Original Article / *Özgün Makale*

DOI: 10.4274/jtsm.galenos.2022.64426

Journal of Turkish Sleep Medicine 2022;9:221-231

A Quantitative Analysis Between Sleep and Psychological Behaviour of Indian Construction Workers

Hintli İnşaat İşçilerinin Uyku ve Psikolojik Davranışları Arasındaki Korelasyonun Nicel Bir Analizi

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Abstract

Objective: This paper presents a cross-sectional longitudinal study on the relationship between sleep and work-related impairment of rational features and psychological management among construction workers.

Materials and Methods: Questionnaire surveys were conducted to the construction workers at the workplace. Impairments in rational features and psychological control were not associated with sleep duration or rotating shift schedules. The link between sleep disorder and psychological management was also transient, as a sleep disorder may be related to immediate and future impairments in psychological management

Results: The findings indicated that thirteen per cent of the variance in the disturbed rational feature at the initial stage [F(6, 382) =11.77, p=0.01] and 24% of the variance in the unsettled rational feature at the final stage [F(6, 168) =11.55, p=0.01] were determined by the multiple hierarchical regression and psychological management has 11% of the variance at the initial stage and 9% of the conflict in unsettled psychological management at the final stage [F(7, 179) =3.71, p=0.01].

Conclusion: Sound sleep is an integral part of human health. Construction workers are often required to undergo accelerated training after being hired, resulting in inadequate sleep and subsequently impacting their psychological well-being. The study recommends that construction workers focus more on optimal sleep quality and quantity, as sleep disturbances could affect psychological well-being, decrease performance, and increase risks in the workplace.

Keywords: Construction workers, insomnia, rational features, psychological management

Öz

Amaç: Bu çalışmada, Hint inşaat endüstrisindeki inşaat işçileri arasında uyku kalitesi (örüntüleri) ile rasyonel işlevi ve psikolojik yönetimi etkileyen işle ilgili bozukluklar arasındaki ilişkinin analiz edilmesi amaçlanmıştır.

Gereç ve Yöntem: Veri toplama amacıyla soru-cevap anketinden oluşan nicel bir araştırma tasarımı yapıldı. Ankete katılanlar rastgele seçilmiş bir inşaat işçisi örneğinden oluşmakta idi ve mevcut korelasyonları araştırmak için sonuçların istatistiksel analizi yapıldı.

Bulgular: Rasyonel fonksiyondaki varyansın %13'ünün [F(6, 382) =11,77, p=0,01] ilk aşamada, ve çözülmemiş rasyonel fonksiyondaki varyansın %24'ünün [F(6, 168) =11,55, p=0,01] son aşamada olduğu, çoklu hiyerarşik regresyon kullanılarak belirlendi. Psikolojik yönetim, ilk aşamadaki varyansın %11'ine ve son aşamadaki istikrarsız psikolojik yönetimdeki çatışmanın %9'una sahipti [F(7, 179) =3,71, p=0,01]. Dönen vardiyalar, rasyonel fonksiyonla negatif olarak ilişkiliydi. Yaş, yalnızca son aşamada bozulan rasyonel özellik ile negatif ilişkiliydi. Cinsiyet ve rasyonel işlev arasında anlamlı bir ilişki yoktu. Yaş, değişen vardiyalar, uyku süresi ve psikolojik yönetim arasında bir ilişki yoktu.

Sonuç: Rasyonel fonksiyon ve psikolojik kontroldeki bozukluklar uyku süresi veya dönen vardiya programları ile ilişkili bulunmamıştır. Uyku bozuklukları ile psikolojik yönetim arasındaki korelasyon geçici olarak tespit edilmiştir. Uyku bozukluğu, psikolojik yönetimdeki acil ve gelecekteki bozukluklarla ilişkili olabilir.

Anahtar Kelimeler: İnşaat işçileri, uykusuzluk, rasyonel özellikler, psikolojik yönetim

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Received/Geliş Tarihi: 29.01.2022 **Accepted/Kabul Tarihi:** 27.04.2022

Introduction

Safety is a key concern for many companies because the negative effects of unsafe working conditions impact productivity and employee health. Construction workers are exposed to numerous risks and dangers; workplace accidents are common (1) and are amplified by the magnitude of the construction sites. Accidents resulting from unsafe working conditions impact the well-being of employees and the wider community and have detrimental effects on the economy of organizations. Frequent accidents result in increased employee absenteeism and reduced efficiency. Moreover, workplace accidents demotivate workers (2), which results in the disorganized and careless execution of tasks (3). Construction is the most dangerous industrial sector because of the frequency at which accidents occur (4). Construction work is physically more demanding than the work in other industries and involves a significant number of workers when large-scale projects are underway.

