therefore, according to the panel of eight experts and the minimum value of the acceptable content validity ratio, the review criterion was considered at 0.75. Accordingly, the items for which the calculated content validity ratio was lower than the desired value were removed (18). Based on the test results, all the items of the researcher-made questionnaire were confirmed.

Data collection methods

After confirming the validity and reliability of the researcher-made questionnaire, the samples were selected from the students based on the simple random method. Regarding the ethical considerations, a code of ethics (IR.IAU.K.REC.1399.007) was obtained from the medical Ethics Committee of Islamic Azad University, Karaj Branch. Before data collection, the research process was explained to the participants and written informed consent was obtained from them. Questionnaires were distributed and collected anonymously and the students were assured of the confidentiality of the information.

Data analysis

In order to analyze the data collected from the questionnaire, descriptive and inferential statistical methods were used in SPSS software (version 26). Moreover, factor analysis and SEM was used to develop and evaluate the model. In order to approximate and test the exploratory factor analysis, SPSS software (version 26) was used. Moreover, SmartPLS software (version 3) was used for the confirmatory factor analysis and structural equations.

Results

The current research was quantitative; accordingly, the data was collected by a researcher-made questionnaire from nursing students in the fifth to eighth semesters of Islamic Azad University, Karaj Branch. In total, 305 students completed the questionnaire and the demographic distribution of the statistical samples showed that 71 and 234 of them were male and female, respectively. Moreover, their mean age was 21.53±2.83 years, and 252 of them were single while 53 of them were married. Most of the participants were studying in the eighth semester, chose their field of study with interest, were satisfied with their profession, and had student work experience related to their profession outside the educational environment.

After collecting data from nursing students, in order to determine the adequacy of the samples and confirm the extracted factors and components, the exploratory factor analysis method was used in SPSS software. The aim of this method is to discover the pattern or identify the underlying structure of the data. This analysis is used when the researcher, who is supposed to start formulating and producing a model based on the data, does not have previous background or experience with the model and the relationship between the variables (19). Afterward, in order to determine the factor loading of the factors and components of the research and model fitting, the first and second-order confirmatory factor analysis and structural equations were used.

In exploratory factor analysis, by using the Kaiser-Meyer-Olkin test and according to the index of 0.977 (range: 0-1), sampling adequacy was confirmed. Moreover, by checking the significance level of chi-squared in Bartlett's test ($P<0.000$), a significant correlation matrix was obtained and the determined level

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of correlation between the variables was acceptable. Subsequently, the validity of the extracted factors was proved by explaining the variance of the extracted components. First-order confirmatory factor analysis was used after identifying the structure of the model and determining the appropriate factors affecting the development of professional commitment to determine whether the components used in data collection had the necessary ability to measure independent variables or not. At this stage, based on the structural equations to check the obtained model, the evaluation of the model was performed in three stages external evaluation (evaluation of the measurement model), internal evaluation (evaluation of the structural model), and overall evaluation (Figure 1).

