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Original Article

Examining the Relationship between Psychosocial Work Factors and Musculoskeletal Discomfort among Computer Users in Malaysia

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Abstract

Background: With computers rapidly carving a niche in virtually every nook and crevice of today's fast-paced society, musculoskeletal disorders are becoming more prevalent among computer users, which comprise a wide spectrum of the Malaysian population, including office workers. While extant literature depicts extensive research on musculoskeletal disorders in general, the five dimensions of psychosocial work factors (job demands, job contentment, job control, computer-related problems and social interaction) attributed to work-related musculoskeletal disorders have been neglected. This study examines the aforementioned elements in detail, pertaining to their relationship with musculoskeletal disorders, focusing in particular, on 120 office workers at Malaysian public sector organizations, whose jobs require intensive computer usage.

Methods: Research was conducted between March and July 2009 in public service organizations in Malaysia .This study was conducted via a survey utilizing self-complete questionnaires and diary. The relationship between psychosocial work factors and musculoskeletal discomfort was ascertained through regression analyses, which revealed that some factors were more important than others were.

Results: The results indicate a significant relationship among psychosocial work factors and musculoskeletal discomfort among computer users. Several of these factors such as job control, computer-related problem and social interaction of psychosocial work factors are found to be more important than others in musculoskeletal discomfort.

Conclusion: With computer usage on the rise among users, the prevalence of musculoskeletal discomfort could lead to unnecessary disabilities, hence, the vital need for greater attention to be given on this aspect in the work place, to alleviate to some extent, potential problems in future.

Keywords: *Malaysia, Musculoskeletal discomfort, Psychosocial work factors, Office worker*

Introduction

The National Institute of Occupational Safety and Health (NIOSH), Malaysia, states that 61.4% of the nation's workforce use computers at work (1), a trend induced by the increasing use of advanced technology in the workplace. Numerous research studies have indicated that computer users are prone to experiencing musculoskeletal discomfort (2-9), thereby raising concern for the health and well-being of office workers. In Malaysia, the Social Security Organization (SOCSO) caps the number of cases involving injuries which are musculoskeletal in nature, at an alarming rate of 10,000 per year, which certainly affects a very large group of workers in the country.

While the World Health Organization (WHO) characterizes "work-related" disorders as multifarious to indicate that various risk factors like physique, work organization, psychosocial and sociological risks play a significant role in contributing to such disorders (10), it also provides several theoretical reasons and empirical evidence suggesting a link between psychosocial work factors, i.e. job demand, job control, job contentment, etc., and musculoskeletal disorders not only among workers in general (11-13) and among office

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worker and computer users (9, 14). However, contradictory evidences have been put forward by other researchers. Some studies claim that the relationship between psychosocial work factors and musculoskeletal discomfort is inconclusive and the role of psychosocial work factors in the development of symptom of musculoskeletal disorders is not clearly understood and need more investigation (15, 16).

In recent years, through a consistent and extensive string of investigations conducted mainly in the U.S.A and Europe, it emerged that psychosocial work factors do not only represent a problem of well-being in itself, but are also related to diverse chronic health conditions including mental health disorders like burnout and depression, and real physical ailments such as cardiovascular disease and hypertension (17, 18). This research however has narrowed the focus to the relationship between psychosocial work factors, specifically the ones indicated in Table 1, and musculoskeletal discomfort.

Table 1: Psychosocial Work Factors

Job Demand	Quantitative workload Work pressure Workload dissatisfaction
Job Control	Task order Pace control Working ahead and taking breaks
Job Contentment	Challenge Attention
Social Interaction and Relationships	Support from supervisor Support from colleagues
Computer-Related Problems	Computer slowdown Computer breakdown

Material and Methods

The conceptual schema of this study focuses on the theoretical model (work-related disorders as multifarious to indicate several risk factors) as a systematic way in measuring musculoskeletal discomfort. Examining the relationship between psychosocial work factors and musculoskeletal discomfort would provide a better understanding of the knowledge of the complexity of relationship that exists between them.

