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Relationship between Emotional Exhaustion and Chronic Fatigue in Nurses: The Moderating Role of Health-Promoting Lifestyles

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ABSTRACT

Background: The present study aims to investigate the moderating role of health-promoting lifestyle in the relationship between emotional exhaustion and chronic fatigue in nurses.

Methods: This was a descriptive correlational study and the statistical population of this study included nurses at Sinai Hospital and Heart Center in Isfahan who were working in the winter of 2022. Based on the Krejci and Morgan's table, 280 questionnaires were distributed among the sample members, of which 266 questionnaires could be analyzed statistically. The data collection tools included the Maslach Emotional Exhaustion Questionnaire, the Chalder Chronic Fatigue Questionnaire, and the Walker Health-Promoting Lifestyle. Data analysis was conducted using two software programs: SPSS and Smart PLS.

Results: The results demonstrated that nurses' chronic fatigue was significantly improved by emotional exhaustion ($\beta = 0.146$, $p < 0.05$). Furthermore, it was discovered that a healthier lifestyle had a greater impact on lowering chronic fatigue ($\beta = -0.393$, $p < 0.001$). An acceptable fit was shown by the model fit indices (SRMR = 0.080, NFI = 0.928, $R^2 = 0.42$). Furthermore, the moderating effect of a healthy lifestyle was validated, showing that increased participation in healthy behaviors lessened the effect of emotional exhaustion on chronic fatigue.

Conclusion: The results showed that a health-promoting lifestyle can play a moderating role in the relationship between emotional exhaustion and chronic fatigue in nurses; therefore, paying attention to factors affecting the increase in a health-promoting lifestyle can be considered in improving the conditions of nurses who are exposed to burnout and chronic fatigue and improve their performance.

Keywords: Emotional exhaustion, Chronic fatigue, Health-promoting lifestyle, Nurses.

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Introduction

Hospitals, medical centers, and nurses are an integral part of the healthcare process in any country (Akbarian et al., 2021; Al-Mugheed et al., 2022), and their performance is therefore of great importance. In almost all hospital cases, nurses are the first group patients encounter who are with them until the end of the recovery period(Elham et al., 2019). Since nurses are the closest people in contact with patients and are considered the largest member of the health system, they play a fundamental role in the continuity of care, promotion, and maintenance of health at different levels of the health service delivery system (Artz AF, 1997). According to studies, on average, 50% of all healthcare system employees in Iran are nurses, and this figure reaches 80% in some countries(Mohaisen & Mohammed, 2024). Therefore, conducting research to identify and investigate the factors affecting nurses' performance is of great importance. One of the important factors to investigate in the nursing community is chronic fatigue. Nurses today experience high levels of chronic fatigue, which affects patient care outcomes and imposes significant costs on the health care system (Al-Mugheed et al., 2022). Chronic fatigue is a persistent and debilitating symptom that is associated with physical, psychological, behavioral, and cognitive problems and persists for 6 months or more and is felt almost every day (Barazandeh A, 2017). In other words, chronic fatigue refers to a type of fatigue that people feel extremely tired even after adequate rest and sleep. According to studies conducted by Rafat et al., the prevalence of fatigue in nurses was 91.9%, and two-thirds of nurses experienced fatigue at most times(Mohaisen & Mohammed, 2024). There are studies that link fatigue with poor performance (Barazandeh et al., 2023). Therefore, fatigue is an unpleasant mental feeling that disrupts a person's physical and mental performance and can prevent them from performing their daily tasks (Bulto LN, 2024), and factors such as job dissatisfaction or chronic fatigue can lead to psychological problems, in a way that provides the basis for experiences such as emotional exhaustion, increased levels of anxiety, stress, and depression (Calder et al., 1996)Moreover, the concepts of work and life have the strongest and most powerful connection with the individual and society, and creating interaction between them is of great importance, and due to the vital role of nurses and the impact of scientific advances in nursing, providing nursing services of optimal quality is not possible without becoming familiar with new techniques and influential factors, and one of the basic measures to improve the quality of care is to determine what effects the individual's own health can have on his or her work (Al-Mugheed et al., 2022). Health promotion is one of these influential concepts that examines the biological, psychological, and social factors that surround individuals and depicts the multidimensional and complex factors that individuals interact with to achieve good health. Health promotion, or the desire to improve health and achieve the best level of health, is the pioneer of the healthy people plan for all nations. Therefore, examining a health-promoting lifestyle is an important factor in the field of nursing practice. Nurses face many stressors in the workplace every day which can affect their general health, and since the decline in nurses' health is associated with medical accidents and errors (Al-Mugheed et al., 2022; Chang et al., 2019), a health-promoting lifestyle is an important factor in improving the quality of work life of employees that can reduce emotional exhaustion and chronic fatigue of employees (Charlier et al., 2020); thus, paying attention to health promotion in medical centers is essential and must be considered. Health-promoting behaviors include any activity which is carried out to increase or maintain the level of health and self-sufficiency of individuals or groups and include health responsibility, spiritual growth, physical activity, nutrition, interpersonal relationships, and stress control (Chen et al., 2024). In this regard, valuing the health and well-being of employees, including

