ORIGINAL RESEARCH ARTICLE

Investigating the Relationship between Job Procrastination and Sleep Quality with the Mediating Role of Emotion Regulation in Nurses Working at Public Hospitals in Shiraz

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Abstract

Background Nurses' procrastination can negatively impact care quality and patient safety. Understanding this phenomenon helps identify underlying factors and inform preventive strategies that enhance occupational performance and health. This study aimed to investigate the relationship between occupational procrastination and sleep quality among nurses, considering the mediating role of emotion regulation.

Methods This descriptive and cross-sectional correlational research employed structural equation modeling. The statistical population included nurses working in public hospitals in Shiraz. A total of 250 nurses (125 women and 125 men) were selected through convenience sampling based on predetermined inclusion criteria. Data collection tools included the Safarinia and Amirkhani-Razligui Organizational Procrastination Questionnaire, the Gross and John Emotion Regulation Questionnaire, and the Pittsburgh Sleep Quality Index. Data analysis was conducted using SPSS-26 and AMOS software within the framework of structural equation modeling.

Results Modeling results confirmed a structural relationship between occupational procrastination and sleep quality mediated by emotion regulation. The fit indices indicated acceptable goodness of fit ($\chi^2/df = 2.07$, GFI = 0.91, AGFI = 0.92, NFI = 0.93, TLI = 0.92, CFI = 0.95, RMSEA = 0.06). Sleep quality showed a negative association with procrastination ($\beta = -0.54$, $p < 0.01$), a negative association with adaptive emotion regulation ($\beta = -0.49$, $p < 0.01$), and a positive association with maladaptive emotion regulation ($\beta = 0.47$, $p < 0.01$). The indirect effect of adaptive emotion regulation on occupational procrastination was negative and significant ($\beta = -0.58$, $p < 0.01$), while the indirect effect of maladaptive emotion regulation was positive and significant ($\beta = 0.43$, $p < 0.01$).

Conclusion The findings provide a framework for explaining occupational procrastination among nurses. It is recommended that mental health professionals incorporate training in positive emotion regulation and strategies to enhance sleep quality as practical interventions to reduce procrastination in clinical settings.

Keywords Emotion regulation, Nurses, Procrastination, Sleep quality

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1 Introduction

Nurses' job performance refers to a set of measurable behaviors and outcomes that align with care objectives, patient safety, and organizational standards.[1] Enhancing job engagement improves nurses' performance and increases the likelihood of achieving the organization's broader health goals. However, due to the demanding, stressful, and critical nature of the nursing profession, there is a constant risk that nurses may experience occupational burnout during their shifts, leading to job neglect and engagement in non-work-related activities, such as the inappropriate use of social media during working hours.

The extent to which nurses become involved in such non-task-related behaviors is directly influenced by their level of cognitive–motivational engagement, emphasizing the complex relationship between job engagement and procrastination.[2] Avoiding procrastination is recognized as a key factor in ensuring patient safety and improving both individual and organizational performance. Although procrastination can be viewed as an interpersonal phenomenon, evidence suggests that individuals exhibit relatively stable tendencies toward this behavior.[3]

Considering the potentially disastrous consequences of procrastination in nursing settings, such as medication errors or patient incidents, addressing this issue and implementing managerial strategies to reduce it are of critical importance.[2,3] Research on procrastination has gained increasing attention over the past three decades.[4,5] Occupational procrastination is defined as the intentional delay of work-related tasks despite awareness of their negative consequences, and it has been studied across various domains.[6] Nevertheless, research on procrastination in high-pressure environments, such as nursing, has been limited.[5] Moreover, existing studies have often been retrospective and cross-sectional, failing to align with evolving societal conditions and overlooking multiple contributing factors to procrastination.[4]

