



Mental Workload and Job Satisfaction in Pre-Hospital Emergency Technicians

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Abstract

Background: Having enough ability to perform delegated tasks has a crucial role in preventing job-related accidents and medical errors. Excessive workload, particularly multitasking, causes increased physical stress and job dissatisfaction. Pre-hospital emergency technicians play a crucial role in saving patients' lives, therefore assessing their mental workload and job satisfaction is highly important.

Objectives: The current study aimed to investigate the mental workload of pre-hospital emergency technicians working in hospitals in the city of Ahvaz and its association with job satisfaction.

Methods: In this study, 252 pre-hospital emergency technicians were studied. The National Aeronautics and Space Administration-Task Load Index (NASA-TLX) was used to assess the mental workload. The Job Descriptive Index (JDI) questionnaire was used to collect information regarding job satisfaction. Data were analyzed using descriptive statistics and ANOVA and chi-square tests. Analyses were performed using SPSS version 22.0.

Results: Participants had a moderate level of workload (mean score: 5296). The highest and lowest scores were related to mental demand (69.96 ± 19) and physical demand (32.35 ± 14.3), respectively. Also, participants had a moderate level of job satisfaction, and there was a significant association between job satisfaction and mental demand and frustration ($P < 0.05$).

Conclusions: This study demonstrated an association between job satisfaction and mental demand and frustration in pre-hospital emergency technicians. Therefore, developing appropriate strategies is necessary.

Keywords: Workload, Job Satisfaction, Pre-Hospital Emergency Technicians, Ahvaz, Ergonomics

1. Background

Pre-hospital emergency medical services include all medical emergency services provided to seriously ill or injured patients before reaching the hospital. These services include a wide spectrum of services such as identification of the situation, telephone access system, providing pre-hospital care, definitive hospital care, medical responses in natural disasters, planning and providing medical services, and transferring patients to medical centers (1). Emergency technicians working condition is unpredictable and dynamic, regardless of their position or the type of organization where they are working. They may work for long hours with limited information, assistance, supervision, and resources to fulfill their mission. On the other hand, they may face several risk factors (e.g., infectious organs, emotional stress, fatigue, physical violence, job-related injuries, and accidents) (2). Based on the literature, the risk of death and injury of emergency technicians

is 1.2 to 2 and 5 times higher than other jobs, respectively (3, 4). Also, as they usually drive fast, there is a risk of damaging other people (2).

From the ergonomics' point of view, the leading cause of job-related injuries and accidents is the inability to perform delegated tasks. Historically, such problems are attributed to the work environment; however, recent studies have shown that psychological, social, and organizational factors also play a key role. Human resources have extreme value for organizations. Job satisfaction is the result of a complex interaction between expectations and the value that individuals attach to their job (5). Job satisfaction generally refers to the individual's attitude (either positive or negative) towards his/her carrier. Several factors contribute to job satisfaction, such as work shifts, leadership, performance, organizational commitment, effort, rewards style, educational background, and age (6-8). Based on recent studies, emergency technicians with

higher job satisfaction have higher abilities, both physical and mental (9). Managers should consider that both job satisfaction and dissatisfaction have several consequences (10). Various countries are performing regular job satisfaction surveys from different perspectives. The highest level of job satisfaction is reported in the United States, while the lowest level is reported in Germany (11). Studies performed in Iran have reported that health professionals have a moderate level of job satisfaction (12-14). The concept of job satisfaction is an important phenomenon in the health sector. Emergency departments are often the most crowded department of hospitals. Given the important role of pre-hospital emergency technicians in out of hospital patient care, increasing their job satisfaction can directly influence the quality of care and patients' satisfaction. Due to their working environment, emergency technicians not only should have a wide spectrum of qualifications but also should be interested (15). Mental workload is an important variable that can be used to understand the user's performance in complex systems. According to the literature, high levels of mental workload without enough time to rest is associated with biological problems such as stress, depression, or burnout.

