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Identifying Psychosocial Factors Associated with Work-Related Musculoskeletal Disorders in Flight Attendants in a Taiwanese Commercial Airline

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Psychosocial factors have the potential for causing psychological or physical harm, perceived psychological demands, job stress, or work-related musculoskeletal disorders (WMSDs). The purpose of the current study was to study the relationship between psychosocial factors including *job demands, job control, managerial and colleague support, relationships at work, role conflict, and organizational change*, and psychosocial factors, health and the well-being, and WMSDs among flight attendants. A survey, mainly based on the “HSE Indicator Tool” developed by Health and Safety Executive and the Copenhagen Psychosocial Questionnaire (COPSOQ), was distributed in 2009 to flight attendants in a Taiwanese commercial airline by convenience sampling. A total of 145 flight attendants returned the survey. Data showed that 115 (79.3%) of flight attendants received musculoskeletal injuries while at work. It was found that job demand is significantly related to work-related musculoskeletal disorders.

Keywords: Flight attendant; Work-related musculoskeletal disorders; Psychosocial factors; Job demand; Stress

Background

There is substantial evidence that musculoskeletal disorders have been the largest, single work-related illness and injury problem in the United States for the last decade. The USA Bureau of Labor Statistics (BLS) reports that there were 333,760 musculoskeletal disorders involving reported days away from work in 2007. Musculoskeletal disorders (MSDs) are not all related to work activities. Nevertheless, MSDs are among the most severe injuries facing American workers (BLS, 2009). Ergonomic injuries and illnesses that affect the connective tissues of the body such as muscles, ligament, nerves, tendons, joints, cartilage, spine, or spinal disks can be described by the term “musculoskeletal disorders” (OSHA, 2002; BLS, 2009). Workers who are exposed to force, pressure, repetition, awkward postures, overextension of limbs etc. in the workplace over a period of time can suffer a variety of disorders and other conditions. These conditions, collectively referred to as musculoskeletal disorders, are thought to result, amongst other causes, from certain psychosocial factors such as job dissatisfaction, monotonous work, and limited job control (OSHA, 2009).

In the aviation industry, the International Air Transport Association (IATA) reported that a higher occurrence of occupational injury and illness has been associated with flight attendants compared to other aviation employees. (IATA, 2006, cited in Kao, Stewart, Lee, 2009). A study conducted by the Environment, Health and Safety Group at AirBC (a former Air Canada airline) concluded that about 58 percent of the injuries to AirBC flight attendants were musculoskeletal injuries, involved the back, neck or shoulders, and were due to ergonomic risk factors (FSF, 2002). Kelleher and McGilloway (2005) found that flight attendants working for an Irish airline experienced high levels of work-related stress because of psychosocial factors and personal characteristics. Another study indicated that the majority of flight attendants working on long-haul international commercial airlines who are exposed to ergonomic stressors are likely to experience work-related musculoskeletal symptoms (Lee, Wilbur, Conrad, Mokadam, 2006).

MacDonald, Deddens, Grajewski, Whelan, Hurrell (2003) and Siu, Phillips, Leung (2004) concluded job stressors such as high mental or job demand, imbalance between job demands and outside obligations, low supervisor support, and emotional load have a positive relationship with the job dissatisfaction and work-related accidents and injuries (MacDonald, et al., 2003; Cooper, Sutherland, 1987, Holecom et al., 1993, Hoffmann, Stetzer, 1996, Murray, Fitzpatrick, O’Connell, 1997, cited in Siu et al., 2004). Psychosocial factors have the potential for causing psychological or physical harm, perceived psychological demands, or job stress (Sauter and Swanson, 1996, cited in Kumar and Kumar, 2008). The Health and Safety Executive (HSE) defines stress as “*The adverse reaction people have to excessive pressure or other types of demand placed on them*”. The National Institute for Occupational Safety and Health (NIOSH) has defined job stress generally as “*The harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker. Job stress can lead to poor health and even injury*” by (NIOSH, 1999). A study by Kumar and Kumar (2008) reported that the psychosocial factors can include, amongst other terms, job dissatisfaction, monotony of work, lack of social support, overexertion due to excessive work rates, workload, time pressure, and no control over work/rest patterns.

