Psychometric Properties of the Persian Version of the "Health and Work Questionnaire" and Association of its Subscales with Work-Related Musculoskeletal Symptoms among Office Workers

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Abstract

Background: For an organization to be successful, the productivity of its employees is of vital importance. This study aimed to: 1) translate and examine the psychometric properties of the Health and Work Questionnaire (HWQ) among Iranian office workers, and 2) Determine the association between six subscales of the Persian version of HWQ (P-HWQ) and Work-related Musculoskeletal Symptoms (WMSs) among the subjects.

Methods: This cross-sectional study was conducted among office workers employed at Shiraz University of Medical Sciences. In order to standardize the questionnaire, the English version of the HWQ was translated into Persian (the Iranian official language), using the standard "forward-backward" translation, cognitive debriefing, and cultural adaptation procedure. The Nordic Musculoskeletal Questionnaire (NMQ) was used to determine the WMSs prevalence rate among the subjects.

Results: 129 office workers, including 44 (34.1%) males and 85 (65.9%) females with a mean ± SD age of 36.22±7.72 years voluntarily participated in this study. Internal consistency of the P-HWQ was acceptable for all subscales (0.65≤α). Factor analysis of the P-HWQ for each item related to the subscale was acceptable (0.4<). The highest prevalence rates of WMSs in the last week were related to lower back (51.2%), neck (43.4%), and shoulders (41.1%). The concentration/focus subscale of productivity (derived from P-HWQ) was related to WMSs in participants.

Conclusion: The P-HWQ has good structural characteristics, is a valid and reliable instrument, and can be used for measuring the productivity of Iranian office workers. Improvement of working conditions is suggested to reduce the musculoskeletal problems, and enhancement of people's concentration/focus and productivity.

Introduction

For an organization to be successful, the productivity of its employees is of vital importance.[1]

In the past decades, accelerating the technological changes and automation in the workplaces led to an increase in the workers' responsibilities than before.[2] Although these changes have increased the overall productivity, a new form of technology increases the job demands, requiring workers to do multi-task, and

as a result increases job stress and time pressures at work.[3-5] These changes can be effective on both increasing the levels of "absenteeism" as well as "presenteeism" at work. Absenteeism is a condition in which an employee is absent from work; in contrast, presenteeism occurs when an employee is present at work but is not fully engaged in his or her work.[6]

The findings of some studies have shown that new changes in working process have many adverse effects on the health of employees. These adverse effects are induced by a number of factors such as job content, overload or underload in work, work pace, working schedule, job control, availability of equipment, organizational support, interpersonal relationships, job security, balance between home and job activities, etc. Furthermore, there are many risk factors in the workplaces such as inadequate physical activity and smoking that can lead to lost productivity.[7, 8]

Some risk factors such as lack of sleep, financial concerns, giving unpaid care to family members, mental health problems, work-related musculoskeletal symptoms (WMSs), and other health issues are negatively related with productivity. The findings of this study showed that workers who are subject to workplace bullying report significantly higher levels of absenteeism and presenteeism than the other colleagues.[9]

WMSs are a significant workplace issue resulting in low productivity at work and sickness absence,[10] increase in medical expenses,[11] impairment losses,[12] reduction of the quality of life,[13] reduction of productivity (e.g. lost time),[14] and productivity loss in terms of presenteeism.[15] Figure 1 shows the determinants of workplace productivity.[9]
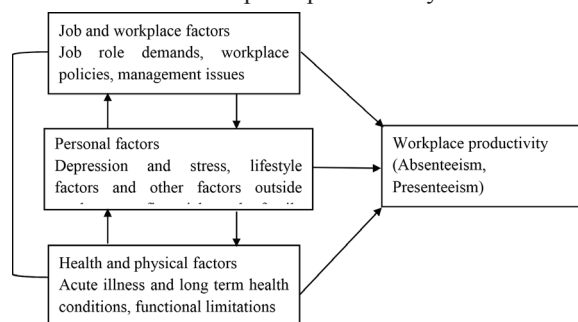

Figure 1: Determinants of workplace productivity.[9]

The findings of some studies have demonstrated that different factors such as the role and competence of managers,[16, 17] cognitive behavioral therapy,[18] and so on can be effective in keeping individuals with mental-health conditions at work and improving their productivity in the workplace.

