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Original Article

The Association of Workplace Psychosocial Factors and Musculoskeletal Pain Among Korean Emotional Laborers

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ABSTRACT

Background: Many studies have reported negative psychological or physical effects of emotional labor. Relationship between work-related musculoskeletal disorder and psychosocial factors has been reported. To manage organizational and psychosocial factors of musculoskeletal disorder with work place intervention among emotional laborers, the factors contributing to musculoskeletal pain must be identified and clarified.

Methods: Data from the fourth Korean Working Conditions Survey was analyzed. Based on the questionnaire, we selected emotional laborers and included 3,979 participants, excluding participants whose variables were of interest to the researcher. Weight variable was applied. The association with musculoskeletal pain and psychosocial factors, such as workload, monotonous work, job control, social support, and job satisfaction, was investigated.

Results: Univariate analysis demonstrated that there was a statistically significant relationship between social support, job satisfaction, and musculoskeletal pain. In multivariate analysis, job satisfaction showed a strong correlation with musculoskeletal pain at all sites. Social support was significantly associated with backache. Monotonous work seemed to reduce the pain in the neck and/or upper limbs. Job control and work intensity were not significantly associated with musculoskeletal pain.

Conclusion: In this study, job satisfaction was significantly associated with musculoskeletal pain, and social support among the social psychological stressors could reduce musculoskeletal pain. However, unlike previously known, the presence of monotonous work resulted in reduced musculoskeletal pain. The results of this study will help to establish the direction of improvement of atmosphere in the workplace to prevent the musculoskeletal pain of emotional laborers.

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1. Introduction

After Hochschild [1] suggested the concept and negative effects of “emotional labor” in 1983, several studies attempted to identify the effects of emotional labor. Hochschild defined emotional labor as “the management of feeling to create a publicly observable facial and bodily display” [1]. Emotional laborers have to control their own emotions to meet the goals of their organization, such as anger and depression, which can suppress their performance [2]. Regulating their emotions leads workers’ self and work roles into conflict and may lead to “burnout” or emotive dissonance [3].

The service department has been rapidly extending among the modern Korean society. Service workers such as sales workers, call

center workers, and restaurant workers must force themselves to be friendly and kind; the demand for emotional labor is increasing, and the importance and effects of emotional labor are highlighted. Many studies conducted in Republic of Korea have reported the negative psychological and physical effects of emotional labor [4–6]. In several reports that examine a Korean context, emotional workers have been found to be more vulnerable to musculoskeletal disorders [7–9].

The relationship between work-related musculoskeletal disorders and psychosocial factors is inconsistent and its mechanisms are uncertain, but increasing evidence has been reported [10,11]. Psychosocial factors are usually divided into various factors that describe occupational and working environments, the extra-work

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environment, and individual worker's characteristics. The interaction between these three factors can cause stress and affect workers' health status and work performance. The psychosocial factors that affect health include organizational characteristics, interpersonal relationships, temporal aspects of the job, and financial and community aspects. It has been suggested that job satisfaction, workload, monotony, job control, social support, etc. are associated with musculoskeletal disorders [12–14]. There are several models in which psychosocial factors influence the development of musculoskeletal pain; the models suggest that these factors affect stress responses and induce musculoskeletal pain through stress responses, either directly or indirectly. Bonger et al. [12] argued that psychosocial factors have a direct effect on stress by changing posture through stress. In addition, Moon and Sauter [15] identified a direct pathway between work methods, including ergonomics, organizational systems, and work environments.

Researchers are beginning to explore psychosocial interventions to manage musculoskeletal disorders, and both quantitative workload and qualitative contexts are recognized for being controlled to prevent musculoskeletal pain [16]. The modification of organizational culture should be accompanied to prevent and improve musculoskeletal pain among workers, and ways to properly manage interventions should be considered [17]. There have been reports of the successful management of musculoskeletal pain with interventions for psychosocial factors, and it has been reported that ergonomic interventions and psychosocial interventions for upper extremity musculoskeletal pain were more effective for pain relief than ergonomic interventions alone [18]. Another case showed that intervention with education about ergonomics, job stress, and communication was more effective than feedback training using biosignals [19]. While the classical ergonomic approach is usually approached from one aspect, it takes account of behavior, cognitive, and affective aspects in a modern ergonomic approach and has the view that these three aspects interact with each other [20]. Therefore, the psychosocial and organizational approach to emotionally vulnerable emotional laborers is important. Establishing an organizational strategy on musculoskeletal pain requires understanding the psychosocial factors that affect musculoskeletal pain.