Over the last few decades, psychosocial factors and their relationship to occupational injury have been studied by various researchers or national and international organizations. In 1979, Karasek proposed a demand-control model which represented the relationship between job characteristics, i.e., job demand and job control (Karasek, 1979, cited in Saastamoinen, Laaksonen, Leino-Arjas, Lahelma, 2008). Recently, the Karasek model has been modified. In 2004, MacDonald argued that stress response is multidimensional and can directly increase both error rate (with possible increases in accident risk) and the risk of WMSDs (MacDonald, 2004). There is more and more concern about the influence of psychological factors along with personal characteristics on WMSDs, but so far little is known about the relationship between psychosocial factors and WMSDs among flight attendants in Taiwan.

Growing evidence shows that there is a significant relationship between psychosocial factors and WMSDs (Cohen, Gjessing, Fine, Bernard, and McGlothlin, 1997, Davis and Heaney, 2000, Hopkins, 1999, Linton, 1999, Ryan, Bampton, 1988, cited in Kumar and Kumar, 2008). For example, Davis and Heaney (2000), and Cohen et al. (1997) noted that job dissatisfaction, monotonous work, limited job control, and lack of social support result in musculoskeletal disorders (Kumar and Kumar, 2008). Another similar study conducted by researchers Devereux and Buckle, found that both work-related stress and WMSDs have similar causes, and they concluded that stress is a significant predictor of physical pain (Devereux, Buckle, 2000, cited in MacDonald, 2004).

This study uses as its base MacDonald's ergonomics model (MacDonald, 2004) and an extensive literature review. Key constructs within MacDonald's model are psychosocial factors, job demands, personal factors, mental workload, stress and fatigue, and health and well-being. MacDonald proposed that job demands among the most frequently cited stressors can result in WMSDs. In the present paper, the focus is primarily on the relationship between these factors and work-related musculoskeletal disorders. Specifically, the purpose of this study was:

- To identify what kind of psychosocial factors (i.e. *job demands, job control, managerial support, colleague support, relationships at work, role conflict, and organizational change*) along with personal characteristics are associated with well-being (i.e. *job satisfaction, general health, mental health, and vitality*) or WMSDs among flight attendants
- To define for airline management risk factors to consider in the prevention of occupational injury of flight attendants

Methods

Procedure

In the current study, a paper-based questionnaire based on the "HSE Management Standards Indicator Tool" developed by HSE for measuring psychosocial factors and the Copenhagen Psychosocial Questionnaire (COPSOQ) was developed. The questionnaire looks at the job demands, job control, managerial support, colleague support, relationships, role, change, job satisfaction, general health, mental health, vitality, and WMSDs among flight attendants to gather data about psychosocial factors that may influence WMSDs. Data were obtained from 145 flight attendants employed at a selected major Taiwanese commercial airline by convenience sampling during a three-week period from January 20, 2009. One of the authors, who is a flight attendant, distributed and collected surveys, along with a plain language statement and a consent form, face-to-face, from her colleagues. Participants were reimbursed NT\$ 100 (US\$3) for their participation. Data were manually keyed in and stored in Microsoft SPSS 14. Negatively worded items were recoded before averaging so that higher scores on all items reflected a positive response. One-way ANOVA, multiple regressions, and logistic regression were performed.

