Original Article

Developing and validating a questionnaire to evaluate faculty members' retention in medical sciences universities

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Abstract

Background & Objective: Due to individual and organizational reasons, the retention of faculty members in medical science universities has become a critical challenge. Identifying and prioritizing the factors influencing faculty retention is essential. This study aimed to develop and validate a questionnaire designed to assess faculty retention at medical science universities.

Materials & Methods: This psychometric study, employing a multi-phase instrument development approach, was conducted in 2023 in Iran. The study consisted of two main phases: item generation and psychometric evaluation. A 25-item preliminary questionnaire was developed based on qualitative interviews with faculty members from several medical sciences universities. In the psychometric phase, face and content validity were assessed using expert judgment, and the Content Validity Index and Content Validity Ratio were calculated based on Lawshe's method. Construct validity was examined using exploratory factor analysis and confirmatory factor analysis. Reliability was evaluated through internal consistency (Cronbach's alpha) and stability (test-retest method using Spearman-Brown coefficient). The sample consisted of 351 faculty members selected through convenience sampling.

Results: The final questionnaire included 21 items across three domains: individual factors, institutional factors, and socio-political factors. The CVI and CVR values were 0.91 and 0.84, respectively. EFA revealed a three-factor structure that explained 64% of the total variance. The results of the Confirmatory Factor Analysis (CFA) indicated that the fit indices for the questionnaire's three-factor structure were appropriate. Cronbach's alpha for the total scale was 0.80, and domain-specific alphas ranged from 0.78 to 0.82. The stability assessment indicated acceptable reliability (Spearman-Brown coefficient = 0.78).

Conclusion: The developed questionnaire demonstrates acceptable validity and reliability for assessing factors related to faculty retention in medical science universities. Further validation in diverse academic contexts is recommended to enhance generalizability.

Keywords: faculty, faculty retention, psychometrics, medical education, organizational loyalty, questionnaires

Introduction

Nowadays, the human workforce is considered the most valuable asset in any organization, and the primary focus of investments is directed towards human resources [1]. The productivity and profitability of organizations depend on the retention and loyalty of their human workforce [2]. Organizational retention refers to the ability to retain human resources for an extended period through various strategies that encourage individuals to remain with the organization. This leads to individuals within an organization utilizing their full potential to achieve organizational goals and engaging enthusiastically in their work [4]. Organizations incur significant costs in attracting, training, and enhancing the skills of individuals, so the departure of talented and experienced individuals results in the loss of valuable resources [1].

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Medical universities rely on motivated and competent faculty members as their most essential human resource for delivering healthcare services, educating students, and enhancing the quality of education and health outcomes [5]. Consequently, medical universities invest significantly in the development and empowerment of young faculty members, and early departure of these individuals becomes costly for the organization. Therefore, the retention of these valuable assets in medical universities is highly important [6]. However, due to both personal and organizational factors, retaining faculty members—who are the foundation of medical sciences in universities—has become increasingly challenging. Some of these individuals tend to leave the medical university system.

The results of Naderi Anari indicated the influence of job satisfaction and organizational commitment among teachers [7]. Bibi et al. demonstrated that improving organizational support, addressing suboptimal working conditions, and enhancing job satisfaction can increase teachers' organizational commitment. Their research also revealed that a decrease in commitment can hurt the organization, educators, and students [8]. The findings of Zhang indicated that academics' emotions in teaching made a significant difference to organizational commitment [9]. Selesho and Naile. examined factors that influence the poor retention rate of academic staff in South Africa. They discovered job satisfaction as the main factor keeping academic staff in their profession. They also identified several extrinsic factors, including salary, heavy workload, challenges in meeting promotion requirements, and inadequate mentoring and professional development, as reasons for faculty members leaving the organization [10].

Several instruments have been developed to measure aspects related to employee retention, organizational commitment, and job satisfaction. For example, the Organizational Commitment Questionnaire (OCQ) developed by Mowday et al. [11], the Job Satisfaction Survey (JSS) by Spector [12], and the Turnover Intention Scale by Hom et al. [13]. Although these tools are useful, they primarily target general workplace settings and do not specifically address the multifaceted context of faculty retention in medical science universities. When we initially attempted to use existing instruments, we encountered several issues. First, available tools lacked items specifically tailored to the academic and clinical environments of medical universities. Second, many tools measured only one or two aspects of retention-related factors, such as satisfaction or motivation, rather than providing a comprehensive evaluation across organizational, professional, and personal domains. These limitations highlighted the need for a dedicated tool.