Different consequences of psychosocial factors may present for job stress between emotional laborers and non-emotional laborers [3]. Musculoskeletal pain is reportedly caused and exacerbated by job stress that is induced by psychosocial factors [12]. Therefore, psychosocial factors that affect the musculoskeletal pain of emotional and non-emotional laborers may also differ. Managing the organizational and psychosocial factors of musculoskeletal disorders with workplace intervention requires identifying and clarifying the factors that contribute to musculoskeletal pain among emotional laborers. There has been a lack of studies regarding the determination of psychosocial factors that are associated with musculoskeletal pain among emotional laborers. Therefore, we conducted this study to identify the psychosocial risk factors of musculoskeletal pain in emotional labor.

2. Materials and methods

2.1. Participants

The fourth Korean Working Conditions Survey (KWCS) by Occupational Safety and Health Research Institute (OSHRI) is a survey for measuring job environment of Korean workers. It is conducted to analyze the exposure of risk factor by job category, sector, and employment state. The survey was conducted among workers over 15 years by pen and paper interviewing. Job status at interviewing time and past 1 week was investigated. The sample

was collected by two-stage stratified probability proportional to size systematic method, according to the 2010 Population and Housing Census. The fourth KWCS data has weight variable to represent the population of nationwide work environment, based on "economically active population survey" conducted in the third quarter of 2014. The weight variable was applied for statistical analysis.

Various workers are treated as emotional laborers, such as hotel worker, sales worker, medical service worker, and flight attendant. Therefore, one of the important feature of emotional labor is heterogeneity [21]. In this study, emotional laborers were selected following Hochschild's definition of emotional laborer: require face-to-face or voice-to-voice contact with the public, require the worker to produce an emotional state in another person, allow the employer to exercise a degree of control over the emotional activities of employees [1]. We included laborers who answered that they were wage earners since Hochschild's definition require the control of employer. To reduce heterogeneity and to focus on the effect of emotional labor, we excluded employer, blue collar workers, specialized workers, administrative workers, agriculture, forestry, and fishery workers, and included sales workers, office workers, and service workers. Specialized workers, administrative workers, and employers were excluded since they are not treated as emotional laborer by classical categorization of emotional labor by Hochschild.

According to overview report of the fifth European working condition surveys (EWCS), which is the original form of the fourth KWCS, the question "Your job requires that you hide your feelings" was developed to emotional demands. [22]. As per the overview report of 2006 KWCS, "Dealing directly with people who are not employees at your workplace, such as customers, passengers, pupils, and patients" is considered as an index of emotional labor [23]. Considering previous studies and Hochschild's definition, we selected two survey questions, "Your job requires that you hide your feelings" and "Dealing directly with people who are not employees at your workplace, such as customers, passengers, pupils, and patients" to define emotional labor. Each question was categorized into dichotomous variables; "positive" was assigned for "exposure of more than half of working hours" and "always", "most of the time", and "sometimes". Workers who answered positive to both the selected questions were considered as emotional laborers. We excluded laborers with missing values for variables of interest, including possible confounders. Weight variable was applied. Finally, 3,979 laborers were included in the analysis (Fig. 1).

2.2. Design

The purpose of the study was to identify the factors contributing to musculoskeletal pain among emotional laborers; therefore, we defined "the presence of musculoskeletal pain" and the indicators of psychosocial status. Next, we performed statistical analysis to determine whether previously known psychosocial risk factors of musculoskeletal disorders suggested by National Institute for Occupational Safety and Health (NIOSH) [10], namely job dissatisfaction, intensified workload, monotonous work, limited job control, low job clarity, and low social support, affect musculoskeletal pain among emotional laborers. Factors that may affect musculoskeletal pain, including exposure to ergonomic risks, were statistically adjusted.

2.3. Materials

The presence of musculoskeletal pain was defined through questionnaires. Workers answered "yes" to the question "over the last 12 months, did you suffer from any of the following health