Measurements

Work-related musculoskeletal symptoms (pain, ache, or discomfort) that subjects experienced during the last 12 months were measured by four questions derived from the Nordic Musculoskeletal Questionnaire (NMQ) and the National Institute for Occupational Safety and Health (NIOSH) Symptom Survey (Lee et al., 2006). Respondents were asked to indicate if they had experienced aches, pain, or discomfort in nine body regions (neck, shoulders, upper back, lower back, wrists, elbows, hips, knees, and ankles) that they considered work related at any time during the prior 12 months. If the respondents answered "yes", then they were instructed to continue with the questions about symptom severity (frequency, duration, and intensity) derived from the NIOSH survey. Psychosocial factors, used as part of the study questionnaire, were measured by a Chinese language version of the HSE Management Standards

Indicator Tool. The Tool comprises seven subscales, i.e., *job demands*, *job control*, *managerial support*, *colleague support*, *relationships at work*, *role conflict*, and *organizational change*. Thirty-five questions measured the above-mentioned subscales. A five-point Likert scale, range from 5: *always*, to 1: *never* (or 1, 2, 3, 4, or 5 for the items negatively formulated), was used. Subscales of the health and well-being conditions were derived from the COPSOQ. These were translated into Chinese by a professional translator. Fourteen items were used measuring *job satisfaction* (4 items), *general health* (1 items), *mental health* (5 items), and *vitality* (4 items). They were measured by a five-point Likert scaling where 5 is *all of the time*; and 1 is *none of the time*. The survey also collected data on various personal variables. These variables included *gender*, *age*, *tenure of employment* (years of employment as a flight attendant), *job position*, *marital status*, *children*, *number of block hours* (air travel time) that they typically worked per month, and *the frequency of international routes* that they flew per month.

Participants

All participants in this study are flight attendants whose base city is Taipei. They work for the cabin crew division of a major Taiwanese airline operating international flights to twenty-six countries and seventy-three destinations using forty-seven wide-bodied jets. The cabin crew comprises flight attendants, assistant pursers who are the leading flight attendants in economy class, and the purser, a line manager or supervisor who is the person in charge of the entire flight. Block time was estimated from questionnaire information describing total block hours a month. Based on the findings, there is no flight attendant who works alone on board as a solo flight attendant. Of the 159 questionnaires distributed, 145 (91.19%) were returned and validated for analyses.

Results of Data Analysis

Characteristics of the study population

The majority of the participants were females (80%). Half (49.7%) of the respondents were young women aged from 25 to 34 years and 82.8% had worked as a flight attendant for more than 5 years. Of the participants, only 9% were pursers who had management responsibilities. Fifty-one percent were married, and 35.9% had children. About three quarters (73.8%) of the flight attendants reported that their block hours were 75 to 85 hours per month and half (46.2%) worked primarily on eastbound flight route twice a month. An interesting finding is that the majority (79.3%) of the flight attendants reported that they had experienced WMSDs. More than half (65.8%) of the flight attendants experienced symptoms at some time during the past 12 months. Just over sixty-nine percent reported symptoms lasting less than one week and 43.9% indicated that the level was moderate. These results were in accordance with other studies (FSF, 2002; Lee et al., 2006).

Flight attendants' descriptions of psychosocial factors and health and well-being conditions

The mean and standard deviation of scores for the factors perception of job demands, job control, managerial support, colleague support, relationships at work, role conflict, organizational change, job satisfaction, general health, mental health, and vitality were obtained. The results of the reliability analysis are as follows: job demands (0.7), job control (0.7), managerial support (0.8), colleague support (0.7), relationships at work (0.6), role conflict (0.7), organizational change (0.6), job satisfaction (0.8), general health, mental health (0.8), and vitality (0.8). We considered the Chronbach's alpha higher than the acceptable level of 0.7 to be satisfactory. Thus, it appeared that all Chronbach's alpha values of the above-mentioned scales were acceptable. Except for role conflict (4.23), psychosocial factors levels were found to be moderate or low (Table 2). Colleague support (3.87) was moderately high, followed by job control (2.86), relationships at work (2.80), managerial support (2.75), and organizational change (2.64). Job demand (2.51) (pressured to work long hours, having unachievable deadlines, have to work very fast and intensively etc.) was low. Job satisfaction (2.81) was moderate, whereas general health (3.59), mental health (3.39), and vitality (3.33) were moderately high. The correlation between the psychosocial factors which were ranged from moderate to strong (0.17 to 0.65) was shown in Table 1. Table 2 shows that the correlation between the health and well-being conditions.

