The Investigation Relationship between Mental Workload and Occupational Fatigue in the Administrative Staffs of a Communications Service Company

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ABSTRACT
Mental workload reflects the level of attention resources required to meet both objective and subjective performance criteria, which may be affected by task demand, external support and past experience. Mental workload and occupational fatigue have been commonly cited as a major cause of workplace accidents. The aim of this study was to investigate the relationship between workload and occupational fatigue in the administrative staffs of a communications service company in Tehran. In this study, 94 employees of the administrative service (69 female and 25 male) were provided with a demographic characteristics questionnaire including age, body mass index (BMI), level of education and work experience. Then the Swedish occupational fatigue inventory questionnaire was used to determine the job fatigue. The NASA-TLX mental workload questionnaire used for assessing mental workload. Finally, Data were analyzed by SPSS Version 20, descriptive statistics, Pearson correlation test and ANOVA test. Results showed that NASA-TLX mental workload in female (59.14) is more than from male (54.56). Also result showed Swedish Occupational Fatigue Inventory (SOFI) in female (30.12) is more than from Male (28.12). Also, the Pearson correlation test showed that there is a significant correlation between NASA-TLX and SOFI ($r = 0.76$, $P<0.0001$) as the mental workload increase, occupational fatigue increased. In other words, as the mental workload increase, occupational fatigue increased. The result of a recent study showed the significance correlation between the mental workload and occupational fatigue in the administrative staff that with mental workload increase, occupational fatigue increased.

Key words: Mental Workload, Occupational Fatigue, Administrative Staff

INTRODUCTION
Organizational and ergonomic factors influence the relationship between occupational fatigue and mental workload for office workers communications Service Company. High workload costs organization on so many levels including a decrease in staffs' performance, increased accidents, work absence, job dissatisfaction, frequent job changes and turnovers, reduced work performance quality [1]. In Finland, employees with a lower level of job satisfaction were more involved in accidents and the accidents they were involved were more severe. If employers overlook the importance of the employee's health, it may turn offices into hazardous workplaces and increase associated costs to the organizations [2]. On the other hand, human resources are considered one of the main resources in an organization. Therefore, attention to occupational fatigue should be one of the priorities of those involved in organizational planning. A proactive approach should be incorporated in organizational planning in order to promote employee's health leading to sustainable improvement [3]. Mental workload is a set of factors that effect on the mental processes of information, providing make a decision and individual reactions in the office workplace. Workload has been reported to negatively affect the health of employees; long-term diseases may be a result of the stress, monotony, mental dullness and fatigue of the office workplace. Moreover, the excessive workload has been ranked first among the reasons for employee burnout, which has been commonly researched in recent years [4].

Excessive workload has been identified as a significant stressor across different occupations. Jobs with a high level of workload cause diminish the operator's performance. Regulating task demands in a way that prevents individuals from being under load or overload has considerable importance to ensure their safety, health, comfort and productivity individuals [5].

The progress of technology and modern technology has changed today's Workplaces and imposed more

mental workload and cognitive demands to workers. The high mental workload may lead to increased human errors, compromised quality and safety of care, and reduced quality of working life [3]. Fatigue is a condition that causes a reduction in the body's resistance and as a result, people lose their propensity towards work and daily activities. Physical fatigue can be defined as the inability to continue functioning at the level of one's normal abilities, and usually becomes particularly noticeable during heavy exercise, though varying from a general state of lethargy to a specific work-induced burning sensation within one's muscles [6]. In addition, fatigue can lead to cardiovascular diseases, mental disorders, mental retardation, insomnia, weakness, memory loss, muscle pain, forgetfulness and lack of balance. In general, fatigue should not be considered as a single event, but it is a very complex phenomenon and has different components [7]. Regarding the fatigue and its consequences such as job burnout, an increase in medication errors and the reduced quality. It is necessary to identify the causes of fatigue in office workers communications Service Company. Fatigue can interfere with physical-mental and emotional performance and can cause energy loss and weakness [8]. Regarding the change of work systems from the traditional to the modern style, institutional order, work overload, and the need to a relatively high level of permanent concentration as the origin of stress in administrative workplaces and office workers, workload among this group of employers are highly probable and predictable. Fatigue and mental workload in the workers reduce the individual's resistance and eventually leads to lower performance, increased errors and accidents. A proactive approach is necessary for prevention mental workload related damages and therefore it is important to do diagnosis, assessment and management workload related risk factor. The aim of this study was to investigate the relationship between workload and occupational fatigue in the administrative staffs of a communications service company in Tehran in July 2017.