Regarding the factors influencing procrastination, the self-regulation perspective of procrastination[6] argues that procrastination results from the depletion of personal resources; therefore, it is essential to examine variables associated with these resources.[7] One particularly relevant factor, especially among nurses, is sleep quality.[8] Recent studies have shown that better sleep quality, particularly in nursing populations, leads to reduced procrastination the following day.[9,10] Building on this emerging perspective, it is suggested that investigating the interactive effects of sleep quality can provide a more accurate understanding of the nature of occupational procrastination among nurses.[10,11] Sleep quality, especially in contexts involving patient safety and clinical care, can be a matter of life and death.[12]

To understand the mechanisms underlying the increase in nurses' procrastination, it is necessary to consider not only sleep quality but also negative emotional states. Nurses who engage in occupational procrastination often report experiencing unpleasant emotions when faced with tasks they postpone.[13] Emotions play a crucial role because they are linked both to procrastination and to sleep quality.[7,13,14] In fact, the relationship between mood and sleep is bidirectional, poor sleep quality intensifies negative emotions, while heightened negative emotions can lead to poor sleep experiences or even sleep disturbances.[15]

Regarding occupational procrastination, Kljajevic and Erceg argue that negative mood serves as a key mechanism that delays tasks. Although procrastination may temporarily relieve emotional discomfort, it creates a self-perpetuating cycle in which the number of postponed tasks continues to grow.[16] Moreover, after procrastinating, individuals often find themselves in the same situation as before, still facing unfinished tasks and experiencing renewed negative feelings, which can make it even harder to start the task.[14,17] This process can intensify negative mood, leading individuals to avoid tasks as a means of protecting themselves from unpleasant emotions associated with them. Therefore, procrastination can be conceptualized as an ineffective emotional regulation response to negative affective states.[18]

Since unpleasant emotional states are associated with maladaptive regulation of task delay, it can be hypothesized that the ability to cope adaptively with negative emotions reduces the risk of procrastination.[15] Emotion regulation skills, such as the ability to recognize, identify, and label one's emotions, facilitate emotional self-regulation, which in turn decreases procrastination.[16] Moreover, interventions that induce positive moods have been found to enhance individuals' capacity to overcome procrastination.[7]

Recent studies have also demonstrated that factors related to emotional well-being play a moderating role in the relationship between task performance and procrastination.[18,19] Although behavioral models describing the causes and consequences of procrastination have been developed,[19,20] it is important to consider sleep quality alongside mood states as a factor related to both procrastination and affective regulation. It should be noted that there is limited information regarding the relationship between individuals' abilities to manage emotions, their emotion regulation capacities, and procrastination, clarifying this relationship appears essential.[21]

Furthermore, while associations between procrastination and sleep disorders [20, 22] or poor sleep quality[23] have been reported, the relationship between sleep quality, particularly among nurses working night shifts, and the postponement of occupational tasks has recently gained

significant attention.[22] Most procrastination studies have been conducted in academic settings, and there remains a need for further research within occupational contexts.[24] To date, no study has examined the moderating role of emotion regulation in the relationship between occupational procrastination and sleep quality.

Based on the above and the lack of research exploring procrastination among healthcare professionals in relation to these variables, the present study aimed to examine the relationship between occupational procrastination and sleep quality, with emotion regulation as a mediating factor among nurses. The conceptual model of the study is presented in Figure 1. Accordingly, the study seeks to determine whether a relationship exists between sleep quality and occupational procrastination, with emotion regulation serving as a potential mediator. Specifically, it examines two central hypotheses: first, that occupational procrastination is associated with sleep quality, and second, that emotion regulation mediates the relationship between these two variables.

