Research Paper

Mediating Effects of Job Stress on the Relationship Between Sleep Quality and Job Satisfaction Among Construction Workers

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ABSTRACT

Background and Purpose: The construction industry creates various health risks to workers, affecting their physical and mental well-being. This study aimed to investigate the relationship between sleep quality and job satisfaction in construction workers, focusing on the mediating role of job stress.

Materials and Methods: This cross-sectional study assesses 100 construction workers in Tehran City, Iran, in 2020. The study data were collected through a demographic questionnaire, the health and safety executive occupational stress, the Pittsburgh sleep quality index (PSQI), and Herzberg's job satisfaction questionnaire. Structural equation modeling and path analysis were used for data analysis.

Results: Among 100 randomly selected construction workers, the Mean±SD scores for job stress, sleep quality, and job satisfaction were determined to be 3.43±0.59, 7.38±3.48, and 363.41±53.78, respectively. Sleep quality showed negative and positive correlations with job stress (r=-0.165, P<0.05) and job satisfaction (r=0.333, P<0.01), respectively. The direct effect of sleep quality on job satisfaction was not significant (0.136, P=0.257), while the direct effect of job stress on job satisfaction was significant (0.318, P=0.007). The indirect effect of sleep quality on job satisfaction through job stress was also not significant (-0.123, P=0.257).

Conclusion: Construction workers experience moderate job stress and sleep quality but low job satisfaction. A significant negative correlation was observed between sleep quality, job stress, and job satisfaction. While job stress directly and significantly impacts job satisfaction, the direct effect of sleep quality on job satisfaction is not significant. Improving sleep quality may indirectly enhance job satisfaction by mitigating the adverse effects of job stress.

Keywords: Sleep quality, Job satisfaction, Occupational stress

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Introduction

A fundamental ethical obligation is to create a healthy work environment that preserves workers' mental and physical health, safety, and welfare [1]. Mental health issues can significantly diminish productivity, leading to higher absenteeism rates and increased costs associated with addressing these challenges [2]. When working conditions align with employees' physical and mental capabilities, productivity levels rise, and health issues are less likely to arise [3]. A balance between working conditions and employees' abilities can enhance motivation, capacity, and overall job satisfaction, ultimately improving health outcomes [4]. However, various factors, including heavy workloads, intense pressure, and physical discomfort, can lead to job stress, which often results in job dissatisfaction; this cycle adversely impacts the safety and health of employees [5, 6].

Within this context, the construction industry is particularly affected, exhibiting the highest rates of occupational accidents in many countries due to the myriad risks and hazardous conditions on construction sites. As the National Institute for Occupational Safety and Health (NIOSH) noted in 2007, construction is categorized as a high-risk job [7, 8]. For instance, in China, approximately 4000 construction workers lose their lives each year due to work-related incidents [9]. In recent years, the expansion of the construction industry and the proliferation of projects in Iran have been accompanied by an alarming upward trend in occupational accidents within this sector [10]. Workers in the construction industry may face many risks, such as repetitive and difficult tasks, shift work, high job demands, and long working hours. These risks can significantly affect their physical and mental health [11]. Therefore, it is crucial to focus on construction workers' mental health parameters to ensure a healthy work environment that enhances work performance, moral issues, and job satisfaction.

As a labor-intensive industry in many countries, the construction industry has a considerable number of employees, and the research on their job stress has important theoretical and practical significance in improving construction safety performance through better job stress management [12]. Employees in the construction sector are vulnerable to mental health challenges that are increasingly surging [13]. Compared with other industries, the research on construction projects is often inadequate [12]. Despite significant research on sleep quality [14], job stress [15], and job satisfaction [16], a notable gap exists in understanding their interrelationships, specifically within the construction industry. Most studies have focused on general populations or other high-stress professions [17, 18], leaving the unique challenges construction workers face understudied. Given the high rates of job dissatisfaction and occupational accidents in this sector, it is crucial to examine how sleep quality influences the relationship between job stress and job satisfaction among these workers. Addressing this gap will provide essential insights for developing targeted interventions to improve mental health and safety within the industry.