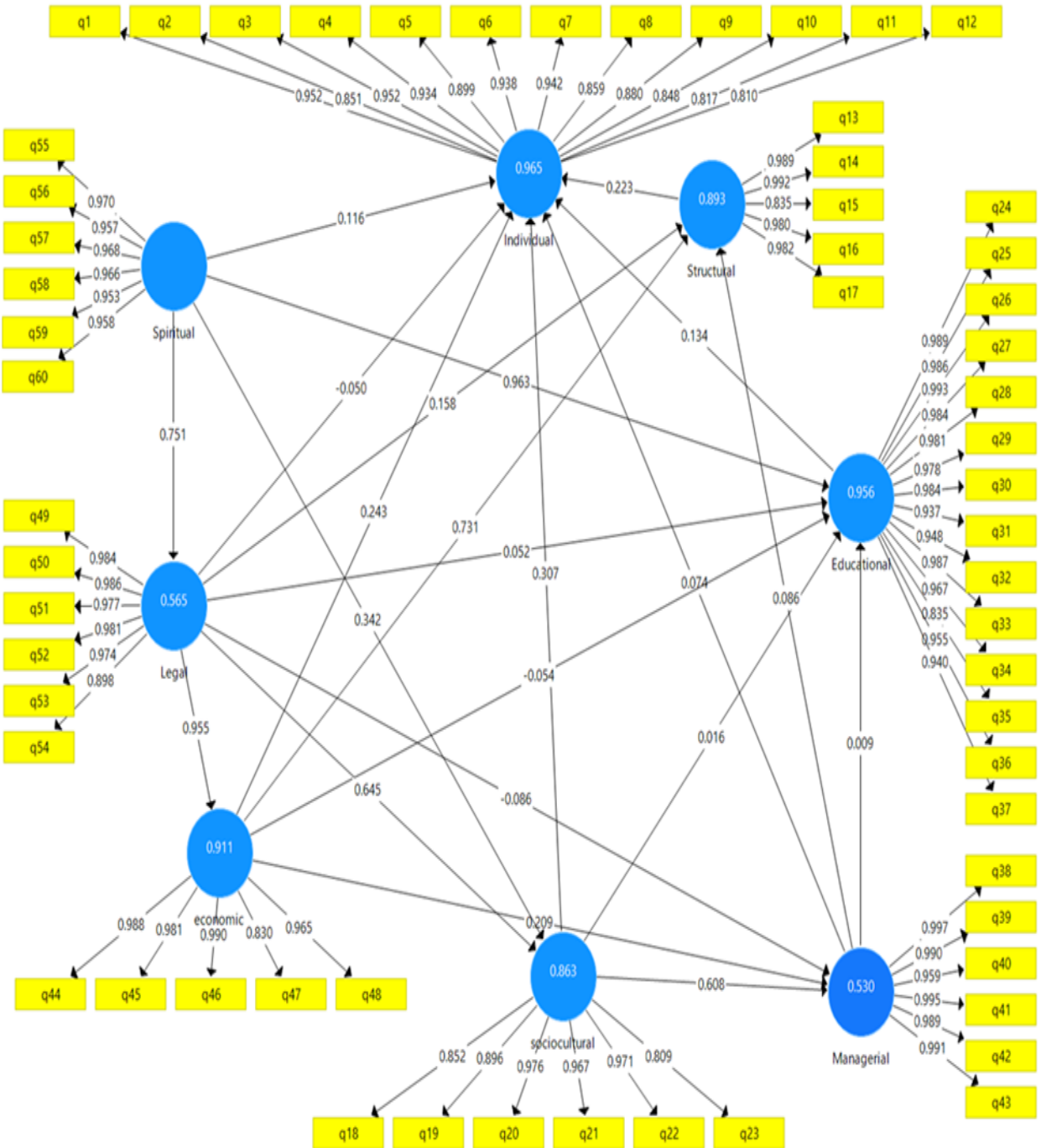

Figure 1. The pattern of development of professional commitment in nursing students in the estimation of path coefficients and factor loadings (first-order confirmatory factor analysis)

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In the external evaluation of the model, the reliability of the index, convergent validity, and divergent validity were examined. Moreover, the reliability of the index was evaluated using Cronbach's Alpha, composite reliability, and factor loading coefficients of each of the factors affecting the development of professional commitment. The reliability of the model presented in the current research was confirmed in terms of measurement model based on Cronbach's alpha value (criterion: above 0.7), composite reliability coefficient value for each structure (criterion: above 0.7), and factor loading of research indicators (criterion: above 0.4).

In the convergent validity examination, the average variance extracted was used (criterion: ≥0.5). According to the obtained results, the model of the current research was found to be desirable in terms of convergent validity. Moreover, the Fronell-Larcker criterion was used to check the divergent validity of the measurement model, which was confirmed according to the obtained values.

For the internal evaluation of the model, the t-test, the R-squared correlation, and the predictive relevance criterion or the Stone-Geisser index (Q^2) were used. Professional commitment and factors affecting it were confirmed at the 95% confidence interval.

The coefficient of determination (R) explains the percentage of changes in the dependent variable by means of independent variables. For the analysis of the coefficient of determination, three values of 0.19, 0.33, and 0.67 are mentioned as the criterion values for low, moderate, and strong values, respectively (19). According to the obtained values and the impact of factors on professional commitment, the designed model was evaluated as strong in individual, structural, cultural-social, educational, and economic factors and moderate in managerial, legal, and spiritual factors.

The predictive relevance criterion (Q^2) determines the predictive power of the model in endogenous structures, which means that if in a model, the relationships between the structures are correctly defined, the structures have a sufficient impact on each other, which correctly confirms the items. Considering the three criteria of 0.02, 0.15, and 0.35 to have low, moderate, and strong predictive powers (19), respectively, the predictive power of the research model was determined in strong endogenous structures.