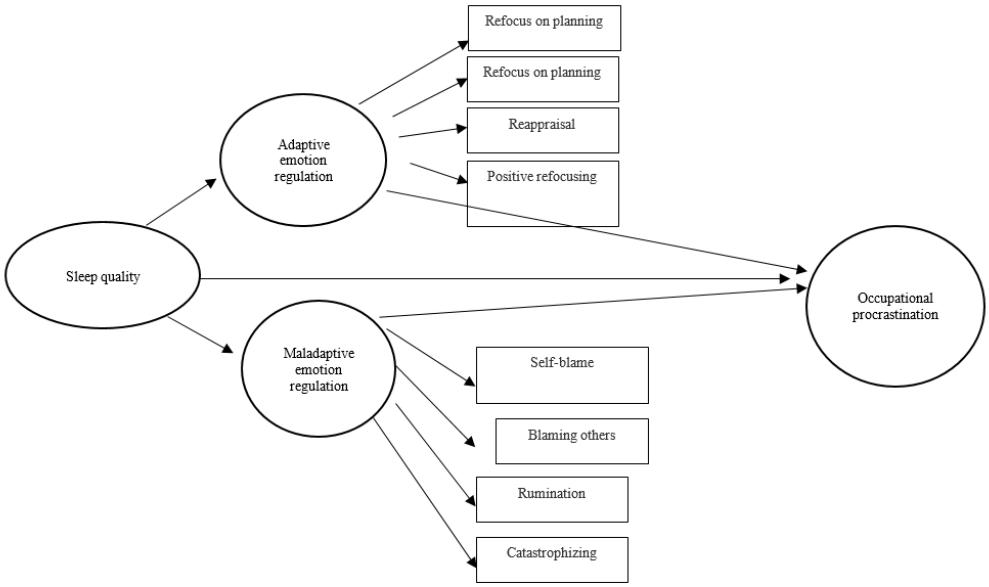

Figure 1 Conceptual model of the study. The relationship between sleep quality and occupational procrastination with the mediating role of emotion regulation

2 Methods

The present study employed a descriptive, cross-sectional correlational design and analyzed the data using Structural Equation Modeling (SEM). The statistical population consisted of all nurses working in public hospitals in Shiraz, totaling approximately 6,500 individuals in 2023. From this population, a sample of 250 nurses (125 men and 125 women) was selected through convenience sampling. To ensure greater accuracy, inclusion criteria were established, and only eligible participants received the questionnaires. The inclusion criteria for participants were as follows: individuals had to be between 25 and 45 years of age and hold either formal or contractual employment status. Participants also needed to express willingness to take part in the study and complete the questionnaire. Moreover, eligibility required prior night-shift experience, no use of psychoactive medications, and the absence of any physical disabilities. Incomplete questionnaires with more than 20% missing responses were excluded.

To observe ethical considerations, participants were assured of the confidentiality of their responses, and written informed consent was obtained. Participation in the study was entirely voluntary. Furthermore, this study received ethical approval from the Ethics Committee of the Research and Technology Deputy of Payame Noor University under the Code of Ethics IR.PNU.REC.1403.507.

Given that the present study employed the SEM method, the sample size was determined based on both classical and modern approaches.

According to the classical approach, the sample size should be approximately 2.5 to seven times the number of items included in the study.[25] In contrast, from the modern perspective, Kline emphasizes that SEM models should not be tested with fewer than 100 participants, and that a minimum of 200 participants is generally sufficient.[26]

Considering that the total number of questionnaire items was 80, a sample size of 250 participants was deemed adequate, meeting the requirements for conducting path analysis. To account for the possibility of invalid or incomplete responses, 310 questionnaires were distributed. After excluding 60 incomplete or invalid

questionnaires, 250 nurses' data were included in the final analysis.

Data analysis was conducted using both descriptive and inferential statistical methods. In the descriptive section, central tendency and dispersion indices, such as the mean, standard deviation, skewness, and kurtosis, were used. For inferential analysis, correlation analysis, and structural equation modeling, SPSS version 26 and AMOS version 24 were used. The following instruments were used for data collection:

Organizational Procrastination Questionnaire

The Organizational Procrastination Scale, developed by Saffarinia and Amirkhani-Razlighi, was used to measure the level of procrastination and delay in employees' administrative tasks. This instrument consists of three subscales: Inefficiency (16 items), Mental Preoccupation (five items), and Task Aversion (four items). Participants rated the extent to which each statement applied to them on a five-point Likert scale, ranging from one (strongly disagree) to five (strongly agree). In the original study with a sample of 503 participants, the scale demonstrated a Cronbach's alpha coefficient of 0.89 for the total measure, indicating high internal consistency. The possible scores range from 21 to 105.[27] In the present study, the Cronbach's alpha coefficient for this questionnaire was 0.77, confirming acceptable reliability.