As one of the current challenges in universities is the departure of faculty members, it is necessary to examine the factors related to faculty retention and prioritize them accordingly. When we decided to develop a new tool, we encountered several key challenges: first, the absence of a comprehensive conceptual framework specific to faculty retention in medical universities made item generation complex. Second, faculty retention is influenced by multiple overlapping domains—personal, institutional, and socio-political—which require balancing broad coverage with item clarity and focus. Third, achieving content relevance across various academic ranks, departments, and institutional cultures required extensive expert involvement and iterative refinement. Finally, ensuring the tool's cultural and contextual appropriateness for the Iranian academic environment required careful linguistic validation and sensitivity to local academic values.

Although there has been limited research on faculty retention in medical universities and the factors influencing it within those organizations, no reliable and valid tools have been identified to examine the factors related to faculty retention. Therefore, designing and validating such a tool to further investigate and prioritize the factors related to faculty retention is necessary. This research aimed to develop and validate a questionnaire for assessing faculty retention in medical science universities.

Materials & Methods

Design and setting(s)

The research was a psychometric study employing a multi-phase instrument development approach conducted at the Tehran University of Medical Sciences in Iran between February and August 2023. The study included item generation, content, and face validation, construct validation through exploratory and confirmatory factor analyses, and reliability assessment.

Participants and sampling

The data were collected from 351 faculty members at medical sciences universities in Iran who participated in the study using a convenience sampling method. Participants were selected in different phases, and sample sizes were determined based on the standards required for each psychometric procedure. Ten experts

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participated in content validation using purposive sampling, while 351 faculty members participated in construct validation through convenience sampling.

The inclusion criteria required participants to express an interest in the study and to have experience as faculty members at medical sciences universities.

There was no restriction on minimum or maximum work experience, as we aimed to include a diverse range of academic profiles. The exclusion criterion was applied to questionnaires that had more than 10% of the questions unanswered. Participants were selected from various faculties, such as medicine, dentistry, pharmacy, nursing, and allied health sciences, representing 12 different universities across Iran. Sampling and data collection were conducted electronically via Google Forms, and the questionnaire link was distributed through official university mailing lists and academic groups on social media platforms.

Item development

The items in the questionnaire were developed based on a qualitative study conducted by the research team, which explored the perspectives of 22 faculty members from various universities in Iran on the factors affecting retention. This study has been published and is cited in references [14]. The qualitative data analysis yielded three main categories and ten subcategories. Three main categories were identified as factors influencing faculty organizational retention: individual factors, institutional factors, and socio-political factors. A directed content analysis approach was used to analyze the qualitative data, guided by the Graneheim and Lundman method [15]. Interviews were transcribed verbatim and coded line-by-line, and codes were grouped into subcategories and categories through consensus discussion among researchers. To finalize the items of the questionnaire, a panel of experts discussed the factors affecting the retention of faculty members in medical sciences universities. An expert panel session involving four key informants was conducted to identify the essential factors related to faculty retention in medical science universities. The group members proposed these factors based on the qualitative data through an inductive brainstorming process.

Following this step, the items for the questionnaire were developed.

Content validation

The content validity of the initial questionnaire was investigated both qualitatively and quantitatively by expert opinion. Ten faculty members from medical science universities were recruited to evaluate each item based on the criteria of "essential," "relevance," "clarity," and "simplicity." Each item was assessed using the Likert scale. Additionally, the experts were invited to provide feedback on the "simplicity" of each item in terms of fluency and the use of straightforward, understandable language, as well as suggestions for the most appropriate placement and order of the items. We assessed content validity by computing the Content Validity Ratio (CVR) and Content Validity Index (CVI) using ratings of item relevance provided by content experts. Given the ten experts who evalu-ated the items, the minimum acceptable amount of CVR was 0.62 based on the Lawshe table [16]. The formula for calculating the CVI using Waltz and Bausell's method is as follows: the total number of respondents who rated the items as "relevant," "clear," and "simple" is divided by the number of experts who assigned a score of 3 or 4 on the corresponding question within each criterion. In this formula, if an item has a score of more than 0.79, that item is retained in the questionnaire. If CVI is between 0.70 and 0.79, the item is questionable and needs correction and revision. Furthermore, if the value is less than 0.70, the item is unacceptable and must be deleted [17]. The experts' constructive comments regarding the wording of items—such as fluency, the use of simple and understandable language, and appropriate word placement—were taken into account.

