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Factors Affecting the Resilience of Nurses in the COVID-19 Crisis: A Mixed Method Study from West of Iran

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A B S T R A C T

Background: The widespread outbreak of the COVID-19 virus has resulted in an increase in hospitalizations and mortality in healthcare centers, directly affecting healthcare personnel, especially nurses. Resilience stands for one of the key non-cognitive skills that can ensure nurses' optimal performance during crises. Hence, the present research was aimed at identifying the status of factors affecting resilience among nurses involved in the COVID-19 crisis at Shohada Hospital in Dehloran (Iran).

Methods: This mixed-method study (qualitative-quantitative) was conducted in 2021 (Solar year 1400). Respectively in qualitative and quantitative parts, the research sample consisted of 18 academic members and executive managers in the healthcare sector and 118 nurses at Shahid Dehloran Hospital in Ilam province (Iran). Data collection was performed using semi-structured interviews and questionnaires. Qualitative data analysis was conducted using $MAXQDA_{2020}$ software, and quantitative data analysis was performed using confirmatory factor analysis, AMOS 26, and SPSS 26.

Results: The factors influencing the resilience of nurses were categorized into three main themes: personal factors (motivation, stress, personal life, Becoming obsessed, balance in personal life, resilience in personal life challenges), organizational factors (mental and psychological health, organizational leaders' responsiveness), and environmental factors (lack of cooperation, lack of facilities and equipment). According to the results, among personal factors, motivation (R=0.88), among organizational factors, mental and psychological health (R=0.83), and among environmental factors, the lack of facilities has the most significant effect on nurses' resilience (R=0.75).

Conclusion: The findings highlight the considerable and significant impact of personal, organizational, and environmental factors on enhancing nurses' resilience. Based on the research results, the proposed conceptual model can serve as a suitable mechanism for hospital managers to enhance the healthcare staff's resilience.

Keywords: Resilience, Nurse, Hospital, Pandemic, COVID-19

Introduction

The COVID-19 emergency conditions have significantly affected the work environment of healthcare providers, making the healthcare provision challenging due to stress and uncertainty (1). Due to the sudden and rapid spread of the COVID-19 disease, high levels of infection and mortality in severe cases, and the lack of effective operational protocols, healthcare staff experienced exhausting conditions (2). Among the human resources working in hospitals, nurses, due to their

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close contact with patients as well as the provision of nursing care, are of utmost importance. Based on studies' results, during pandemics, nurses in healthcare teams experience higher levels of anxiety and psychological problems (3).

Resilience is a type of self-improvement with positive emotional, affective, and cognitive outcomes, and resilient individuals exhibit higher adaptability and flexibility when facing adverse situations. Resilience refers to positive compliance in responding to unfavorable situations so that it is essential for individuals' mental health (4). One of the components that can contribute to the growth and development of human capital is the ability to tolerate hardships and pressures, or resilience. Resilience is one of the fundamental capabilities enabling individuals to adapt to influential risk factors, particularly those affecting the acceleration and extent of improvement after facing significant disturbances (5). It does not eliminate stress but empowers individuals to employ coping strategies more effectively when confronted with challenges. Consequently, resilience acts as a dynamic psychological process, influencing individuals' reactions in different life situations, in particular during crises, and enhances performance by managing emotions and feelings (6). Researches conducted in this field indicate that individuals with higher resilience exhibit lower levels of avoidance, cope better with work difficulties, have a less pessimistic view of challenges, besides thinking less about hardships (7).

Resilience is a dimension that can affect individual cognition, therefore situated in the cognitive system (8). Organizational resilience refers to an organization's capabilities to adapt to disturbances and utilize the opportunities arising in a changing environment (9). Resilience exists in two forms: reactive and proactive. In proactive situations, resilience becomes apparent after events occur, reflecting how quickly and without enduring damage, harm, or disruption, an organization returns to its initial state. Reactive resilience indicates a conscious effort towards improving capabilities to cope with challenges ahead, involving the identification of existing risks, the expansion of warning systems, and the implementation of active measures (10).