Job stress

Job stress occurs when the demands of the job do not match or exceed the capabilities, resources, or needs of the worker or when the knowledge or abilities of an individual worker or group to cope are not matched with the expectations of the organizational culture of an enterprise [4]. Job stress is a prevalent issue among construction workers, with previous studies showing its negative impact on job satisfaction [13, 19]. Previous studies have shown that job stress is associated with various adverse outcomes, including decreased job satisfaction, increased absenteeism, decreased productivity, and organizational behavior [20, 21]. The health and safety executive (HSE) indicator tool is a widely used job stress questionnaire developed by the UK HSE team, which includes 35 items with 7 subscales to measure staff job stress [22].

Job satisfaction

Job satisfaction refers to an individual's general attitude towards their job and their evaluation of their job position [23, 24]. Herzberg's job satisfaction questionnaire is commonly used to evaluate job satisfaction. It consists of two general sections: 36 expressions of satisfaction and 36 expressions of job dissatisfaction [25]. Previous studies have shown that job satisfaction is affected by various factors, including sleep quality and job stress. Job satisfaction is crucial in increasing employee productivity, motivation, and performance [26]. Conversely, job dissatisfaction can psychologically affect employees and ultimately lead to economic problems at the community level [27].

Sleep quality

Sleep quality is the subjective evaluation of sleep duration, continuity, and depth adequacy. Sleep quality is a

fundamental human need for maintaining physical and mental health. Previous studies have found that sleep quality is a significant factor in job satisfaction [24, 28, 29]. Sleep disruption can cause health problems and reduce efficiency [24, 30]. The Pittsburgh sleep quality index (PSQI) is commonly used to measure sleep quality, which includes 7 subscales: Subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction [21, 31]. A survey of 5090 Japanese workers showed that job dissatisfaction is one of the most important factors related to poor sleep quality [32]. These studies support a reciprocal relationship between sleep quality and job satisfaction [33].

Theoretical perspectives and empirical evidence

Our proposed model is based on the job demands-resources (JD-R) model. It suggests that job demands and resources can influence employee's well-being and work outcomes. According to the JD-R model, high job demands can lead to stress and burnout, while high job resources can lead to engagement and job satisfaction. Empirical evidence has supported the JD-R model in various occupational settings, including the construction industry. Gharibi et al. found that job stress had a negative effect on the general health of employees in a construction project [34]. According to the study by Enshassi et al., about 82% of employees in a construction project experienced job stress [35]. Previous research has also shown that sleep quality is related to organizational job stress factors [29, 36, 37] and that job stress affects job satisfaction [23, 38]. Rahimi Moghadam et al. reported that job stress might reduce job satisfaction through its effect on employees' mental health [22], while Trivellas et al. found that conflict and heavy workload among healthcare employees would cause job stress that reduced their job satisfaction [39].

Several studies have found that stress can affect employees' job satisfaction and sleep quality [21, 40]. Working in the construction industry is considered one of the most stressful, risky, and dangerous jobs due to the various steps and tasks involved in construction projects that can be stressful for employees due to time and budget constraints [35, 41, 42]. In contrast, previous studies have focused on the relationship between work stress and job satisfaction in healthcare workers and offices [43, 44]. Based on our literature review, no studies have explored the relationship between job stress, sleep quality, and job satisfaction, specifically among construction workers in Iran.

Based on the previous studies, we proposed a theoretical model demonstrating a path model between variables. The proposed model illustrates the hypothesized relationships among sleep quality, job stress, and job satisfaction. The model suggests that sleep quality is negatively associated with job stress, which is negatively associated with job satisfaction. We hypothesize that job stress mediates the relationship between sleep quality and job satisfaction.

Therefore, as illustrated in Figure 1, we postulated the following hypotheses:

H1: "Job satisfaction has a significant relationship with sleep quality."

H2: "Job satisfaction has a significant relationship with job stress."

H3: "Job stress mediates the relationship between sleep quality and job satisfaction.

Overall, this conceptual framework (Figure 1) provides a theoretical basis for examining the relationships among sleep quality, job stress, and job satisfaction among construction workers and suggests potential areas for intervention to improve workers' well-being and work outcomes. This study investigates how sleep quality and job stress affect job satisfaction among construction workers, a less-explored area with implications for safety and productivity.