Table 1. Mean, standard deviation and correlation between psychosocial factors (n=145)

	Mean	SD	Correlation						
			1	2	3	4	5	6	7
1. Job demand	2.51	0.56	1						

2. Job control	2.86	0.69	0.17*	1					
3. Managerial support	2.75	0.78	0.19*	0.45**	1				
4. Colleague support	3.87	0.48	0.05	0.45**	0.50**	1			
5. Relationships at work	2.80	0.64	0.39*	0.04	0.01	0.26**	1		
6. Role conflict	4.23	0.51	0.07	0.31**	0.48**	0.45**	0.05	1	
7. Organizational change	2.64	0.81	0.13	0.49**	0.65**	0.41**	-0.03	0.36**	1

* correlation significant at the 0.05 level; ** correlation significant at the 0.01 level

Table 2. Mean, standard deviation and correlation between health and well-being conditions (n=145)

	Mean	SD	Correlation			
			1	2	3	4
1. Job satisfaction	2.81	0.73	1			
2. General health	3.59	0.89	0.33**	1		
3. Mental health	3.39	0.65	0.24**	0.33**	1	
4. Vitality	3.33	0.70	0.29**	0.51**	0.62**	1

* correlation significant at the 0.05 level; ** correlation significant at the 0.01 level

Bivariate associations between psychosocial factors and health and well-being conditions

Bivariate associations between psychosocial factors and health and well-being conditions are summarized in Table 3. Although psychosocial and health and well-being factors reflected different aspects, the findings indicated that conditions of job satisfaction and vitality are all highly interrelated with all psychosocial factors. General health and mental health have partial interrelationships with psychosocial factors.

Table 3. Bivariate associations between psychosocial factors and health and well-being conditions (n=145)

	Job satisfaction	General health	Mental health	Vitality
1. Job demand	0.38**	0.22**	0.29**	0.35**
2. Job control	0.29**	0.33**	0.09	0.25**
3. Managerial support	0.36**	0.27**	0.10	0.27**
4. Colleague support	0.25**	0.13	0.14	0.31**
5. Relationships at work	0.25**	0.15	0.30**	0.23**
6. Role conflict	0.23**	0.27**	0.16	0.28**
7. Organizational change	0.32**	0.14	0.06	0.20**

* correlation significant at the 0.05 level; ** correlation significant at the 0.01 level

Comparison of different demographic flight attendants

Table 4 shows the ANOVA (analysis of variance) results for the mean responses to psychosocial factors and health and well-being conditions from different personal backgrounds of flight attendants. Except for the variables of marital status and flight pattern, those of gender, age, tenure, job position, children number, block hour, and WMSDs were indicated to have significantly different responses to psychosocial factors and health and well-being conditions respectively. For example, male or female flight attendants' influence their own capacity to cope with job control ($p = 0.023$), social relationships at work ($p = 0.015$), general health ($p = 0.003$), and vitality ($p = 0.025$). Flight attendants with children, compared with those without children, had different perceived job demands ($p = 0.029$), job control ($p = 0.037$), and general health ($p = 0.030$). Moreover, the flight attendants with work-related musculoskeletal disorders, compared with those without WMSDs, had negatively perceived psychosocial job demands ($p = 0.005$), relationships at work ($p = 0.007$), general health ($p = 0.005$), mental health ($p = 0.001$) and vitality ($p = 0.001$).