Standardized root mean square residual index was used for the overall evaluation of the model (criterion value less than 0.08), and the level of the index in the current research model was estimated to be very well (Table 1)

Table 1. Evaluation indices of the professional commitment development model in nursing students in first-order confirmatory factor analysis

Evaluation index / Factors	External evaluation indices of the model				Internal evaluation indices of the model		Overall evaluation indices of the model
	Index reliability		Convergent validity	Divergent validity			
	Cronbach's alpha coefficient (CA)	Composite reliability (CR)	Average variance extracted (AVE)	Fornell-Larcker criterion	Coefficient of determination (R Square)	Predictive relevance (Q^2)	Standardized root mean squared residual
Individual	0.976	0.979	0.795	0.892	0.965	0.710	0.058
Structural	0.976	0.982	0.917	0.957	0.893	0.803	
Sociocultural	0.960	0.968	0.836	0.914	0.863	0.723	
Educational	0.994	0.994	0.926	0.963	0.956	0.853	
Managerial	0.995	0.996	0.974	0.987	0.530	0.888	
Economic	0.973	0.980	0.907	0.952	0.911	0.790	
Legal	0.986	0.989	0.935	0.967	0.565	0.842	
Spiritual	0.984	0.987	0.925	0.962	0.527	0.828	

In the next stage of analysis, second-order confirmatory factor analysis was used to investigate whether the factors in question have the ability to measure the dependent variable or not. In the evaluation of the model in this part, external evaluation, internal evaluation, and overall evaluation of the model were used (Figure 2).

The obtained results showed that according to Cronbach's alpha, the combined reliability coefficient, and factor loading coefficients, each of the extracted factors was effective in the development of professional commitment. Moreover, the reliability of the model was confirmed in terms of measurement. In the examination of convergent validity, according to the mean value of extracted variance, the model was suitable in terms of convergent validity. Furthermore, in order to check the divergent validity of the measurement model according to the Fronell-Larcker criterion, the divergent validity of the research model was also confirmed.

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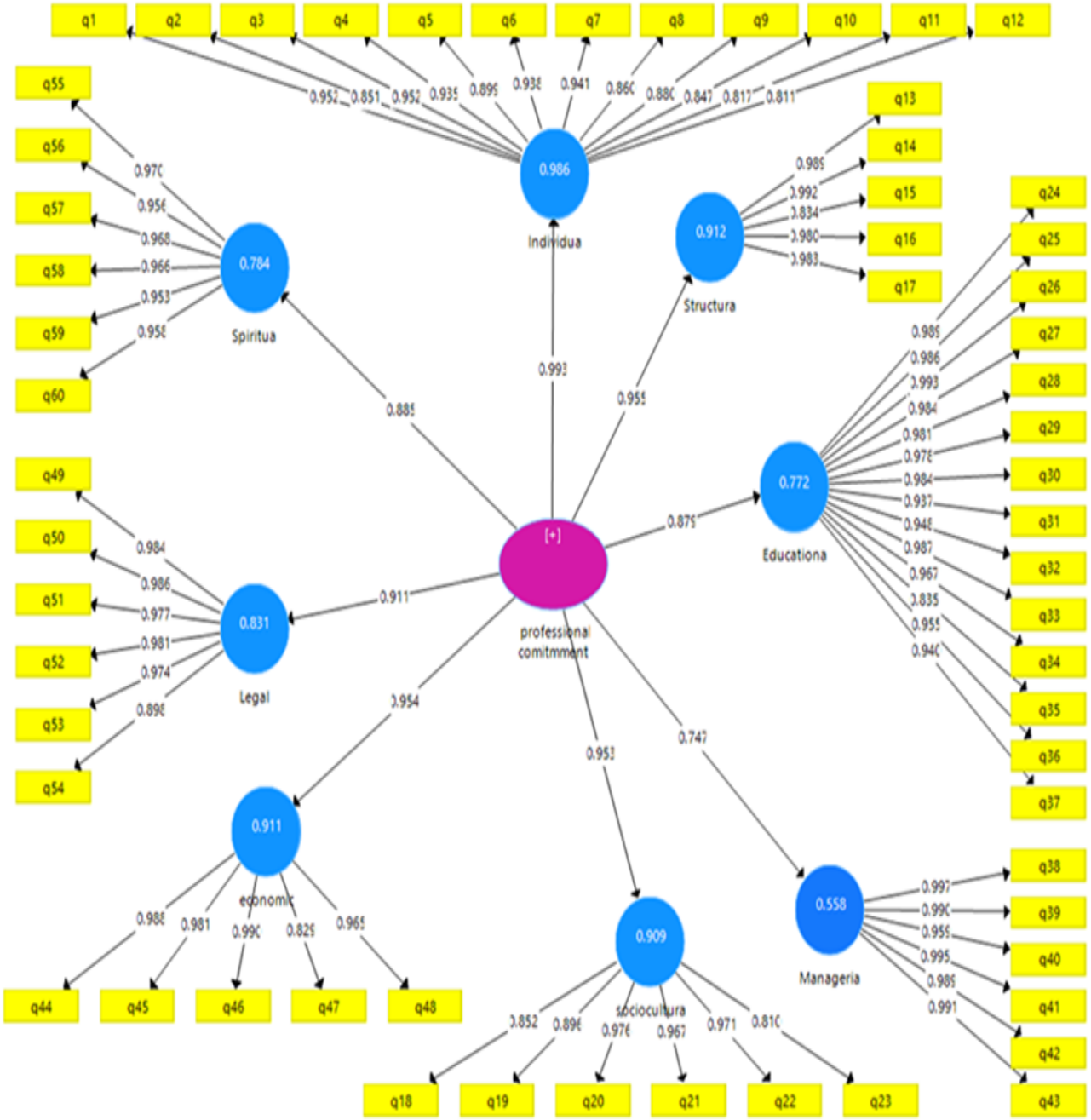