Materials and Methods

This cross-sectional, descriptive-analytical study was conducted to measure sleep quality, job stress, and job satisfaction and describes relationships among construction workers in Tehran City, Iran, in 2020. The sample size was estimated using the Cochran formula. We calculated an intended sample of a minimum of 95 required for the study to have 80% power to identify a correlation of 10% at a significance level of 0.05. However, we increased the sample size to 110 for potential non-responses or dropouts. We first defined the target population, which comprised 110 construction workers. Then, a comprehensive list of all members within the target population was compiled. This list served as the sampling frame. Lastly, we assigned a unique number to each member of the sampling frame using a random number generator. Subsequently, a predetermined number of participants were selected based on the randomly generated numbers. These workers were randomly selected with complete consent and aware-

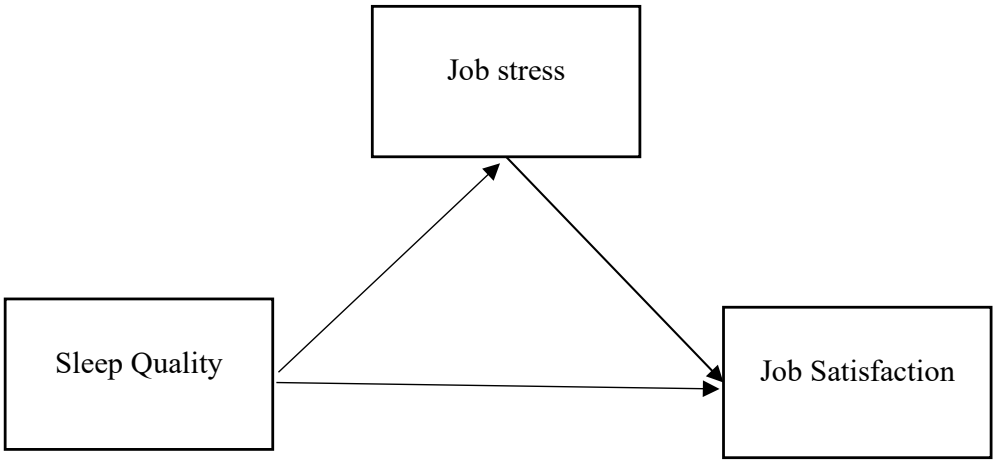

Figure 1. The theoretical model of the study

ness to participate in the study. After initial checking, 10 questionnaires were excluded from the study because they were incomplete. Here is the Cochran formula for sample size calculation (Equation 1):

$$1.\ n = \frac{\frac{z^2 pq}{d^2}}{1 + \frac{1}{N}\left[\frac{z^2 pq}{d^2} - 1\right]}$$

In which:

(n): The required sample size.

(Z): The z-score corresponds to the desired confidence level (e.g. 1.96 for 95% confidence).

(p): The estimated population proportion with the attribute of interest.

(q): The complement of (p) (i.e. (q=1-p)).

(d): The desired level of precision (margin of error).

(N): The population size.

The inclusion criteria were as follows: participants must be employed as construction workers at the time of the study, they should be aged 18 years or older to ensure they are legally able to work, participants must have at least six months of experience in the construction industry to ensure they are familiar with job stressors and conditions, they must provide informed consent to partake in the study, indicating their willingness to answer questions regarding job stress, sleep quality, and job satisfaction, participants should not have any severe medical conditions (e.g. psychiatric disorders, sleep disorders) that could confound the results, such as diagnosed sleep apnea or debilitating mental health issues, and participants must be able to read and understand the study materials, typically in the primary language(s) of the study (e.g. Persian). The exclusion criteria were as follows: Individuals not directly involved in construction work (e.g. managers or administrative staff), participants with less than one year in the construction industry, those with significant chronic health issues that could affect sleep quality or stress levels (e.g. severe anxiety disorders, chronic pain conditions), and individuals who do not provide informed consent or refuse to participate in the study were excluded.

First, we collected demographic details, including age, work experience, marital status, and level of education. The Persian version of the standard questionnaire of the HSE institute [22] was used to investigate the level of job stress among the study sample. The validity and reliability of this questionnaire were investigated and confirmed by Marzabadi and Gholami [45]. Several studies have used this questionnaire to investigate job stress in various industries [46-48]. The questionnaire included 35 questions in 7 subscales: Demands, control, peer support, managers support, relationships, role, and change. The response format is based on a 5-point Likert-type scaling, and scoring on each scale ranged from 1 to 5 (1: Never, 2: Occasionally, 3: Sometimes, 4: Usually, and 5: All the time), of which 1 was undesirable, and 5 was desirable. A high score in this questionnaire indicates low job stress and a low score indicates a high level of job stress. Based on the Marzabadi and Gholami study, the questionnaire reliability was 78% using the Cronbach α and %65 by the split-half method [45].

