

A Cross Sectional Study in Sleep Quality, Effort–Reward Imbalance, and Perceived Stress among Night Shift Drivers

Sahaya Varshini. A¹, Manoj. R², Asha. K. A³

¹Student, Department of psychology 1st, Dr. MGR Educational & Research Institute

²Head of the department, Department of Psychology 2nd, Dr. MGR Educational & Research Institute

³Assistant professor, Department of Psychology 3rd, Dr. MGR Educational & Research Institute

Abstract

Working in the night shift can be physically and psychologically staining. Poor sleep is frequently the result of night drivers' natural sleep patterns being disrupted. Additionally, many believe that they are working harder than they are receiving in terms of fair compensation, recognition, or job security. These factors have the potential to significantly increase stress. This study examined the relationship between night shift drivers' stress levels and their sleep quality and their perception of not receiving enough rewards that is imbalance between effort and reward. Data from 200 night time drivers, including delivery riders and bus drivers, using a correlational method has been collected. The tolls such as Perceived Stress Scale (PSS-10), the Effort–Reward Imbalance Questionnaire (ERI), and the Pittsburgh Sleep Quality Index (PSQI) has been distributed to the samples of this population. After that, Pearson correlation analysis and fundamental statistics were used to examine the data. Poor sleep was found to be significantly associated with higher levels of stress [$r = .241$, $p < .01$] and Effort reward imbalance was associated with higher levels of stress [$r = .171$, $p < .05$]. From these results, conclusion was made that both the effort reward imbalance and poor sleep quality clearly contributes high stress levels in night shift drivers.

Keywords: Sleep Quality, Effort–Reward Imbalance, Perceived Stress, Night Shift Drivers, Occupational Health

Introduction

In the transport and auto mobile sectors, night shift drivers are seen as a important group as their working conditions produces several psychological and physiological damages because their job has long hours of working condition, they have to alert and work at night time even when the time is meant for being biologically rest. Such irregular pattern of schedules of work interferes with body's circadian rhythm which affects sleep patterns and the entire health. Due to these aspects they experience some challenges in sleeping pattern, fatigue and low psychological wellbeing. Drivers may also face considerable demands like sustained attention, emotional control. But when these demands are not treated and balanced with enough and adequate rewards regarding their working input such as equal and fair pay, recognition, job security then they may experience effort reward imbalance. Effort reward imbalance model also states that they experience stress when the employees perceive that the input or the effort, they invest in their work is not adequately compensated by rewards. Furthermore, several longitudinal studies have given their

support with ERI Model by declaring that when people experience high effort and low reward conditions may slowly develop sleep related problems, and other health problems over time [Kudielka et al., 2004; Rugulies et al., 2009; Nordentoft et al., 2020]. Although these relationships have been revealed that in many working groups, limited attention has been given to night shift drivers. As this group faces unique work-related challenges, including irregular work hours, disruption of circadian rhythms, long duration of driving, and a high level of responsibility for road safety. These working conditions may increase their vulnerability to sleep problems and psychological stress. Therefore, understanding and knowing the clear aspects of how sleep quality and effort–reward imbalance produce perceived stress among night shift drivers is particularly important. Evaluating these relationships can provide useful insights into the occupational health risks faced by this population. Hence, the present study was conducted to investigate the relationship between sleep quality, effort–reward imbalance, and perceived stress among night shift drivers.

Review of literature

Deng, Fang and Cai (2021) aimed to evaluate the relationship between effort-reward imbalance (ERI) and sleep quality among people of community health workers in mainland China. The tools used in this research were Pittsburgh Sleep Quality Index (PSQI) and the Effort-Reward Imbalance (ERI) questionnaire to measure job-related stress. The samples selected in the study included 472 participants comprising 249 registered doctors and 223 registered nurses. The method used was in the study included cross-sectional design, to the people who was employed from September to November 2018. Data were analyzed using multivariate logistic regression. The findings suggest that sleep problems are prevalent among community health workers, with higher work effort than perceived rewards contributing to poorer sleep outcomes.