MATERIALS AND METHODS

This cross-sectional and descriptive analytical research was performed on 94 administrative employees Tehran province in July 2017. Inclusion criteria the study has at least one year of work experience and at least 8 hours of work per day in a continuous and extensive manner. Exclusion criteria were individuals with pain or discomfort in different organs of the body. Ethical considerations in this research were also observed and all participants signed consent form Participate in research. All of the participants were assured that their information will remain confidential to the researcher. In this study, the participants were selected through simple random sampling and the number of participants was similar to the studies [7]. At first, demographic information about age, sex, work experience, educational level and body mass index were recorded and collected. Then the mental workload and occupational fatigue questionnaire were completed. NASA-TLX is one of the well-known mental workload assessment tools, presented by Hart and Staveland. This is a multidimensional instrument, which gives a total score according to six subscales including mental Demand, physical demand, temporal demand, performance, effort, and frustration. The calculation of this scale was done according to the method presented earlier, in which participants rate the level of their workload for each subscale on a 10cm visual analogue scale and then these scores are altered to a 0-100 scale [9]. Reliability and validity of this questionnaire were confirmed by Mohammdi *et al.* and Cronbach's alpha for this scale was 0.89 [10]. In order to assess occupational was used fatigue Swedish Occupational Fatigue Inventory (SOFI-20) which was designed and presented by Asberg *et al*. [11]. This questionnaire can assess the psychological and physical aspects. Validity and reliability of this questionnaire were verified by Javad Pour *et al*. And Cronbach's alpha for this questionnaire was 0.95 [12]. Also the value of $P < 0.05$ was considered statistically significant. The data were analyzed using SPSS version 20, descriptive statistics, Pearson correlation test and ANOVA test.

RESULTS

In this study, 94 people participated that were including 69 female and 25 male. Demographic information by sex includes age, work experience and body mass index Table 1 is shown.

Table 1: Demographic information by sex includes age, work experience and body mass index administrative parts

Variable	Classification	Mean (SD)
age	male	28.35(3.4)
	female	26.91(4.6)
work experience	male	6.01(1.45)
	female	4.75(2.03)
body mass index	male	25.01(2.03)
	female	23.41(1.28)

According to Table 1, the mean age, work experience and body mass index in the male are more than female. The number of participants based on the level of education and by sex is shown in Table 2.

Table 3 shows the mean and standard deviation NASA-TLX index for men and women.

According to Table 3, results showed that NASA-TLX mental workload in female (59.14) is more than from male (54.56). The highest score for the NASA-TLX

mental workload is related to mental demand in male (72.32) and female (86.22).

Table 2: Number of participants based on the level of education administrative parts

Variable		classification	number	percent
level of education	Bachelor of science	male	17	68
		female	48	69
	Under Bachelor of science	male	8	32
		female	21	31

Table 3: Mean and standard deviation NASA-TLX index for male and female administrative parts

NASA-TLX	Male		Female	
	mean	SD	SD	Mean
physical demand	39.26	24.25	21.23	42.36
temporal demand	57.68	23.23	20.33	79.25
Performance demand	37.32	26.65	22.63	44.23
Effort demand	57.35	19.84	19.21	72.65
frustration demand	35.66	24.19	22.49	35.22
mental demand	72.32	16.7	13.1	86.22
total score for NASA-TLX	54.56	23.56	59.14	21.33

Table 4 shows the mean and standard deviation Swedish Occupational Fatigue Inventory (SOFI) for male and female.

According to Table 4, the result showed Swedish Occupational Fatigue Inventory (SOFI) in female (30.12) is more than from Male (28.12). The highest score for SOFI is related to Physical discomfort in male (3.45) and female (3.81).

Also, Pearson correlation test showed that there is a significant correlation between NASA-TLX and SOFI ($r = 0.76$, $P<0.0001$). In other words, as the mental workload increase, occupational fatigue increased.