The standard PSQI was also used to determine workers' sleep quality. Studies show that this questionnaire

has appropriate validity and reliability [49, 50]. Several studies have also used the Persian version of the questionnaire to evaluate sleep quality [51-53]. This questionnaire was designed to assess the quality of sleep in the last 1 month, and it has 18 questions and 7 subscales: Subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Each component's minimum and maximum scores vary from 0 (no problem) to 3 (severe problems). Finally, we add the scores of each component together and convert it to a total score (0 to 21). A high score on any component or overall score indicates poor sleep quality. The Cronbach α reliability was 0.83, and A total score of 6 or more means inadequate sleep quality [54].

Herzberg's job satisfaction questionnaire was used to determine job satisfaction in this study. Based on the review of studies, the validity and reliability of this questionnaire are also confirmed [55, 56]. The questionnaire consists of two general sections: 36 expressions of satisfaction and 36 expressions of job dissatisfaction. There is a 7-point scale, and the respondent is asked to read the phrases carefully and then determine the degree of success of each phrase with a cross in degrees 1 to 7. Grade 1 shows the least agreement, and grade 7 shows the most agreement. Finally, the job satisfaction rate is determined based on the final score. If the final score is between 72 and 215, job satisfaction is poor, scores between 215 and 360 mean average job satisfaction, and scores between 360 and 504 are strong. The Cronbach α reliability was 0.925 [55].

Before the research, we obtained ethical approval and the required permission to collect data from the workplace. The research proposal for this survey was registered at the Khomein University of Medical Sciences. Two investigators of the research team distributed the written questionnaire to workers in person. The collected data were entered into SPSS software, version 19. The descriptive statistics were computed. The Pearson correlation analysis examined the relationship between quantitative variables such as stress, job satisfaction, and sleep quality. Structural equation modeling (SEM) was also conducted using AMOS software, version 24 for path analysis. The fitness of the designed model was examined using fit indices, including absolute fitness indices, comparative fitness indices, and normed fit indices [57].

Results

The results showed that most workers were married, aged between 25 and 35, and had less than ten years of work experience in this industry. The demographic characteristics of the samples are shown in Table 1.

Table 2 presents the minimum, maximum, Mean±SD for studied variables, including job stress, sleep quality, and job satisfaction. Concerning job stress, the mean scores were highest for the role and relationship subscales, while the lowest mean score was for manager support. The standard deviations were relatively consistent across all subscales, indicating moderate variability in job stress levels among participants.

For sleep quality, the mean scores were highest for subjective sleep quality and lowest for sleep efficiency. The standard deviations were relatively high for sleep disturbance and daytime dysfunction, indicating high variability in sleep quality among participants.

These results suggest moderate variability in job satisfaction levels among participants.

Table 3 presents the correlation coefficients between different variables related to sleep quality, job stress, and job satisfaction among the participants. This analysis aimed to discover two-by-two relationships between variables. The results indicate that subjective sleep quality is significantly correlated with sleep latency, sleep duration, sleep disturbance, use of sleep medication, daytime dysfunction, and the total sleep quality score. These correlations suggest that participants who reported higher levels of subjective sleep quality also tended to have shorter sleep latency, longer sleep duration, lower sleep disturbance, less use of sleep medication, and fewer daytime dysfunctions. The total sleep quality score also showed strong positive correlations with all individual sleep quality variables.

Regarding job stress, the total score showed weak negative correlations with some sleep quality variables, such as sleep duration and the total score of sleep quality. This issue suggests that higher levels of job stress were associated with shorter sleep duration and lower overall sleep quality.

