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Design and Validation of a Healthcare Workforce Resilience Model with an Employee Retention and Maintenance Approach in Tehran Hospitals

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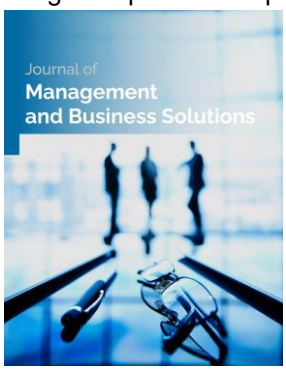
ABSTRACT

The objective of this study was to design and empirically validate a comprehensive model of healthcare workforce resilience with a focus on employee retention and maintenance in hospitals of Tehran. This study employed a sequential exploratory mixed-methods design. In the qualitative phase, semi-structured interviews were conducted with ten healthcare management experts and senior administrators selected through purposive sampling until theoretical saturation was achieved. Data were analyzed using grounded theory procedures, including open, axial, and selective coding. The resulting conceptual model was operationalized into a researcher-made questionnaire. In the quantitative phase, data were collected from 230 healthcare employees working in public and private hospitals in Tehran using stratified random sampling. Measurement validity and reliability were examined through content validity indices, Cronbach's alpha, composite reliability, AVE, and the Fornell–Larcker criterion. The structural model was tested using structural equation modeling with SmartPLS. Structural modeling indicated strong predictive power for key endogenous constructs, including employee participation (R^2 = 0.870), employee outcomes (R^2 = 0.934), employee retention and maintenance (R^2 = 0.700), organizational outcomes (R^2 = 0.507), and societal outcomes (R^2 = 0.531). The global goodness-of-fit index demonstrated a strong overall model fit (GOF = 0.641). All measurement constructs showed acceptable reliability (α > 0.70; CR > 0.75) and convergent and discriminant validity (AVE ≥ 0.50). The validated model confirms that healthcare workforce resilience is a systemic and multi-dimensional construct that significantly strengthens employee retention, organizational performance, and societal health outcomes, offering a robust framework for sustainable workforce management in hospital systems.

Keywords: Healthcare workforce, organizational resilience, employee retention, hospital management, structural equation modeling, human resource management

Introduction

Healthcare systems worldwide are experiencing unprecedented levels of pressure as they confront persistent workforce shortages, escalating service demands, and complex organizational transformations. Within this turbulent environment, the resilience of healthcare personnel has emerged as a strategic asset rather than merely an individual psychological trait. Resilience in healthcare settings now represents a multi-layered construct that integrates personal capacities, organizational systems, leadership practices, and socio-environmental conditions in



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sustaining effective service delivery, safeguarding staff well-being, and ensuring institutional continuity (1-3). The COVID-19 pandemic further amplified this reality, exposing structural vulnerabilities in hospitals while simultaneously highlighting the central role of workforce resilience in crisis management and long-term recovery (1, 4, 5). Consequently, resilience has become a cornerstone of contemporary health management discourse, intersecting directly with employee retention, engagement, and organizational sustainability (6, 7).

In parallel with these systemic challenges, healthcare organizations are confronted with growing difficulties in retaining qualified professionals. High turnover rates among nurses and clinical staff have become a chronic global problem, driven by burnout, emotional fatigue, workload intensification, limited career development opportunities, and declining job satisfaction (8-10). Empirical evidence consistently demonstrates that resilience operates as a protective buffer against these pressures, reducing emotional exhaustion, mitigating burnout, and strengthening job commitment (4, 11, 12). Moreover, higher levels of resilience are strongly associated with reduced turnover intention and enhanced work engagement, particularly during periods of crisis and organizational instability (6, 8, 13). These findings suggest that resilience is not only an individual resource but also a critical organizational capability that directly influences employee retention and workforce stability.

The conceptualization of resilience in healthcare has evolved from a narrow focus on individual psychological coping toward a broader organizational systems perspective. Contemporary research emphasizes that resilient healthcare organizations cultivate enabling structures, supportive leadership, adaptive human resource management practices, and participatory cultures that collectively strengthen workforce capacity to withstand and recover from adversity (2, 3, 14). Organizational resilience thus emerges from the dynamic interaction between human capital, leadership behavior, institutional policies, and external environmental conditions (1, 15). Within this framework, resilience becomes a strategic management objective that aligns closely with employee retention strategies, workforce development planning, and service quality assurance (6, 7).

A growing body of evidence underscores the importance of resilience-building interventions in healthcare workplaces. Systematic reviews indicate that resilience-based programs significantly improve psychological well-being, reduce emotional distress, enhance coping capacity, and strengthen work engagement among healthcare professionals (15, 16). Interventions grounded in positive psychology, mindfulness, emotion regulation, and meaning-centered therapy have demonstrated strong effects on increasing resilience, life satisfaction, and job commitment (17-20). Furthermore, organizational education and continuous professional development play a vital role in reinforcing career resilience, particularly during public health emergencies (21). These findings collectively reinforce the premise that resilience must be systematically cultivated through integrated organizational strategies rather than left to individual adaptation alone.

At the individual level, multiple psychological variables have been identified as significant predictors of resilience in healthcare personnel. Emotional intelligence, cognitive flexibility, self-compassion, mindfulness, and moral resilience consistently emerge as core psychological resources that strengthen adaptive functioning under stress (18, 22-25). These attributes not only protect mental health but also enhance professional performance, ethical decision-making, and patient care quality (13, 26, 27). Importantly, resilience mediates the negative effects of stress, compassion fatigue, and workplace violence on work outcomes, underscoring its central regulatory function in occupational health (4, 11, 13).