Several studies showed that nurses have a moderate to high level of mental workload. Besides, it's well-documented that high mental load leads to reduced performance and job satisfaction and increased errors (16, 17).

Bozazan et al. showed that job satisfaction was negatively associated with the mental workload. Given the importance of job satisfaction and mental workload for pre-hospital emergency technicians to do their jobs efficiently, the present study was conducted to investigate the mental workload of pre-hospital emergency technicians working in hospitals in the city of Ahvaz and its association with job satisfaction.

2. Objectives

The current study had two main objectives: a) assessing the mental workload and job satisfaction of pre-hospital emergency technicians working in hospitals in the city of Ahvaz, and b) Investigating the association between job satisfaction and mental workload.

3. Methods

3.1. Sample

This descriptive-analytical study was carried out on pre-hospital emergency technicians working in educational hospitals in the city of Ahvaz (Iran). Initially, an invitation letter was sent to all emergency technicians working

in selected hospitals. The inclusion criteria were at least one year of work experience, no history of specific diseases or use of antidepressants.

3.2. Data Collection

The National Aeronautics and Space Administration-Task Load Index (NASA-TLX) was used to assess the workload of participants. NASA-TLX is a well-recognized subjective workload assessment tool, developed by Hart and Stave land (18). This is a multidimensional instrument for measuring subjective mental workload, which contains six subscales of mental demand, physical demand, temporal demand, performance, effort, and frustration level (19). The final score is a combination of all subscales (20). The subscales are rated within a 100-points range. The validity and reliability of the Persian version of the NASA-TLX have been demonstrated by several studies (14, 21).

The Job Descriptive Index (JDI) was used to assess job satisfaction, which is a widely used tool for assessing job satisfaction. The validity and reliability of the Persian version of this questionnaire have been confirmed in a previous study (22). The DJI consists of 39 items on five facets of job-related satisfaction of work itself (10 items), pay (6 items), promotions (5 items), supervision (8 items), and coworkers (10 items). The subscales are scored on a six-point Likert scale, ranging from one to five. The total score ranges from 39 and 195. Then, based on the total job satisfaction score, subjects were classified into three groups of low job satisfaction (A score < 39), moderate job satisfaction (near the midpoint 117), and high job satisfaction (near the upper limit score 195) (19, 23). Demographic Information (gender, age, marital status, level of education, and work experience) were also collected.

3.3. Data Analysis

Data were analyzed using SPSS version 22.0 (SPSS Inc., Chicago, IL, USA). Statistical significance was considered when P-value < 0.05. Descriptive statistics, ANOVA, and chi-square test were employed. Pearson's correlation coefficient was used to examine the association between job satisfaction and mental workload subscales.

4. Results

Of 270 questionnaires distributed, 252 people responded for a return rate of 93%. All of the subjects were male. Concerning the education level, most of them had an associate degree (58.7%) and 71.4% of them were married. The mean age and work experience of participants were 31.27 ± 7.26 and 8.13 ± 5.1 years, respectively. The minimum and maximum years of work experience were one and 23

years, respectively (Table 1). The demographics characteristics of participants are described in Table 1 (n = 252).

Table 1. Demographic Characteristics of Participants (n = 252)

Category	No. (%)
Age, y	
20 - 30	97 (38.5)
30 - 40	111 (44.1)
40 >	44 (17.5)
Work experience, y	
1 - 10	118 (46.8)
10 - 20	98 (38.9)
20 >	36 (14.3)
Marital status	
Single	72 (28.6)
Married	180 (71.4)
Education level	
Diploma	29 (11.5)
Associate degree	148 (58.7)
Bachelor's degree and higher	75 (29.8)