Figure 2. The development pattern of professional commitment in nursing students in the estimation of path coefficients and factor loadings (second-order confirmatory factor analysis)

In the internal evaluation of the model according to the t-test, the coefficient of determination, and the predictive relevance criterion, the impact of factors on professional commitment in the designed model were strong in terms of educational, individual, legal, spiritual, structural, economic, and cultural-social factors and moderate in terms of the managerial factor. Moreover, the predictive power of the model was determined to be strong in endogenous structures. In the general evaluation of the model based on structural equations, according to the root mean square residual, the research model was at the level of very good models. These results showed that all factors affect the professional commitment of nursing students (Table 2).

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Table 2. Evaluation indices of the professional commitment development model in nursing students in second -order confirmatory factor analysis

Evaluation index		External evaluation indices of the model				Internal evaluation indices of the model		Overall evaluation indices of the model
		Index reliability		Convergent validity	Divergent validity			
Factors	**Factor load**	**Cronbach's alpha coefficient (CA)**	**Composite reliability (CR)**	**Average variance extracted (AVE)**	**Fornell-Larcker criterion**	**Coefficient of determination (R Square)**	**Predictive relevance (Q^2)**	**Standardized root mean squared residual**
Individual	0.993	0.976	0.979	0.795	0.892	0.986	0.710	0.061
Structural	0.955	0.976	0.982	0.917	0.957	0.912	0.803	
Sociocultural	0.953	0.960	0.968	0.836	0.914	0.909	0.723	
Educational	0.879	0.994	0.994	0.926	0.963	0.772	0.853	
Managerial	0.747	0.995	0.996	0.974	0.987	0.558	0.888	
Economic	0.954	0.973	0.980	0.907	0.952	0.911	0.790	
Legal	0.911	0.986	0.989	0.935	0.967	0.831	0.842	
Spiritual	0.885	0.985	0.987	0.925	0.962	0.784	0.828	

After evaluating and confirming the model with the method of structural equations, the final model of the research was designed with 8 factors and 60 components (Figure 3).

The results showed that the individual factor with a factor load of 0.993 had the greatest impact on professional commitment, followed by structural, economic, cultural-social, legal, spiritual, educational, and managerial factors (Table 3).