Table 4: Mean and standard deviation Swedish Occupational Fatigue Inventory (SOFI) for male and female administrative parts

SOFI	Male		Female	
	Mean	SD	Mean	SD
Lack of energy	3.19	0.36	3.59	0.28
Physical exertion	1.87	0.78	2.51	0.30
Physical discomfort	3.45	0.63	3.81	0.45
Lack of motivation	1.23	0.21	1.14	0.39
Sleepiness	1.17	0.68	1.44	0.69
Total score for SOFI	28.12	2.4	30.12	3.7

In this study, after Kvlmvgraf- Smirnov test and ensure the distribution normal variables, analysis of variance showed that the between age with NASA-TLX mental workload there is no significant relationship in male($P=0.09$) and female($P=0.08$). Also, analysis of variance showed that there is no significant relationship the between work experience with NASA-TLX mental workload in male ($P=0.07$) and female ($P=0.07$).also analysis of variance showed that the between age with SOFI there is no significant relationship in male ($P=0.05$) and female ($P=0.05$). Also, analysis of variance showed that there is no significant relationship the between work experience with SOFI in male ($P=0.06$) and female ($P=0.06$).

DISCUSSION

In a healthy organization, staff's physical and mental health is as important and considerable as production and productivity. Mental workload is a result of long-term tension and stress in the job environment. Its symptoms occur when employees power and potency is not enough for the job environment demand. The results of this study showed that mental workload increase, occupational fatigue increased. Zamanian *et al.* investigated the Relationship between mental workload and job satisfaction and concluded among the various subscales of mental workload, faculty members reported high levels of subjective pressure, time pressure and effort [13]. In this study, a significant correlation was observed between the NASA-TLX mental workload and occupational fatigue. Findings of the present study are consistent with the majority of previous researches. Dorrian *et al.* in study work hours, mental workload, sleep and fatigue in Australian rail industry employees, concluded that mental workload effects on fatigue and sleep individuals, which findings of the present study confirm [14]. In this study, there was no significant correlation between age and work experience with the mental workload. Malekpour *et al.* concluded there was no significant correlation between age and work experience with mental workload score for NASA-TLX, which findings of the present study confirm [15]. Jin Ma *et al.* check out mental workload influence on fatigue and concluded with the increasing mental workload, occupational fatigue of individuals increased, which confirms the findings of this study [16]. Motamedzade *et al.* investigated mental workload and its association with fatigue in the operating room and concluded that mental workload and fatigue may be correlated with each other, which is consistent with the findings of this study [17]. Mental workload has not significant correlated with age and work experience, which is consistent with the findings of Ganbari *et al*. [18]. The result of this study showed that occupational fatigue has not significant correlated with age and work experience. MacDonald investigated the impact of job demands and mental workload on stress and fatigue, result this study showed occupational fatigue has not significant correlated with age and work experience which findings of the present study confirm [19].

Mehta *et al.* investigated the influence of mental workload on muscle endurance and fatigue that concluded mental workload affected on fatigue individual, which confirms the findings of this study [20].

Grech *et al*. pay to an examination of the relationship between mental workload and fatigue across consecutive days of work and concluded that with mental workload increase, occupational fatigue increased [21]. In a healthy organization, staff's physical and mental health is as important and considerable as production and productivity. Occupational fatigue is cause reduces productivity and reduces physical and mental health [22]. Torres el pay to fatigue and workload among aircraft and concluded that there was a significant relationship mental workload and occupational fatigue [23] Hernandez *et al.* investigated assessment of workload, fatigue, and musculoskeletal discomfort concluded in their study and concluded in their study that between mental workload, fatigue and musculoskeletal discomfort there was a significant relationship, which confirms the findings of this study [24] Hassanzadeh *et al*. investigated Mental workload and its relation with fatigue and concluded that there was a significant relationship between Mental workload and fatigue, which is consistent with the findings of this study [25] The present study has several limitations. First, the study population does not reflect the general population, because it only included man military personnel. Second, the relatively small sample size of this study highly recommends conducting studies with a bigger population.

CONCLUSION

The results of this study showed that mental workload effects on occupational fatigue and should conduct ergonomic interventions actions. Accordingly, the correct adjustment of the work schedule as risk management strategies in office workers communications Service Company is recommended. Using a suitable work-rest cycle can reduce fatigue. It seems that using a comprehensive and unique ergonomic approach for the redesigned work, work systems and procedures are essential to provide a holistic perspective on office workers communications Service Company.

ETHICAL ISSUES

Ethical issues have been observed by the authors.

CONFLICT OF INTEREST

The authors have declared no conflict of interest.

AUTHORS' CONTRIBUTION

Authors contribute to this study as following items:
Ayoub Ghanbary Sartang: Study design.
Behnam Haghshanas: Statistical analysis and reviewing the final version of the manuscript.
Ehsanollah Habibi and Mahboobe Abedi: Data coordinator and data mining

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