Fig. 1 depicts the link between the variables of psychosocial work factors, and musculoskeletal discomfort. In this theoretical framework, psychosocial work factors are the independent variables, while musculoskeletal discomfort is a dependent variable. This study attempts to bridge the gap by providing a basis for a thorough and insightful discernment on the relationship between psychosocial work factors and musculoskeletal discomfort.

The model suggests that the greater the extent in which these five types of psychosocial work factors are present, the higher the likelihood of musculoskeletal discomfort.

As mentioned earlier, the target population of this study was computer users (office workers) in public sector organizations in Malaysia. Many researchers have argued that the relationship between psychosocial work factors and musculoskeletal discomfort cannot be successfully examined in a cross-sectional study (15, 19). For this study according to researchers (20, 21) we used a daily study. In the later part of the year 2006, a sample of 120 office workers from a public sector organization in Malaysia were invited to participate in a daily study on computer-related musculoskeletal discomfort. Convenience sampling was used. A questionnaire was used to collect data. This questionnaire measured the following:

i) The psychosocial work factors based on the UW Office Worker Survey (22), specifically developed for office workers, particularly VDT and computer users;

ii) The development of musculoskeletal discomfort via questions, scales and diagram showing parts of the body, as adapted from the standardized NORDIC questionnaire (23). In this study, we use only upper extremity region questions for participants.

The workers surveyed completed the questionnaire during their normal work hours. The participants were completed the questionnaire daily for four weeks (20 d). A total of 2400 observations were recorded.

Prior to examining the relationship among the factors and ascertaining the predictors of these factors, a principal component factor analysis with

varimax rotation was carried out on the 16 item measuring psychosocial work factors. The result indicated 5 significant factors with a total variance explained of 67.69%. The Keizer-Meiyer Oklim (KMO) was 0.539 indicating sufficient inter- correlation to proceed with the factor analysis and the Bartlett's Test for Spehericity was significant (χ^2= 3274.675, P< 0.001). These factors were named job demand (4 items), social interaction (5 items), job control (3 items), computer related problem (2 items), job content (2 items) respectively. Similarly, another factor analysis was carried out to confirm the dimensionality of work related musculoskeletal discomfort. A one-factor solution was revealed explaining 58.76% of the variance in musculoskeletal discomfort. Test of Sphericity was significant (χ^2= 3857.088, P< 0.001) while KMO measure of sampling was 0.855 indicating sufficient inter-correlation.

Cronbach's alpha scores measure the internal consistency reliability for each factor. The reliability coefficient (alpha) of each variable of psychosocial work factors were as follow: job demand (0.76); social interaction (0.77); job control (0.73), computer related problem (0.76), and job content (0. 78).