The significant surge in COVID-19 cases posed serious and numerous challenges to hospitals (11). Nurses must possess acceptable personal resilience to provide continuous nursing care in a challenging work environment while maintaining their own health. Personal resilience refers to an individual's ability to adapt positively to negative aspects or cope effectively with difficulties and challenges (12). Ilam province has faced significant damages to the healthcare staff due to the high number of COVID-19 cases, including both leading to improvement and mortality. Moreover, the high number of COVID-19 patients, their hospitalizations, and the shortage of hospital facilities have led to fatigue among healthcare staff, prompting a deeper investigation into this matter. Thus, this research was conducted to identify the factors affecting resilience among nurses at Shohada Hospital in Dehloran during the COVID-19 pandemic.

Materials and Methods

This study was conducted by a descriptive-analytical method using a mixed-method approach (qualitative-quantitative) in 2021. The population of the qualitative part of the study included academic members and executive managers in the healthcare sector (Deputy of Treatment, Treatment Manager, Nursing Manager, Treatment Supervision Manager of the University, Chief, Nursing Manager, and supervisors of the nursing office, and some ward managers in the studied hospital). Accordingly, and based on saturation in data collection, 18 experts were selected using snowball sampling and included in the study. In the quantitative part, the population included all nurses at Shohada Hospital in Dehloran in Ilam (Iran). Using the Krejcie-Morgan table, a sample size of 118 individuals was randomly selected and included in the study.

For qualitative data collection, a semi-structured interview method was employed. Questions were

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included in an interview guide, focusing on issues or areas needing coverage and the paths to be followed. The sequence of questions was not the same for all participants, and depending on the interview process, each person's responses, and the prevailing conditions at the interview site were different.

The Lincoln and Guba evaluation method, a validation technique for qualitative research based on four criteria of credibility, dependability, confirmability, and transferability (FDC) was used in this study (13). Credibility refers to the conscious effort to ensure the accuracy and correctness of data interpretation. To achieve credibility, it was tried to select participants with maximum diversity of experiences. Sampling continued until data saturation was reached. The interview text and extracted codes were presented to participants, and they provided feedback on its accuracy and reliability. In case of any discrepancies, the issues were addressed and reviewed. Dependability refers to the stability of data over time and under different conditions. I.e., this criterion shows the ability to repeat the data in similar times and conditions, considered similar to the reliability criterion in quantitative research. To this end, prolonging the time of data collection (conducting interviews) was avoided as much as possible and all the participants were asked about the same topic. Confirmability indicates the correlation of data with sources and the emergence of results and interpretations from these sources. Accordingly, the research results are not the hypotheses or preconceived notions of the researcher, and a full description of the research stages, including data collection, analysis, and the formation of themes, was provided in order to ensure the comprehensibility of the research by the audience and readers. Moreover, the work process was made available to some of the research colleagues for validation. Ultimately, transferability refers to the extent to which study findings are transferable or applicable to other groups or places. Diverse perspectives and experiences of various participants regarding a phenomenon, or the principle of maximum diversity, enhance the transferability of findings. To facilitate transferability, the research team provided a clear description of the background, participant selection process, and their characteristics, data collection, and analysis processes so that the reader could judge the applicability of the findings in other situations.

Interviews were conducted in individual sessions, and the interviews continued until reaching theoretical saturation. The duration of each interview was set between 45 to 60 minutes, and the timing and location of the interviews were selected according to the participants' preferences in a safe space, considering the conditions of the pandemic. In some cases, due to the impossibility of face-to-face (in person) meetings, interviews were conducted remotely. The collected data were analyzed by the grounded theory qualitative analysis method with the assistance of MAXQDA2020 software.