Emotion Regulation Questionnaire (ERQ)

This questionnaire was developed by Garnefski et al. to assess cognitive emotion regulation strategies used following adverse or distressing life events. It consists of 36 items, each rated on a five-point Likert scale ranging from one (never) to five (always).

The instrument assesses both positive and negative cognitive emotion regulation strategies across nine subscales. The positive strategies encompass acceptance, positive refocusing, refocusing on planning, positive reappraisal, and putting into perspective. The negative strategies include self-blame, rumination, catastrophizing, and blaming others.

Garnefski and colleagues reported Cronbach's alpha coefficients ranging from 0.71 to 0.81 for the subscales.[28] The reliability of this scale has also been confirmed in Iranian samples, with Cronbach's alpha values ranging from 0.64 to 0.82.[29] In the present study, Cronbach's alpha coefficients were 0.73 for positive emotion regulation and 0.79 for negative emotion regulation, indicating acceptable internal consistency.

Pittsburgh Sleep Quality Index (PSQI)

PSQI is a standardized instrument designed to assess sleep quality, patterns, and disturbances among adults. It evaluates an individual's overall perception of sleep quality, sleep latency, actual sleep duration, habitual sleep efficiency, sleep disturbances (such as nighttime awakenings, bathroom visits, breathing difficulties, discomfort due to temperature, or pain), use of sleep medication, and daytime dysfunction resulting from poor sleep.

The questionnaire consists of 19 items, each rated on a scale from zero (no difficulty) to three (severe difficulty). The total PSQI score ranges from 0-21, where lower scores indicate better sleep quality. Specifically, scores of 0–5 reflect good sleep quality, while scores of six or above indicate poor sleep quality. Thus, higher scores represent worse sleep quality, with a score of 21 signifying the poorest sleep condition and zero representing the best.[30] The PSQI has been standardized and validated in Iran, demonstrating a Cronbach's alpha of 0.89.[31] In the present study, the Cronbach's alpha coefficient for the PSQI was 0.71, confirming acceptable internal consistency.

3 Results

In the present study, a total of 250 nurses participated. The mean age and standard deviation of the female participants were 33.60 ± 4.27 years, while those of the male participants were 36.14 ± 6.82 years. In terms of educational level, 95 participants (38%) held a master's degree, and 155 participants (62%) held a bachelor's degree. Regarding marital status, 80 participants (32%) were single, 45 participants (18%) were divorced or widowed, and 125 participants (50%) were married. According to Table 1, the correlations among all variables included in the model were statistically significant. The significance of these relationships provided the basis for conducting further analyses.

Before testing the research model, the assumptions of SEM, including normality, independence of errors, and multicollinearity, were examined. The normality of the variable distributions was assessed using skewness and kurtosis indices, and the results indicated that all variables were normally distributed (within the range of ± 1). Multicollinearity among the predictor variables was tested using the Variance Inflation Factor (VIF) and Tolerance statistics. A Tolerance value closer to one indicates lower multicollinearity, and the results confirmed the absence of this issue. A Tolerance value around 0.4 suggests potential concern, while a VIF value above five indicates the need to remove the variable from the model. The obtained results showed that all VIF values were within the acceptable range, confirming no multicollinearity problem. Overall, the findings demonstrated that all fundamental assumptions for SEM analysis were met, and therefore, no barriers existed for conducting the analysis. The relationships among the observed variables were examined using