Singh, Viramgami, Makwana, Mishra, Padhariya, Dave, and Soundararajan (2025) done a study to understand the relationship between job stress, subjective sleep quality, and inflammation among female nurses working in a hospital. The tools used were Pittsburgh Sleep Quality Index, Effort reward imbalance questionnaire and perceived stress scale. The samples was 50 female nurses. The study focused the Effort-Reward Imbalance (ERI) model. The method used was cross-sectional research design. The findings proved that participants with high ERI reported poorer sleep quality. Overcommitment (OC), a component of the ERI model, was positively connected with poor sleep quality. The study concluded that high effort reward imbalance and overcommitment lead to poor sleep quality and inflammation, indicating high levels of risks for burnout and other health outcomes among healthcare professionals.

Fahlen, Knutsson, Peter, Akerstedt, Nordin, Alfredsson, and Westerholm (2006) combined and did a study to investigate the accuracy of the Effort–Reward Imbalance (ERI) model in connection to sleep disturbances and fatigue among working adults. The study involved 789 men and 214 women who completed the Effort Reward Imbalance questionnaire. The data were obtained from a subset of the WOLF (Work, Lipids, Fibrinogen) cohort study on cardiovascular risk factors. Data were analyzed using Cox regression analysis. Results proved and revealed that Higher exposure to ERI components was repeatedly associated with increased rates of both sleep disturbances and fatigue. Among men, the strongest relationship was observed between high overcommitment and fatigue.

Methodology

Aim

To identify the relationship among sleep quality, effort-reward imbalance, and stress in night shift drivers.

Objective

- To examine the relationship between Sleep quality and perceived stress.
- To examine the relationship between Effort reward imbalance and perceived stress

Hypothesis

H 1: There will be a significant relationship between poor sleep quality and high perceived stress among night shift drivers.

H 2: There will be a significant relationship between greater effort-reward imbalance and higher levels of perceived stress among night shift drivers.

Research design

The present study adopted correlational study to examine the relationship among the variables and cross-sectional study to collect data from the samples.

Variables

- Independent variable: Effort reward imbalance
- Independent variable: Sleep quality
- Dependent variable: Stress

Tools

Informed Consent form and Confidentiality Statement

The consent form was developed by the researcher in order to make the participants understand the purpose of the study. It also helps to know the willingness of the participants for the study. The confidentiality of their information and identity was provided.

Socio Demographic Profile

Socio demographic profile was generated for collecting necessary information like Name, Age, Marital status, years of experience.

Perceived Stress Scale (PSS-10) (Short Form)

Perceived Stress Scale (PSS-10) was constructed by Cohen, Kamarck, & Mermelstein in the year 1983. This scale is used to identify the stress levels and their intensity in people. The short form of this questionnaire consists of 10 items with a 5-point rating scale differing from “Never to Very Often,” where higher scores indicate higher stress. This scale includes construct validity and a reliability (Cronbach’s alpha) of 0.78.

Effort-Reward Imbalance (ERI) Questionnaire (Short Form)

Effort-Reward Imbalance (ERI) Questionnaire (Short Form) was standardized by Siegrist in the year 1996. This scale is used to assess the imbalance between effort and reward in the workplace. The scale contains 10 items with a 4-point rating scale, where higher scores indicate greater imbalance. This scale has

construct validity and a test- retest reliability of 0.73.

Pittsburgh Sleep Quality Index (PSQI)

Pittsburgh Sleep Quality Index (PSQI) was built by Buysse, Reynolds, Monk, Berman, & Kupfer in the year 1989. This scale is used to calculate sleep quality over the past few months. The scale includes 19 items across 7 components with a 0–3 rating scale, where higher scores indicate poorer sleep quality. This scale has construct validity and a reliability (Cronbach’s alpha) of 0.83.

Sample

The study will include a sample of 200night shift drivers, including bus drivers and delivery riders. Convenient sampling and snowball sampling are the sampling techniques used to collect samples of this population.

