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Original Research

Evaluation of the Relation between Noise and Vibration Exposure with Job Burnout in City Bus Drivers

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Introduction: Today, burnout has emerged as a significant concern affecting the well-being of employees within various groups and organizations. Numerous factors, including vibrations and noise, have been identified as impacting job burnout. City bus drivers are individuals who are frequently exposed to a wide range of stressors and pressures. Consequently, this study aims to evaluate the influence of noise and vibration exposure on job burnout specifically city bus drivers in Neyshabur.
Material and method: In the conducted study, a total of 62 bus drivers from Neishabur city participated. To accurately measure sound levels, a TES dosimeter was employed, while vibration levels were assessed using an SV 106 vibration meter. As for job burnout, the researchers utilized the well-established Maslach questionnaire.
Result: The present study reveals notable findings regarding the frequency levels of various dimensions among bus drivers. Particularly, the dimension of emotional exhaustion and depersonalization exhibited the highest percentage at a medium level. Moreover, all bus drivers scored high on the dimensions of lack of success and lack of efficiency. the dimension of emotional exhaustion and depersonalization was found to have the highest frequency percentage, particularly at a medium level. Results from the correlation test indicated a significant relationship between emotional fatigue and various factors, such as the number of working hours per week, amount of overtime per week, number of services, and exposure to vibrations. Additionally, a significant relationship was observed between the depersonalization dimension and the number of services, noise exposure, as well as lack of success and the number of services. Furthermore, a significant relationship between the lack of success dimension and the number of services and exposure to vibrations was identified.
Conclusion: Factors such as the quantity of working hours, overtime, the number of services within the driving profession, as well as exposure to high levels of noise and vibration, have been identified as influential factors on job burnout. It is plausible to mitigate work burnout in driving occupations by implementing strategies such as reducing working hours, utilizing

contemporary and low-vibration vehicles, and rotating work shifts between drivers in bustling and clamorous locales with more serene urban environments.

Introduction

In the workplace setting, individuals are subjected to a range of stressors including physical, chemical, environmental, and psychological factors, all of which pose threats to human health. If these stressors persist, they can significantly debilitation the physical and mental resilience of individuals, ultimately resulting in job burnout [1]. The term “job burnout” was initially introduced by Freudenberger in 1974, representing a state characterized by feelings of failure and fatigue [2]. In another definition, burnout is a state of physical, emotional and mental fatigue that occurs as a result of staying in emotionally exhausting conditions [3].

Job burnout is a recognized psychological and physical syndrome characterized by detrimental behaviors, attitudes, and a general dissatisfaction towards oneself, work, and clients. This syndrome often leads to absenteeism, poor morale, and a lack of job satisfaction, as identified in numerous studies [4]. Individuals experiencing job burnout commonly exhibit symptoms such as lethargy, feelings of monotony, and a notable decline in motivation to strive for progression [5]. Furthermore, the repercussions of burnout extend beyond mental and emotional aspects, manifesting in sleep disorders, headaches, digestive illnesses, elevated blood pressure, muscle tension, and chronic fatigue [6]. Multiple instances of burnout-related health consequences have been reported in various professional settings. Bus driving is a service-oriented occupation [7]. Bus drivers hold a crucial position in the realm of public transportation and are instrumental in alleviating traffic congestion and reducing air pollution [8]. They expertly navigate various routes, facilitating the movement of individuals and assisting them in accomplishing their daily responsibilities [9]. Numerous studies suggest that drivers belong to a group of individuals whose mental well-being is at risk due to occupational factors [10-14]. This concern arises from the multitude of job-related pressures that drivers encounter. Among these, one prominent and perilous stressor is noise [15]. when sound levels surpass the standard threshold, it can have detrimental effects on various bodily functions, such as hearing loss and disruptions in blood circulation [16]. Moreover, noise has secondary implications on human performance, manifested through diminished work efficiency and productivity. Additionally, it heightens the likelihood of accidents and errors by compromising individuals’ ability to concentrate [17]. Another stressor that drivers encounter is vibration. When operating a bus, the driver’s seat absorbs and transmits vibrations throughout their entire body [18]. This phenomenon is recognized as an occupational hazard for bus drivers due to its long-term detrimental effects, including spinal issues, back pain, minor fractures, and a reduction in disc height [19,20]. To date, extensive research has been conducted on the topic of job burnout. However, there is a deficiency of studies examining the association between job burnout and the influential factors of vibration and sound [21]. Remarkably, these physical factors play a substantial role in establishing a comfortable environment for drivers, thereby impacting the driving experience quality they encounter. Vibration and noise, as stress-inducing elements within the workplace setting, instigate feelings of irritation. Over prolonged and consistent exposure, these factors have been found to contribute to burnout syndrome in individuals. Consequently, this study aims to bridge this research gap by investigating the relationship between job burnout and the influential factors of vibration and noise within a work environment [22].