Quantitative data were collected using a researcher-made questionnaire, formulated based on the qualitative study findings. The questionnaire utilized a 5-point Likert scale (ranging from 5 for fully agree to 1 for fully disagree). For validity assessment, both face validity and construct validity were considered. Five experts were asked to provide feedback to assess face validity. After evaluation and making minor adjustments based on experts' feedback, the face validity of the questionnaire was confirmed. Subsequently, internal consistency (Cronbach's alpha) was employed to examine the reliability of the questionnaire, resulting in coefficients of 0.877, 0.813, and 0.890 for personal, organizational, and environmental factors, respectively. To analyze the data, confirmatory factor analysis (CFA) was performed using AMOS26 and SPSS 26.

Results

Qualitative Section

In this study, the raw data collected were initially coded; common codes were conceptualized, and then categorized, leading to the formulation of a theory. After analyzing the interviews, 87 open

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codes were totally identified. Among these codes, 10 were selected as sub-themes, and 3 were selected as main themes, as presented in Fig. 1 and Table 1.

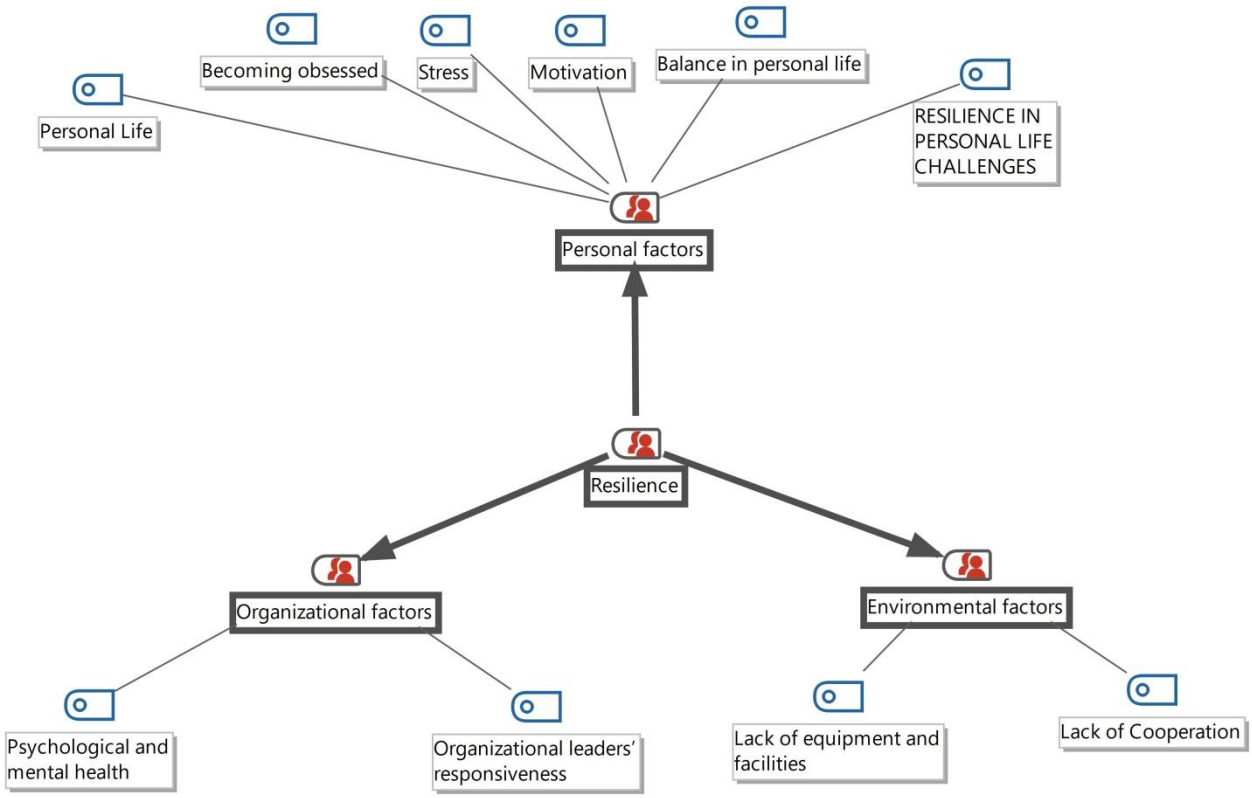

Figure 1. Research Model (Tree-MAXQDA Diagram)

Quantitative Section

For model validation and assurance of credibility, the questionnaire was distributed among healthcare workers. After data collection, model validation was performed using CFA with AMOS software, and the results are presented below. Before conducting factor analysis, it was essential to make sure whether the dataset was suitable for factor analysis or not.