Face validation

Faculty opinions were solicited to assess the face validity of the questionnaire. In this process, interviews were conducted with ten faculty members using concurrent verbal probing and a think-aloud protocol. The questionnaire items were examined in terms of fluency, appropriate phrasing, avoiding specialized words, and potential ambiguity. In addition to qualitative assessment, quantitative face validity was calculated using the item impact method. Items with an impact score ≥1.5 were retained.

Construct validation

The modified questionnaire, based on content and face validation, was distributed to 351 faculty members via Google Forms. The link was sent out three times over the course of one month, and reminders were shared via social media. An Exploratory Factor Analysis (EFA) was first conducted using LISREL software (version 8.8) to identify the underlying factor structure. Principal axis

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factoring with Promax rotation was used. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity were performed to ensure sampling adequacy. After confirming the factor structure, a Confirmatory Factor Analysis (CFA) was conducted to verify the fit of the model.

Fit indices included Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Adjusted GFI (AGFI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA) [18].

Reliability assessment

Internal consistency was examined using Cronbach's alpha; values above 0.70 were considered acceptable. Cronbach's alpha was calculated for each subscale and the entire questionnaire using data from 351 participants. Stability was evaluated through test-retest reliability. Ten faculty members completed the questionnaire twice, with a 7-day interval between administrations. The Intraclass Correlation Coefficient (ICC) was used to assess test-retest reliability. An ICC ≥ 0.70 was considered acceptable.

Statistical analysis

All statistical analyses were conducted using SPSS version 26 and LISREL version 8.8. Normality was checked using the Kolmogorov–Smirnov test. Before EFA, assumptions of sampling adequacy and factorability were tested using KMO and Bartlett's test.

Results

All 10 experts completed the content validation form. Ten faculty members also participated in the face validity phase.

Three hundred fifty-one faculty members participated in investigating construct validity. Of these, 202 were female (57.5%) and 149 were male (42.5%). Most participants were assistant professors (71.9%, n=252). In terms of departmental affiliation, 201 participants (57.3%) belonged to clinical departments, while the remaining 150 (42.7%) were from basic sciences. Regarding academic experience, 252 participants (71.7%) had 1–5 years of experience, 65 participants (18.5%) had 6–10 years, and 34 (9.8%) had over 10 years of experience. The sample size was determined based on the recommendation for confirmatory factor analysis, which suggests using 5 to 10 participants per parameter estimate in the measurement model [19]. During the reliability assessment phase, we included 10 participants, comprising six females and four males. Seven were assistant professors, and three were associate professors. Six participants were from clinical departments, and four were from basic sciences. All participants had between 3 to 12 years of experience as faculty members.

The overall CVR was 0.82, which was acceptable. The CVI for all items was 0.87 by using the Waltz and Bausell method. Five items with CVR <0.70 were removed as they were identified as being vague or similar to other items. One item was added based on the experts' suggestions, and ambiguities were corrected in six items. The scoring of each item for CVR and CVI was done using a 4-point Likert scale, and the final decision for item retention followed Lawshe's criteria.

Based on the faculty's feedback during the face validity process, all translated items were clear and accepted. Quantitative face validity was also assessed using the item impact score index. The impact score for each item was calculated as *Impact Score = Frequency (%) × Importance.* All items had impact scores greater than 1.5 and were therefore retained in the questionnaire.

The results of the CFA indicated appropriate fit indices for the questionnaire's three-factor structure: RMSEA = 0.064, NFI = 0.90, NNFI = 0.93, CFI = 0.94, SRMR = 0.060, GFI = 0.89, and AGFI = 0.86.

The measurement model, along with the standardized factor loadings of each item, is depicted in **Figure 1**. All items, except for item PF3, exhibited factor loadings higher than 0.4 and were statistically significant (T-value > 1.96).

However, item pf3 demonstrated a relatively weak factor loading (0.35). Given the significant factor loading of this item (T-value = 4.77), it was decided to retain it rather than exclude it.

There was consistency between the qualitative themes identified during the item development phase, and the factor structures revealed through CFA. This supports the theoretical framework established from the qualitative data.