Table 1 Zero-order correlation matrix of the observed variables in the study

Variables	1	2	3	4	5	6	7	8	9	10	11
Occupational procrastination	1										
Self-blame	0.34	1									
P-value	0.001										
Blaming others	0.38	0.04	1								
P-value	0.001										
Rumination	0.43	0.21	0.19	1							
P-value	0.001	0.01	0.01								
Catastrophizing	0.51	0.03	0.11	0.20	1						
P-value	0.001	0.11	0.05	0.01							
Refocus on Planning	− 0.39	− 0.09	− 0.07	− 0.18	− 0.25	1					
P-value	0.001	0.07	0.13	0.05	0.01						
Positive refocusing	− 0.31	− 0.05	− 0.01	− 0.16	− 0.19	0.57	1				
P-value	0.01										
Positive reappraisal	− 0.58	− 0.28	− 0.33	− 0.21	− 0.49	0.61	0.76	1			
P-value	0.001	0.01	0.01	0.01	0.001	0.001	0.001				
Acceptance	− 0.58	− 0.57	− 0.63	− 0.38	− 0.29	0.60	0.55	0.39	1		
P-value	0.001	0.001	0.001	0.001	0.01	0.001	0.001	0.001			
Perspective-taking	− 0.21	− 0.37	− 0.39	− 0.41	− 0.29	0.51	0.49	0.42	0.35	1	
P-value	0.001	0.001	0.001	0.001	0.01	0.001	0.001	0.001	0.001		
Sleep quality	− 0.60	0.43	0.49	0.61	0.56	− 0.58	− 0.41	− 0.44	− 0.47	− 0.39	1
P-value	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	

Pearson's correlation coefficients, as presented in Table 1. The results of these correlations are reported within the zero-order correlation matrix of the variables. To assess the model fit, several well-established fit indices were employed, and the results are presented in Table 2.

The first evaluated index was the chi-square divided by degrees of freedom (χ^2/df). Since the obtained value (2.07) falls within the acceptable range (< 3), the result indicates a good model fit. The Comparative Fit Index (CFI), which compares the specified model with a null model lacking relationships among variables, was 0.91, exceeding the acceptable threshold of 0.90, thus demonstrating a desirable model fit.

The Goodness-of-Fit Index (GFI), which represents the proportion of variance and covariance explained by the model, was also 0.91, exceeding the acceptable level of 0.90, confirming the model's adequacy. The Adjusted GFI (AGFI), which adjusts the GFI for sample size and model degrees of freedom, ranges from 0 to 1, with values closer to 1 indicating better model fit. The AGFI value for the final model was 0.92, suggesting a satisfactory fit. The last examined index, the Root Mean Square Error of Approximation (RMSEA), should be below 0.08 to indicate a good fit. The obtained value of 0.06 confirms that the model demonstrates an acceptable and desirable level of fit. Overall, these results indicate that the final model achieves an adequate level of goodness-of-fit. The path diagram of the fitted model, along with the estimated standardized parameters, is presented in Figure 2.

As shown in Table 3, the path coefficients between sleep quality and job procrastination (β = 0.54), sleep quality and maladaptive emotion regulation (β = 0.49), sleep quality and adaptive emotion regulation (β = - 0.42), and maladaptive emotion regulation and job procrastination (β = 0.47) indicate relatively strong relationships among the variables.

Table 2 Model fit indices of the proposed research model

Index	χ^2/df	GFI	AGFI	NFI	TLI	CFI	RMSEA
Proposed model values	2.07	0.91	0.92	0.93	0.92	0.95	0.06
Acceptable threshold	< 3	> 0.90	> 0.90	> 0.90	> 0.90	> 0.90	< 0.08

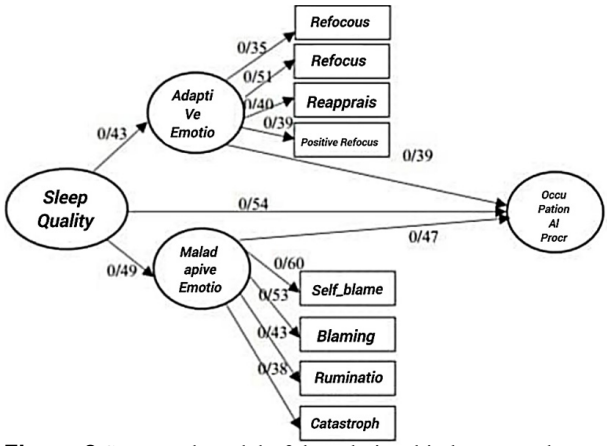

Figure 2 Structural model of the relationship between sleep quality and procrastination with the mediating role of emotion regulation