Sleep is essential to human physiology because it allows the body to recover from fatigue and helps repair the cells in the body. Therefore, a person's work productivity is dependent on their sleep efficiency (5). In addition to being a basic human desire, sleep affects a wide range of essential functions, such as psychological feature control and deliberate regulation (6). Therefore, quality and duration of sleep are crucial for rational function and psychological control (7). Accordingly, the relationship between sleep and psychological behaviour has garnered considerable attention in recent years (8), particularly among construction workers (9). In India, construction workers often undergo accelerated training after being hired; this places them at risk of experiencing sleep problems that may negatively impact their future psychological well-being (10).

The working and resting hours of construction workers are often irregular. Workers with fixed or rotating shifts between 4 p.m. and 7 a.m. are more susceptible to insomnia and poor sleep quality than those who work during the day (11). A sleep cycle of 6 hours or less is detrimental to the daily functioning of adults aged 26-74 (12-14). Less than 6 hours of sleep per night negatively affects rational functions, such as attention and memory, and is commonly observed in patients suffering from insomnia (15,16). A lack of sleep impairs decision-making and emotion recognition, and decreases impulse control, compassion, and optimistic approaches (17-20). Persistent issues with initiating or maintaining sleep, quality of sleep, and reduction in sleep duration increase fatigue and disturb a ones' ability to work. Some studies have highlighted that impaired concentration and long-term memory caused by sleep deprivation have a cumulative effect on labor execution and safety (21,22). As a result of rational function failures associated with poor sleep, employees with sleep disorder symptoms appear to engage in fewer safety behaviors (23,24).

Optimal rational functions are vital for construction workers, as their work is centered around challenging assignments, rapid decision-making scenarios, and group cooperation (10,25). According to the Bureau of Labor Statistics, numerous construction-related tasks have higher health and safety risks than those of other jobs (26,27). Therefore, a decrease in psychological management at the workplace due to sleep deprivation might affect an individual's performance, physical and mental health, and pose a significant risk with potentially harmful effects (28-31). The long-term impacts of sleep deprivation on intellectual abilities and enthusiasm in the construction industry have not been investigated (32-35). Therefore, the aim of the study is to investigate the long-term effects of sleep quality on rational function and psychological control on construction workers using a cross-sectional longitudinal study.

Materials and Methods

This study investigated the sleep cycles, activity, workplace psychosocial dynamics, and health data of construction workers. The source data focused on three significant factors: Sleep (duration and quality), psychological management, and rational function shown in Figure 1. Data was collected through questionnaires distributed to all construction station staff in Bengaluru, with an interval of 8 months between surveys. The initial and subsequent data collections were conducted in September 2020 and March 2021, respectively. This research was approved by the Ethics Committee of the SRM Medical College Hospital and Research Centre (2186/IEC/2020) and was conducted according to the principles of the Institutional Ethical Committee. Verbal consent was obtained from all participants involved in this study.

Sample

Power analysis was conducted with a desired significance level of alpha =0.05 to determine the sample size for the study. Five-hundred-and-sixty construction workers were recruited for the study; the dropout rate between the initial and final data collection phases was 50% (Table 1). Because of missing data from the surveys (8% and 11% in the initial and final stages, respectively), the final sample for the regression analysis comprised 515 and 280 participants in the initial and final stage, respectively (Table 2).

Questionnaire Survey

The questionnaire was designed and distributed among the workers to assess their sleep and psychological behavior. Questionnaires collect knowledge standardized during survey analysis and are thus considered vital for data collection. Surveys and effective forms are helpful tools that produce a "snapshot of how things are at a particular time". They describe phenomena, provide live associations, and allow evaluations and predictions. The questionnaire was provided in five languages, namely English, Kannada, Telugu, Tamil, and Hindi. Table 3 and 4 provide the research basis and format of the questionnaires.

Measures

Sex, age, and shift work patterns were chosen as the fundamental parameters (36,37). Sex and age were selected as control variables because they closely correlate with psychological and rational functions. Shift work patterns were measured