Table 3. Factor loading and significance level of factors affecting the development of professional commitment in nursing students

Factors	Factor loading	T-value	P-value
Individual	0.993	982.79	0.000
Structural	0.955	82.48	0.000
Sociocultural	0.953	108.26	0.000
Educational	0.879	29.18	0.000
Managerial	0.747	14.78	0.000
Economic	0.954	81.07	0.000
Legal	0.911	43.06	0.000
Spiritual	0.885	31.48	0.000

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Figure 3. The final model of factors affecting the development of professional commitment in nursing students

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Discussion

Given the role that commitment plays in the emergence of professional behaviors, this research mainly aimed to design and evaluate a professional commitment development model for nursing students and increase the generalizability and validity of this model. The main concept and axis of the extracted model was the professional commitment, which was influenced by various factors that led to its development. The SEM technique was used in order to check the validity of the model and strengthen its generalizability. The results of the model review confirmed the reliability as well as the external and internal validity of the research model. The research model was evaluated as a very good model in both stages of the first- and second-order confirmatory factor analysis.

The coefficient of determination of the model in the first-order confirmatory factor analysis was reported to be strong in individual, structural, socio-cultural, educational, and economic factors and medium in managerial, legal, and spiritual factors. Furthermore, it was evaluated as strong in the second-order confirmatory factor analysis in educational, individual, legal, spiritual, structural, economic, and sociocultural factors while it was moderate in the management factor. Besides, the predictive power of the model was found to be strong in both orders of confirmatory factor analysis and endogenous constructs.

Examination of the values of the factor loadings showed the impact of each factor on the development of professional commitment. According to the results, the individual factors with the highest factor loading (0.993) were identified as the most important factors affecting the development of professional commitment, and the most important effective component among individual factors was family support for the student and personal interest in the profession. In line with the results of the current research, those of a study performed by Ozkan et al. (2021) indicated the effect of interest and positive attitude towards the profession and selection of a profession based on interest in the professional commitment (20). In addition, Yu et al. (2021) considered family support to be effective on professional commitment (3) and Duran et al. found that family support for the student and selection of a profession based on interest as the factors that affected professional commitment. These findings were consistent with those of the present study (14).

In terms of the factor loading, structural factors were the second factor (0.955) affecting the development of professional commitment, and the most important factor in structural factors was the presence of support organizations in the profession. This was confirmed by the results of a study performed by Chang et al. (2019) which recognized the existence of associations and organizations of nursing and compensation as effective factors in professional commitment (7). However, Siraneh et al. (2018) in their research found a relationship between professional commitment and professional structure. This difference can be due to the differences in professional conditions with regard to geographical locations and professional equipment (21).

In terms of the factor loading, economic factors were the third factor (0.954) affecting the development of professional commitment, and fair distribution of income was identified as the most important factor among economic factors. Results of the studies performed by Tuna and Sahin (2021) and Abbas et al. (2020) reported the impact of the financial status of business owners and the amount of salary and income as effective factors on professional commitment (10,22). Moreover, Rakhshani Zabol et al. (2017) in their research found the existence of financial incentives and fair distribution of income in the profession to be effective in increasing professional commitment. This result was in line with those of the current research.

Regarding the explanation of these findings, it can be said that some nurses and students work in several hospitals and consecutive shifts due to financial reasons which increases the possibility of fatigue and burnout in them and causes functional and irreparable errors. Therefore, attracting the attention of managers to fair payments and resolution of financial and economic issues of employees can increase professional satisfaction and improve the quality of care, while reducing performance errors (11).

In terms of the factor loading, cultural-social factors were the fourth factor (0.953) that affected the development of professional commitment. Among the cultural-social factors, the component of providing a culture of commitment in universities and clinical centers had the highest factor loading (0.976). This result was confirmed by those of a study carried out by Abbas et al. (2020) which indicated the impact of culture on the development of professional commitment (10). Moreover, the findings of a research performed by Ghobadi et al. (2018) also revealed that cultural patterns and social interactions affect the level of professional commitment, and these results were consistent with those of the present study (23).

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In terms of the factor loading, legal factors were the fifth factor (0.911) that affected the development of professional commitment. Among these factors, the component of developing performance monitoring regulations and fair evaluation had the highest factor loading (0.986). Kashmiri et al. (2020) in their study found the establishment of justice in procedures and fair evaluation as factors affecting commitment. These results were in line with the findings of the present study (24).

In their research, Mahdavi and Zamani (2018) also emphasized the effect of external control on professional commitment and considered the monitoring of the performance of employees to promote professional commitment (4). In addition, based on the results of the study performed by Masoumi et al. (2018), fair evaluation of desirable professional performance and provision of feedback were effective factors in professional commitment. It should be mentioned that these results were consistent with those of the present study (16).