Materials and Methods

In this study, a total of 62 city bus drivers voluntarily participated while providing informed consent. the measurement of individual noise exposure was conducted using the TES Dosimeter Model 660, manufactured in Taiwan. The measurements were taken for each driver along the designated route, following the guidelines outlined by the ISO 5128:1980 for noise measurement inside motor vehicles [9]. These measurements were collected both at the driver’s seat and near the

drivers' hearing system. furthermore, the assessment of vibration exposure was conducted utilizing a SV 106 vibration meter (Svantek, Poland). This specific model exhibits a sensitivity of 10 ms^2/mv. To perform the vibration measurements, an accelerometer plate was strategically positioned at the seat's center, directly below the drivers, simulating their typical working conditions. These measurements were carried out in strict accordance with the criteria elucidated in the ISO 2631 standard [23].

Emotional Exhaustion

- High: A score above 30 for frequency and above 40 for intensity.

- Moderate: A score between 18 and 29 for frequency and between 26 and 39 for severity.

- Poor: A score below 17 for frequency and below 25 for severity.

Disfigurement:

- High: A score higher than 12 for frequency and higher than 15 for intensity.

- Moderate: A score between 6 and 11 for frequency and between 7 and 14 for severity.

- Weak: A score below 5 for frequency and below 6 for severity.

Lack of Success:

- High: A score less than 33 for frequency and less than 36 for intensity.

- Moderate: A score between 34 and 39 for frequency and between 37 and 43 for severity.

- Weak: A score above 40 for frequency and above 44 for intensity.

The data collected for this study were subjected to analysis using SPSS23 software. To ensure the normality of the data, the Kolmogorov-Smirnov test was employed. The correlation test was utilized to assess the impact of quantitative variables, such as age, work experience, and working hours, on the various dimensions of job burnout. Additionally, the t-test and one-way analysis of variance (ANOVA) tests were employed to examine the influence of qualitative variables, specifically job satisfaction (categorized into two modes) and education level (categorized into three modes), on the dimensions of job burnout. The obtained p-values were used to determine the significance of these relationships.

Results

This study examined a sample of 62 married male bus drivers. The participants' age ranged from 23 to 57 years, with an average age of 40.06 years. The drivers had an average of 13.71 years of driving experience. On average, these bus drivers worked for approximately 59.93 hours per week and accumulated approximately 78.72 hours of overtime per month. Among the participants, 62% expressed satisfaction with their work (Table 1).

	Minimum	Maximum	Mean	Std. Deviation
Age (years)	29	51	40.06	5.57
Height (cm)	150	187	173.72	6.54
Weight (kg)	53	105	80.75	11.41
Body mass index (kilograms per square	18.78	34.6	26.72	3.25

meter)				
Work experience (years)	1	30	13.71	6.91
Work experience (years)	1	6	2	0.9
Working hours per week	42	98	59.93	19.61
Overtime hours per month	0	210	78.72	83.79
Noise exposure (dB)	72	88	82.18	4.49
Qualitative variables			Frequency	(Percent)
Level of Education	High school		18	29.2
	associate		37	59.6
	bachelor		7	11.2
Job satisfaction	yes		39	62
	no		23	38

Table 1. Demographic Characteristics of City Bus Drivers.

In terms of frequency, the dimension of emotional exhaustion and depersonalization exhibited the highest percentage, indicating a medium level of prevalence. Conversely, all bus drivers scored high in the dimension of lack of success and lack of efficiency. Table 2 provides detailed information on the absolute and relative frequencies of job burnout across various dimensions, including emotional fatigue, depersonalization, as well as lack of success and efficiency.

Frequency / Intensity	Low		Medium		High	
Emotional exhaustion	Precent	Frequency	Precent	Frequency	Precent	Frequency
Disfigurement	1.6 (0)	1 (0)	87.1 (16)	54 (25.8)	9.7 (45)	6 (72.6)
Lack of success	0 (2)	0 (3.2)	83.9 (60)	52 (96.8)	16.1 (0)	10 (0)
Emotional exhaustion	0 (62)	0 (1)	0 (0)	0(0)	100(0)	62 (0)

Table 2. Frequency and (intensity) of Job Burnout in City Bus Drivers.

Table 2 presents the absolute and relative frequencies of burnout among the city bus drivers included in the study. Regarding the dimension of emotional exhaustion, the majority of individuals exhibit a low level of intensity in this dimension. In terms of depersonalization, the medium level demonstrates the highest frequency. Lastly, all individuals are classified as experiencing a high level of lack of success in the respective dimension.

The result presents in Table 3 depicting the association between various factors influencing job burnout.

	Emotional Exhaustion		Disfigurement		Lack of Success	
	p-value	r	p-value	r	p-value	r
Age	0.97	-0.005	0.09	-0.21	0.73	0.04
Work experience	0.47	-0.09	0.81	-0.03	0.79	-0.03
BMI	0.44	-0.09	0.24	-0.15	0.37	-1.12
Number of children	0.84	0.02	0.06	-0.24	0.18	0.17
Working hours per week	*0.0001	0.44	0.13	0.19	0.08	0.22
Overtime hours	*0.0001	0.23	0.18	0.17	0.53	0.07

per month						
Number of services	*0.0001	0.49	*0.04	0.25	*0.0001	0.49
Exposure to noise	0.54	0.08	*0.04	0.36	0.68	-0.05
Exposure to vibration	*0.04	0.09	0.07	0.17	*0.03	0.55

Table 3. Correlation between Demographic Characteristics of Drivers with Different Dimensions of Job Burnout Questionnaire (frequency of intensity).