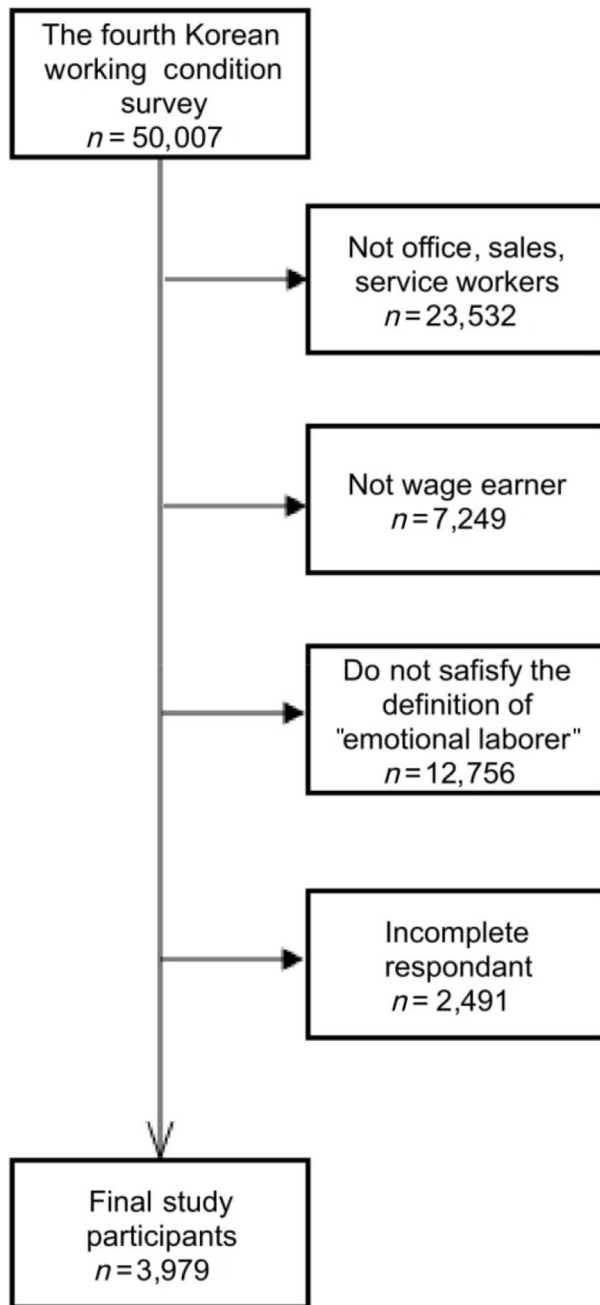


Fig. 1. Flow chart of study population selected for the analysis.

problems?”—backache, muscular pains in the shoulder, neck and/or upper limbs, and muscular pains in lower limbs (e.g., hips, legs, knees, and feet) are considered as positive of “presence of musculoskeletal pain”.

Based on the documents of OSHRI, the items of each psychosocial factor were selected and analyzed: (1) job control (five questions: are you able to choose or change your order of tasks, your methods of work, your speed or rate of work, you have a say in the choice of your working partners, you can take a break when you wish); (2) workload (two questions: working at very high speed, working to tight deadlines); (3) social support (two questions: your colleagues help and support you, your manager helps and supports you); (4) monotonous work (one question: does your main paid job involve monotonous tasks); and (5) job satisfaction (one question:

overall, how do you feel about the work environment you work in?). Job clarity was excluded from the analysis because there was no appropriate questionnaire item. To adjust for exposure to musculoskeletal harmful factors, an index of ergonomic risk factors was generated, which was the sum of the scores for the five questions: tiring or painful positions, lifting or moving people, carrying or moving heavy loads, standing, repetitive hand or arm movements, dealing directly with people who are not employees at your workplace, such as customers, passengers, pupils, and patients. Each question was categorized into dichotomous variables; one point was assigned to each question, and the scores were obtained for each psychosocial factor. The response of ergonomic risk factors and intensity of work is the ratio of the hours exposed during the working hours to the seven factors (all of the time, around 3/4 of the time, around half of the time, 1/4 of the time, almost never, never), and one point was assigned for “exposure of more than half of working hours”. The response of social support is “always”, “most of the time”, “sometimes”, “rarely”, and “never”. One point was assigned for “always”, “most of the time”, and “sometimes”; zero point was assigned for “rarely” and “never”. Monotonous work was a yes/no question; therefore, one point was assigned for “yes”. Three questions about job control were yes/no questions: are you able to choose or change your order of tasks, your methods of work, your speed or rate of work; one point was assigned for “yes”. The responses of two questions about job control—you have a say in the choice of your working partners, you can take a break when you wish—were “always”, “most of the time”, “sometimes”, “rarely”, and “never”. One point was assigned for “always”, “most of the time”, and “sometimes”. Then, the sum of the score of each factor was calculated. The scores for each factor were categorized into “high” group and “low” group, based on the median value. The validity of each factor was verified by measuring the Cronbach α . The Cronbach α values of all participants in the fifth KWCS were 0.911 for social support, 0.622 for job control, 0.933 for job intensity, and 0.621 for ergonomic risk factors.

2.4. Procedure

Univariate and multivariate analyses of each psychosocial factor and musculoskeletal pain were performed. Logistic regression analysis was performed to investigate the relationship between each psychosocial factor and the presence of musculoskeletal pain; the odds ratio (OR) was calculated for each stress factor. To minimize the confounding effect, we included general characteristics as adjust variables in the multiple logistic regression model. General and work-related characteristics related to musculoskeletal pain were selected as confounding variables. Variables having a statistically significant ($p < 0.05$) relationship with one or more of the musculoskeletal symptoms were selected as confounder variables. Age, sex, shift work, income, working hours, and ergonomic risk factors were chosen as confounding variables according to pre-analysis. Statistical analysis was performed using SPSS version 23.00 (IBM, Chicago, USA).