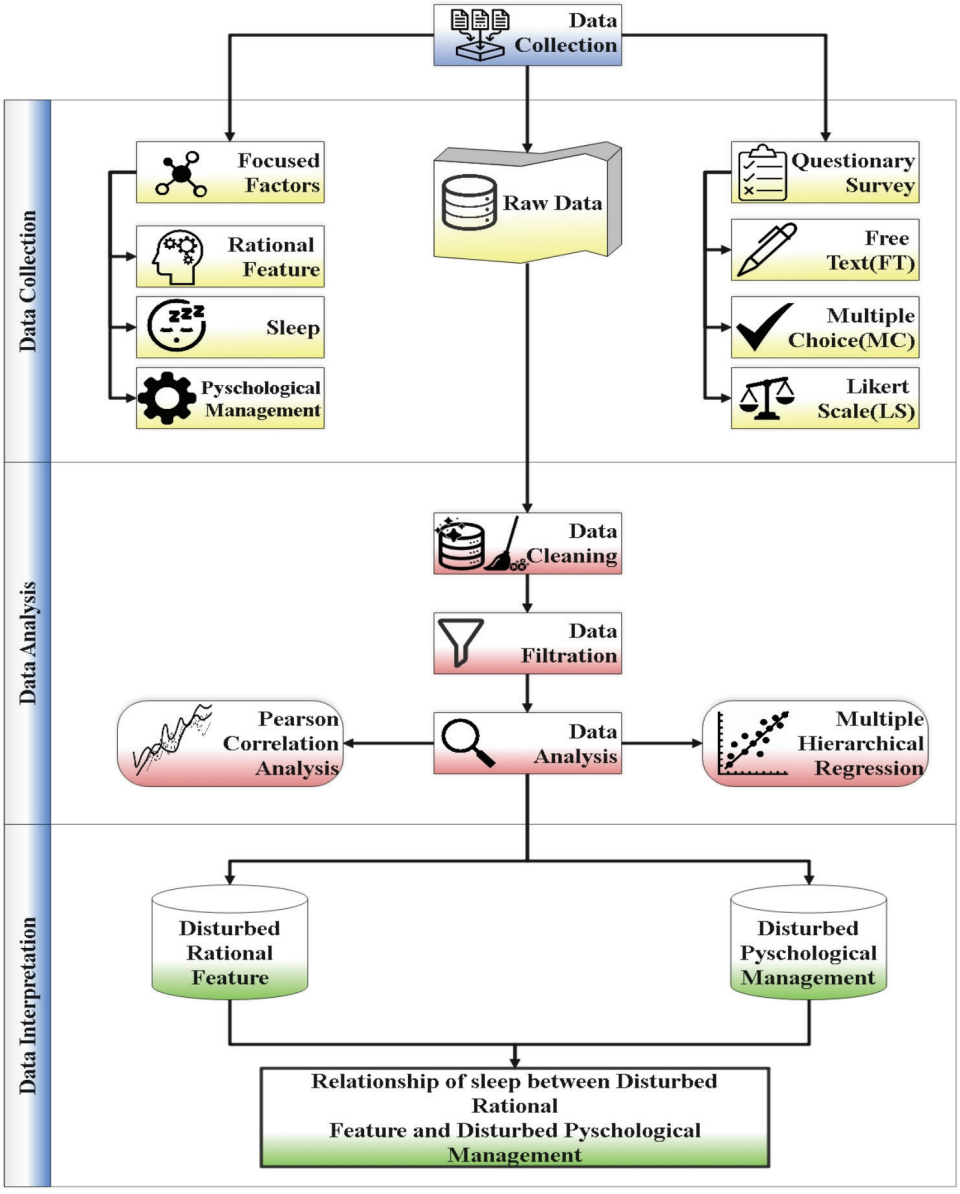

Figure 1. Research methodology

using the following categories: only day shifts; equal number of day and night shifts; and rotating shifts, including night shifts. The variables in this study were classified as follows: (1) Non-rotational working hours, including night shifts; and (2) Rotational shifts, including night shifts. The schedules of half of the workers excluded night shifts (43% temporary agents; 7% had identical hours to night-shift workers) and the remaining half were categorized as shift workers that alternated day and night shifts.

Insomnia

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition includes six items in the Insomnia Scale to measure insomnia symptoms (38-40), which are considered a reliable measure of insomnia. The construction workers were asked, through the questionnaires, how many days per week (0-7) in the previous month they had suffered these six explicit indications of sleep deprivation: Early awakenings, difficulty in sleep maintenance, delayed sleep initiation, excessive tiredness, and inadequate rest (41-43). Furthermore, they were requested to specify how many days per week (0-7) they struggled with these side effects. This study used a continuous scale with computation scores ranging from 1 to 43. At the initial and final stages, the initial dependability of insomnia was high (α=0.85).

Construction Work-related Psychological Management and Rational Function

Psychological management and rational function were estimated using the burnout assessment tool (44,45). Disturbed psychological management was estimated using the following statements: "At the workplace, I have trouble staying engrossed", "During workplace, I struggle to think clearly", "I am forgetful and distracted at work", "When I am working, I have difficulties in concentrating", and "I make mistakes in my work because I have my mind on other things". The disturbed rational function was estimated using the following statements: "During workplace, I feel unable to control my emotions", "I do not comprehend the way I react emotionally at work", "During my workplace, I become irritable when things do not go my way", "I get disappointed or annoyed at the workplace without knowing why", and "During workplace, I may overreact unintentionally". The workers were asked to rate each item on a 5-point Likert frequency scale that ranged from 1 (never) to 5 (consistently), based on how regularly they believed each statement applied to their situation at the workplace. The mean scores were calculated for each item (46). As measured in the initial and final stages, the internal consistencies of the disturbed rational function (α=0.90 and α=0.88, respectively) and disturbed psychological management (α=0.81 and α=0.79, respectively) were satisfactory.