The correlations between the subscales of stress, sleep quality, and job satisfaction are reported in Table 4. The results indicate that job stress significantly correlates with several variables, including role, relationship, manager support, peer support, control, demand, and

Table 1. Demographic characteristics of construction workers and their frequencies

Variables	Category	No. (%)
Age (y)	<25	28(28)
	25-35	58(58)
	35-45	13(13)
	>45	1(1)
	Total	100(100)
Marital status	Single	36(36)
	Married	64(64)
	Total	100(100)
Work experience (y)	<10	75(75)
	10-20	23(23)
	>20	2(2)
	Total	100(100)
Level of education	Less than a high school diploma	34(34)
	High school diploma	39(39)
	Associate degree or bachelor's degree	27(27)
Total		100(100)

changes. These correlations suggest that participants who reported higher levels of job stress also tended to have lower levels of role and relationship satisfaction, less support from managers and peers, less control over their work, higher job demands, and more frequent changes in their work environment. The total job stress score showed strong positive correlations with all individual job stress variables.

Regarding sleep quality, the total sleep quality score showed significant negative correlations with some job stress variables, including role, relationship, manager support, peer support, control, and changes. This finding suggests that participants who reported higher levels of job stress tended to have lower overall sleep quality.

Table 5 describes the studied variables' effect coefficients (standardized regression coefficients) on job satisfaction. Table 6 also represents the study variables' direct, indirect, and total effects on job satisfaction. According to the results, low sleep quality could not directly affect job satisfaction significantly, while the effect of sleep quality on job satisfaction by creating job stress as an indirect pathway was significant. Of course, it should be noted that a higher score on the job stress questionnaire indicates lower stress. Therefore, poor sleep quality can lead to increased stress and decreased job satisfaction. Table 7 also shows the fit indices of the analyzed model. Based on the results, the fit of the drawn model was confirmed [57].

Discussion

The present study investigated a structural equation model that hypothesized relationships among sleep quality, job stress, and job satisfaction. This research investigated the correlation between job satisfaction, sleep quality, and job stress as a mediator variable among construction workers. Importantly, our results highlighted how sleep quality and stress likely influence job satisfaction.

This study calculated construction workers' average job stress score, sleep quality, and job satisfaction. Besides, the results generally showed that none of the sleep quality subscales significantly correlated with the total job stress score. Also, the correlation between subjective sleep quality, sleep duration, use of sleep medication, and daytime dysfunction and the total job satis-

Table 2. Scores of the dimensions related to job stress, sleep quality, and job satisfaction among construction workers

Variables		Min	Max	Mean±SD
Job stress	Role	1.4	5	3.60±0.92
	Relationship	1.5	5	3.53±0.87
	Manager's support	1.6	5	3.42±0.8
	Peer support	1.5	5	3.45±0.9
	Control	1.5	4.83	3.26±0.75
	Demand	1.88	4.88	3.32±0.65
	Changes	1	5	3.46±0.88
	Total score	2.3	4.71	3.43±0.59
Sleep quality	Subjective sleep quality	0	3	1.17±0.89
	Sleep latency	0	3	0.94±0.72
	Sleep duration	0	4	1.05±0.77
	Sleep efficiency	0	2	0.51±0.63
	Sleep disturbance	0	3	1.55±0.67
	Use of sleep medication	0	3	0.88±1
	Daytime dysfunction	0	3	1.28±1.01
	Total score	1	17	7.38±3.48
Job satisfaction	Total score	172	496	363.41±53.78

faction score was significant. Based on the results, our study shows that the average total job stress score was 3.43±0.59, and the highest score among the subscales belonged to the role dimension. The study of Hosseinabadi et al. shows that the average total score of job stress was 3.64±0.38, and among the job stress dimension, the highest score was related to the role dimension (4.28±0.57) [22]. The stress score in the study of Edwards et al. is 3.53±0.03, similar to our study [58]. In addition, the results regarding job stress generally show that the subscales of role, communication, peer support, and demand are significantly related to the total sleep quality score. Many studies have reported an association between high job demand and sleep problems [59-61]. Akerstedt et al. found that high job demands were associated with more frequent sleep problems [62]. Research on Japanese workers has also shown that job demands and strain are related to sleep problems [63]. Some studies show that role conflict is positively associated with sleep problems [64]. The findings of the Fortunato et al. study showed that interpersonal conflict, workload, and job ambiguity negatively correlate with sleep quality. Interpersonal conflict and job ambiguity were among the samples' most important predictors of sleep quality [65]. Asadi et al.'s research showed a significant correlation between job stress and sleep quality [66]. In the study of Nixon et al., role conflict had a significant correlation with sleep disorders [61]. All these findings are consistent with the results of the present study.