The mean overall workload was estimated to be 52.96 ± 12.53 . Mental demand (69.96 ± 19.94) and physical demand (33.35 ± 14.4) had the highest and lowest scores, respectively. Based on the findings, there was a significant difference concerning the overall workload among different age groups ($P < 0.001$). There was a significant difference concerning the overall workload among those with different work experiences ($P < 0.002$) so that the lower was the work experience, the higher was the overall workload. Moreover, a significant association was observed at different levels of education, so that the higher was the education level, the lower was the overall workload. The findings also showed no significant difference concerning the overall workload in subjects with different marital statuses (Table 3). The mean (\pm SD) job satisfaction score was 121.42 ± 16.41 , which indicates a moderate level. The results showed that 31.3% (n = 79), 61.9% (n = 156), and 6.8% (n = 17) of participants had a low, moderate, and high level of job satisfaction, respectively. As shown in Table 2, the maximum and minimum job satisfaction scores were related to work (2.63 ± 0.53) and promotion (1.24 ± 0.44) subscales, respectively. Furthermore, a significant association was found between education level and job satisfaction ($P < 0.001$), so that those with higher levels of education were more satisfied with their job. There was also a significant association between age and job satisfaction and between work experience and job satisfaction ($P < 0.05$). The results

revealed no association between marital status and job satisfaction ($P = 0.145$). However, those participants who were single had a lower level of job satisfaction (Table 3).

Table 2. Job Satisfaction Scores Separated by Subscale

Subscales	1 to 5 (Mean \pm SD)
Work	2.63 ± 0.53
Supervision	1.71 ± 0.42
Coworkers	2.35 ± 0.61
Promotion	1.24 ± 0.44
Payment	1.82 ± 0.63

Pearson correlation coefficient was used to investigate the association between subscales of workload and job satisfaction. The result of the analysis showed a significant negative correlation between job satisfaction and subscales of workload, including mental demand and frustration. This means that for every one-unit increase in the mental demand and frustration, the predicted value of mean job satisfaction decreases by 0.31 and 0.21, respectively ($P < 0.05$, $r = -0.31, -0.27$). The results showed no significant difference between the overall workload in participants with low job satisfaction scores compared to those with moderate and high scores. The association between job satisfaction levels and workload subscales is shown in Table 4. The mean scores for performance ($P < 0.051$) and frustration ($P < 0.043$) were significantly higher for those with low job satisfaction scores compared to those with moderate/high scores.

5. Discussion

In the present study, job satisfaction and mental workload of pre-hospital emergency technicians were investigated, and the results showed a moderate level of job satisfaction and mental workload. Based on the NASA-TLX scores, the highest score was for mental workload and temporal load. The most important reasons for the high mental workload of participants were the demand of injured people for urgent aids, decision making, and critical response to control vital signs. Those with higher mental workload scores had more difficulty in performing their jobs. Mental stress was the main cause of high workload among participants, which indicates the difficulty, complexity, and need for high accuracy in performing duties. The high temporal pressure (the second priority) reveals the importance of being fast in performing duties. Haqi et al. reported that the highest and lowest priorities belonged to mental stress and frustration, respectively, in performing complex duties (24). A study conducted by

Table 3. Statistical Analysis of Mental Workload and Job Satisfaction

Category	Mental Workload (Mean ± SD)	P-Value	Job Satisfaction (Mean ± SD)	P-Value
Age, y		0.28 ^a		0.001 ^a
20 - 30	54.42 ± 14.21		116.6 ± 17.14	
30 - 40	54.24 ± 16.32		124.84 ± 19.34	
40 >	53.63 ± 12.34		128.41 ± 16.33	
Work experience, y		0.34 ^a		0.002 ^a
1 - 10	52.62 ± 18.37		120.56 ± 17.74	
10 - 20	52.22 ± 14.67		122.31 ± 19.35	
20 >	52.30 ± 13.45		125.46 ± 15.73	
Marital status		0.86 ^b		0.145 ^b
Single	53.44 ± 11.8		121.19 ± 18.36	
Married	52.21 ± 13.20		123.93 ± 16.21	
Education level		0.002 ^a		0.001 ^a
Diploma	53.42 ± 14.8		116.66 ± 14.56	
Associate degree	51.66 ± 12.11		121.61 ± 15.43	
Bachelor's degree and higher	50.34 ± 17.74		126.24 ± 17.31	