Office workers are a large group of employees that generally work in organizations around the world.[2] The efficiency of these people will be low if they are tired, have personal worries, or are suffering from working stress. Also, the physical environment can put office workers in a better mood. Moreover, a number of personal factors, which depend on the somatic and mental health of an individual, and a number of external factors, which depend on the physical and social environment as well as the work-related systems of management influence the level of productivity.[1]

Usually, the employees' productivity in the workplace or organization is measured by the output produced in the daily task.[7] However, when the measurement of quantitative or traditional productivity is desired, this measure (output of daily task) is not applicable and instead of that the subjective productivity may be used based on the personnel's subjective assessment.[9] In this regard, one instrument is the Health and Work Questionnaire (HWQ), a multidimensional questionnaire with various aspects of productivity of the workplace. Generally, this questionnaire focuses on three aspects of productivity, including efficiency, quantity, and quality. In using this instrument, people are asked to rate their work efficiency, quantity, and quality from own, their co-workers' and supervisor's perspectives. Figure 2 shows the conceptual model for self-rated productivity in the Health and Work Questionnaire.[19]
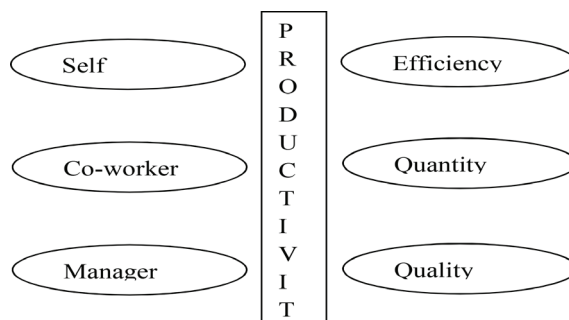

Figure 2: The conceptual model for self-rated productivity in the Health and Work Questionnaire where t people are asked to rate their work efficiency, quantity, and quality from own, their co-workers' and supervisor's perspectives.[19]

This study aimed to: 1) translate and examine the validity and reliability of the Health and Work Questionnaire (HWQ) in Iranian office workers, and 2) survey of the association between six subscales of the Persian version of HWQ (P-HWQ) and WMSs among subjects.

Materials and Methods

a) Psychometric properties of HWQ:

- Instrument: Health and Work Questionnaire (HWQ)

Health and Work Questionnaire (HWQ) was developed by Shikiar et al. (2004) among a sample of reservation agents at a US-based international airline,

in the United States of America.

The HWQ is a questionnaire that assesses various aspects of workplace productivity. HWQ consists of 30 questions with a 10-point Likert scale for each question, which have been categorized into six subscales: productivity, concentration/focus, supervisor relations, work satisfaction, non-work satisfaction, and impatience/irritability. It is worth mentioning that concentration/focus and impatience/ irritability subscales were scored reversely. This means that higher scores represent lower concentration/focus and impatience/irritability.[19]

To calculate the score of each subscale, the items' scores were summed up and the total were divided by the number of the items. Similarly, a total productivity was calculated.[19]

- Translation and adaptation

In this study, translation and translation of the HWQ into Farsi was performed by the forward-backward procedure. The final version was examined in a pilot study with 20 subjects and the comprehensibility of each question was verified. This stage was considered as the pilot study.

- Subjects

Totally, 129 office workers participated in this study; they were affiliated to Shiraz University of Medical Sciences in Iran with at least one-year work experience. Variables such as age, gender, marital status, educational level were recorded. Before starting of the study, an informed consent form was signed by all the subjects. For illiterate people, the questions of the Persian version of HWQ (P-HWQ) were asked through face-to-face interview in Persian. The intervention of the interviewer was restricted just to elaborate the meaning of the questions for them. Also, the relevance and clarity of the questions were assessed.

b) Work-related Musculoskeletal Symptoms (WMSs):

Nordic Musculoskeletal Questionnaire (NMQ) was used to examine the reported prevalence rate of WMSs in different body regions among the study population.[20] In the present study, reported WMSs were limited to the past week. Each participant received the questionnaire in his/her workplace. The validity and reliability of the Persian version of NMQ hadve been surveyed by Choobineh et al.[21]

Statistical Analysis

In this study, we used the Statistical Package for Social Sciences 16 (SPSS Inc, Chicago, IL, USA). Cronbach's alpha and Spearman correlation coefficient were used for assessment of internal consistency reliability and convergent validity; to assess the construct validity, we used factor analysis test. In addition, independent sample t-test was used to determine the association among six subscales obtained from the P-HWQ related to productivity and WMSs.