The Kaiser-Meyer-Olkin (KMO) measure was used to assess sampling adequacy. This statistic indicates the ratio of common variance among variables that may be caused by underlying factors, ranging from 0 to 1, where values closer to 1 suggest that factor analysis is appropriate. If the KMO value is less than 0.6, factor analysis results may not be useful. The KMO test results in Table 2 show that the KMO values for all scales are greater than 0.6, indicating that the sample size is adequate for factor analysis.

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Table 1. Results of Interview Coding: Factors Related to Nurses' Resilience in the COVID-19 Crisis

Initial Codes	subtheme	Main theme	Axial code
Matching with Disease Conditions High Workload Adherence to Health Protocols Work Conscience Tolerance for Heavy Protective Cover Proximity to Patients High Number of Patients Resistance to Attitude Change Towards the Job	RESILIENCE IN PERSONAL LIFE CHALLENGES		
Shift Scheduling to Address Family Needs	Balance in personal life		
Weight Loss Due to Obsession Obsession with Contracting COVID-19 Obsession in Work Obsession with Health-related Issues	Becoming obsessed		
Fear of Transmitting the Disease to the Family Avoiding Family Due to Fear of Being a Carrier Imbalance in Life Due to Workload Neglecting Family	Personal life	**Personal factors**	
Stress of Being a COVID-19 Carrier Stress of Specialized Work Stress Due to Limited Knowledge About the COVID-19 Virus Fear of Contracting COVID-19 During Sampling Stress Regarding the Sense of Responsibility to the Community Stress Due to the Low Age of Patients	Stress		**Resilience**
Lack of Motivation Due to Low Income Mutual Understanding Among Colleagues Establishing Communication with Patients for Staff Motivation Hope for the End of the COVID-19 Disease Temporarily Perceiving COVID-19 in the Mind	Motivation		
Depression Due to Decreased Interactions Depression After COVID-19 Among Staff Jeopardizing Mental and Psychological Health During COVID-19 Mental Pressure of Fearing Disease Contraction	Psychological and mental health	**Organizational factors**	
Obtaining Hygiene Items from Authorities	Organizational leaders' responsiveness		
Boredom at Work Excessive Fatigue Due to Staff Shortages Increased Aggression Staff Demoralization Due to Ineffective Patient Treatment Lack of Human Resources	Lack of equipment and facilities	**Environmental factors**	
Lack of Motivation Due to the Lack of Cooperation from the Public Lack of Staff Cooperation Due to Fear of COVID-19 Transmission	Lack of Cooperation		

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Table 2. KMO Test Results for Questionnaire Dimensions

Index Name	KMO	Result
Personal factors	0.907	
Organizational factors	0.945	The statistical power and adequacy of the sample is confirmed
Environmental factors	0.816	

In this section, confirmatory factor analysis was conducted on the research variables to develop a measurement model, clarify the independent and dependent variables, and ultimately elucidate the structural equation model. Moreover, the fit of the measurement model for independent and dependent variables was assessed through confirmatory factor analysis, a practical application of structural equation modeling. The fit indices and measures in this study are summarized in Table 3.