2.5. Ethical considerations

This study has been approved by the institutional review board of Keimyung university Dongsan medical center. The approval number is 2016-05-034-007.

3. Results

A total of 3,979 participants from the fifth KWCS satisfied our inclusion criteria by adjusting weight variable and rounded off the numbers to the nearest tenth. Among these, 1,324 (33.0%) were

male, and 2,656 (67.0%) were female. Furthermore, 1,313 (33.0%) were employed in the office work, 1,225 (30.8%) were employed in service, and 1,441 (36.20%) were employed in sales. The general characteristics of samples are shown in Table 1.

Exposure of psychosocial factors is described in Table 2. Of the total participants, 2,067 (51.9%) were in low job control group, 1,462 (35.8%) were in high work intensity group, 623 (15.7%) were in low social support group, 1,890 (47.5%) were in monotonous work group, and 950 (23.9%) were in low job satisfaction group.

The prevalence of musculoskeletal pain is shown in Table 3. In total, 1,542 (38.8%) participants answered that they had any musculoskeletal pain. There were 546 (13.7%) patients with backache, 1,207 (30.3%) patients with pain in the shoulders, neck and/or upper limbs, and 895 (22.5%) patients with pain in the hips, legs, knees, and feet.

The presence of musculoskeletal pain by each psychosocial status is shown in Table 4. Univariate analysis showed that there was a statistically significant relationship between social support, job satisfaction, and musculoskeletal pain. Job satisfaction was related to all the areas of pain ($p < 0.0001$), and social support was associated with backache ($p < 0.0001$) and hips, legs, knees, and feet pain ($p < 0.001$). Monotonous work was significantly associated with backache ($p < 0.05$) and hips, legs, knees, and feet pain ($p < 0.05$). Work intensity was also significantly associated with pain in the neck and/or upper limbs ($p < 0.0001$) and hips, legs, knees, and feet pain ($p < 0.001$).

In multivariate analysis, adjusted for individual factors and other musculoskeletal risk factors in workplaces, job satisfaction showed a strong correlation ($p < 0.0001$) with musculoskeletal pain at all sites. Social support was significantly associated with

Table 1
General characteristics of participants

Characteristics	Participants (n = 3,979)
Sex	
Male	1,324 (33.0)
Female	2,656 (66.7)
Age	39.73 ± 11.15
Education	
≤ High school	1,825 (45.9)
College, university	2,135 (53.7)
Non-responder	20 (0.5)
Job classification	
Office workers	1,313 (33.3)
Service workers	1,225 (30.8)
Sales workers	1,441 (36.2)
Shift work	
Yes	460 (11.6)
No	3,519 (88.4)
Exposed to ergonomic risk factor	
High	1,923 (48.3)
Low	2,056 (51.7)
Size of workplace	
≤50 workers	3,101 (77.9)
50–299 workers	615 (15.5)
≥300 workers	196 (4.9)
Non-responder	68 (1.7)
Presence of labor union	
Yes	498 (12.5)
No	3,349 (84.2)
Non-responder	132 (3.3)
Working hours	
≤40 h	2,142 (53.8)
>40 h	1,838 (46.2)
Job status	
Permanent workers	3,038 (76.4)
Precarious workers	933 (23.4)
Income	
<2 million won	2,059 (51.7)
≥2 million won	1,921 (48.3)

Data are presented as n (%) or mean ± standard deviation.

Table 2
Exposure to psychosocial factors of participants

Workplace factors	Participants (n = 3,979)
Job control	
Low	2,067 (51.9)
High	1,913 (48.1)
Workload	
Low	2,554 (64.2)
High	1,426 (35.8)
Social support	
Low	623 (15.7)
High	3,356 (84.3)
Monotonous work	
Low	2,089 (52.5)
High	1,890 (47.5)
Job satisfaction	
Low	950 (23.9)
High	3,030 (76.1)

Data are presented as n (%).

backache (OR = 1.496, 95% confidence interval = 1.191–1.878). Monotonous work seemed to reduce the pain in the neck and/or upper limbs (OR = 0.823, 95% confidence interval = 0.710–0.954). Job control and work intensity were not significantly associated with musculoskeletal pain (Table 5; Fig. 2).

4. Discussion

According to the results of our study, job satisfaction was significantly associated with musculoskeletal pain at all sites, and social support was associated with hip, leg, knee, and back pain. Monotonous work only showed a significant correlation with pain in the neck, shoulder, and upper limbs. However, unlike previous results [15,24], monotonous work has been shown to reduce musculoskeletal pain in the neck and/or upper limbs.