Results

Table 1 presents some characteristics of the studied subjects. The mean±standard deviation of age and working hours per week in the studied office workers (n=129) were 36.22±7.72 years and 44.59±9.57 hours, respectively. 34.1% of the subjects were male and the others (65.9%) were female workers.

a) Psychometric properties of HWQ:

Table 2 presents the mean and standard deviation of the total productivity and its six subscales obtained from the P-HWQ among office workers.

The reliability of the six subscales of P-HWQ was obtained by Cronbach's alpha coefficient (Table 3). As presented in this Table, internal consistency for all subscale was acceptable (0.65≤α).

Table 4 shows the internal consistency (Cronbach's α) of each subscale of health and work questionnaire (P-HWQ) by sex, marital status, job tenure and daily working hours.

Table 1: Characteristics of the participants in the study (n=129)

Quantitative variable		Mean±SD
Age (years)		36.22±7.72
Weight (kg)		69.80±16.60
Stature (cm)		166.40±11.84
Job tenure (years)		12.16±7.28
Working hours per day		8.14±1.01
Working hours per week		44.59±9.57
Hours of exercise per week		2.58±2.86
Qualitative variable		No. (%)
Sex	Male	44 (34.1%)
	Female	85 (65.9%)
Marital status	Single	40 (31%)
	Married	89 (69%)
Educational level	Associate Degree and lower	17 (13.17%)
	Bachelor of Science and higher	112 (86.83%)

Table 2: Mean, standard deviation, minimum and maximum of the score of total productivity and the other 6 subscales obtained from the P-HWQ (n=129)

HWQ Subscale	Mean±SD	Minimum	Maximum
Productivity (11 item)	7.38±1.46	3.09	10
- Own Assessment (5 item)	7.22±1.44	3.2	10
- Other's Assessment (6 item)	7.51±1.72	0	10
Concentration/Focus (4 item)	4.28±2.21	1	9
Supervisor Relations (2 item)	7.10±2.10	1.5	10
Non-Work Satisfaction (3 item)	7.10±1.58	3	10
Work Satisfaction (4 item)	6.83±1.38	3.75	10
Impatience/Irritability (3 item)	3.09±1.76	1	9
Total productivity (27 item)	6.31±0.91	3.81	8.11

Table 3: Reliability of the six subscales of P-HWQ

HWQ Subscale	No. of items per scale	Convergent* validity (range of correlation)	Scaling success†	Scaling success††	Internal consistency (Cronbach's alpha)
Productivity	11	0.442-0.868	11/11	100	0.931
- Own Assessment	5	0.523-0.860	5/5	100	0.850
- Other's Assessment	6	0573-0.911	6/6	100	0.942
Concentration/Focus	4	0.605-0.906	4/4	100	0.895
Supervisor Relations	2	0.741-0.935	2/2	100	0.859
Non-Work Satisfaction	3	0.451-0.829	3/3	100	0.739
Work Satisfaction	4	0.394-0.747	4/4	100	0.664
Impatience/Irritability	3	0.496-0.817	3/3	100	0.726

*Convergent validity: The extent to which a measured variable is found to be related to other measured variables designed to measure the same conceptual variable.[22] †The number of correlations between the items and hypothesized scale corrected for overlap >0.4 / total number of convergent validity tests. ††Scaling success rate of previous column as percentage

Table 4: Internal consistency (Cronbach's α) of each subscale of P-HWQ by sex, marital status, job tenure and daily working hours

HWQ Subscale	Sex		Marital status		Job tenure		Daily working hours	
	Male	Female	Single	Married	≤10 years	10 years <	≤8 hours	8 hours <
	Cronbach's alpha							
Productivity	0.934	0.925	0.920	0.913	0.944	0.922	0.936	0.903
- Own Assessment	0.903	0.809	0.848	0.851	0.863	0.841	0.861	0.732
- Other's Assessment	0.959	0.926	0.946	0.930	0.948	0.938	0.942	0.941
Concentration/Focus	0.931	0.866	0.900	0.882	0.854	0.919	0.889	0.925
Supervisor Relations	0.867	0.860	0.823	0.917	0.957	0.857	0.845	0.929
Non-Work Satisfaction	0.769	0.701	0.797	0.742	0.749	0.735	0.670	0.792
Work Satisfaction	0.714	0.654	0.658	0.700	0.626	0.710	0.675	0.660
Impatience/Irritability	0.838	0.775	0.777	0.721	0.777	0.753	0.709	0.784
Total productivity	0.843	0.798	0.846	0.784	0.816	0.843	0.835	0.834