The results of the correlation test indicate a statistically significant connection between the dimension of emotional exhaustion and the variables of working hours per week, amount of overtime per week, and the number of services. Likewise, the depersonalization dimension exhibits a significant relationship with the number of services and exposure to noise. Additionally, a significant link is observed between the lack of success dimension and the number of services. Table 3 provides a comprehensive overview of these relationships.

In the conducted study, the application of the t-test indicated a noteworthy association between job satisfaction and emotional exhaustion ($p=0.012$). Interestingly, no significant relationship was observed between job satisfaction and the remaining dimensions of job burnout. Additionally, the examination employing the chi-square test failed to establish a substantial connection between the diverse dimensions of the job burnout questionnaire and the educational attainment level ($p>0.05$).

Discussion

One crucial aspect for individuals in any profession is to prioritize their mental well-being. devoting attention to this matter not only leads to enhanced productivity but also contributes to personal and organizational growth in one's career and life. A significant threat to mental health is job burnout's detrimental impact [23]. City bus drivers represent one demographic that is particularly susceptible to experiencing job burnout. However, no previous study has explored the correlation between noise, vibration, and job burnout specifically among drivers in this profession. As a result, comparisons between this research and other studies examining such relationships are currently lacking. Nonetheless, the findings and insights presented in this article can be deemed comparable and relevant to the broader research conducted in this field. In the current study, the findings from the correlation analysis indicated a substantial association between the emotional exhaustion dimension and variables such as weekly working hours, weekly overtime, and the number of services. Additionally, a significant correlation between average monthly income and burnout was also identified in the study conducted by Rezaei et al [24]." This issue was also corroborated by Baker et al. in their empirical study [25].

In the conducted study, no statistically significant correlation was observed between the age and work experience of drivers and the factors contributing to job fatigue. These findings align with Kowalski's prior research on the subject matter [26]. In a significant academic contribution, Talai et al. (2008) demonstrated the existence of a statistically significant relationship between job burnout and various factors, such as age and years of work [27]. The study highlights the correlation between the three dimensions of job burnout and these variables. When assessing the extent of burnout, it was observed that all participants in the study experienced a lack of success, while depersonalization and emotional exhaustion were moderately prevalent among most of the subjects. Previous research has also indicated that emotional exhaustion, recognized as a contributing factor to job burnout, escalates with higher levels of burnout. Additional factors such as stress, tension, and a sense of ineffectiveness can intensify emotional fatigue [28].

In the study conducted by Alidosti et al. [26], the findings regarding the factors contributing to lack of success align with those of the present research. However, Alidosti and colleagues identified two

additional factors, namely fatigue and emotionality, as well as depersonalization, which were found to significantly influence low success rates in their study. These factors differ from the outcomes observed in the current research [29]. It is worth noting that experiencing success can enhance self-confidence and reduce feelings of frustration in individuals. Among the factors contributing to job burnout, depersonalization is the sole component demonstrating a noteworthy and affirmative association with noise exposure. In a comprehensive study carried out by Madvari et al., focusing on ceramic industry employees, the outcomes of the Spearman correlation test unveiled a substantial and positive correlation between various aspects of job burnout and the level of noise annoyance experienced by the workers. These findings are consistent with our own research results, substantiating the significant impact of noise on the dimensions of job burnout [22]. In a study conducted by Alimohammadi et al., it was found that there exists a significant and negative correlation between exposure to noise and job performance among employees [30]. Similarly, Zamanian et al. also demonstrated a direct relationship between workplace noise and job stress, and this relationship was found to be statistically significant. These findings highlight the impact of noise on employee performance and the association between noise levels and job-related stress [31]. Another factor that underwent examination in this study was the level of exposure to vibration. The findings of the research investigating the correlation between fatigue and bodily vibrations reveal a statistically significant relationship between these two variables. Given that drivers often engage in prolonged driving sessions, the vibrations generated by their vehicles tend to impact their entire body. Through a thorough examination of various research studies, it can be deduced that both noise and vibration factors have a significant impact on the mental health of drivers. These factors not only hinder their abilities and decision-making skills, but also contribute to their exhaustion, fatigue, and lack of concentration. Additionally, they can give rise to various physical ailments among drivers. The findings of the study indicate that several factors, including exposure to noise and vibration, the duration of working hours and overtime each week, and the number of service responsibilities in driving jobs, have a significant impact on job burnout. Therefore, it is crucial to address the specific aspects of job burnout and implement appropriate solutions to alleviate it. Possible measures to consider include reducing working hours, considering the noise levels and busyness of routes and optimizing work shifts accordingly, incorporating modern buses equipped with mechanisms to minimize vibration and noise, conducting regular examinations of drivers' hearing abilities, assessing their musculoskeletal health, and evaluating their mental well- being. Moreover, providing occupational health training can also be beneficial in reducing burnout and enhancing the well-being of these employees [32].

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