Table 3. Fit Indices Results for Confirmatory Factor Analysis of Measurement Models

Reported Measure (confirmatory factor analysis)	Acceptable Measure	Fit index
0.826	0.90≥	**AGFI (Aggregated goodness of fit index)**
0.903	0.90≥	**GFI (goodness of fit)**
926.0	0.90≥	**CFI (Comparative Fit Index)**
0.956	0.90≥	**TLI (Tucker-Lewis Index)**
0.969	0.90≥	**IFI (incremental fit index)**
0.955	0.90≥	**NFI (Normed Fit Index)**
0.689	0.5≥	**PCFI (parsimony comparative fit index)**
0.679	0.5≥	**PNFI (Parsimony Normed fit Index)**
0.711	0.5≥	**PRATIO (economy ratio)**
0.001	0.08≤	**RMSEA (root mean Square error of approximation)**

As indicated in Table 3, all model fit indices are in an appropriate state. For example, the significant level of the model's chi-square is more than 5%, indicating that the empirical data adequately support the research conceptual model. Additionally, the root mean square error of approximation is less than 10%, further confirming the model fit. Acceptability of other model fit indices is also evident in the software output presented in Table 3. Fig. 2 illustrates the confirmatory factor analysis measurement model with standardized estimates.

Therefore, all model fit indices are in a satisfactory state, indicating that the empirical data adequately support the research conceptual model.

As observed in the above table, all factor loads exceed the threshold, indicating that the indices effectively explain the conceptual variables.

In case that single-sample t-test values are higher than the standard value of 1.96, and the significance level is less than the acceptable level of 0.05, it may be concluded that the influence of the mentioned factors on enhancing staff resilience is significant. According to the results of the single-sample t-test findings, there is significant impact of personal, organizational, and environmental factors on increasing staff resilience(presented in Table 4).

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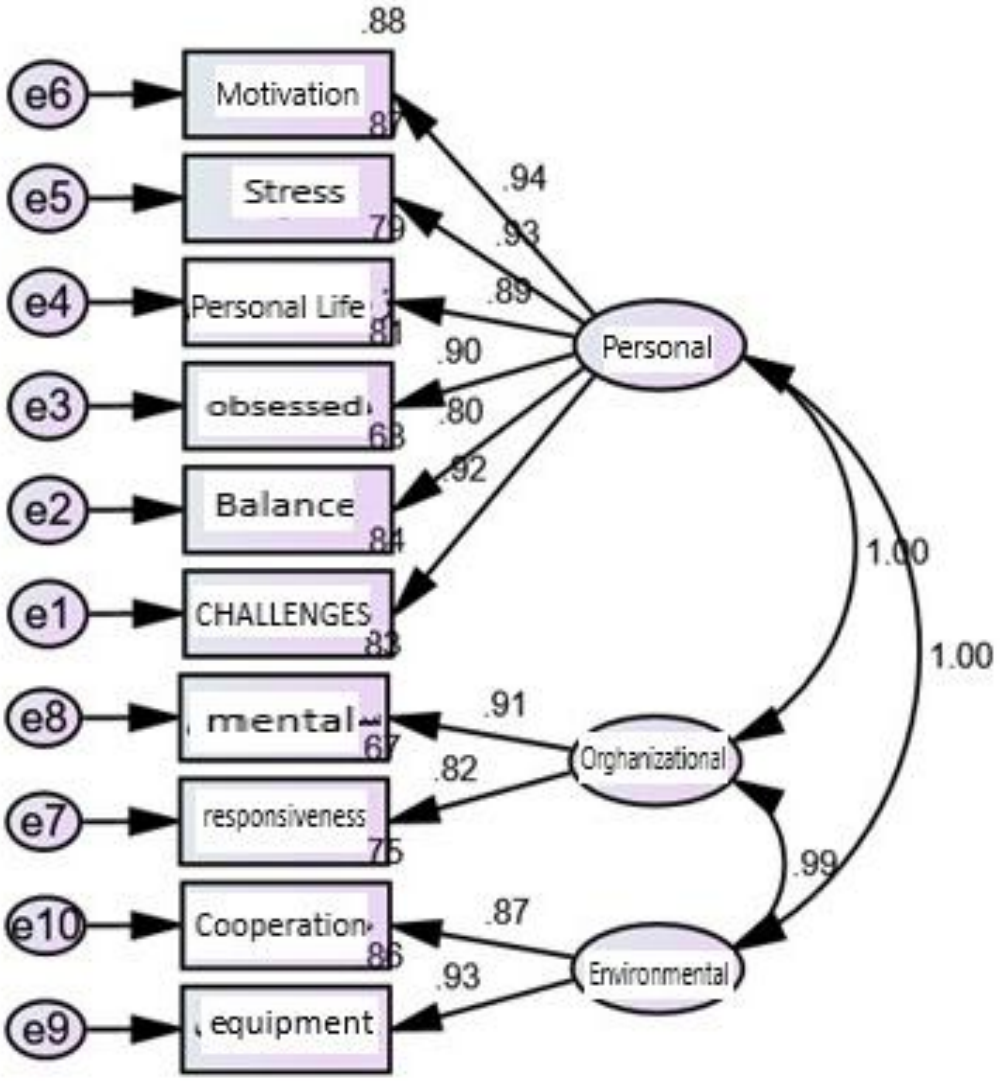