Based on the results, the correlation of all job stress subscales except demand with job satisfaction was significant. Previous studies confirm the relationship between work stress and job satisfaction [67, 68]. Applying the Pearson correlation coefficient test, Hosseinabadi et al. reported a significant correlation between job stress and job satisfaction. The results also showed a significant relationship between the dimensions of demand, control, relationships, and changes with job satisfaction. Demand subscales and relationships in the environment are important factors in increasing job stress. This study had a significant direct relationship between job satisfaction and role. There is also a direct relationship be-

Table 3. Correlations between sleep quality subscales, job stress, and job satisfaction

Variables	1	2	3	4	5	6	7	8	9	10
Subjective sleep quality	-									
Sleep latency	0.268**	-								
Sleep duration	0.283**	-0.013	-							
Sleep efficiency	0.133	0.046	0.323**	-						
Sleep disturbance	0.502**	0.235**	0.258**	0.071	-					
Use of sleep medication	0.422**	-0.024	0.126	0.050	0.551**	-				
Daytime dysfunction	0.478**	0.093	0.373**	0.060	0.517**	0.446**	-			
The total score of sleep quality	0.754**	0.347**	0.544**	0.341**	0.748**	0.663**	0.752**	-		
The total score of Job stress	-0.127	-0.063	-0.119	-0.145	-0.52	-0.158	-0.130	-0.165	-	
The total score of job satisfaction	-0.273**	0.129	-0.292**	-0.069	-0.169	-0.306**	-0.318**	0.333**	-0.431**	-

**P<0.01.

tween job control and job satisfaction [22]. Marcatto et al. also reported significant relationships between job satisfaction, demand, control, supervisor support, relationships, and role [69]. In another study, Job stress is significantly and negatively related to all dimensions of job satisfaction [39].

Also, there was a significant relationship between the total sleep quality score and job stress and satisfaction. A study on 271 programmers from an internet company in Shanghai showed that high occupational stress resulted in lower sleep quality and job satisfaction [70]. Moreover, in line with the findings of this study and based on the Pearson correlation analysis, An et al. showed that the field managers who were satisfied with their jobs had less job stress. This study examined the correlation between job stress and job satisfaction among building construction project managers [71]. The results of

Table 4. Correlations between the subscales of job stress, sleep quality, and job satisfaction

Variables	1	2	3	4	5	6	7	8	9	10
Role	-									
Relationship	0.323**	-								
Managers support	0.555**	0.264**	-							
Peer support	0.643**	0.377**	0.680**	-						
Control	0.620**	0.122	0.579**	0.657**	-					
Demand	0.162	0.648**	0.171	0.266**	0.029	-				
Changes	0.569**	0.086	0.562**	0.651**	0.639**	0.033	-			
The total score of job stress	0.800**	0.560**	0.775**	0.875**	0.744**	0.435**	0.732**	-		
The total score of sleep quality	-0.290**	-0.376**	-0.159	-0.297**	-0.148	-0.262**	-0.113	-0.165	-	
The total score of job satisfaction	-0.325**	-0.231*	-0.514**	-0.383**	-0.333**	-0.114	-0.222*	-0.431**	-0.333**	-

*P<0.05,**P<0.01.

Notes: The proposed model in the present study is shown in Figure 2.

Table 5. Values of direct and indirect effects of the studied variables on job satisfaction

Variables	Direct Effect	Indirect Effect	P
Sleep quality → job satisfaction	0.136	-0.123	0.257
Job stress → job satisfaction	0.318	-	0.007
Sleep quality → job stress	-0.388	-	0.002