From an organizational perspective, the relationship between resilience and job satisfaction, organizational commitment, and quality of care is well documented. Hospitals characterized by strong organizational resilience

demonstrate higher employee satisfaction, stronger professional commitment, improved service performance, and enhanced patient outcomes (2, 7, 10). Strategic leadership, participatory governance, transparent communication, and supportive human resource management systems are repeatedly identified as foundational pillars of organizational resilience (3, 14, 28). In particular, green human resource management and empowerment-oriented leadership models have been shown to strengthen resilience while simultaneously promoting employee happiness, engagement, and long-term organizational loyalty (28).

Despite the expanding international literature, context-specific models of healthcare workforce resilience remain limited, particularly in Middle Eastern and developing healthcare systems. Iran's hospital sector faces unique challenges stemming from workforce shortages, economic constraints, increasing service demands, and complex regulatory environments. Studies conducted within Iranian healthcare settings confirm high levels of occupational stress, emotional fatigue, and turnover intention among hospital staff, emphasizing the urgent need for systemic resilience interventions (5, 17, 20). Yet, existing research in Iran has primarily focused on isolated psychological predictors of resilience rather than developing integrated organizational models that explicitly link resilience to employee retention and workforce sustainability.

Furthermore, global health crises have accelerated structural changes in healthcare delivery, including digital transformation, flexible work arrangements, and expanded interdisciplinary collaboration, all of which impose new demands on workforce adaptability and organizational resilience (1, 3). These transformations necessitate the development of comprehensive, empirically grounded resilience frameworks capable of guiding policy formulation, leadership practice, and human resource management in hospital environments.

In this regard, recent studies highlight the mediating role of resilience between workplace stressors and organizational outcomes. Resilience mediates the effects of job stress on commitment (12), of workload on quality of life (29), of compassion fatigue on quality of care (4), of workplace violence on engagement (13), and of moral challenges on post-traumatic growth (25). These convergent findings illustrate that resilience functions as a central regulatory mechanism linking individual well-being to organizational performance and societal health outcomes.

Collectively, the literature reveals three critical gaps. First, most studies examine resilience either at the individual psychological level or at the organizational systems level, but rarely integrate both into a coherent multi-dimensional model. Second, empirical models explicitly connecting resilience with employee retention and maintenance in hospital contexts remain scarce. Third, few studies offer context-specific frameworks tailored to the structural realities of large metropolitan hospital systems such as those in Tehran. Addressing these gaps requires an integrative approach that combines qualitative exploration with quantitative validation to construct a robust, contextually grounded resilience model.

Such a model is particularly vital for Tehran's hospital network, which serves as the clinical backbone of Iran's healthcare system and faces persistent workforce instability, growing patient loads, and increasing organizational complexity. A scientifically validated resilience model can inform leadership strategies, human resource policies, training programs, and institutional reforms aimed at strengthening employee retention, sustaining workforce capacity, and enhancing service quality.

Therefore, the aim of this study is to design and validate a comprehensive healthcare workforce resilience model with an explicit focus on employee retention and maintenance in Tehran hospitals.

Methods and Materials

This study was conducted as an applied, sequential exploratory mixed-methods research project aimed at designing and validating a resilience model for healthcare staff with an explicit focus on employee retention and workforce maintenance in Tehran hospitals. The logic of the design was developmental and model-building: the study first explored and extracted the core dimensions, components, and indicators of resilience within the local hospital context through qualitative inquiry, and then translated those qualitative results into a measurable framework that could be empirically tested and validated in a quantitative phase. Accordingly, the research process was implemented in three integrated stages. The first stage involved theoretical and documentary review to clarify the phenomenon, refine the interview focus, and develop a preliminary conceptual map to guide fieldwork. The second stage used the qualitative findings to develop a researcher-made questionnaire and operationalize the emergent components as observable items. The third stage tested the proposed model through field survey data and validated the measurement and structural relations using structural equation modeling.

In the qualitative phase, the study population consisted of experts and senior managers in the healthcare sector, including academic faculty members and executive managers with substantive experience in human resource management in hospitals and health organizations. Sampling was purposive, targeting individuals most capable of providing rich and theoretically relevant insights into the antecedents, mechanisms, and outcomes of resilience linked to retention. Recruitment and interviewing continued until theoretical saturation was achieved, meaning subsequent interviews no longer generated substantively new codes or concepts. The qualitative sample size was planned around approximately ten experts, consistent with saturation-oriented logic in grounded theory. Inclusion criteria for experts emphasized both credentialing and experiential depth, including at least a master's degree in human resource management or a closely related field, documented executive experience in HR or workforce governance, at least ten years of combined managerial, executive, or academic experience, and willingness to participate in a complete and in-depth interview process. Individual interviews were conducted at the participants' workplace or another agreed professional location, with sessions typically lasting between 30 and 90 minutes.

In the quantitative phase, the statistical population comprised healthcare staff employed in Tehran hospitals. The population frame reflected hospitals across the city, including public, armed forces, and private hospitals, with an estimated total of 5,900 healthcare staff. A sample size of 230 participants was determined using Cochran's formula to ensure adequate statistical power for model testing. Sampling followed a proportionate stratified approach to preserve representation across hospital strata; the population was divided into distinct strata aligned with the relative size of each hospital (and, where relevant, hospital type), and participants were selected proportionally from each stratum. Eligibility criteria for survey respondents included at least a bachelor's degree, a minimum of five years of work experience within hospital care delivery, and willingness to participate and complete the questionnaire fully and carefully.