Table 1. Sample characterization of workers

	Initial stage (n=560)	Final stage (n=280)
Sex (%)		
Male	320 (54%)	155 (54%)
Female	240 (46%)	125 (46%)
Age (y)		
Mean (SD)	41.86 (12.14)	43.37 (11.63)
Min-max	21-69	23-66
Median	42	44
Work schedule (%)		
(Day/evening) non-rotating shift	230 (48%)	157 (55%)
(Day/evening/nights) rotating shift	330 (52%)	123 (45%)
Construction workers time in		
SD (mean) min-max median	11.15 (14.20)	11.47 (16.32)
Time in current labors	0-47	0-41
Mean (SD) min-max median	10	15
Type of workers (%)		
Skilled	306 (46%)	135 (40%)
Unskilled	168 (34%)	98 (33%)
Semiskilled	86 (11%)	47 (27%)

SD: Standard deviation

Table 2. Sample collection description at the initial and final stages

Description	Initial stage	Final stage	Initial stage (%)	Final stage (%)
Questionnaire distributed	560	560	100	100
Questionnaire returned and valid	515	280	91.95	50
Questionnaire returned but invalid	29	170	5.05	32
Unreturned	16	110	3	18

Statistical Analysis

The Statistical Package for Social Sciences (SPSS) was used for all analyses (IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp). Pearson's correlation analysis measured the relationship between the fundamental parameters in the initial and final stages (Equation 1). T-tests were used to examine the differences between the construction workers who participated only in the initial stage and those who participated in both phases. Two and three steps of multiple hierarchical regression analyses were conducted for differences between the disturbed rational function and psychological management, respectively, in the initial and final stages. In the first step of the regression analysis, age, sex, and shift patterns were considered and then incorporated with sleep duration on workdays and sleep disorders into a single step. The final phase of the analysis included adjustments for the early symptoms of disturbed

Table 3. Parameters considered for questionnaire survey

Parameters considered for questionnaire survey	References
Sex	(Jung et al. 2011)
Age	(Khanh et al. 2021; Manoharan et al. 2020)
Type of workers	(Chakraborty et al. 2018; Ahmed et al. 2020; Khanh et al. 2021)
Work schedule	(Jarrin et al. 2013; Savin et al. 2021)
Construction workers time	(Brick, Seely, and Palermo 2010; Savin et al. 2021)
Sleep length	(Westerlund et al. 2016; Gerhardsson et al. 2019)
Insomnia	(Raniti et al. 2017; Paavonen et al. 2016)
Disturbed rational feature	(Kurt Gök, Peköz, and Aslan 2017; Paterson et al. 2019)
Disturbed psychological management	(Bogdan and Reeves 2018; Kurtzer et al. 2020; Fung et al. 2016)

Table 4. Parameters and format for questionnaire survey

Categories	Parameters considered for questionnaire survey	Format
Demographic	Sex	Free text
	Age	Free text
Labor	Type of workers	Multiple choice
	Work schedule	Multiple choice
	Construction workers time	Multiple choice
Sleep	Sleep length	Multiple choice
	Insomnia	Insomnia scale
Psychological	Disturbed rational feature	Likert scale
	Disturbed psychological management	Likert scale

rational function and psychological management, as estimated at the start of the longitudinal study.

$$r = \frac{\sum(x_i - x)(y_i - y)}{\sqrt{\sum(x_i - x)^2 \ \sum(y_i - y)^2}} \quad (1)$$

where r = correlation coefficient, x_i= x-variable values in a sample, x = mean values of the x variable, y_i= y-variable values in a sample, y = mean values of the y variable.

Results

Males and females were divided into two groups based on their age and rotational work shifts. Table 5 presents the interpretive insights and relationships between the specified factors investigated in the initial and final stages.

Based on Table 1, it can be discerned that there were no significant differences in the rational function and psychological management between workers who responded to the initial survey alone and those who completed both the initial and final questionnaires. There was a negligible age difference between the workers who participated in both surveys [mean (M) =43.37 years, standard deviation (SD) =11.63] and those who completed only the initial questionnaire (M =41.86 years, SD =12.14), as shown in Table 1. There was a direct correlation between sleep disorders in the initial and final stages. Rotating shifts were negatively correlated with the rational function measured at the initial and final stages. Tables 6 and 7 show the longitudinal and cross-sectional relationships in work-related rational function and psychological management measured at the initial and final stages.

Figure 2 presents the functional relationship between the initial and final stages of the distributed variables such as sex, rotating shift work, insomnia, age, and length of sleep. These initial and final stages are presented in Table 6. The x-axis values represent the initial stages of the features, while the y-axis values represent the final stages. Each of the (x, y) data point pairs have their height described as the final stage of the rational function at that point.

Management of Work-related Rational Function

The multiple hierarchical regression model, which included age, sex, rotating shifts, sleep duration, and sleep disorder, explained the 13% variance in the disturbed rational function at the initial stage [F (6, 382) =11.77, p=0.01] and the 24% variance in the unsettled rational function at the final stage [F(6, 168) =11.55, p=0.01]. After adjusting for the initial-stage disturbance in rational function, the variance increased to 42% [F (7, 189) =21.62; p=0.01]. There was a positive correlation between the sleep disturbances measured in the initial stage and impairments in rational function recorded in both stages. Sleep duration on working days was not significantly correlated with disturbed rational function in either stage. However, rotating shifts were negatively associated with disturbed rational function in both stages. Age was negatively correlated with the disturbed rational feature in the final stage only. There was no significant association between sex and rational function in either stage.