Table 4. The ANOVA results for the mean response to psychosocial factors and health and well-being conditions (n=145)

	Gender	Age	Tenure	Job Position	Marital Status	Children Number	Block Hour	Flight Pattern	WMSDs
1. Job demand						4.41*			8.28**
2. Job control	5.28*			6.12**		4.86*			
3. Managerial support		6.07**	5.86**	9.13**					
4. Colleague support									
5. Relationships at work	6.06*								7.58**
6. Role conflict		2.91*	2.71*						
7. Organizational change		3.02*		4.05**					
8. Job Satisfaction				3.34*					

9. General Health	9.36**	4.80*	8.24**
10. Mental Health		3.59*	12.11**
11. Vitality	5.13*		12.68**

* *F* statistics significant at the 0.05 level; ** *F* statistics significant at the 0.01 level

Regression analysis for predicting health and well-being and WMSDs

We performed further multiple regression analyses to predict health and well-being condition, and work-related musculoskeletal disorders using psychosocial factors as explanatory variables. Table 5 shows the results of models to predict health and well-being conditions and WMSDs. For example, managerial support is the first and job demand is the second significant elements chosen from psychosocial factors to predict job satisfaction. Both factors are positive and can explain the variation of job satisfaction model by 21%. To predict the probability of having WMSDs, logistic regression analysis is used. The model shows that job demand factor is the only one positively significant factor which explains the variation of WMSDs by 9%. It is noted that managerial support is not much related to WMSDs but job demand among psychosocial factors plays the most important role to predict health and well-being conditions and WMSDs.

Table 5. Multiple regression analyses of health and well-being conditions and WMSDs (n=145)

Model	β	Standard Error	P Value
Job satisfaction (adjusted R ² =0.21)			
Managerial support	0.32	0.10	0.000
Job demand	0.29	0.07	0.000
General health (adjusted R ² =0.14)			
Job control	0.22	0.11	0.008
Role conflict	0.19	0.14	0.024
Job demand	0.17	0.13	0.032
Mental health (adjusted R ² =0.12)			
Relationships at work	0.22	0.09	0.010
Job demand	0.21	0.10	0.015
Vitality (adjusted R ² =0.12)			
Job demand	0.35	0.10	0.000
Work-related Musculoskeletal disorders (WMSDs) (adjusted R ² =0.09)			
Job demand	1.10	0.40	0.006

The classification results in Table 6 present the correct percentage using logistic regression model with job demand as an explanatory variable to predict the probability of WMSDs.

Table 6. Classification table of work-related musculoskeletal disorders (WMSDs)

Observed		Predicted		Percentage Correct
		Yes	No	
WMSDs	Yes	115	0	100.00
	No	29	1	3.30
Overall Percentage			80	

Discussion

One objective of this study was to identify what kind of psychosocial factors exist among flight attendants, which might affect WMSDs. The mean score for job demand is extremely low (2.51) followed by organizational change, managerial support. This means that the flight attendants perceived high job demand and low managerial support. There are undoubtedly many stressful aspects of the flight attendants, including evermore longer working hours in a long-haul flight, unachievable deadlines, working very fast in short-haul flight, working very intensively due to irregular working and rest patterns, etc. Although the prevention should be multidimensional (i.e. ergonomic interventions), the findings of this study suggested that matching workloads and job demands to flight attendants' capacities is critical.

This study also revealed the presence and severity of work-related musculoskeletal symptoms experienced by the flight attendants working for a commercial Taiwanese airline. The numbers of flight attendants that reported WMSDs

are quite high. We suggest that work-related musculoskeletal symptoms are very common health problems in this special type of job and efforts to reduce the prevalence of WMSDs may be important to enhancing the well-being and satisfaction of flight attendants. Finally, our preliminary research has provided basic information regarding psychosocial factors related to health and well-being conditions and WMSDs among flight attendants. We found that there is an association between most of the psychosocial factors (i.e. job demand, job control, managerial support, relationships at work, role conflict) and the health and well-being factors. In particular, the research indicated the factor job demand is significantly related to job satisfaction, general health, mental health, vitality, and WMSDs. However, our findings did support MacDonald's (2004) ergonomics model and confirm the view that job and task demands are the main focus to minimize WMSDs.

Conclusions and Further Directions

In conclusion, this study showed that job demand is an important factor in predicting WMSDs. The findings from this study suggest a way for managers who want to prevent WMSDs or improve the work environment for flight attendants. The small sample size is one of the limitations. Therefore, a further larger study is recommended.

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