4 Discussion

The present study aimed to examine and model the relationship between job procrastination and sleep quality, with the mediating role of emotion regulation among nurses working in public hospitals in Shiraz. The results of SEM indicated that the proposed model demonstrated a satisfactory fit for the studied sample. Accordingly, emotion regulation was found to be associated with job procrastination through sleep quality. Therefore, all research hypotheses were confirmed. In other words, nurses who possess positive emotion regulation strategies and have better sleep quality tend to exhibit lower levels of job procrastination.

The hypothesis regarding the relationship between sleep quality and job procrastination among nurses was supported. The findings revealed a significant negative relationship between the two variables, indicating that poorer sleep quality is associated with greater job procrastination. These results are consistent with the findings of Sun et al.[7] Gort et al.[14] and Jeon et al.[21] but are not consistent with studies by Kühnel et al.[12,23] and Van Bogaert et al.[2] which reported that procrastination could not be solely explained by sleep quality. They argued that other factors, such as self-control,[12] positive emotions, time pressure,[12] and self-regulation ability,[2,20,22] play significant roles in procrastination.

However, several studies have shown that poor sleep quality can impair job performance and increase tendencies toward procrastination.[10,13] Nurses with low sleep quality, often exacerbated by occupational stress and night shifts, may experience reduced energy, fatigue, and diminished physical and psychological capacity, leading to lower productivity despite physical presence at work.[7,31–33] Consequently, sleep quality can influence a nurse's energy level and ability to stay engaged and persistent in performing tasks over time.[31] When individuals lack sufficient energy due to sleep disturbances, they may tend to delay or avoid tasks.[11]

Overall, sleep quality appears to affect both performance and attitudes toward professional duties,[4,6,29,33]

Table 3 Structural model path coefficients between sleep quality, emotion regulation, and job procrastination

Paths	Critical ratio (CR)	Standardized coefficient (β)	P-value	Result
Sleep quality → job procrastination	6.03	0.54	0.001	Confirmed
Sleep quality → adaptive emotion regulation	5.31	- 0.42	0.001	Confirmed
Sleep quality → maladaptive emotion regulation	5.97	0.49	0.001	Confirmed
Adaptive emotion regulation → job procrastination	4.13	- 0.39	0.001	Confirmed
Maladaptive emotion regulation → job procrastination	5.69	0.47	0.001	Confirmed

Moreover, to examine the mediating role of emotion regulation in the relationship between sleep quality and job procrastination, the Sobel test was conducted, and the results are presented in Table 4.

Table 4 Sobel test results for the mediating role of emotion regulation in the relationship between sleep quality and job procrastination

Path	Sobel test	Standardized path coefficient	VAF statistic
Sleep quality → adaptive emotion regulation → job procrastination	6.32	0.58	0.41
Sleep quality → maladaptive emotion regulation → job procrastination	5.01	-0.43	0.39

The results of the Sobel test indicated that the indirect effect of adaptive emotion regulation on job procrastination was -0.58, which was significant at $p < 0.01$. Similarly, the indirect effect of maladaptive emotion regulation on job procrastination was - 0.43, also significant at $p < 0.01$.

emphasizing its critical role in shaping work-related behaviors such as procrastination among nurses. Especially in situations where safety issues are involved, poor sleep quality can become a matter of life and death.[17] Therefore, paying attention to the sleep status of nurses is of great importance in ensuring effective patient care, and improving sleep quality programs should be considered an essential strategy to reduce job procrastination.[5]

The research hypothesis regarding the relationship between emotion regulation and job procrastination was confirmed. This finding is consistent with the results of studies by Tice et al.[19] Schuenemann et al.[20] Wypych et al.[24] and Kljajic and Erceg,[16] but inconsistent with those of Deng et al.[32] The results of the present study indicate that multiple factors contribute to procrastination, and its relationship with emotion regulation is not entirely definitive; thus, procrastination cannot be attributed solely to emotional factors.