Figure 3 depicts the cluster graph containing the different disturbing rational functions at work. Each point in the chart is plotted by using the initial stage of that feature as the x-coordinate and the final stage of the feature as the y-coordinate. Using this graph, the distribution of the rational function was observed.

Psychological Management in the Workplace: Alternating Shift Work and Sleep Length

The model included sleep disorders, which explained 11% of the variance in disturbed psychological management at the initial stage and 9% of the conflict in unsettled psychological management at the final stage [F(7, 179) =3.71, p=0.01]. After

Table 5. Statistical correlations and descriptive statistics for measured variables at the initial and final stages (n=193-560)

	1	2	3	4	5	6	7	8	9	10	11
Sex[A]											
Age	0.03										
Rotating shift work[B]	0.2										
Sleep length[B]	0.13										
Sleep length[C]	0.17	0.01	0.08	0.6							
Insomnia[B]	0.13	0.02	0.03	0.38	0.28						
Insomnia[C]	0.17	0.04	0.01	0.42	0.37	0.73					
Disturbed rational feature[B]	0.12	0.07	0.22	0.12	0.12	0.28	0.19				
Disturbed rational feature[C]	0.13	0.11	0.18	0.13	0.13	0.39	0.41	0.57			
Disturbed psychological feature[B]	0.15	0.01	0.09	0.09	0.17	0.28	0.19	0.57	0.35		
Disturbed psychological feature[C]	0.2	0.02	0.12	0.15	0.22	0.24	0.21	0.45	0.48	0.62	
Mean (SD)	0.48 (0.51)	40.8 (11.3)	0.51 (0.51)	6.59 (0.83)	6.54 (0.85)	11.61 (8.68)	10.64 (8.52)	1.76 (0.63)	2.08 (0.60)	1.47 (0.48)	1.58 (0.51)

[A]0 Male, [B]0 Initial study, [C]0 Final study, SD: Standard deviation

adjusting the final model for the initial phase of psychological management, the variance increased to 41% [F(7, 178) =15.30; p=0.001]. A strong correlation was observed between sleep disorders measured initially and disturbed psychological management. There was no significant difference in disturbed psychological management in the adjusted model between the initial and final stages. Before adjusting for sleep disturbances, sleep duration, and early symptoms of disturbed psychological

Table 6. Regression analysis between variable measures at the initial and final stages of disturbed rational function at work

	Disturbed rational feature							
	Initial stage (n=366)				Final stage (n=193)			
	B	SE B	p	R^2	B	SE B	p	R^2
Model 1	0.61				0.09			
Sex	0.08	0.07	0.13		0.11	0.09	0.15	
Age	0.03	0.03	0.64		0.21	0.04	0.09	
Rotating shift work	0.22	0.07	0		0.26	0.1	0.01	
Model 2	0.13				0.24			
Sex	0.03	0.06	0.49		0.02	0.08	0.78	
Age	0.02	0.03	0.74		0.2	0.04	0.07	
Rotating shift work	0.22	0.07	0		0.24	0.09	0.01	
Insomnia	0.27	0.04	0		0.41	0.05	0	
Sleep duration	0	0.04	0.97		0.07	0.05	0.38	
Model 3					0.42			
Sex					0.01	0.07	0.84	
Age					0.14	0.04	0.03	
Rotating shift work					0.11	0.08	0.1	
Insomnia					0.31	0.04	0	
Sleep duration					0.1	0.05	0.12	
Disturbed psychological feature					0.47	0.06	0	

Table 7. Relationships between measured variables at the initial and final stages of disturbed psychological management at the site by regression analysis

	Disturbed psychological management							
	Initial stage (n=366)				Final stage (n=193)			
	B	SE B	p	R^2	B	SE B	p	R^2
Model 1	0.03				0.06			
Sex	0.13	0.05	0.02		0.18	0.08	0.15	
Age	0.05	0.03	0.42		0.07	0.04	0.42	
Rotating shift work	0.08	0.06	0.17		0.14	0.08	0.13	
Model 2	0.11				0.9			
Sex	0.1	0.05	0.07		0.13	0.08	0.09	
Age	0.04	0.02	0.49		0.06	0.04	0.47	
Rotating shift work	0.08	0.06	0.18		0.12	0.08	0.14	
Insomnia	0.28	0.03	0		0.19	0.05	0.02	
Sleep length	0.04	0.03	0.43		0.03	0.05	0.71	
Model 3					0.41			
Sex					0.02	0.06	0.81	
Age					0.05	0.03	0.49	
Rotating shift work					0.06	0.07	0.38	
Insomnia					0.08	0.04	0.27	
Sleep length					0.03	0.04	0.7	
Disturbed psychological feature					0.6	0.06	0	

management, sex showed a positive relationship with disturbed psychological management in both stages. However, there was no association between age, rotating shifts, sleep duration, and psychological management at either the initial or final stage.