Figure 2. confirmatory factor analysis measurement model (standard estimate)

Table 4. T-Statistics and Factor Loadings for Confirmatory Factor Analysis

MAIN THEME	SUBTHEME	T STATISTIC	FACTOR LOAD
PERSONAL FACTORS	MOTIVATION	22.44	0.93
	STRESS	22.15	0.93
	PERSONAL LIFE	19.23	0.89
	BECOMING OBSESSED	19.78	0.90
	BALANCE IN PERSONAL LIFE	14.77	0.79
	RESILIENCE IN PERSONAL LIFE CHALLENGES	17.53	0.91
ORGANIZATIONAL FACTORS	ORGANIZATIONAL LEADERS' RESPONSIVENESS	16.31	0.81
	MENTAL AND PSYCHOLOGICAL HEALTH	18.89	0.91
ENVIRONMENTAL FACTORS	LACK OF FACILITIES AND EQUIPMENT	22.02	0.92
	LACK OF COOPERATION	16.49	0.86

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Table 5. Status of Nurses' Resilience Components in Crisis

CONFIDENCE INTERVAL		SIGNIFICANCE LEVEL	DEGREE OF FREEDOM	T	MEAN DIFFERENCE	COMPONENTS
UPPER LIMIT	LOWER LIMIT					
0.754	0.393	0.000	117	6.24	0.573	MOTIVATION
0.870	0.528	0.000	117	8.00	0.699	TOLERATING HARDSHIP
0.700	0.330	0.000	117	5.61	0.514	BALANCE IN PERSONAL LIFE
0.817	0.475	0.000	117	7.56	0.646	PERSONAL LIFE
-0.797	-0.445	0.000	117	-7.10	-0.621	BECOMING OBSESSED
-0.726	-0.381	0.000	117	-6.36	-0.553	STRESS
0.825	0.440	0.000	117	6.50	0.632	MENTAL AND PSYCHOLOGICAL HEALTH
0.840	0.490	0.000	117	7.48	0.669	ORGANIZATIONAL LEADERS' RESPONSIVENESS
-0.820	-0.505	0.000	117	-8.23	-0.662	LACK OF COOPERATION
-0.766	-0.424	0.000	117	-6.86	-0.595	LACK OF FACILITIES AND EQUIPMENT

As shown in Table 5, the level of influence of motivation, tolerating hardship, balance in personal life, personal life, mental and psychological health, and organizational leaders' responsiveness on increasing staff resilience has been positive. I.e. an increase in these components has led to an increase in healthcare staff's resilience. However, on the other hand, components such as becoming obsessed, stress, lack of cooperation, and lack of facilities, due to their negative single-sample t-test values that were not within the range of +1.96, and -1.96, have had a negative impact on increasing healthcare staff's resilience. This means that an increase in these components has resulted in a decrease in healthcare staff's resilience, and a decrease in these components has led to an increase in healthcare staff's resilience.