^aOne-way ANOVA.^bIndependent t test.**Table 4.** The Association Between Mental Workload Subscales (Mean ± SD) and Job Satisfaction Levels

NASA-TLX	Job Satisfaction		P-Value
	Low	Moderate / High	
Mental demand	56.15 ± 18.94	54.32 ± 16.8	0.053
Physical demand	32.11 ± 19.39	31.83 ± 15.94	0.645
Temporal demand	55.43 ± 20.98	54.91 ± 14.23	0.174
Performance	50.72 ± 23.4	49.24 ± 18.71	0.451
Effort	50.65 ± 19.63	49.92 ± 21.14	0.524
Frustration	52.54 ± 18.62	50.04 ± 17.12	0.043
Overall workload	52.71 ± 15.41	52.12 ± 16.43	0.31

Levin on physicians working at emergency departments indicated that the highest mental workload of physicians, similar to the present study, was related to the temporal and mental pressure (25). Boultinghouse et al. have assessed the physicians' mental load and reported that mental demand had the highest mean and impact on the mental workload of physicians (26). Young et al. reported that older people had a higher mental load compared to their young counterparts (27). However, in this study, no significant association was found between mental load and age. The present study demonstrated that the overall job satisfaction

of pre-hospital emergency technicians working in the city of Ahvaz was moderate, which is consistent with the results of other studies performed on the healthcare workers (28-31). Other studies performed in Iran reported a moderate level of job satisfaction among medical staff. For example, Asghari et al. have evaluated the nurses' job satisfaction and reported a moderate level (9). Mousavi et al. have assessed job satisfaction among the public and military nurses and reported a moderate level of job satisfaction (19). Saberi Nia et al. have identified the stressors causing dissatisfaction in pre-hospital emergency technicians and mentioned the following factors as the main reasons: personal problems, organizational problems, inappropriate coordination, and community-related problems (32). This study demonstrated that work experience, age, and education level affect job satisfaction. Hayes B et al. also argued that job satisfaction is positively associated with work experience and age (33). Tabak N and Orit K, in a study on nurses, reported that older participants had higher job satisfaction compared to their younger counterparts (34). However, Movahed and Lu et al. reported that the association between age and job satisfaction was not statistically significant (35, 36). It might be justified by the fact that less-experienced and novice health workers have ideal expectations which are not consistent with the organization's realities, which in turn leads to job dissatisfaction; however, by gaining more realistic views about their job and acquiring more skills, their job satisfaction will increase. Based

on the findings, although those who were single had lower levels of job satisfaction, but the difference was not statistically significant. Married participants had a higher level of job satisfaction than their single counterparts, which is consistent with the results of Hoboubi N et al. (23).

The results of this study revealed that although job satisfaction was negatively associated with overall workload, but no significant association was found between job satisfaction and overall mental workload. Concerning the mental workload subscales, job satisfaction was only significantly associated with mental demand and frustration. In this regard, Hoboubi N et al., in a study on emergency nurses, also showed that job satisfaction was significantly associated with mental demand and frustration (23). Other studies conducted on healthcare have also emphasized that increased workload causes decreased job satisfaction, increased job-related stress, and decreased quality of work-life (37-39).

5.1. Limitation

The current study had limitations, including all participants, were male. Also, to increase the accuracy of investigating factors that affect job satisfaction and mental workload, further studies with more emphasis on demographic factors is recommended.

5.2. Conclusion

This study demonstrated a moderate level of job satisfaction and workload. Also, the job satisfaction of pre-hospital emergency technicians was associated with mental demand and frustration. Therefore, to achieve higher job satisfaction in the workplace, identification of various dimensions of mental demand and frustration, and implementation of constructive and managerial interventions should be prioritized.

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Footnotes

Authors' Contribution: Study concept and design: davod afshari; analysis and interpretation of data: zohre jafarzade and mojtaba nakhaei, ali sahraneshin samani; drafting of the manuscript: zohre jafarzade and maryam nourollahi-darabad; critical revision of the manuscript for important intellectual content: davod afshari and maryam nourollahi-darabad.

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