Figure 4 presents the comparison between the initial and final stages of the disturbing psychological management, adjusting for factors such as sex, age, rotating shift work, insomnia, and sleep length, using a surface plot for the functional relationship between the initial and final stages. The x- and y-coordinates were obtained from Table 7, where the x-coordinate represents the initial stage of a specific feature, while the y-coordinate represents the final stage. The height of each data point is directly proportional to its y-coordinate. This enable's to view from a three-dimensional perspective the relative scaling of the final stage compared with the initial step.

Figure 5 presents the disturbed psychological management in cluster form. The x-coordinate of each point corresponds to the initial stage, while the y-coordinate corresponds to the final phase. We can observe that each feature forms a cluster of its own, some also showing minor overlap.

A cross-lagged analysis revealed that there was no significant difference in disturbed rational function (β=-0,02, p=0,728) and psychological management (β=0,04, p=0,505) at the initial and final stages. Disturbances in rational function (β=-0,02, p=0,762) and psychological management (β=-0,05, p=0,432) at the initial stage did not predict sleep duration 8 months later. However, the overall health status of the participants was good; 93% of participants rated themselves as having "good" or "very good health", and only 7% rated themselves as being in "bad" health.

The questionnaire was framed to analyze the behavior of the construction workers, based on each parameter, and provide the role of each construction worker (respondent). Each question was posed to establish the relationship between sleep quality and the psychological management and rational function of construction workers shown in Figure 6.

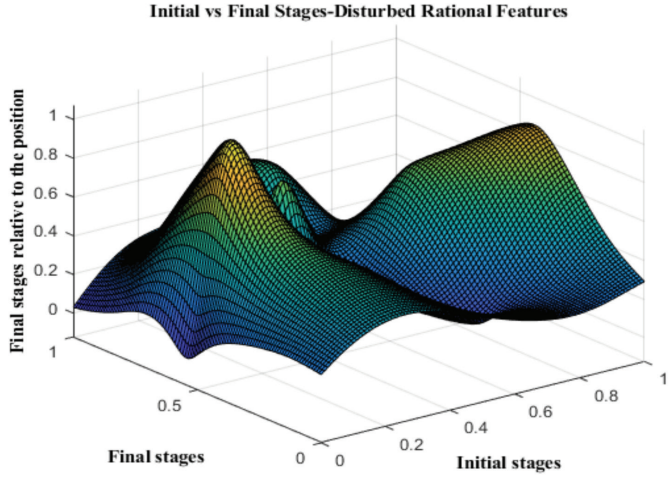

Figure 2. Surface plot relationship of initial vs. final stages of disturbed rational function

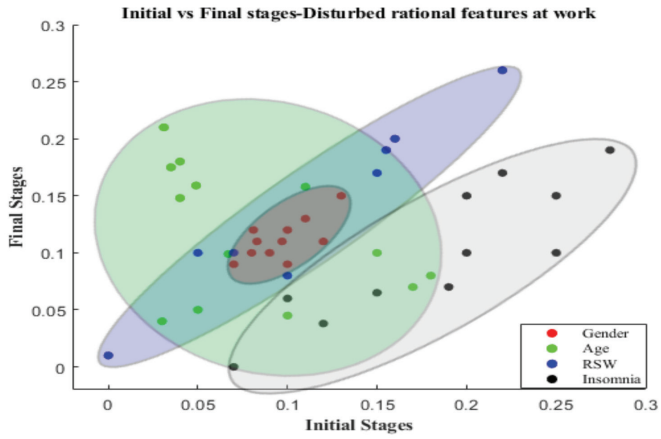

Figure 3. Cluster plot relationship of initial vs. final stages of disturbed rational function

RSW: Rotating shift workers

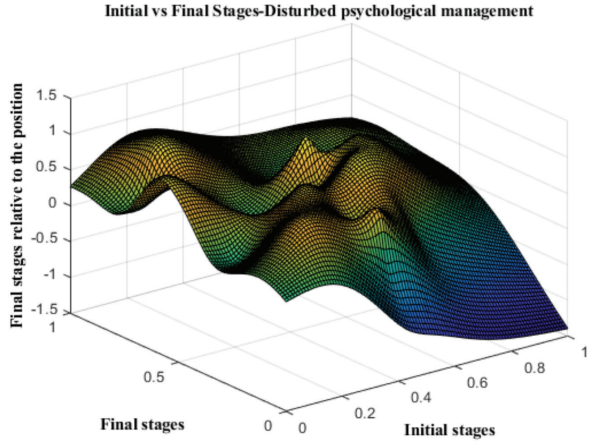

Figure 4. Surface plot relationship of initial vs. final stages of disturbed psychological management