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restaurant workers, can help reduce burnout and chronic fatigue of employees and promote their competence and self-worth (Chen et al., 2019). In this regard, emotional exhaustion is one of the many factors that exist in the workplace and had had lasting and serious consequences in workplaces (Borle et al., 2017). Emotional exhaustion is one of the representations of burnout that has been proposed by Maslach and Jackson (1981) (Dugger, 2024). According to a report, emotional exhaustion is a feeling of widespread emotional pressure accompanied by feelings of fatigue and energy depletion (Ebrahemzadih et al., 2020). Research has shown that workers in health care and social services are particularly at risk of emotional burnout (Fang & Mushtaque, 2024).

In other words, emergency room and other healthcare workers generally face more physical and psychological challenges due to their exposure to unpredictable situations such as medical and treatment emergencies, which ultimately leads to greater waste of time and energy (firouzkouhi berenj abadi & pourhossein, 2022). Emotional burnout is known as a psychological response accompanied by an impersonal response to service recipients and a reduced sense of competence and success at work, which is often associated with high turnover rates, poor employee performance, and low organizational effectiveness (Golparvar M, 2008), leading to job dissatisfaction and negative impacts on employees' personal, social, and family lives. Several studies show that nurses experience more job burnout and emotional burnout than other occupations, with healthcare occupations being associated with the highest rates of occupational injuries, including occupational and emotional burnout. Obvious signs of emotional exhaustion include increased absenteeism from work, withdrawal, and fear of returning to work after withdrawal and absence(Al Sabei et al., 2025).

Nurses who spend considerable time and energy helping others easily suffer from this condition and are exposed to constant physical and mental stress. Stress is a well-known component in nursing and causes many problems for both the nurses and the patients. This problem imposes high costs and job burnout. One of the axes of assessing the health of different societies is the mental health of that society. Considering the issues raised in the statement of the issues, the implementation of this plan is of particular importance. Also, the analysis of the factors affecting the growth and development of advanced societies indicates that all these countries have had efficient and effective treatment centers. Understanding the personality, psychological and emotional characteristics of nurses can be the conditions for planning in hospitals. The results of the present study can be used by medical and educational center departments, higher institutions, psychology students and future researchers.

Methods

This study is a descriptive correlational study in which chronic fatigue is the criterion variable, emotional exhaustion is the predictor variable, and lifestyle plays the role of a moderator variable. The study population was 477 nurses working at Sina Hospital and Heart Center in Isfahan in the winter of 2022. Based on Morgan's table (1970), the required sample size for a population of 480 is 142 (Kim & Yun, 2017). Accordingly, and in order to predict the possibility of some questionnaires being distorted, 280 questionnaires were distributed among the sample members, of which 266 could be analyzed statistically (return rate 0.95). SPSS version 26 and Smart PLS software were used to analyze the research data.