Data collection integrated library-based/documentary methods and field methods, consistent with the sequential exploratory structure. During the theoretical stage, relevant books, peer-reviewed articles, and credible academic internet sources were reviewed to support conceptual sensitivity and refine the interview protocol. In the qualitative stage, primary data were collected using semi-structured, semi-open individual interviews. The interview protocol was designed to elicit expert judgments aligned with the logic of grounded theory and the paradigm model, covering causal conditions and influencing factors, the central (core) phenomenon, strategies and actions, contextual

(background) conditions and facilitators, intervening conditions including barriers and challenges, and expected outcomes of resilience in relation to retention and workforce maintenance. In addition to the core substantive questions, basic participant background questions were asked at the beginning to contextualize the expert perspectives. With participants' permission, interviews were audio-recorded to ensure accuracy in transcription and subsequent coding, and the researcher documented complementary field notes during and immediately after each session.

Outputs from the qualitative stage were converted into a researcher-made survey instrument in the second stage. Item generation was grounded in the extracted codes and categories produced through open and axial coding, ensuring that questionnaire content reflected the Tehran hospital context rather than relying exclusively on imported measures. The questionnaire was structured in two main sections: a brief demographic section to capture respondent characteristics such as age, gender, education level, and work experience, and a substantive section containing model indicators operationalized as Likert-type items. The response scale followed a five-point format ranging from very low to very high, supporting variability and parametric modeling assumptions. Prior to full deployment, the questionnaire underwent an initial pilot administration to identify ambiguous phrasing, improve clarity, and support preliminary reliability assessment.

Instrument validity and reliability were addressed in both phases, with phase-appropriate strategies. In the qualitative phase, credibility and trustworthiness were strengthened through expert review of interpretations, participant involvement where feasible in validating meanings, and triangulation between interviews and documentary evidence. Face validity was supported by review from supervisors, advisors, and domain specialists familiar with hospital HR and resilience concepts. Reliability of qualitative coding was supported by attention to transcription consistency and inter-coder agreement procedures; a within-subject agreement index between coders was used as an indicator of coding reliability, with a minimum acceptable agreement threshold of 60% or higher for control interviews. In the quantitative phase, validity was assessed through face validity, content validity, and construct validity. Content validity was reinforced using a Delphi-oriented review process with a panel of experts, supported by the Content Validity Ratio (CVR) and Content Validity Index (CVI) to evaluate necessity, relevance, clarity, and representativeness of items. Construct validity was tested through convergent and discriminant validity procedures within the structural equation modeling environment. Discriminant validity was examined using the Fornell–Larcker criterion at the latent-variable level. Reliability in the quantitative phase was examined using Cronbach's alpha to assess internal consistency and composite reliability to capture construct reliability within the latent variable modeling framework, with conventional acceptance thresholds emphasizing alpha values greater than 0.70 as evidence of satisfactory internal consistency.

Qualitative data analysis followed grounded theory procedures using systematic coding in three sequential layers: open coding, axial coding, and selective coding. Audio-recorded interviews were transcribed verbatim and repeatedly reviewed to develop intimate familiarity with the data. During open coding, interview text was broken into meaning units, and initial conceptual labels were assigned to phrases and sentences to capture discrete ideas relevant to healthcare workforce resilience and retention-oriented management. These initial codes were then compared and refined through constant comparison, allowing similar codes to be merged and distinctions to be sharpened. During axial coding, codes were clustered into higher-order categories by identifying shared properties and dimensions, leading to the formation of components and subcomponents that reflected patterns in experts' accounts. During selective coding, the analytical focus shifted to integrating the categories into a coherent model

by specifying how categories relate to one another in a retention-oriented resilience framework. In this step, categories were organized within a paradigm structure that distinguishes causal conditions, contextual and intervening conditions, strategies, the central phenomenon, and consequences. Qualitative coding and category management were conducted using MAXQDA, enabling systematic organization, retrieval, and refinement of codes and supporting transparent analytic auditability. The qualitative model was further refined through iterative expert feedback, including returning synthesized results to specialists to achieve shared understanding and improve conceptual clarity, and, where planned, additional validation interviews and Delphi-like rounds were used to strengthen the stability of the emergent structure.

Quantitative data analysis was conducted using both descriptive and inferential techniques. Descriptive statistics were used to summarize demographic characteristics and to describe central tendency and dispersion of the study variables, including mean and standard deviation, and distribution diagnostics such as skewness and kurtosis where relevant. Preliminary assumptions for parametric analysis were assessed using the Kolmogorov–Smirnov test to evaluate distributional normality. Inferential modeling focused on validating both the measurement model and the structural relations among constructs derived from the qualitative phase. Confirmatory factor analysis and path analysis were implemented within a structural equation modeling framework to test whether observed indicators adequately measured the latent constructs and whether hypothesized relationships among constructs were supported by the data. Software tools included SPSS for initial data screening, descriptive analysis, and assumption checks, and SmartPLS (version 4) for variance-based structural equation modeling. The choice of partial least squares structural equation modeling was aligned with the study's model-development orientation, its suitability for complex models with multiple constructs and indicators, and its robustness under both normal and non-normal data conditions, particularly where the model originates from qualitative extraction and requires empirical validation in an applied organizational setting. The final model validation relied on evaluating measurement quality indices for reliability and validity and examining structural path estimates to confirm the proposed network of relationships that collectively define a retention-oriented resilience model for healthcare staff in Tehran hospitals.