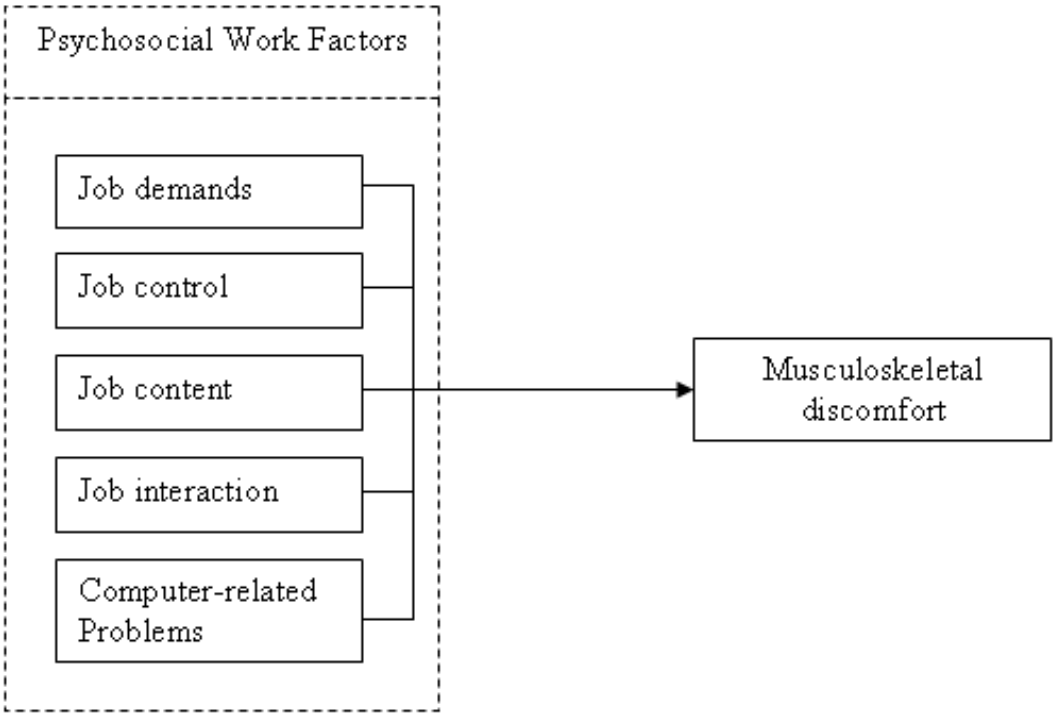

Fig. 1: Research Framework for the study of psychosocial work factors and musculoskeletal discomfort

Results

Table 2 gives an overview of the demographic information gathered and job characteristics reported. The results show Mean 8.8 h with SD= 2.0 of the subjects reported that computer usage (included work and home).

Following the collection of data and descriptive statistics, Pearson product moment correlation was used to examine the association between psychosocial work factors (job demands, job control, job contentment, social interaction and computer-related problems) and musculoskeletal discomfort. A regression analysis was used to examine the relationship between the variables, and consequently ascertain the predictors of musculoskeletal discomfort.

Scale used for psychosocial work factors (1= rarely, 2= occasionally, 3= sometimes, 4= often).

Scale used for musculoskeletal discomfort (1= almost never, 2= rarely, 3= sometimes, 4= frequently, 5= almost always)

The correlation matrix in Table 4 provides the correlation coefficients between the independent variables specified in this study, using the multiple item scale based on the NORDIC questionnaire (23). The correlation coefficient indicates the strength of association between the independent or predictor variables, and is considered significant if the *P*-value is less than 0.05. There is significant correlation between most of the predictor variables as listed in the above mentioned table. The highest correlation (r= 0.49) is between job control and job demand. The results show no high correlation of 0.90 or above. The highest coefficient of correlation in this research however is 0.49 which is below the cut-off of 0.80 for the collinearity problem. Hence, collinearity and multicollinearity do not constitute the problems pertaining to data in this research (24, 25).

This study reveals a link between psychosocial work factors and the presence of musculoskeletal discomfort. In Table 5, three elements of psychosocial work factors are visibly stark-computer-related problems, job control and social interaction-which are positively associated with musculoskeletal discomfort. Job demand and job content did not have significant association has a association with musculoskeletal discomfort.

Table 2: Demographic information and participants' job characteristics

Details		
Gender		
Female	73.3%	
Male	26.7%	
Marital Status		
Single	56.7%	
Married	43.3%	
Age (years)	Mean=29.8	SD = 4.33
Work experience (years)	Mean=5.46	SD= 1.69
Work Hours:		
Per week (hours)	Mean=39.8	SD=5.9
Per day (hours)	Mean=7.9	SD=0.7
Computer usage		
Per day (hours)	Mean=8.8	SD=2.0
Computer experience (years)	Mean=5.8	SD= 4.3

Table 3: Descriptive statistics for psychosocial work factors and musculoskeletal discomfort

Variable	Scale	Mean	S.D.
Psychosocial Work Factors			
Job Demands	1-4	3.08	0.40
Job Control	1-4	2.83	0.50
Job Contentment	1-4	2.42	0.57
Computer-Related Problems	1-4	3.07	0.59
Social Interaction	1-4	2.69	0.49
Musculoskeletal Discomfort	1-5	2.46	0.53