• Research tools

1) Health-promoting lifestyle questionnaire: This questionnaire was designed in 1990 by Walker et al. in Spain. This model was presented to determine the extent to which individuals perform health-promoting behaviors. This questionnaire contains 52 questions, and after reading each question, the respondent selects one of the 4 options based on the Likert scale: never, often, some, and always. Scoring is based on the answers as follows: the answer never: 1 point,

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some: 2 points, often: 3 points, and always: 4 points. The health-promoting lifestyle score is obtained by calculating the average of the individual's responses to all 52 items. Walker et al. have estimated the reliability of this questionnaire at 94% (Calder et al., 1996). The Health Promoting Lifestyle Questionnaire in Iran has been approved by Mohammadi Zaidi and Pakpour (2011), and its reliability for the entire questionnaire based on Cronbach's alpha coefficient has been reported to be 82% (Kwon, 2023).

2) Emotional Burnout Questionnaire**:** A 9-question questionnaire presented by Maslach and Jackson (1981) was used for emotional burnout (Kwon & Oh, 2023). The response scale used in this study was a five-point questionnaire ranging from never (1) to always(Mohaisen & Mohammed, 2024). This questionnaire, which measures the level of emotional burnout of employees, has validity and reliability according to the report of Mulki et al. (2006). Confirmatory factor analysis shows that the 9 questions of this questionnaire as a factor in the study by Mulki et al. (2006) have a Cronbach's alpha of 0.86 (Ebrahemzadih et al., 2020). Golparvar et al. (2008) translated and prepared a version of this questionnaire in Iran and reported a Cronbach's alpha of 0.91 for this questionnaire(Lu et al., 2023). The scoring method of this scale is as follows: two scores are considered for each question for the individual. Frequency score and severity score: If the subject has marked the box “never”, he/she will get a score of zero in both frequency and severity. Otherwise, depending on the mark he/she has placed in the frequency and severity section, he/she will get a score of 1 to 6 in frequency (from several times a year to every day) and a score of 1 to 7 in severity section (from very little to very much). When the scores of the subjects in each question are known, the four subtests can be calculated by adding the scores. In fact, by adding the scores, two scores can be obtained for this subtest in the two scales of frequency and severity (Marczak & Milecka, 2024).

3) Chronic Fatigue Questionnaire**:** The Chalder scale (1993) will be used to measure chronic fatigue (Maslach & Jackson, 1981). This scale is a short instrument with 14 items, and by adding up the scores, the total score of the individual can be obtained. According to Chalder's report, this questionnaire has an internal consistency coefficient of 89% for the entire scale (Mohammadi Zeidi et al., 2011). This scale was translated for the first time in Iran by Nasri in 2010, and its reliability coefficient was reported to be 83%(Mohaisen & Mohammed, 2024). In the study by Homayuni et al. (2015), the reliability coefficients of this questionnaire were obtained by two methods: Cronbach's alpha and split-half, respectively, as 0.91 and 0.87 (mohammadyari et al., 2022).

Results

The enrolled participants consisted of both men and women, and most of them were between the ages of 20 and 40. The majority of them were highly educated, with some having diplomas when they began their careers and many holding bachelor's degrees or higher. The range of work experience vary from highly experienced staff with over 20 years of service to new hires with less than a year. This diversity of varying in` ages, educational backgrounds, and work experience helps to ensure that the study's findings are more generalizable. (Table 1)

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Table 1. Distribution of Survey Respondents by Sex, Age, Service Record, and Education Level (N=266)

Sex	No.	Age	No.	Service record	No.	Education	No.
Man	92	20 -30 31-40 41- 50	97 84 74	Under 1 year 1-5 years 6 -10 years	23 67 84	Diploma and postgraduate diploma	81
Woman	174	More than 50	12	11-15 years 16 -20 years Over 20 years	46 31 15	Bachelor's degree Master's degree and above	109 76
Total	266	Total	266	Total	266	Total	266

Given that the Cronbach's alpha value of all variables is higher than 0.7 (Al-Mugheed et al., 2022), it can therefore be said that all latent variables in the model are unidimensional. Because Cronbach's alpha provides a more rigorous estimate of the internal consistency reliability of latent variables (alpha), in structural path models another measure called composite reliability (p_c) is used; when this value is greater than 0.7, the block is unidimensional. The composite reliability values are also shown in **Table (2)**. The results show that the model blocks have the required composite reliability(Table2).