Table 6. Fit indices of the analyzed model

Index	Name	Fitness	Obtained Value
Absolute fitness indices	Goodness-of-fit index (GFI)	>0.9	0.904
	Adjusted GFI (GFI)	>0.85	0.854
Comparative fitness indices	Comparative fit index (CFI)	>0.9	0.995
	Incremental fit index (IFI)	0-1	0.996
Normed fit indices	Root mean squared error of approximation (RMSEA)	<0.08	0.017
	Normed chi-square (χ^2/df)	1-3	1.029

this study are consistent with the results of the present study. Also, Karagozoglu et al. showed that as nurses' sleep quality decreases, their job satisfaction decreases, and there is a correlation between these two variables [24]. Factors associated with poor sleep quality were perceived stress and job dissatisfaction [32]. Research by Riaz et al. shows a positive relationship between job stress and employee job satisfaction. High job stress and low job satisfaction among employees affect the organization's performance. Therefore, it is recommended that organizations understand the needs of their employees and provide them with an environment that satisfies them and meets their needs [72]. In another study based on the results, Job satisfaction and sleep quality were significantly correlated, which means that higher job satisfaction corresponds to better sleep quality. The results of this study indicate a correlation between job satisfaction and sleep quality, and sleep quality with job demands [28]. The results of Chang et al.'s study show that the job satisfaction of shift nurses affects their sleep quality. This study shows that the more satisfied nurses are with their jobs, the better their sleep quality [31]. Job satisfaction improves sleep quality and positively affects work performance [73]. According to the study by Kucharczyk et al., there is an acceptable correlation between sleep quality and job satisfaction. In this study, researchers pointed to decreased job satisfaction as a possible consequence of insomnia symptoms [33].

Table 7. Fit indices of the analyzed model

Index	Name	Fitness	Obtained Value
Absolute fitness indices	GFI	>0.9	0.952
	AGFI	>0.9	0.915
Comparative fitness indices	Normed fit index (NFI)	>0.9	0.951
	CFI	>0.9	0.948
	IFI	0-1	0.950
Normed fit indices	RMSEA	<0.1	0.059
	χ^2/df	1-3	1.619