The correlations of each item of HWQ with the rotated factors are displayed in Table 5.

b) Association between productivity subscales (P-HWQ) and WMSs:

The prevalence rates of the reported WMSs in different body regions among the subjects during the past week are presented in Table 6.

Table 7 presents the association among the six subscales of P-HWQ and WMSs in the past week among office personnel.

Discussion

a) Psychometric properties of HWQ:

This study was conducted to translate the Health and Work Questionnaire (HWQ) into Farsi and assess its reliability and validity in Iranian office workers.

The results of the present study showed that the mean score of positive subscales, including productivity (own assessment and other's assessment), supervisor relations, non-work satisfaction, and work satisfaction were 6.83≤ (range: 1-10). In addition, the mean scores of negative subscales, including concentration/focus, and impatience/irritability were 4.28 and 3.09 (range: 1-10), respectively. In the study of Shikiar et al.[19] the mean score of positive subscales was 7.01≤, and that of negative subscales was 7.14≤. The results obtained rom our study about positive subscales of P-HWQ were somewhat similar to those of Shikiar et al.'s study,[19] but the mean score of negative subscales in comparison to those of Shikiar et al.[19] was lower. This difference can be attributed

Table 5: Factor analysis of the Persian Version of the Health and Work Questionnaire (P-HWQ)

HWQ item number	Descriptor	Factor loadings					
		Productivity	Concentration/ focus	Supervisor relations	Non-work satisfaction	Work satisfaction	Impatience/ irritability
12A	Your view of your efficiency this week	0.515					
12B	Supervisor's view of your efficiency	0.805					
12C	Coworkers' view of your efficiency	0.865					
13A	Your view of your quality this week	0.487					
13B	Supervisor's view of your quality	0.795					
13C	Coworkers' view of your quality	0.903					
14A	Your amount of work this week	0.471					
14B	Supervisor's view of your amount of work	0.783					
14C	Coworkers' view of your amount of work	0.880					
15	Rate highest level of efficiency	0.551					
16	Rate lowest level of efficiency	0.472					
20	Frequency of restlessness at work		0.772				
21	Frequency of boredom at work		0.848				
22	Frequency of concentrating at work		0.807				
24	Frequency of being too exhausted to do work		0.873				
8	How satisfied with supervisor relationship?			0.847			
10	How easy to communicate with supervisor?			0.793			
4	How rewarding was personal life?				0.733		
5	How satisfied with relationships?				0.739		
11	How easy to communicate with family/friends?				0.768		
2	How satisfied with work environment?					0.620	
3	How rewarding was work in past week?					0.698	
6	How satisfied with your job?					0.577	
7	How satisfied with coworker relationship?						0.669
17	Frequency of annoyance with coworkers						0.534
18	Frequency of impatience with coworkers						0.824
19	Frequency of conflicts with coworkers						0.843

Table 6: The frequency of the reported WMSs in different body regions among workers during the past week (n=129)

Body region	WMSs	
	No.	%
Neck	56	43.4
Shoulders	53	41.1
Elbows	15	11.6
Wrists/hands	34	26.4
Upper back	49	38.0
Lower back	66	51.2
Thighs	27	20.9
Knees	47	36.4
Ankle/feet	37	28.7
Total WMSs*	101	78.3

*Presence of WMSs at least in one body region

Table 7: Association between the six subscales of P-HWQ and WMSs in the past week (n=129)

P-HWQ Subscale	With WMSs	Without WMSs	P value*
	Mean±SD	Mean±SD	
Productivity	7.16±1.23	7.44±1.51	0.318
- Own Assessment	6.91±1.46	7.31±1.43	0.207
- Other's Assessment	7.37±1.55	7.55±1.77	0.596
Concentration/Focus	5.37±1.22	3.98±1.12	0.005
Supervisor Relations	6.62±2.26	7.23±2.05	0.204
Non-Work Satisfaction	6.98±1.65	7.53±1.25	0.062
Work Satisfaction	6.40±1.32	6.95±1.37	0.061
Impatience/Irritability	3.11±1.81	3.03±1.60	0.837

*Independent sample t-test

to differences between racial, social and cultural characteristics, interpersonal relationship, and organizational structure in two studied populations.