Table 2. Assessment of the Measurement Model: Internal Consistency, Reliability, and Convergent Validity

Variables	Cronbach's alpha values	Composite reliability values (p_c)	AVE values (convergent validity)	Subscription index
Emotional burnout	0/701	0/806	0/518	0/518
Health promotion lifestyle	0/834	0/865	0/525	0/425
Chronic fatigue	0/700	0/791	0/567	0/567

After examining the validity and reliability of the research instrument, model evaluation was considered. In the present study, the effect size criterion was used to evaluate the model. For each effect in the path model, the effect size can be evaluated using Cohen's f^2. The effect size $f^2$is the ratio of the changes in R^2 to the part of the variance of the endogenous latent variable that remains unexplained in the model. Accordingly, in structural equation analysis, after estimating the parameters and before interpreting them, the fitness of the model must be ensured(Table3).

Table 3. Model Fit Summary for the Hypothesized Structural Equation Model

Test name	Description	Amount obtained
SRMR	Standardized root square residual	0/080
Chi-square	Chi-square coefficient	1580/69
NFI	Standardized goodness-of-fit index	0/928
R^2	Coefficient of determination	0/42

As shown in Table (4), the direct paths of health-promoting lifestyle and emotional exhaustion to the criterion variable of chronic fatigue are 0.39 and 0.146, respectively, which are significant at the 0.05 level. According to these findings, it can be shown that the effect of emotional exhaustion on chronic fatigue of nurses through the moderating variable of health-promoting lifestyle is significant at the 0.05 level (p>0.05) due to the obtained T score (1.98) which is greater than 1.96. Therefore, it can be stated that increasing health-promoting lifestyle can play a

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moderating role in the relationship between reducing emotional exhaustion and chronic fatigue of nurses, and hence the research hypothesis that health-promoting lifestyle moderates the relationship between the frequency of emotional exhaustion and chronic fatigue in nurses is confirmed (Table 4).

Table 4. Effect coefficients of emotional exhaustion and the effect of the moderating role of health-promoting lifestyle on chronic fatigue

Route	Overall impact level	Modified impact size	Standard deviation	T	Meaningfulness
Health-promoting lifestyle <-- Chronic fatigue	-0/393	-0/395	0/061	6/485	0/000
Emotional exhaustion <-- Chronic fatigue	0/146	0/145	0/098	1/983	0/049

• Model estimation

After evaluating the model, the data were entered into the SmartPLS software. The visual output of the model in path coefficient estimation mode is shown in Figure along with the observed variables. As can be seen, the above figure shows the path coefficients between the research variables. The path coefficients are the standardized beta values. (Figure1)

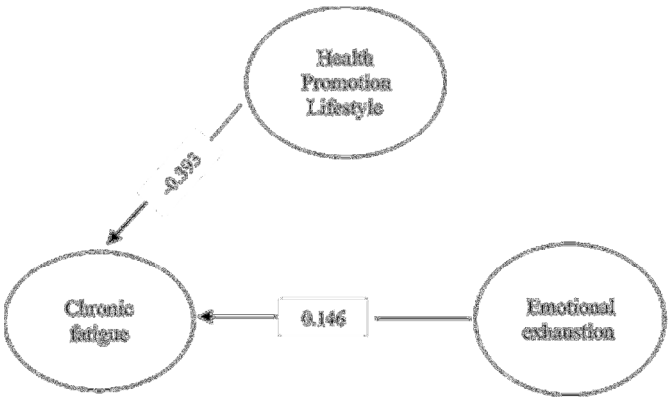

Figure 1. Estimation of path coefficients of the research model with determinants

Discussion

According to the findings , emotional exhaustion is a significant predictor of chronic fatigue in nurses which were in line with previous research showing that high levels of workplace stress, including heavy workloads, emotional demands, and a lack of support, contribute to burnout and emotional depletion in nursing professionals(El-Ashry et al., 2023; Poku et al., 2020).For example, a study on nurses in Ghana discovered that nearly 40% of the variation in emotional exhaustion was caused by unhealthful work environments(Poku et al., 2020).Similarly, critical care nurses involved in high-stress procedures such as CPR exhibited higher levels of compassion fatigue and secondary traumatic stress, contributing to chronic fatigue and diminished well-being(El-Ashry et al., 2023).