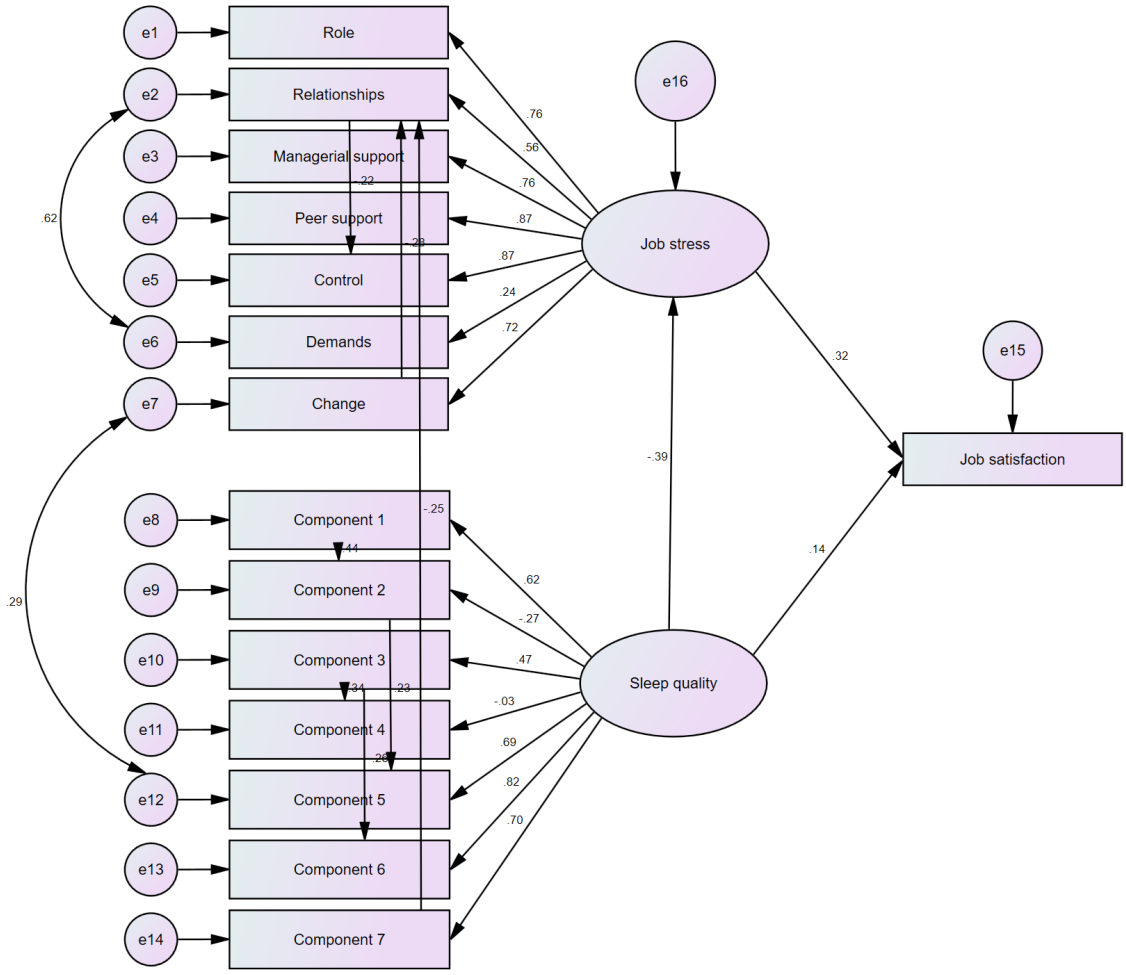

Figure 2. The model of effect of sleep quality on job satisfaction through the job stress mediator variable

Our analyses also revealed that job stress mediates the association between sleep quality and job satisfaction. According to the results, low sleep quality could not directly affect job satisfaction, while the effect of sleep quality on job satisfaction was significant by creating job stress as an indirect pathway. Poor sleep quality can lead to increased stress and decreased job satisfaction. Thus, an important finding of the present study is that low sleep quality is associated with decreased job satisfaction. Hence, sleep problems can decrease occupational safety and productivity, increase occupational disease absenteeism, impede career advancement, and decrease job satisfaction among workers [33]. Powell et al. showed that insufficient sleep among construction workers reduced performance and increased risk of accidents. Due to the high risk of working in the construction industry, workers need to be educated about the effects of reduced sleep quality and how to improve sleep quality. Employers in the construction industry should identify and categorize the various work tasks and ensure that the jobs with the highest risk receive more priority in training on the subject. Construction project managers are advised to raise awareness about the importance of sleep and its impact on workplace disruption among employees [8]. A study by Martikainen et al. suggests that factors related to work and mental health are significantly more important in predicting insomnia than factors related to physical health [74].

Despite the growing importance of the construction industry, few studies have been conducted on construction workers, and therefore, one of the most important limitations of this research is the lack of comparability among studies. The data were collected from a single project, which may have limitations when generalizing the findings. Moreover, our study was limited to construction workers per the study's scope, so that further research may be helpful in other workplaces. Also, a larger sample needs to be surveyed to verify the generalizability of the study results. Therefore, future studies should broaden the scope by including multiple construction projects and different geographical locations to enhance comparability

and generalizability. Extending research to other workplaces, such as manufacturing, healthcare, or service industries, can provide additional insights. Longitudinal studies are recommended to observe long-term trends, while larger sample sizes will improve statistical power. A mixed-methods approach can offer deeper insights by combining quantitative surveys with qualitative interviews.

Conclusion

The results showed a significant relationship between job stress, job satisfaction, and sleep quality, and low sleep quality can lead to increased job stress and decreased employee job satisfaction. Our findings indicate that sleep quality can affect job satisfaction, whether directly or indirectly, by using job stress as a mediator variable. In this study, results reveal that, on the whole, workers are estimated to have poor sleep quality. It can be argued that employers need to pay more attention to their employees' health status and satisfaction to increase their productivity, as health-related problems such as sleep problems and job stress may lead to increased job dissatisfaction, leading to accidents. Therefore, this study provides a valuable reference for employers to set plans by which they can increase employees' job satisfaction. Since job stress and employees' sleep quality affect job satisfaction, procedures should be considered to reduce and increase employee satisfaction. Workers need to understand the impact of poor sleep and what they can do to improve their sleep quality and quantity.

Ethical Considerations

Compliance with ethical guidelines

The research proposal for this survey was registered at the Khomein University of Medical Sciences, Khomein, Iran (Code No. 401000001). This survey was confirmed and conducted according to the ethical rules proposed by the Research Ethics Review Committee of the e Khomein University of Medical Sciences, Khomein, Iran.

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Authors contributions

All authors whose names appear on the submission made substantial contributions to the conception or design of the model and data gathering, analysis, and interpretation of data.

Conflict of interest

The authors declared no conflict of interest.

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