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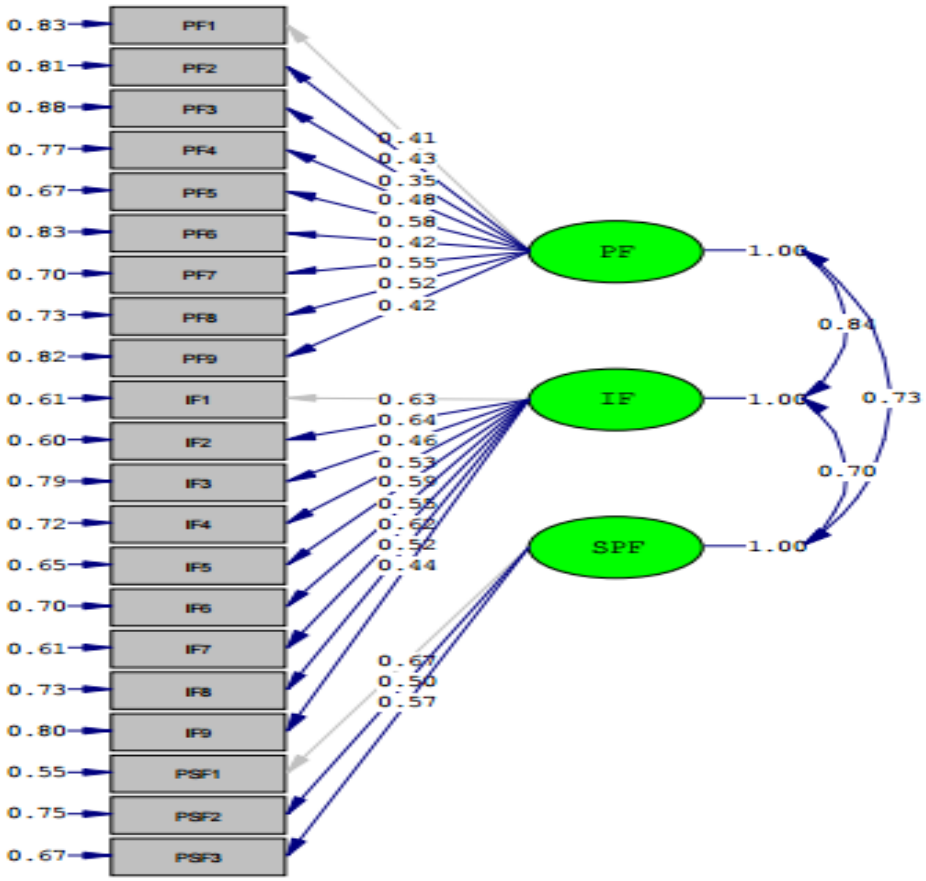

Figure 1. Measurement model, standardized factor loadings, and error variances of the questionnaire items.

Cronbach's alpha coefficient for the entire questionnaire was 0.80. For individual subscales, Cronbach's alpha was: "individual factors" = 0.80, "institutional factors" = 0.82, and "socio-political factors" = 0.78, all indicating acceptable internal consistency.

Test-retest reliability was evaluated by administering the questionnaire to 10 faculty members at a 7-day interval. The Spearman-Brown coefficient was 0.78, confirming the instrument's stability. The ICC was also calculated and was 0.76.

After investigating reliability and validity, the final questionnaire was developed to evaluate factors related to faculty members' retention in medical science universities, consisting of 21 items across three domains: "individual factors" (9 items), "institutional factors" (9 items), and "socio-political factors" (3 items). (Each item was scored using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher total scores indicate stronger perceptions of retention factors).

Discussion

This study described the development and psychometric testing of the first instrument to evaluate faculty members' retention in medical science universities. The initial questionnaire included 25 items, and after content validation, 21 items were retained. Further analyses showed acceptable internal consistency and reliability for the questionnaire. The results of the EFA indicated that the three-factor model provided a reasonable fit to the data. These categories included "individual factors", "institutional factors", and "socio-political factors".

Although we did not find any studies reporting the development and validity evidence of a questionnaire specifically designed to evaluate factors related to faculty retention in medical science universities, our results are closely aligned with previously published work on the conceptualization of organizational loyalty [14]. The items in this questionnaire aim to redefine organizational loyalty in the context of medical science universities as the faculty's intention or desire to maintain

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their membership, actively participate, and work diligently toward the university's goals [4].