Findings and Results

The qualitative expert panel consisted of ten senior professionals whose profiles reflected substantial academic and executive experience in human resource–related domains. Five participants were university faculty members with doctoral degrees in human resource management, information technology, public policy, and organizational behavior, and with professional experience ranging from 14 to 16 years. The remaining five participants held senior executive roles in hospital human resource systems, including recruitment and selection, compensation and benefits, performance appraisal, and overall human resource management. Among these practitioners, two were specialists in recruitment and selection with 13 and 14 years of experience and doctoral degrees in public administration and public policy, one was a compensation and payroll expert with 13 years of experience and a doctorate in human resource management, one was a performance evaluation specialist with 14 years of experience and a doctorate in public administration, and one served as a hospital human resource manager with 15 years of experience and a doctorate in educational management. Overall, participants possessed between 13 and 16 years of professional experience, all held doctoral-level qualifications, and collectively represented a balanced combination of academic scholarship and applied human resource leadership relevant to the study's focus on healthcare workforce resilience and employee retention.

Table 1. Final Components and Indicators of the Healthcare Workforce Resilience Model

Dimension	Theme	Indicator	Expert Codes	Expert Approval (%)
Causal Factors	Individual	Job skills, expertise, and experience	A1–B1–E1–G1–B3–G3	100
		Adaptability and agility	A2–C4–H4	90
		Training	B2–C3–G6–K5	100
		Self-efficacy	B4–E2–G2	80
		Job motivation	C1–D2–F1	90
		Flexibility	E5–K2–L4	90
	Environmental	Family support	A4–B5–E4	100
		Social interactions	F4–L2	80
		Cooperation and participation	F5–L3	80
	Organizational	Managerial and hospital leadership support	A3–C2–D1–H1	90
		Job security	A5–D3–F2–H3	90
		Organizational climate	D4–F3–K1–L1	90
		Teleworking	D5–E3	80
		Development opportunities	G4–H2–K3	90
		Job design	G5–K4	80
Core Category (Employee Retention and Maintenance)		Creating a balanced and supportive work environment	A6–F8–L6	90
		Developing committed and loyal employees	A7–B6–G7	90
		Optimal utilization of employee capacities	A8–F9–G8–K8	90
		Recruiting competent professionals	B7–D8–E6–K6	90
		Organizational alignment with employee needs and expectations	B8–G9–H6	80
		Active organizational engagement of employees	C5	70
		Employee alignment with organizational policies and strategies	C6–H5–F7–L5	90
		Optimal use of intellectual capital and skills	D6–L7	80
		Investment in recruitment and training	D7–H7	80
		Workforce diversity	E7	70
		Human resource efficiency and organizational profitability balance	E8–K7	70
Strategy (Employee Participation)		Empathetic and emotional collaboration	A9	70
		Cognitive and emotional engagement in group contexts	A10–E11–G10	80
		Responsibility and employee role in organizational governance	B10–G11–K11	80
		Shared responsibility and accountability	B12–E12–H10–L10	90
		Voluntary organizational activities	C8–D11–F10–H9–K9–L9	90
		Intergroup and interorganizational collaboration	C10–G12–L8	80
		Innovative problem solving	D10–H8	80
		Active cognitive-emotional involvement in decision making	F11–E10–F12–K10	90
Facilitators (HRM Practices)		Communication skills and proactive HR leadership	A11–C11–H13–K12	80
		Managerial support of employees	A12	70
		Preservation of positive organizational culture	B13–B14	90
		Effective manager–employee communication	D12–G13	90

		Managerial trust and participatory decision-making	D14–K14	90
		Continuous performance feedback	E14–G15–H11	90
		Valuing employee cooperation and performance	F13–F14	90
		Managerial emphasis on employee welfare	F15–L11	90
		Formal performance evaluation system	G14–H12	90
		Planned career development and merit-based promotion	L12–L13	80
Intervening Conditions (HR Challenges)		Job burnout	A13–D15–H14	90
		Training cost and inefficiency of low-skilled staff	A14–H15–C15–G18	90
		Financial constraints and budget pressure	A15–D16–G16–L16	90
		Monitoring workforce activities	B16–K15	80
		Workforce diversity and conflicting beliefs	B17	70
		Performance monitoring and feedback	B18–E16	80
		Organizational change	C14–K16	80
		Continuous training supervision	C16	70
		Succession planning	D17–K17	80
		Performance evaluation systems	E17–L14	80
		Legal and regulatory knowledge	E18–L15	80
		Communication protocols	F18	70
		Managerial negotiation and transparency	G17	70
Resilience Outcomes	Employee Outcomes	Stress management	A18–C17–K19	80
		Crisis adaptation and problem solving	B20–E20	80
		Quality of life improvement	B21	70
		High efficiency and effectiveness	C18	70
		Self-esteem	C19–L17	100
		Job attachment and satisfaction	D18–D19–L18	100
		Mental health enhancement	E21	90
		Work–life balance	F19	90
		Self-efficacy	G20	80
		Professional quality of life	G21	80
	Organizational Outcomes	Organizational social capital	A16	80
		Organizational performance improvement	A17–K18	80
		Productivity and operational efficiency	F21–H17–H19	100
		Organizational development	H18	80
	Societal Outcomes	Crisis management	B19–E19	90
		Public health security management	D20–F20–L19	100
		Societal crisis adaptation	K20	90

Table 1 presents the final structure of the healthcare workforce resilience model derived from the qualitative phase and refined through the Delphi validation process. Initially, ninety-one potential indicators were extracted from expert interviews and theoretical analysis. After three rounds of expert evaluation, seventeen indicators failed to reach the minimum adequacy threshold of expert approval and were removed, resulting in a final set of seventy-four validated indicators incorporated into the survey instrument. These indicators were organized within a grounded-theory framework consisting of six major dimensions: causal factors, the core category of employee retention and maintenance, strategic actions centered on employee participation, facilitating conditions reflecting

human resource management practices, intervening conditions representing human resource challenges, and resilience outcomes. Causal factors encompassed individual, environmental, and organizational domains, highlighting the central roles of professional competence, organizational climate, leadership support, family support, and job security. The core category emphasized mechanisms of employee retention, including organizational alignment with employee needs, optimal utilization of human capital, and investment in recruitment and development. Strategic dimensions focused on participatory behaviors such as shared responsibility, emotional engagement, and collaborative problem solving. Facilitating conditions underscored the importance of effective communication, managerial trust, structured performance management, and employee welfare systems. Intervening conditions captured key challenges including burnout, financial constraints, workforce diversity, and organizational change. Finally, resilience outcomes were specified at three levels—employee, organizational, and societal—demonstrating that workforce resilience not only strengthens individual well-being and job satisfaction but also enhances organizational performance, productivity, and broader public health stability.