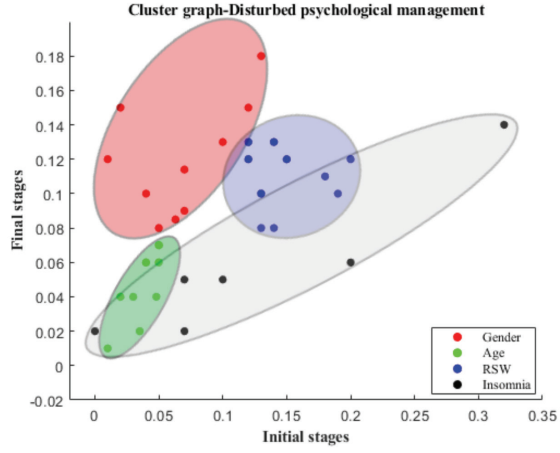

Figure 5. Cluster plot relationship of initial vs. final stages of disturbed psychological management

RSW: Rotating shift workers

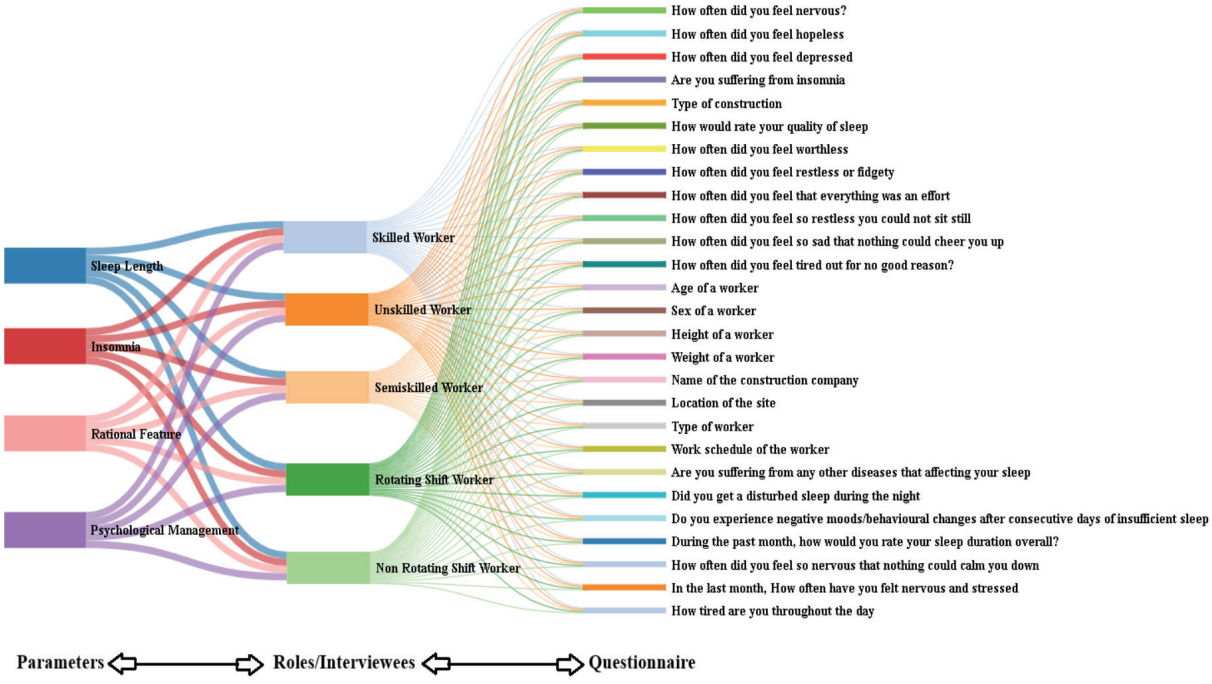

Figure 6. Relationships between the parameters, the interviewees' roles, and the questionnaire in which they are involved

Discussion

The relationship between the independent and dependent variables is mathematically described using regression analysis, which is used to predict the mean value of both the independent dependent variables. After adjusting for the scores obtained at the initial stage, insomnia was found to be correlated with disturbed psychological management and rational function in the workplace. However, only the latter association remained significant after eight months. This was indicative that there was no correlation between subjective sleep duration, rotating shifts, and, psychological and rational functions at the final stage. After eight months, disturbed rational and psychological traits did not predict insomnia or sleep duration, supporting the direct relationship between sleep and rational function and psychological management observed in this study. We also observed a more transient relationship between insomnia and psychological components than rational factors.