There have been several studies using different job stress factors from the KWCS questionnaire and data on the internal reliability of the questionnaire used in each study has been reported as 0.6–0.8 [25,26]. We selected and analyzed the items of each factor based on the documents that OSHRI, the leading organization of KWCS, had studied. Job clarity items were unclear and therefore excluded. The other five indicators were selected to confirm the relevance of musculoskeletal pain for emotional workers [27,28]. The Cronbach α values of the items were 0.911 for social support, 0.622 for job control, 0.933 for job intensity, and 0.621 for ergonomic risk factors. We used a cut-off value of 0.6 as a criterion to evaluate the internal reliability of items through Cronbach α [29,30].

Bonger et al. [12] suggested that psychosocial factors in the workplace induce stress symptoms, which may lead to musculoskeletal symptoms through increased muscle tension or other

Table 3
Prevalence of musculoskeletal pain among participants

Musculoskeletal pain	Participants (n = 3,979)
Backache	
Yes	546 (13.7)
No	3,434 (86.3)
Muscular pain in the shoulders, neck and/or upper limbs	
Yes	1,207 (30.3)
No	2,772 (69.7)
Muscular pains in the lower limbs (e.g., hips, legs, knees, feet)	
Yes	895 (22.5)
No	3,084 (77.5)
Musculoskeletal pain (any part)	
Yes	1,542 (38.8)
No	2,437 (61.2)

Data are presented as n (%).

Table 4
Univariate analysis of the association between workspace psychosocial factors and musculoskeletal pain

	Musculoskeletal pain (any part)	Backache	Muscular pain in the shoulders, neck and/or upper limbs	Muscular pain in the lower limbs (hips, legs, knees, feet)
	OR (95% CI)*	OR (95% CI)	OR (95% CI)	OR (95% CI)
Job control				
High	reference	reference	reference	reference
Low	1.064 (0.937–1.209)	0.982 (0.820–1.177)	1.105 (0.965–1.266)	1.107 (0.954–1.286)
Workload				
Low	reference	reference	reference	reference
High	1.136 (0.995–1.287)	0.932 (0.771–1.127)	1.288 (1.120–1.481)	1.236 (1.061–1.441) [‡]
Social support				
High	reference	reference	reference	reference
Low	1.268 (1.066–1.507) [‡]	1.496 (1.191–1.878)	1.13 (0.941–1.356)	1.399 (1.153–1.698) [§]
Monotonous work				
Low	reference	reference	reference	reference
High	1.037 (0.913–1.178)	1.244 (1.039–1.491) [†]	0.961 (0.839–1.100)	1.201 (1.035–1.394) [†]
Job satisfaction				
High	reference	reference	reference	reference
Low	2.120 (1.829–2.457)	2.115 (1.746–2.562)	2.140 (1.839–2.491)	2.260 (1.922–2.657)

*: Logistic regression analysis was performed.

†: $p < 0.05$.

‡: $p < 0.01$.

§: $p < 0.001$.

||: $p < 0.0001$.

CI, confidence interval; OR, odds ratio.

such mechanisms. Among the indicators used in this study, job dissatisfaction was a stress symptom, and the other indicators were psychosocial factors [10]. In this study, there was a significant correlation between job dissatisfaction and musculoskeletal pain. In the group with high subjective job satisfaction, the musculoskeletal symptoms were low for all parts of the lower back and both upper and lower extremities. Several previous studies have also shown a relationship between musculoskeletal pain and job satisfaction [31–33], and studies reported in Republic of Korea have shown similar results. A study among manufacturing laborers reported an association between musculoskeletal pain and job satisfaction [34]. In studies among non-manufacturing laborers, consistent results were reported among nurses [35] and civil affairs officials [7]. Although the causal relationship was not confirmed, this study showed that job dissatisfaction, an indicator of stress symptoms, was related to the occurrence of musculoskeletal pain.

Since the 1997 NIOSH report introduced social support for musculoskeletal symptoms, some studies have reported conflicting results, while many other studies have reported that social support is associated with musculoskeletal symptoms [36–39]. It has been determined that the support of colleagues and supervisors plays a positive role in a positive work environment, and job satisfaction, low stress, and job ability in emotional laborers [40–42]. Therefore, we also expected that social support would be associated with musculoskeletal symptoms in emotional laborers. Social support showed a significant association with back pain in this study; the mechanism of the effect of social support on the lower back has not been elucidated; however, many previous studies have reported a link between back pain and social support [43–47], and the results of this study are consistent with those reported results. Studies on non-manufacturing laborers reported in Republic of Korea show consistent results for salespeople [48] and healthcare workers [49]. The importance of creating a workplace culture in which sufficient

Table 5
Multivariate analysis of the association between workspace psychosocial factors and musculoskeletal pain, adjusting possible confounder