The quantitative sample consisted of 230 healthcare employees working in Tehran hospitals. Of these respondents, 136 participants (59.1%) were female and 94 participants (40.9%) were male, indicating a predominance of women in the study population. With respect to educational attainment, the majority of respondents held a bachelor's degree, accounting for 146 individuals (63.5%), while 65 participants (28.3%) had a master's degree and 19 participants (8.2%) possessed a doctoral qualification. Regarding work experience, 106 respondents (46.1%) reported up to ten years of professional experience, whereas 124 respondents (53.9%) had more than ten years of experience, reflecting a workforce with substantial professional maturity. In terms of age distribution, 38 participants (16.5%) were between 26 and 30 years old, 139 participants (60.4%) fell within the 31 to 40 year age group, and 53 participants (23.1%) were between 41 and 50 years old, demonstrating that the majority of the sample was concentrated in the early to mid-career stages.

Table 2. Descriptive Statistics of Research Variables

Statistic	Individual Factors	Environmental Factors	Organizational Factors	Employee Retention	Employee Participation	HRM Practices	HRM Challenges	Employee Outcomes	Organizational Outcomes	Societal Outcomes
Mean	4.0159	3.7435	3.8580	3.9692	3.5609	3.6387	3.9602	3.6835	3.4783	3.6449
Std. Error	0.03463	0.04011	0.04177	0.03520	0.02987	0.03171	0.03270	0.03341	0.03225	0.07334
Median	4.0000	3.6667	4.0000	4.0000	3.5000	3.6000	3.9231	3.8000	3.5000	3.6667
Mode	4.67	4.00	3.50	4.09	3.00	3.00	3.85	3.00	3.00	3.00
Std. Deviation	0.52519	0.60836	0.63355	0.53380	0.45299	0.48093	0.49596	0.50663	0.48903	1.11233
Variance	0.276	0.370	0.401	0.285	0.205	0.231	0.246	0.257	0.239	1.237
Skewness	-0.351	-0.411	-0.239	-0.176	0.391	0.397	0.385	0.003	0.402	7.439
Kurtosis	-0.970	0.106	-1.028	-0.849	-1.041	-0.926	2.934	-1.153	-0.598	68.941
Range	1.83	2.67	2.17	1.91	1.50	1.70	3.62	2.00	1.75	11.67
Minimum	3.00	2.00	2.67	3.00	2.88	2.90	3.00	2.80	2.75	2.67
Maximum	4.83	4.67	4.83	4.91	4.38	4.60	6.62	4.80	4.50	14.33
Sum	923.67	861.00	887.33	912.91	819.00	836.90	910.85	847.20	800.00	838.33

Table 2 presents the descriptive statistics for the ten main constructs of the study. All mean values are above the midpoint of the measurement scale, indicating generally positive perceptions of resilience-related conditions among healthcare staff. Individual factors (M = 4.02) and employee retention (M = 3.97) show the highest average scores, highlighting their central role in workforce resilience, while organizational outcomes (M = 3.48) display comparatively lower yet still favorable evaluations. Standard deviations range from 0.45 to 0.63 for most constructs, reflecting acceptable variability, with societal outcomes exhibiting greater dispersion (SD = 1.11), suggesting more diverse perceptions regarding societal-level impacts. Skewness and kurtosis values for most variables fall within acceptable limits for normal distribution, supporting the suitability of parametric analysis, although societal outcomes show noticeable deviation due to the wide range of responses. Overall, the descriptive results demonstrate adequate variability and appropriate distributional properties for subsequent structural modeling.

Table 3. Composite Reliability and Cronbach's Alpha of Study Variables

Variable	Cronbach's Alpha	Composite Reliability
Individual Factors	0.778	0.861
Environmental Factors	0.780	0.799
Organizational Factors	0.903	0.904
Employee Retention	0.906	0.921
Employee Participation	0.832	0.889
HRM Practices	0.862	0.911
HRM Challenges	0.892	0.912
Employee Outcomes	0.860	0.869
Organizational Outcomes	0.797	0.755
Societal Outcomes	0.706	0.794

Table 3 reports the reliability indices for all latent constructs of the proposed resilience model. Cronbach's alpha coefficients range from 0.706 to 0.906, and composite reliability values range from 0.755 to 0.921, both exceeding the commonly accepted threshold of 0.70. The highest internal consistency is observed for employee retention and organizational factors, confirming the stability of these core constructs. Even the lowest reliability values, observed for societal outcomes, remain within acceptable limits, indicating adequate measurement consistency. These findings confirm that the measurement model demonstrates strong internal reliability, thereby supporting the robustness of the constructs employed in subsequent structural equation modeling.

Table 4. Average Variance Extracted (AVE) for Latent Constructs

Construct	AVE
Individual Factors	0.575
Environmental Factors	0.695
Organizational Factors	0.676
Employee Retention	0.527
Employee Participation	0.594
HRM Practices	0.579
HRM Challenges	0.539
Employee Outcomes	0.548
Organizational Outcomes	0.500
Societal Outcomes	0.577

Table 4 displays the average variance extracted values for all latent constructs in the model. All AVE values are at or above the recommended threshold of 0.50, ranging from 0.500 for organizational outcomes to 0.695 for environmental factors. These results demonstrate satisfactory convergent validity, indicating that each construct

explains at least half of the variance of its observed indicators. The particularly strong AVE values for environmental factors and organizational factors reflect robust measurement quality for these dimensions of workforce resilience.