Discussion

The present study was aimed at identifying the effective factors on nurses' resilience in Shohada Hospital in Dehloran during the COVID-19 crisis. The research findings indicated that motivational factors, tolerating hardships, balance in personal life, mental and psychological health, and organizational leaders' responsiveness have a positive impact on nurses' resilience. Furthermore, according to the findings, becoming obsessed, job stress, lack of cooperation, and lack of facilities have negatively affected nurses' resilience. The results of this study align with the findings of Terry et al. (14), Baqeri et al. (15), and Ahmadi et al. (12).

Based on the study results, among the examined personal, organizational, and environmental factors, variables like tolerating hardships, attention to personal life, and organizational leaders' responsiveness played the most significant role in increasing nurses' resilience during the COVID-19 crisis. On the other hand, components related to becoming obsessed and lack of cooperation had the most significant negative impact on reducing nurses' resilience. Khosravian et al(16) in their study have recommended implementing virtual and electronic programs to increase psychological resilience and coping with difficulties among nurses in Kermanshah. Resilient individuals, due to their broad emotional expression and participatory problem-solving approach, improve job performance in stressful conditions caused by the COVID-19 pandemic (16).

Organizational factors that significantly affect the nursing staff's resilience of include the organizational leaders' responsiveness. In an organization, particularly the one dealing with contagious diseases and navigating through challenging times, the organizational leaders' responsiveness in various aspects, such as providing healthcare supplies to the healthcare staff and addressing their needs, contributes to increased resilience. Also according to Soltani Shal et al.(17), spiritual intelligence, organizational

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commitment, and flexibility have positive effects on nurses' resilience during the COVID-19 pandemic, and although low-quality work life is essential, it has not hindered nurses from delivering satisfactory services (17). Having a flexible approach from leaders, along with attention to adhering to nursing professional principles, can improve the quality of work life, followed by increased nursing staff's resilience during crises.

In the environmental domain, lack of cooperation, including non-cooperation of people, especially patients' companions and visitors, with healthcare staff, as well as insufficient collaboration among nurses in different wards and even various hospitals, has been identified as one of the most critical environmental factors decreasing nurses' resilience. Panahifar et al.'s study on nurses working in the intensive care unit (ICU) of Loghman Hospital showed a significant negative relationship between resilience and COVID-19-related anxiety, i.e. an increase in nurses' resilience considerably reduced COVID-19-related anxiety (18). Lack of collaboration and the absence of a supportive environment in the organization, prerequisites for improving the quality of work life, significantly affect the nurses' capacity and spirit to function in crisis conditions. One of the strengths of the study lies in its focus on the crucial topic of nursing groups' resilience during the COVID-19 conditions and the utilization of a mixed-methods approach. The challenging circumstances of the COVID-19 pandemic, including the difficulty in accessing samples and the limitation of conducting the study solely in one hospital, are among the key constraints of the current study.

Conclusion

Improving the healthcare staff's resilience, especially nurses, during crises such as COVID-19, that can ensure the efficiency and effectiveness of the healthcare system should be considered a top priority and receive more serious attention. After overcoming the COVID-19 crisis, it is time to implement a well-planned program through the design and execution of a coherent set of interventions to enhance the resilience of nurses in the country's hospital system. Improving the payment system for nurses, employing experienced psychology professionals to analyze the nurses' mental state and provide technical counseling, managerial leadership and flexibility in dealing with nurses, organizing job satisfaction training courses, and recognizing the healthcare personnel's families are some suitable strategies to increase nurses' resilience.

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Authors' Contribution

Ahmadi A designed research; Rashidi H and Mirahmadi conducted research; sadeghifar J and Momeni KH and Ahmadi A analyzed data; and sadeghifar J, Rashidi R, Momeni KH, Mirahmadi M, Ahmadi A, wrote the paper. Ahmadi A had primary responsibility for final content. All authors read and approved the final manuscript.

Ethical Considerations

including informed consent for participation, confidentiality of interviews and completed questionnaires, and the right to withdraw from the study according to participants' discretion, were observed in both qualitative and quantitative sections.

Ethical Appropal

This study was conducted with the approval of Ilam University of Medical Sciences under ethical code IR.MEDILAM.REC.1402.120.

Conflict of Interests

All authors declared no conflict of interests.

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