According to Tice et al.[19] the relationship between procrastination and emotion regulation is explained by the idea that effective emotion regulation, by enhancing an individual's impulse control, can reduce procrastination. Therefore, nurses who exhibit positive, adaptive emotional responses are better able to manage their impulses and consequently exhibit lower levels of procrastination. Similarly, Schoenman et al.[20] argue that emotion regulation mechanisms enable individuals to overcome negative emotions and fulfill their duties. Their research further demonstrated that emotion regulation training can effectively reduce procrastination among nurses.

Emotion regulation skills include subcomponents such as emotional awareness, identification and labeling of emotions, accurate interpretation of emotional experiences, and self-support in emotionally distressing situations, all of which are effective in reducing negative emotions.[15] There is evidence that deficits in emotion regulation skills are associated with various health problems, while enhancing emotional regulation abilities can help reduce procrastination.[16,34] Moreover, interventions that induce positive emotions or involve self-affirmation techniques have been shown to enhance emotional regulation capacity, which is essential for overcoming procrastination.[18,35]

The research hypothesis regarding the relationship between occupational procrastination and sleep quality, with the mediating role of emotion regulation, was examined. The results indicated that this relationship was significant, and the hypothesis was confirmed. The findings of this study are consistent with those of Gort et al.[14] and Jeon et al.[21]

Based on the results, the causes and consequences of nurses' procrastination can be illustrated in a behavioral model in which emotional states, emotions, and sleep are identified as factors that influence task delay and interact in a reciprocal cycle. In fact, poor sleep can lead to occupational procrastination, while maladaptive emotions, which may arise either from procrastination or from sleep problems, can intensify this cycle.[14]

On the other hand, nurses with effective emotion regulation skills can cope with negative emotions and show less procrastination, even in the face of insomnia or sleep difficulties. Therefore, simultaneous attention to both sleep quality and emotion regulation in nurses is essential, since sleep disturbances can reduce one's ability to regulate emotions, and conversely, deficits in emotion regulation can make individuals less capable of coping with procrastination.[20]

Overall, the findings of this study indicate that sleep quality and emotion regulation are two key components in predicting and managing occupational procrastination among nurses, and that educational and supportive interventions in these two areas can play a crucial role in reducing procrastination and improving job performance.

5 Conclusion

Overall, the results indicated that nurses with lower sleep quality tend to exhibit higher levels of occupational procrastination. At the same time, those who employ positive emotion regulation strategies show lower levels of procrastination. However, poor sleep quality still exerts a considerable influence. The highest levels of procrastination were observed among nurses who not only experienced poor sleep quality but also relied on maladaptive emotion regulation strategies, where procrastination was particularly pronounced.

Given the critical and sensitive nature of the nursing profession, where procrastination can, at times, have life-or-death consequences for patients, it is strongly recommended that sleep health promotion programs specifically designed for nurses be implemented.[26,36] Furthermore, since emotion regulation training has been shown to reduce procrastination,[20] providing such training for nurses is also advised.

One limitation of the present study was the use of convenience sampling, which restricts the generalizability of the findings. Therefore, future research is recommended to employ random or cluster sampling methods, which allow for greater representativeness and broader applicability of the results.

Declarations

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Artificial Intelligence Disclosure

AI tools (including ChatGPT) were used only for language editing

and improving clarity of the text. All analyses, interpretations, and final decisions were made entirely by the authors.

Authors' Contributions
Akram malekzadeh designed the study. Akram malekzadeh collected the data. Saeed mazlumian performed the data analysis. Saeed mazlunian and aram malekzadeh drafted the manuscript. All authors reviewed, revised, and approved the final version of the manuscript.

Availability of Data and Materials
The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

Conflict of Interest
The authors declare that they have no conflicts of interest regarding the publication of this study.

Consent for Publication
Not applicable.

Ethical Considerations
This study was reviewed and approved by the Ethics Committee of Payame Noor University under the Code of Ethics IR.PNU. REC.1403.507. All research procedures were conducted in accordance with relevant ethical guidelines and regulations

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