Inclusion Criteria

- Drivers who have been driving night shifts for 6 months and more than that.
- Drivers whose age varies between 21-60 years.
- Drivers who work on night shift on alternative days.

Exclusion Criteria

- Drivers currently on medications affecting sleep or stress.
- Drivers who are below 21years and above 60 years old.
- Drivers who work night shifts on temporary basis for few days.

Data Analysis

Data will be studied and explored using IBM SPSS Statistics (version 26.0). Descriptive statistics, including means, standard deviations will be used to outline participants’ demographic details, sleep quality, effort-reward imbalance, and perceived stress. Pearson’s correlation analysis will look into the relationships among sleep quality, ERI, and perceived stress. Multiple regression analysis will be conducted to assess the predictive effects of sleep quality and ERI on perceived stress.

Results

Table: 1

Descriptive statistics showing mean and standard deviation of Sleep quality, Perceived Stress and Effort Reward Imbalance among night shift drivers.

Variables	N	Mean	Std. Deviation
Sleep Quality	200	11.77	4.920
Perceived stress	200	24.84	8.759
Effort Reward Imbalance	200	32.34	12.059

The table 1 shows the mean and standard deviation for the variables such as, Sleep quality has a mean value of 11.77 and standard deviation as 4.920, Perceived stress has a mean value of 24.84 and standard deviation as 8.759, Effort reward imbalance has a mean value of 32.34 and standard deviation as 12.059.

Table: 2
Correlation between Sleep quality and Perceived stress among night shift drivers
N = 200

Variables	Perceived Stress	Sleep Quality
Pearson Correlation	1	.241
Sig. (2 – tailed)		.001
N	200	200
Pearson Correlation	.241	1
Sig. (2-tailed)	.001	
N	200	200

Correlation is Significant at 0.01 level

Table 2 shows that there is a significant relationship between Sleep quality and Perceived stress, As the correlation value is found to be .241. It is found that Poor Sleep quality is associated with higher Perceived stress. Perceived stress and Sleep quality have a statistically significant linear relationship ($r = .241$), ($p < 0.01$). And this shows that as Sleep quality decreases and perceived stress increases. If Sleep quality decreases the person may experience the feeling of dizziness, feeling of irritation, unable to concentrate, feelings of exhaustion and anger outbursts so that may lead to perceived stress. Hence Hypothesis I, “There is a significant relationship between poor sleep quality and high levels perceived stress among night shift drivers” is accepted.

Table: 3
Correlation between Perceived stress and Effort reward imbalance among night shift drivers
N = 200

Variables	Perceived Stress	Effort reward imbalance
Pearson Correlation	1	.171
Sig. (2 – tailed)		.015
N	200	200
Pearson Correlation	.171	1
Sig. (2-tailed)	.015	
N	200	200

Correlation is Significant at 0.05 level

Table 3 shows that there is a significant relationship between Perceived stress and Effort reward imbalance, As the correlation value is found to be .171. It is found that Perceived stress is positively correlated with Effort reward imbalance. Perceived stress and Effort reward imbalance have a statistically significant linear relationship ($r = .171$), ($p < 0.05$). And this shows that as Perceived stress increases and Effort reward imbalance also increases. If Effort reward imbalance increases the person may experience a heightened state of psychological strain as they invest high levels of effort but receive insufficient rewards such as recognition, salary, so that may activate perceived stress leading to emotional exhaustion, reduced job satisfaction and increased risk of burnout. Hence Hypothesis II, “There is a significant relationship between greater Effort reward imbalance and high levels of perceived stress among night shift drivers” is accepted.