Stress factors	Musculoskeletal pain (any part)	Backache	Muscular pain in the shoulders, neck and/or upper limbs	Muscular pains in the lower limbs (hips, legs, knees, feet)
	OR (95% CI)*	OR (95% CI)	OR (95% CI)	OR (95% CI)
Job control				
High	reference	reference	reference	reference
Low	1.042 (0.911–1.192)	0.952 (0.791–1.146)	1.087 (0.943–1.253)	1.051 (0.898–1.230)
Workload				
Low	reference	reference	reference	reference
High	0.971 (0.842–1.119)	0.839 (0.687–1.024)	1.094 (0.942–1.270)	1.038 (0.880–1.224)
Social support				
High	reference	reference	reference	reference
Low	1.131 (0.943–1.357)	1.354 (1.072–1.711) [†]	1.013 (0.835–1.229)	1.226 (0.998–1.505)
Monotonous work				
Low	reference	reference	reference	reference
High	0.893 (0.777–1.026)	1.096 (0.905–1.328)	0.823 (0.710–0.954) [‡]	0.997 (0.848–1.172)
Job satisfaction				
High	reference	reference	reference	reference
Low	1.898 (1.621–2.223)	1.906 (1.557–2.333)	1.908 (1.622–2.245)	1.870 (1.571–2.225)

*: Multiple logistic regression was performed, adjusted by sex, age, shift work, income, working hour, and ergonomic risk factor exposure.

†: $p < 0.05$.

‡: $p < 0.01$.

||: $p < 0.0001$.

CI, confidence interval; OR, odds ratio.

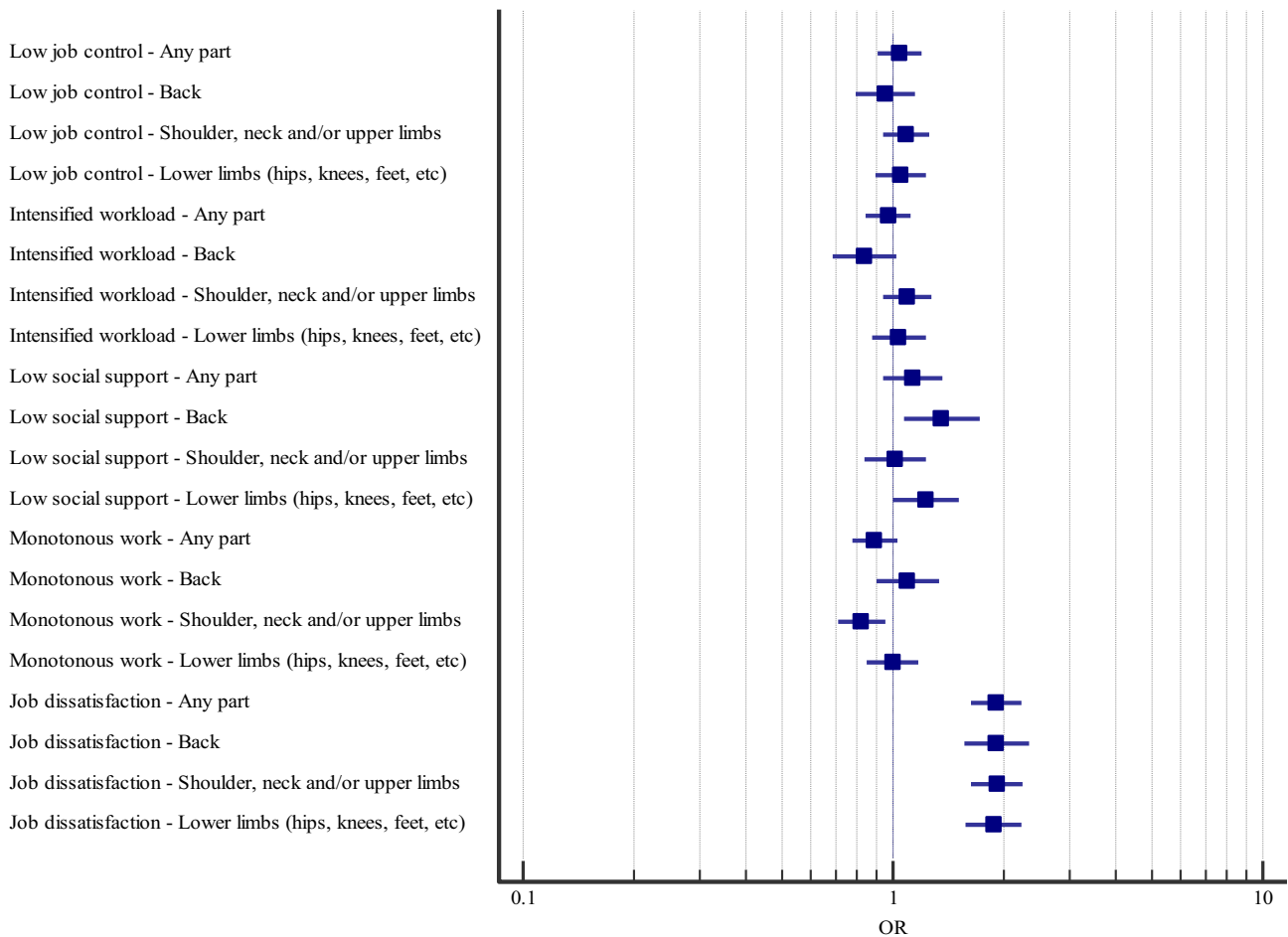


Fig. 2. The odds ratio of multivariate logistic regression between workspace psychosocial factors and musculoskeletal pain, adjusted by possible confounders.