This research emphasizes the connection between chronic fatigue and lifestyle choices that promote health. This result is consistent with the strong advantages found in systematic reviews of workplace interventions which meant to enhance nurses' mental and physical health, especially in areas like nutrition, stress management, and exercise(Moghimi et al., 2024; Stanulewicz et al., 2020). According to a cross-sectional study conducted in Taiwan, nurses' self-perceived health and quality of life are significantly mediated by their lifestyle choices, which accounts for more than 42% of the variation(Wang et al., 2023).This

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highlights the central role of behaviors in sustaining well-being.

Particularly, the moderating effect of a healthy lifestyle, which attenuates fatigue even when emotional exhaustion is high is noticeable. It is consistent with data showing that programs focusing on nutrition, stress reduction, and physical activity improve nurses' health outcomes.(Moghimi et al., 2024; Stanulewicz et al., 2020). This suggests that learning resilience through lifestyle interventions can act as a protector against the negative effects of occupational stress.

Multimodal intervention designs, which combine behavioral education with practical support for change, appear to be more effective than purely educational approaches, as evidenced by the inconsistent results of lifestyle interventions (e.g., diet, stress, body composition, and job-related metrics)(Stanulewicz et al., 2020).

Research supports linking health-promoting behaviors, well-being, and job environment satisfaction into comprehensive frameworks. One model (the NHJS) demonstrated strong psychometric validity, underscoring how lifestyle and well-being improvements align with greater job satisfaction and retention(Chung et al., 2020).

There are a few limitations to take into account, though. First off, because the study was carried out in a private hospital in Isfahan, its conclusions might not apply directly to nurses working in public hospitals or in other areas with distinct socioeconomic circumstances. By using a larger and more varied sample, future studies could investigate these differences. Furthermore, even though self-reported data offer insightful information, objective health metrics like wearable technology or biometric data could be included in future research to confirm the results. Finally, adding more variables to the model—like workplace climate, staffing levels, and organizational support—might yield a more thorough understanding of the elements affecting nurses' well-being. Future studies could also examine the psychological processes that underlie compassion fatigue, which would serve as the foundation for focused therapies meant to address various phases of emotional exhaustion.

Conclusion

This study presents strong empirical evidence that health-promoting lifestyle serves as a significant protective factor, reducing the negative relationship between emotional exhaustion and chronic fatigue among nurses. The findings confirm that although emotional exhaustion is a direct and powerful predictor of chronic fatigue, its influence is not one-way. Adopting health-promoting behaviors such as stress management, physical exercise, and good nutrition indeed buffers this relationship, preventing the flow from psychological burnout to general physical depletion.

There are significant practical ramifications. Healthcare organizations need to incorporate proactive, organizationally supported wellness initiatives in place of reactive ones. These should go beyond sporadic workshops to include structural adjustments like making dietary advice accessible, setting up areas for exercise, putting stress-reduction initiatives into place (like mindfulness-based stress reduction), and cultivating an environment where staff members' well-being is truly valued. Hospitals can lessen individual suffering, improve patient safety, raise the standard of care, and cut expenses related to absenteeism and staff turnover by systematically investing in the health of their nursing staff.

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Conflict of interest

There are no conflicts of interest in this article.

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Ethical considerations

In order to observe ethics in research, before distributing the questionnaires, necessary explanations were given to the individuals about how the study was conducted and how to answer the questions, and it was emphasized that they had the right to withdraw from conducting the research or answering the questions. All individuals were assured that all information would be obtained confidentially and anonymously.

Code of Ethics

IR.IAU.KHUISF.REC.1402.054

Authors' contributions

The idea conception, the literature review, and the data collection were all done by M.K. As the corresponding author, A.B. oversaw the project, created the methodology, and planned the study. M.T. conducted the data analysis, analyzed the results, and made critical revisions to the manuscript. M.F. approved the final manuscript, reviewed and edited it, and offered clinical and medical advice. S.F. contributed to the preparation of tables and figures, and assistance in drafting the manuscript.

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