Discussion

This research study explored the relationship between sleep quality, perceived stress, and effort-reward imbalance among night shift drivers. The results indicated that poor sleep quality was evidently associated with higher perceived stress ($r = .241$, $p < .01$). Effort–reward imbalance was also positively correlated with perceived stress ($r = .171$, $p < .05$). The results revealed a significant relationship between sleep quality and perceived stress, as well as perceived stress and effort-reward imbalance. The results concur with findings from studies on different occupational groups, including healthcare workers, night shift workers, and transportation workers. All of these studies showed a link between the quality of sleep and perceived stress, as well as perceived stress and effort-reward imbalance in the workplace. Sleep disturbance is a common problem experienced by night shift drivers because of the disturbance of their normal bodily rhythms, also known as circadian rhythms, due to the timing of their work shift. This, therefore, denies them adequate sleep, which then makes them feel tired, irritated, distracted, or emotionally unstable, all of which contribute to a situation of increased perceived stress. According to the effort-reward imbalance theory, perceived stress can also result from a lack of balance in work conditions, where an individual feels they are putting in too much effort at work without adequate rewards in terms of pay, security, or opportunities for career advancement in their profession. In the case of night shift driving, for instance, long hours at work, demanding work schedules, or a sense of responsibility for road safety can be perceived as a lot of work or effort without adequate rewards or recognition for a driver’s services, thereby making them feel more frustrated or emotionally drained or dissatisfied with their work. Therefore, the results concur with theories and findings from studies on perceived stress in the workplace by different researchers. The present study results are in line with the existing literature in showing that sleep disturbances and effort-reward imbalance are key stress-related factors in the occupational setting, particularly for those working in irregular or night shifts. These results have significant implications for occupational settings and management. The results of this study show that by improving sleep quality and reducing effort-reward imbalance, it may be possible to reduce stress levels and improve the well-being of night shift drivers. The results of this study contribute to the growing literature on occupational health by showing that when addressing stress in night shift drivers, it is essential to take into account physiological and psychological occupational factors. The results of this study show that sleep quality and effort-reward imbalance are key stress-related factors in the occupational setting for night shift drivers. Although the strength of these associations may vary, it is essential to take these factors into consideration when addressing occupational health for night shift drivers.

Conclusion

The findings of the current study revealed that both sleep quality and effort-reward imbalance are important factors in influencing perceived stress among night shift drivers. According to the findings of the current study, based on the responses received from 200 participants, the results revealed a significant relationship between sleep quality and perceived stress. Night shift drivers usually work during the hours of the day that disrupt the natural biological rhythm of the body, which might affect the sleep pattern of the individual. Inadequate sleep might affect both physical and emotional states of the individual, which might result in a higher level of stress in daily life. The findings of the current study proved a significant relationship between effort-reward imbalance and perceived stress. Usually, drivers who do not receive enough reward like enough salary, appreciation, or job security might experience a level of dissatisfaction, which leads to a higher level of stress as a result of the imbalance between effort and reward. Overall, the

study highlights the fact that both sleep disturbances and negative work conditions are factors that contribute to stress in the lives of night shift drivers. Thus, it is essential to understand the influence of both sleep disturbances and negative work conditions to improve the well-being and satisfaction of individuals in this occupation.

Limitations

- The study only involved 200-night shift drivers (bus drivers and delivery riders), hence it may not be generalizable to other types of night shift employees.
- The study employed convenience and snowball sampling, hence the results may not be representative of all-night shift drivers.
- Other variables such as personality, coping styles, health status, substance use (caffeine, smoking), and family support may also affect stress and sleep and were not controlled for in the study.
- The study only employed psychological variables and did not employ objective variables such as sleep tracking devices or biological markers of stress.

Implications

- The study implies that poor sleep quality and effort-reward imbalance are significantly associated with increased stress, emphasizing the importance of addressing the drivers' mental health.
- Transport companies need to work on improving shift work and breaks to minimize sleep problems.
- Organizations should analyse whether the employees receive rewards as per their working input to reduce stress
- The result defines the importance of sleep related interventions and stress management training for night shift drivers.
- Improving sleep and stress might help in reducing road accidents and enhancing public safety.
- Future studies should use the longitudinal approach or intervention-based programs to understand and minimize stress in night shift drivers.

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