social support is provided has been suggested to manage the musculoskeletal disorders of emotional laborers.

NIOSH suggested that “monotonous work” is a psychosocial risk factor for musculoskeletal disorders [10]; however, this study showed conflicting results for monotonous work. Moon and Sauter [15] suggested that in monotonous tasks, workers cannot compensate to give attention to their musculoskeletal symptoms, thus increasing the prevalence of musculoskeletal symptoms. An association between monotonous work and lower back and neck pain has been shown in several epidemiologic studies [24,50]. However, in this study’s results, monotonous work tended to decrease musculoskeletal pain in the neck, shoulder, and arms. Psychological job demands such as alertness and arousal requirements are known to have a non-linear relationship with job stress responses [51]. Emotional labor has a higher psychological demand than other tasks because it includes the act of facing people, working with others, and regulating emotions [2,52]. Our study had fewer respondents who answered that their work was “monotonous” compared to non-emotional laborers. Therefore, it can be inferred that the base group in this study performed a more demanding job than the non-emotional worker group. The psychological needs of the baseline work are high; thus, it may be difficult to apply the existing theory that monotonous tasks sensitize laborers to the perception of musculoskeletal pain. This is an interesting result, and careful attention should be paid to the establishment of psychosocial intervention strategies for emotional laborers. A limitation of this section of the study is that the degree

of monotony of work felt by workers was only assessed through a single question. Future research should segment items such as the presence of “uneventful events” or “repetitive work” [53] and should examine the effects of monotony on musculoskeletal pain among emotional workers.

Our study found no significant relationship between job control and workload intensity for musculoskeletal pain. Job control was accepted as a protective factor of job stress [54] and musculoskeletal pain [12]. However, some studies conducted among emotional laborers in Republic of Korea showed conflicting results. A Korean study among emotional laborers showed that the degree of work method control does not significantly affect job stress. The author suggested that most emotional workers may have little discretion regarding how they work. In other words, baseline job control may be lower than in other occupations due to the nature of emotional labor [6]. Other studies conducted among Korean service workers found that the locus of control can even increase job stress. The hypothesis that increased job control among service workers requires more effort and skill development to be influential with job and work skill has been suggested [5]. Another study conducted among Korean female service, production, sales, and call center workers showed that job autonomy was not significantly associated with musculoskeletal symptoms [9]. An epidemiologic study among call center laborers, generally classified as emotional laborers, did not show the relationship between “work method control” and musculoskeletal disorder [4]. The relationship between job control and musculoskeletal pain in

emotional workers has not yet been fully elucidated. The impact of job control on emotional workers in Republic of Korea is uncertain, and additional studies are required to establish strategies for occupational stress management and occupational musculoskeletal disease prevention.

Many studies on emotional laborers are limited to a single occupation. However, we involved participants from various occupations to satisfy the condition of emotional laborer as suggested by several reports of EWCS and KWCS, and considered Hochschild's classical definition of emotional laborer to derive a general approach for managing the psychosocial factors of musculoskeletal pain among emotional laborers. One of this study's strengths is its large sample size of 3,979 emotional laborers. In addition, we showed the results of adjusting the factors that affect musculoskeletal pain through statistical techniques. The results showed the known psychosocial factors that affect musculoskeletal pain among emotional laborers.

The limitations of the retrospective cross-sectional study made it difficult to prove a causal or sequential relationship. Our study was performed using the data of the fourth KWCS, and the questionnaire was not solely made for measuring psychosocial factors of the workplace and musculoskeletal disorders; therefore, certain factors and confounders of our interests, such as job clarity, could be analyzed. The questionnaire about monotonous work and musculoskeletal pain had only yes/no as possible responses, which made it difficult to analyze and interpret results in detail. Moreover, the Cronbach α for "job control" and "ergonomic risk factor" factors were lower than the generally accepted value of >0.7 , although some literature used >0.6 as a criterion for new developing methods [29,30]. Nevertheless, the interpretation of the results should take the low internal reliability into account. In addition, no previous studies that evaluated the validity of the questionnaire were reported. The existing questionnaire was unsuitable for the analysis of the path of psychosocial factors that affect the musculoskeletal system; therefore, it could not be analyzed through path analysis or structural equation modeling.