Previous crossover and termination studies have linked insomnia with a rational and psychologically impaired performance at construction sites (47). However, after correcting the initial symptoms of disturbances in psychological traits, the long-term relationship between insomnia and deterioration of psychological traits at work was insignificant (48). The relationship between insomnia and impeded rational characteristics culminated to a slight improvement after eight months (11). Several studies have shown that a chronic lack of sleep has cumulative adverse effects on performance under challenging situations and critical tasks, such as driving and operating equipment. Sleep disturbances increase the risk of poor performance as it affects the safety of construction workers. Sleep deprivation affects executive function and prevents construction workers from concentrating and making optimal decisions, potentially resulting in fatal consequences (49). Construction workers must be able to control their emotions and act rationally. Although this study did not show a causal relationship between insomnia and disruption of psychological management, the ability to regulate emotions is fundamental to mental health, social relationships, and general health and well-being (50). Previous research has linked sleep deprivation and poor sleep quality to rational disability and psychological distress. Our findings provide new insights into how sleep affects rational function and psychological management in the workplace environment. Sleep duration in the initial stage and after eight months was not associated with gender and psychological dysfunction in the workplace. According to this study, the workers had improved sleep durations. Optimal sleep duration depends on individual needs, and in some cases, good sleep, rather than a longer sleep cycle, is more important. In addition to providing ample rest during shifts, organizations should also focus on the quality of employees' sleep (51). Workers interested in improving sleep quality and quantity experience fewer sleep disorders because of the care and measures taken to improve their sleep quality.

This study has several strengths. First, this longitudinal study provides a new perspective on the relationship between sleep and rational function and psychological management associated with sleep and work across two-time points. In

this context, at least four months between measurements may be considered sufficient to observe potential longitudinal changes (52). However, extended periods between multiple measurement points are recommended for future studies. Second, multiple linear regression provided more information about the relationship between insomnia and rational dysfunction than a simple regression analysis alone. Despite the 50% dropout rate between the initial and final stages, there were no significant differences between the variables included, with the exception of age differences (46,31). Since the rational and psychological scales used to measure the disabilities in this study were unique to construction work, it may be possible to generalize our findings to highly rational function and psychological management to improve work efficiency and safety at construction sites.

According to our research, lack of sleep can adversely affect the workforce's rational function and psychological management. Our study demonstrated why employers need to consider their workers' sleep, especially in high-risk occupations, such as construction, fire-fighting, rescue, and the military (3).

Study Limitations

The major limitation of this study was the use of self-reported sleep duration, which may have contributed to inaccurate estimations of sleep duration. Sleep study participants tended to overestimate sleep duration compared with objectively measured sleep duration. Consequently, the use of self-reporting questionnaires might have introduced a bias in our study results. However, questionnaires have the advantage of obtaining information that is relevant to only the responders. Since our study sample was small, it is advisable to duplicate the results using a larger sample size. Furthermore, this study did not consider trauma, past accidents, psychosocial or mental factors, and physical illnesses, that could have influenced the results. For example, traumatic brain injury and anxiety can lead to sleep disorders and depression (30). However, severe illness and/or trauma would disqualify construction workers from performing most of their tasks. This study excluded workers who had been absent from work for extended periods owing to illness.

Conclusion

The study showed that insomnia had a more significant impact on rational function and psychological management in the workplace than the work schedule and sleep duration. The psychological characteristics associated with sleep deprivation and restlessness are correlated with each other; however, they are temporary and limited to cross-sectional surveys. The correlation between insomnia and rational function found in longitudinal studies was more substantial than that in cross-sectional studies, implying that the adverse effects of sleep problems on rational function may accumulate over time. This major finding of this study is that (1) Rotating shifts were found to be negatively correlated with the rational function measured at both the initial and final stages. That is, 13% of the variance in the disturbed rational feature at the initial stage [F(6, 382) =11.77, p=0.01] and 24% of the variance in the unsettled rational feature at the final stage (F(6, 168) =11.55, p=0.01) were determined by the multiple hierarchical regression. In the final stage, age was found to be negatively correlated with the disturbed rational feature, although this was not noted initially. There was no significant association between sex and rational function in either stage 2. Psychological management had 11% of the variance at the initial stage and 9% of the conflict in unsettled psychological management at the final stage [F(7, 179) =3.71, p=0.01]. However, no association was found between age, rotating shifts, sleep duration, and psychological management at either the initial or final stages. Since sleep deprivation harms construction workers' rational and psychological features at work, the prevention and treatment of insomnia should be prioritized. Future research should focus on the possible cumulative effects of insufficient and poor-quality sleep on rational function. Organizations need to invest time and resources to focus on the importance of sleep and suggest personalized measures to prevent associated problems among workers; this will help ensure that the workers obtain better sleep, which would improve their productivity at work.

Acknowledgements

The authors wish to acknowledge the construction workers who actively participated in the questionnaire survey in this study. In addition, Pramuk Meridian, Imax Construction, and Nirmala Construction of Bengaluru, India, and the SRM Institute of Science & Technology Chennai, India, provided valuable support in carrying out this study.

Ethics

Ethics Committee Approval: This research was approved by the Ethics Committee of the SRM Hospital and Research Centre (2186/IEC/2020) and was conducted according to the principles of the Institutional Ethical Committee.

Informed Consent: Oral consent was obtained from all the participants included in this study.

Peer-review: Internally and externally peer-reviewed.

Authorship Contributions

Concept: S.S., K.L., Design: S.S., K.L., Data Collection or Processing: S.S., Analysis or Interpretation: S.S., Writing: S.S., K.L.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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