The spiritual factor was the sixth factor (0.885) that affected the development of professional commitment. In this factor, the component of relying on religious values and beliefs had the highest factor loading (0.970). In their study, Abbas et al. (2020) mentioned the impact of religious and moral beliefs on the development of professional commitment, which was in line with the results of the present study (10).

In their research, Graminejad et al. (2018) found that trust affected professional relationships and beliefs played a role in the actions and behaviors of employees (25). Moreover, Mahdavi and Zamani (2018) in their study found that internal control is effective on the level of professional commitment. In addition, they found that people with internal control have more professional commitment, mastery over their performance, and the ability to accept responsibility (4). These results confirmed the findings of the present study.

In terms of the factor loading, educational factors were the seventh factor (0.879) that affected the development of professional commitment. Regarding this factor, the component of role model creation had the highest factor load (0.993). This result was confirmed by those of the studies performed by Vabo et al. (2021) which pointed to the effect of the existence of a role model on the development of professional commitment (26). Moreover, a study performed by Chang et al. (2019) reported the factors of educational programs and the creation of professional role models as effective factors in professional commitment (7). These results were consistent with those of the present study.

Based on the findings and social learning theory by Bandura, a positive role model can encourage people to develop professional behaviors, and in learning through modeling, the learning is effective when the learner receives a reward for performing that behavior. However, if the behavior is faced with punishment, the probability of performing that behavior by the observer decreases (5).

In terms of the factor loading, managerial factors were the eighth factor (0.747) that affected the development of professional commitment. In this factor, the component of attention of managers to professional daily life and its resultant exhaustion had the highest factor loading (0.997). In their study, Duran et al. (2021) mentioned the support of managers as an effective factor in professional commitment (14). Moreover, the results of a study conducted by Phuekphan et al. (2020) indicated that job burnout and low levels of support led to a reduction in professional commitment and the desire to leave the profession (6). These findings were in line with those of the present research.

Based on the findings of the present research and the summary of the factors that lead to the development of professional commitment in the form of a comprehensive and practical model, it is necessary to provide it for the managers of educational and healthcare organizations to preserve human capital. This model can be employed alongside the development of appropriate strategies to create a favorable environment that provides the opportunity for growth and improvement of professional commitment in nurses.

Conclusion

Professional commitment plays a fundamental and important role in the quality of performance and the desire of nurses to remain in their professions. The development of a strategy for the improvement of professional commitment requires the use of a comprehensive model consisting of all factors and components that affect professional commitment as well as the comprehensive efforts of human resources of all academic units and healthcare systems. Therefore, according to the results of this study, which are presented in the form of a comprehensive model for the development of professional commitment, it is suggested that its implementation in universities and organizations be accepted and institutionalized as part of the current measures in the fields of education, research, and

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healthcare. Moreover, it is recommended to use the results to evaluate the impact of this model on the professional behavior of nurses.

One of the strengths of this research was the development of the professional commitment literature and the provision of a comprehensive model along with the ranking of factors affecting it. This model can be provided for policymakers and managers to help find solutions for the development of professional commitment. However, it should be noted that this research also had some limitations. Accordingly, since the statistical population consisted of undergraduate students and the culture of society as well as conditions of work and life environment affect professional commitment, it is possible that the ranking of the factors affecting the development of professional commitment is not the same in all societies. Therefore, in determining priorities and policies, one should pay attention to the different characteristics and structures of the profession and society and design plans and decisions accordingly. Given the importance of the subject, it is suggested that further research be conducted in diverse and larger samples and that the study of each factor and component affecting professional commitment be conducted and expanded separately.

Ethical considerations

The present study is derived from the doctoral thesis approved by the Research Council of Tehran University of Science and Research and has a code of ethics from the Medical Ethics Committee of Islamic Azad University, Karaj Branch (dated 14/04/2020, number IR.IAU.K.REC.1399.007). In the present study, participation was voluntary and the participants could withdraw at any time. The objectives and methods used in the research were explained to the participants, and the confidentiality of the contents and preservation of names were confirmed. Moreover, written informed consent was obtained from them before completing the questionnaire.

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Conflict of interest

The authors had no conflict of interest at any stage of the research.

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Author contributions

Dr. Arash: generating research ideas, collecting and analyzing data, writing the article, and revising the text.

Dr. Ghourchian: generating research ideas, writing the article, revising the text.

Dr. Jafari: generating research ideas, revising the text.

Dr. Jamali: generating research ideas, revising the text.

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