Note: S.D-standard deviation

Table 4: Correlation matrix for predictor variables

	Job Demand	Job Contentment	Job Control	Computer-Related Problems	Social Interaction	Musculoskeletal Discomfort
Job Demand	1					
Job Contentment	0.09*	1				
Job Control	0.49**	0.13**	1			
Computer-Related Problems	0.26**	0.04	0.30**	1		
Social Interaction	0.45**	0.11**	0.33**	0.06	1	
Musculoskeletal Discomfort	0.20**	0.04	0.27**	0.18**	0.22**	1

* Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at *P*< 0.01 level (2-tailed)

Table 5: Psychosocial Work Factors Related to Musculoskeletal Discomfort

Variables	B
Job demand	0.024
Job content	-0.004
Job control	0.173*
Computer-related problems	0.120*
Social interaction	0.148*

Note: Standardized Beta coefficients are listed.
*Significant at $P< 0.05$; n= 2400 (F= 14.20, $P= 0.00$); $R^2= 0.107$, Durbin-Waston =1.81

Discussion

It is obvious that a link exists between psychosocial work factors and musculoskeletal discomfort among computer users in the work place. Several of these factors, such as job control, computer-related problems and social interaction, are more strongly associated than the others. The results corroborate previous findings which uphold that psychosocial work factors do play a role in the development of musculoskeletal discomfort as discussed by researchers (15, 26-27). Numerous studies have reported a positive association between limited job control and musculoskeletal discomfort (upper extremity and back problems), which include neck symptoms (28-29), neck/back/shoulder symptoms (30), musculoskeletal aches (31), and muscle/joint symptoms (32-33). A study however, failed to support this relationship (34). In a study on teleservice operators, after controlling a number of individual and work-related factors, found perceived job control at work to be inversely associated with back disorders. In other words, the lower the quanta of perceived job control at work, the higher the odds of back disorders (35). In a study a researcher found a similar association between job control, and neck, back and shoulder discomfort (29).

Limited social support from supervisors and co-workers has been found to be positively associated with a variety of musculoskeletal discomfort (upper extremity and back symptoms), as indicated in some studies (28-29, 34, 36). In a study showed a positive association between neck symptoms and limited support from supervisors (37). A researcher reported an effect of limited support from co-workers, but not supervisors, on neck symptoms (27), while other researcher reported an effect of limited support from supervisors, but not co-workers, on sick leave due to shoulder muscle symptoms (38). Many researchers, however, found no effect of social support on neck/shoulder symptoms (39), while other found no effect of social support at work on neck and shoulder symptoms or symptoms of the other joints (with or without adjustment for physical load) (30). However, this association was found to be insignificant during further investigation when included in a multivariate analysis.

Several other studies have also demonstrated a relationship between computer-related problems and musculoskeletal disorders (40-43). The results of this study, as shown in Table 5, specifically for the variable of "computer-related problems", support the findings in the studies by the authors mentioned above, thus backing up the premise that many aspects of psychosocial work factors are important to musculoskeletal discomfort.

In examining the relationship between psychosocial work factors and musculoskeletal discomfort, this study endeavors to make both theoretical and practical contributions to extant literature, and also contains several implications for future research. There are many psychosocial work factors linked with the use of computers in offices. The findings on this study aid in enhancing understanding of the specific psychosocial work factors that bear an effect on musculoskeletal discomfort, which will consequently help in reducing and preventing musculoskeletal disorders within the working population.

Further studies should be performed to confirm that musculoskeletal discomfort is inevitable among computer users and continued efforts to determine and reduce the factors that contribute to its existence should be on-going. More innovative methods of measuring stress of office workers, in particular, computer users, should also be utilized to enable a higher level of accuracy in the data gathered.

Ethical Considerations

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors.

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