Findings of Halpern et al.'s study, using the HWQ in order to compare productivity among current smokers, former smokers, and non-smokers, revealed that "productivity-other's assessment" and "non-work satisfaction" have significant relationship with the highest values for non-smokers, intermediate for former smokers, and lowest for current smokers.[23]

Thorp et al. in a study h used HWQ in office workers in order to assess productivity in two conditions (sit and sit-stand). They found that the overall work productivity has improved in the sit-stand condition compared to the sit position, but concentration/focus was lower in sit-stand condition than the other status (sit condition).[24]

In a study by Peterman et al., a multicomponent workplace intervention (individual-, environmental-, and organizational-level approaches) was carried out to reduce workplace sitting. The findings revealed that during 12 months, only the non-work satisfaction subscale of the HWQ had improved (P=0.053).[25]

Internal reliability and convergent validity of the English version of the HWQ had been surveyed in previous studies.[15, 26] The findings of our study revealed that the psychometric properties of the P-HWQ were desirable. Reliability of P-HWQ was assessed by Cronbach's alpha coefficient and it was acceptable for all subscales, similar to the findings of the English version that have been developed and evaluated by Shikiar et al.[19] In another study, Rainbow et al. used HWQ to measure "presenteeism" among US nurses. They reported a Cronbach's alpha coefficient of 0.94 across all items.[27] The internal consistency of each subscale according to sex, marital status, job tenure, and daily working hours was acceptable. The present study revealed a high convergent validity for all subscales of the P-HWQ. The scaling success rate for all subscales was 100. This finding (assessing of convergent validity) has not been reported by other studies.

Factor analysis was performed to determine whether the P-HWQ is a six-dimensional measure, including productivity, concentration/focus, supervisor relations, non-work satisfaction, work satisfaction, and impatience/irritability. Generally, our findings showed that P-HWQ was a valid and reliable instrument for assessment of productivity in Iranian office workers. These findings are in the same line with the results of Thiele Schwarz et al.'s[26] study that revealed HWQ was a proper instrument for measuring productivity, but the dimensions and perspectives should be analyzed as one factor.

b) Association between productivity subscales (P-HWQ) and WMSs:

Totally, 78.3% of the office workers reported WMSs at least in one body region during the last

week. The highest prevalence rates of WMSs in the last week were related to lower back (51.2%), neck (43.4%), and shoulders (41.1%). Previous studies have revealed that the prevalence rates of WMSs in these body regions (lower back, neck, and shoulders) are high among office workers.[28, 29] The presence of the symptoms (WMSs) in these regions among office personnel is linked to static and awkward postures and repetitive movements. This shows that elimination of the risk factors of WMSs related to these regions should be prioritized.

The findings of our study showed that only the concentration/focus subscale of productivity (derived from P-HWQ) was related to WMSs in participants. In other words, the level of concentration/focus in people with WMSs was lower than the other group (people without WMSs). Some studies have reported that the WMSs can be related to lost working days, staff absenteeism, rise in sickness payments, decline of productivity, and early retirement.[30] Our previous study also revealed that the severity of musculoskeletal pain/discomfort in some body regions (neck, lower back, buttock, and thighs) was correlated to the concentration/focus subscale of productivity derived from P-HWQ.[31]

Limitation

Regarding the cross-sectional design of the study and the data collection by a self-report method, the findings of this study should be interpreted with caution. This study was carried out among office workers in Shiraz University of Medical Sciences. Therefore, the results of the study may not be generalized to other working groups.

Conclusion

The P-HWQ can be considered as a valuable, applicable and specific instrument to assess different dimensions of P-HWQ (productivity, concentration/focus, supervisor relations, work and non-work satisfaction, and impatience/irritability) among Iranian office workers. Reduction and elimination of WMSs risk factors by improvement of work conditions can lead to an increase in the employees' concentration/focus and as a result high productivity in workplace.

Acknowledgments

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