The "individual factors" domain focused on the intellectual, personal, and financial demands, as well as faculty members' dignity and status within the institution, as crucial elements determining faculty retention in the organization. The domain of "institutional factors" encompasses issues such as organizational structure and culture, evaluation mechanisms for faculty, and the facilities and equipment provided by the university that relate to the faculty's work environment. The "socio-political factors" domain refers to the socio-political context of both the universities and the broader country.

Our results in the "individual factors" domain are consistent with those of previous studies, with a particular emphasis on the impact of personal, academic, and financial needs on employee retention within the organization.

Vuong et al investigated the factors affecting doctors' satisfaction and loyalty in Vietnam and found that income, including both salary and bonuses, plays a significant role in employee loyalty [4]. There is a critical need to pay attention to the role of faculty professional values and administrative arrangements. The misalignment between the values and the organization's administrative practices has been identified as a crucial factor in faculty dissatisfaction and retention. The lack of alignment between faculty professional values and the organization's administrative arrangements significantly contributes to the work dissatisfaction of faculty members [20].

The findings related to the "institutional factors" domain have been discussed in previous studies on employee retention. Mea and Se. explored how work-life balance, job satisfaction, and the work environment impact the loyalty of female lecturers. They revealed that the work environment has a positive and significant effect on the loyalty of female lecturers [21].

Human relations within the institution, department, or college play a crucial role in retaining faculty members at the university. These relations refer to the process of sharing information, ideas, and feedback within an organization, fostering a transparent and collaborative working environment. Nguyen and Ha . examined the role of internal communication in fostering employee loyalty within higher education institutions in Vietnam and found a significant relationship between internal communication and employee loyalty. They also emphasized the role of managers in enhancing organizational engagement, which, in turn, affects members' loyalty to the organization [22].

Our findings underscored the faculty members' need for access to the best and most effective faculty development programs. The evaluation of faculty development reflects their desire and commitment to staying current in the field of medical education and to explore various areas of medical education [23].

The results from the "socio-political factors" domain align with prior studies. Madurani and Pasaribu. revealed a direct consequence of talent management on the retention of organizational members, with an indirect effect mediated by organizational justice [24].

The results showed internal consistency, with a Cronbach's alpha coefficient of 0.80 for all items and 0.80, 0.82, and 0.78 for the respective categories, indicating acceptable levels of reliability. The acceptable Cronbach's alpha values indicate good internal consistency and confirm the validity of the three-factor model derived from the EFA. The results from the test-retest method and the calculation of the Spearman-Brown coefficient indicated that the tool's stability was acceptable. Therefore, given that the Cronbach's alpha coefficient exceeded 0.7, the reliability of the questionnaire was deemed suitable, confirming the results of the EFA. The study has some limitations. All evaluations are based on the viewpoints of faculty members, which is a potential source of bias about organizational loyalty. We therefore recommend utilizing other insights, such as those from human resources managers and policymakers. For use in other contexts, the questionnaire requires further validation among groups speaking different languages, from various cultures, and in other universities. Additionally, there are currently no other questionnaires available for evaluating factors related to faculty retention in medical science universities, making it impossible to validate the new questionnaire against a gold standard or assess criterion validity. Future research could investigate how institutions can benefit from utilizing this questionnaire to enhance faculty retention within their organizations.

Conclusion

This is the first questionnaire designed to evaluate factors related to faculty retention in medical science universities, and it is a valid and reliable instrument for measuring faculty member's commitment to the organization. The questionnaire was developed and evaluated psychometrically by a variety of methods. All content validation and test-retest reliability assessments

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were found to be appropriate. The results of the EFA indicated that the three-factor model fits the data reasonably well. This study is expected to contribute to the theoretical framework and enhance our understanding of the various mechanisms involved in faculty retention at medical science universities.

Ethical considerations

The Ethical Review Board of the National Agency for Strategic Research in Medical Education approved the study (IR.NASRME.REC.1402.097).

The participants did not receive any incentives, and participation was voluntary. The participants were also assured of the confidentiality of their information, and it was explained that the results would only be used for research objectives.

Artificial intelligence utilization for article writing

None.

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Conflict of interest statement

There is no conflict of interest.

Author contributions

MS and EM formulated the research idea. MS and EM gathered data. MS and EM performed the analysis of the data. MS wrote the manuscript. EM edited the draft of the paper. All authors approved the final manuscript.

Supporting resources

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Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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