Table 5. Fornell–Larcker Criterion for Discriminant Validity

Construct	IF	EF	OF	ER	EP	HRMP	HRMC	EO	OO	SO
Individual Factors (IF)	0.758									
Environmental Factors (EF)	0.687	0.833								
Organizational Factors (OF)	0.723	0.816	0.822							
Employee Retention (ER)	0.718	0.688	0.605	0.726						
Employee Participation (EP)	0.665	0.612	0.749	0.722	0.770					
HRM Practices (HRMP)	0.698	0.678	0.719	0.707	0.712	0.761				
HRM Challenges (HRMC)	0.645	0.701	0.642	0.696	0.717	0.610	0.734			
Employee Outcomes (EO)	0.665	0.614	0.679	0.641	0.717	0.701	0.722	0.740		
Organizational Outcomes (OO)	0.698	0.637	0.669	0.619	0.656	0.699	0.602	0.705	0.707	
Societal Outcomes (SO)	0.729	0.717	0.692	0.655	0.727	0.666	0.701	0.759	0.748	0.759

Table 5 presents the discriminant validity assessment using the Fornell–Larcker criterion. The square root of the AVE for each construct (shown on the diagonal in bold) exceeds its correlations with all other constructs in the corresponding rows and columns. This pattern confirms adequate discriminant validity for the measurement model, demonstrating that each construct captures a unique aspect of healthcare workforce resilience and is empirically distinguishable from the other latent variables.

Table 6. Goodness of Fit (GOF) Index for the Structural Model

Component	R^2	Communality	GOF	Result
Individual Factors	—	0.575		Exogenous
Environmental Factors	—	0.695		Exogenous
Organizational Factors	—	0.676		Exogenous
Employee Retention	0.700	0.527		
Employee Participation	0.870	0.594		
HRM Practices	—	0.579		Exogenous
HRM Challenges	—	0.539		Exogenous
Employee Outcomes	0.934	0.548		
Organizational Outcomes	0.507	0.500		
Societal Outcomes	0.531	0.577		
Model Average	0.708	0.581	0.641	Model Confirmed

Table 6 summarizes the overall model quality using the Goodness of Fit index. The average communality (0.581) and average R^2 (0.708) yield a global GOF value of 0.641, which exceeds the recommended threshold for strong model fit. The endogenous constructs demonstrate substantial explained variance, particularly employee participation ($R^2 = 0.870$) and employee outcomes ($R^2 = 0.934$), indicating high predictive accuracy of the model. These results collectively confirm the adequacy and robustness of the proposed resilience model for healthcare staff.

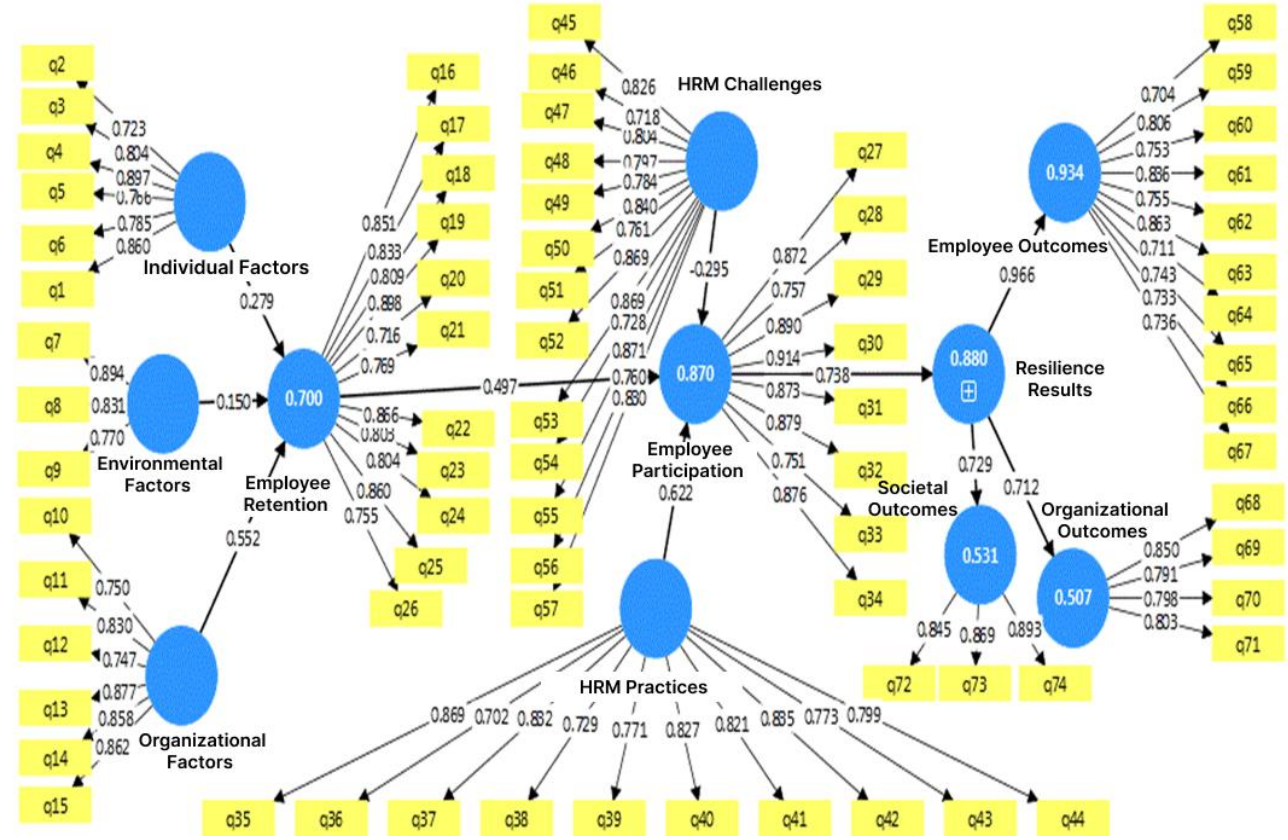

Figure 1. Model with Beta Values

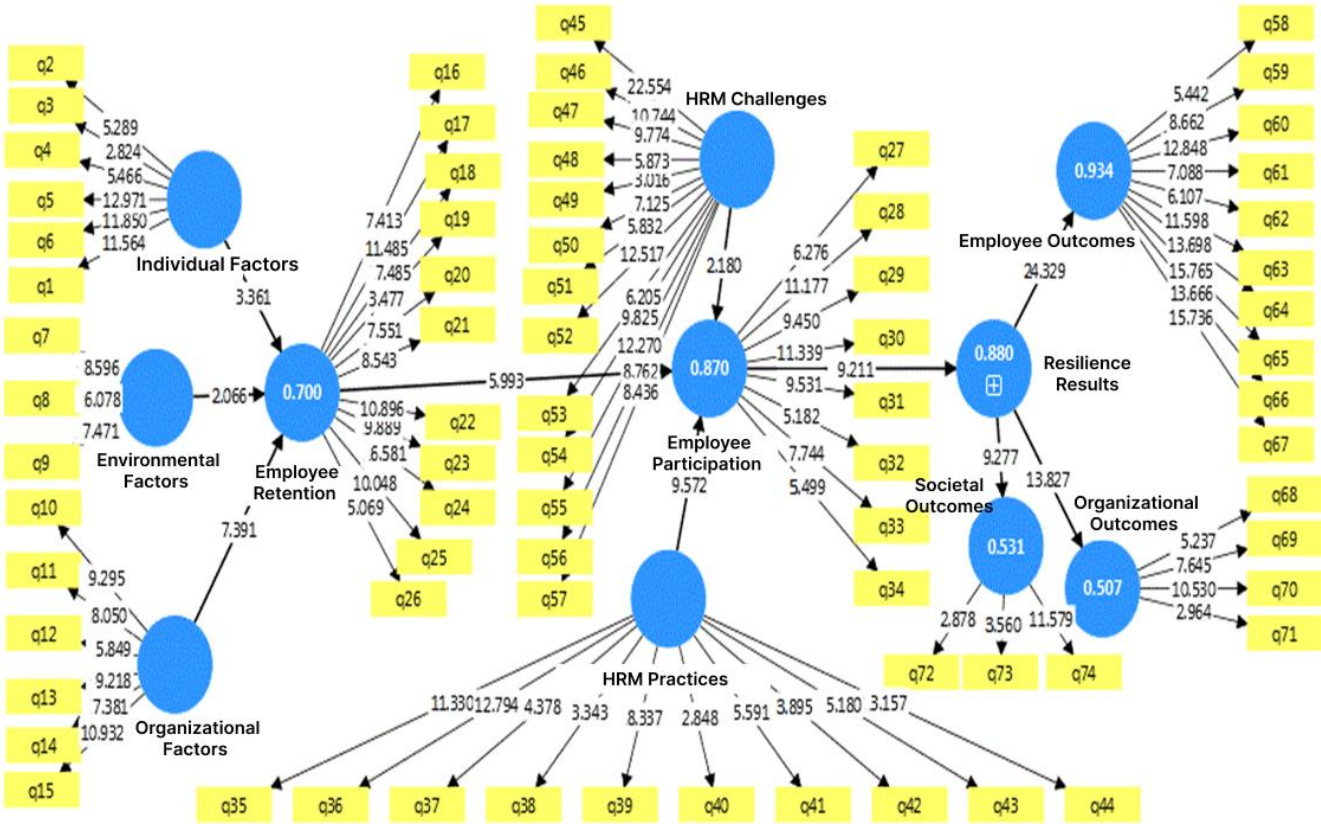

Figure 2. Model with T-Value

Discussion and Conclusion

The present study sought to design and validate a comprehensive model of healthcare workforce resilience with a focus on employee retention and maintenance in Tehran hospitals. The empirical results strongly support the robustness and explanatory power of the proposed model. The structural equation modeling results demonstrated high predictive accuracy, with substantial explained variance for key endogenous constructs, particularly employee participation ($R^2 = 0.870$) and employee outcomes ($R^2 = 0.934$), alongside a strong global goodness-of-fit index (GOF = 0.641). These findings confirm that resilience within healthcare settings is not a fragmented psychological attribute but a systemic, multi-dimensional capability emerging from the dynamic interaction between individual, environmental, organizational, and managerial factors.

At the level of **causal factors**, the high mean scores for individual, environmental, and organizational dimensions indicate that resilience in Tehran hospitals is anchored in a combination of professional competence, adaptive capacity, social and family support, and supportive organizational conditions. The strong effects of individual factors such as professional skills, training, self-efficacy, motivation, and flexibility align closely with prior evidence demonstrating that emotional intelligence, cognitive flexibility, self-compassion, and mindfulness are central predictors of resilience among healthcare workers (18, 22, 23). Similarly, the importance of environmental factors such as social interactions and family support resonates with the findings of Kiaei et al., who reported that perceived social support strengthens resilience and emotional adaptation under stress (27), and with Olashore et al., who observed that resilience buffers severe anxiety in hospital staff during crisis periods (11).

Organizational causal conditions—particularly managerial support, job security, organizational climate, development opportunities, and job design—emerged as foundational resilience drivers in the model. This result is consistent with international evidence indicating that strategic leadership, transparent communication, and supportive organizational systems are critical to organizational resilience and workforce stability (2, 3, 14). The strong association between organizational factors and employee retention in the model reinforces findings from Foroutan et al., who demonstrated that organizational resilience significantly predicts job satisfaction in hospital settings (7), and from Al-Shomrani et al., who showed that resilience is inversely related to nurses' intention to leave governmental hospitals (8).

The **core category** of the model—employee retention and maintenance—was empirically validated as the central mechanism through which resilience translates into sustainable workforce outcomes. The high mean score of this construct (M = 3.97) and its strong structural effects indicate that resilient systems directly reinforce organizational alignment with employee needs, optimal utilization of staff capabilities, recruitment of qualified personnel, and the development of commitment and loyalty. These results strongly corroborate Yang and Lee's findings that employee resilience, when combined with social support and proactive personality, significantly reduces career change intentions and strengthens retention during crises (6). Similarly, Pourhossein et al. showed that resilience moderates the negative effect of job stress on organizational commitment among nurses (12). The present findings extend this literature by demonstrating that retention is not merely an outcome of resilience but its central operational core within healthcare systems.

The **strategic dimension** of employee participation displayed one of the highest explanatory powers in the model ($R^2 = 0.870$). Indicators such as shared responsibility, voluntary engagement, emotional collaboration,

innovative problem-solving, and active involvement in decision-making were found to significantly strengthen workforce resilience. This aligns with the conceptual framework proposed by Ho et al., emphasizing that participatory governance and collective engagement enhance organizational resilience under environmental uncertainty (3). Moreover, Arun Kumar et al. demonstrated that empowerment-oriented and participatory human resource practices significantly improve employee happiness, feedback seeking, and resilience (28). The current study confirms that participation is not a peripheral organizational value but a structural pillar of resilience and retention.

The **facilitating conditions**, represented by human resource management practices, further reinforced the model's coherence. Strong communication skills, trust-based leadership, performance feedback systems, career development pathways, and managerial concern for employee welfare exhibited high loadings and significant structural effects. These findings are consistent with Abbaszadeh et al., who showed that organizational education enhances nurses' career resilience during COVID-19 (21), and with Hollaar et al.'s systematic review, which concluded that workplace-based resilience interventions yield sustained improvements in employee well-being and performance (15). The present study extends these insights by positioning HRM practices not merely as supportive tools but as structural facilitators that activate and stabilize the resilience-retention cycle.

The model also explicitly incorporated **intervening conditions** representing human resource challenges, including burnout, financial constraints, training inefficiencies, organizational change, workforce diversity, and regulatory complexity. These challenges were shown to significantly influence the effectiveness of resilience strategies and outcomes. This finding reflects the work of Cacciatori et al., who identified burnout as a major risk factor for newly hired healthcare workers (9), and Elhay et al., who documented the negative effects of change fatigue on job satisfaction and psychological resilience (10). By modeling these challenges as intervening conditions rather than isolated stressors, the study offers a more realistic representation of the healthcare work environment.

Finally, the **outcome layer** of the model demonstrated that resilience generates benefits at three interconnected levels: employee, organizational, and societal. Employee outcomes such as stress management, self-efficacy, work–life balance, mental health, and job satisfaction were strongly predicted by the model, confirming extensive prior evidence that resilience protects against psychological distress and enhances well-being (16, 19, 20). Organizational outcomes, including productivity, social capital, and organizational development, mirror findings from Velner et al. and Foroutan et al. linking resilience with organizational performance and service quality (2, 7). At the societal level, improved crisis management and public health security reflect the systemic role of resilient hospitals as anchors of community stability, a conclusion consistent with Oufi et al.'s analysis of long-term crisis management in hospitals (1) and with Nadushan Jafari et al.'s work on hospital resilience during epidemics (5).

Collectively, these findings validate resilience as a strategic governance construct rather than a narrow psychological attribute. The present study contributes a contextually grounded, empirically validated model that integrates micro-level psychological resources, meso-level organizational processes, and macro-level societal outcomes into a unified resilience–retention framework. This integrative structure significantly extends existing scholarship and provides actionable insight for healthcare system leaders.

Despite its contributions, the study has several limitations. The cross-sectional design restricts causal inference and does not capture the dynamic evolution of resilience over time. The reliance on self-report questionnaires may introduce common-method bias. The study was conducted within Tehran hospitals, which may limit generalizability to other healthcare systems with different institutional and cultural contexts. Finally, although the qualitative phase

achieved theoretical saturation, the expert sample size was relatively small, which may constrain the breadth of perspectives incorporated into the initial model development.

Future studies should employ longitudinal designs to examine how resilience and retention interact over extended periods and across different phases of organizational change and crisis. Comparative research across regions, hospital types, and national healthcare systems would enhance the external validity of the model. Further research could integrate objective performance indicators and patient outcome measures to complement perceptual data. Additionally, experimental and intervention-based studies are needed to test the causal effectiveness of resilience-enhancing programs derived from the proposed model.

Healthcare leaders should embed resilience development into strategic planning, leadership training, and human resource policies. Hospitals should invest in participatory governance structures, continuous professional development, transparent communication systems, and employee well-being programs. Performance management systems must emphasize psychological safety, feedback, and career growth. Policymakers should support hospitals through stable funding mechanisms and regulatory frameworks that enable organizational flexibility and workforce sustainability.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adheried in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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