Although several limitations exist, identifying the psychosocial factors that affect the musculoskeletal symptoms of emotional laborers in a large sample is important for setting the goals of future research and interventions. The results of our study may be valuable for establishing culture-specific psychosocial and organizational intervention strategies for various emotional labor fields in Republic of Korea.

As industrialization has progressed, musculoskeletal diseases have become an important part of occupational disease research, and there is an increasing interest in examining psychological factors and physical factors as risk factors for musculoskeletal diseases among emotional laborers. According to this result, the management of job satisfaction and social support should be emphasized in the health management of emotional laborers. The approach to "monotonous work" in work environment management should be performed carefully and the effects of monotonous work on musculoskeletal pain among emotional laborers should be further investigated through a clear questionnaire.

Authors' contributions

All authors participated in drafting the paper and gave final approval of the version to be submitted.

Study conception and design

KB and IC; Acquisition of data: KB and IC; Analysis and interpretation of data: KB and IC; Drafting of manuscript: KB, IC, SY, and ML; Critical revision: KB, IC, SY, and ML.

Conflicts of interest

All authors have no conflict of interest to declare. The authors report that there was no funding source for the work that resulted in the article or the preparation of the article.

Institution and ethics approval and informed consent

This study has been approved by the institutional review board of Keimyung university Dongsan medical center. The approval number is 2016-05-034-007.

Disclaimer

None.

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References

- [1] Hochschild AR. *The managed heart: commercialization of human feeling*. Berkeley: Univ of California Press; 2003.
- [2] Grandey AA. Emotion regulation in the workplace: a new way to conceptualize emotional labor. *J Occup Health Psychol* 2000;5:95–110.
- [3] Wharton AS. The psychosocial consequences of emotional labor. *Ann Am Acad Pol Soc Sci* 1999;561:158–76.
- [4] Yoon JW, Yi KJ, Kim SY, Oh JG, Lee JT. The relationship between occupational stress and musculoskeletal symptoms in call center employees. *Korean J Occup Environ Med* 2007;19:293–303.
- [5] Lee BH, Lee SH. Causal mechanism of job stress by type of service work. *Korean Ind Relations* 2011;21:65–93.
- [6] Kim WB, Rhee KY, Lee GR. Work environment and stress of emotional laborers. *Korean J Sociol* 2012;46:123–49.
- [7] Yoo SK, Choi CK, Song HS, Lee CG. Relationship between occupational stress-emotional labor and musculoskeletal symptoms and experience of absence or early leave in some civil affairs officials. *Korean J Occup Environ Med* 2011;23:192–202.
- [8] Lee BK. The relationship between emotional working hour and muscle pain. *Korean J Occup Health Nurs* 2014;23:269–76.
- [9] Kim HJ. Emotional labor and health among working women. *Ewha J Gen Law* 2015;7:33–50.
- [10] Putz-Anderson V, Bernard BP, Burt SE, Cole LL, Fairfield-Estlin C, Fine LJ, et al. *Musculoskeletal disorders and workplace factors*, vol. 104. National Institute for Occupational Safety and Health (NIOSH); 1997.
- [11] Lundberg U. Psychophysiology of work: stress, gender, endocrine response, and work-related upper extremity disorders. *Am J Ind Med* 2002;41:383–92.
- [12] Bongers PM, de Winter CR, Kompier MA, Hildebrandt VH. Psychosocial factors at work and musculoskeletal disease. *Scand J Work Environ Health* 1993;297–312.
- [13] Linton SJ. A review of psychological risk factors in back and neck pain. *Spine (Phila Pa 1976)* 2000;25:1148–56.
- [14] Hartvigsen J, Lings S, Leboeuf-Yde C, Bakketeig L. Psychosocial factors at work in relation to low back pain and consequences of low back pain; a systematic, critical review of prospective cohort studies. *Occup Environ Med* 2004;61. e2–e.
- [15] Moon SD, Sauter SL. *Psychosocial aspects of musculoskeletal disorders in office work. Beyond Biomechanics*. Taylor and Francis; 1996.
- [16] Lindström K. Psychosocial criteria for good work organization. *Scand J Work Environ Health* 1994;123–33.
- [17] Westgaard RH, Winkel J. Ergonomic intervention research for improved musculoskeletal health: a critical review. *Int J Ind Ergon* 1997;20:463–500.
- [18] Feuerstein M, Nicholas RA, Huang GD, Dimberg L, Ali D, Rogers H. Job stress management and ergonomic intervention for work-related upper extremity symptoms. *Appl Ergon* 2004;35:565–74.
- [19] Faucett J, Garry M, Nadler D, Ettare D. A test of two training interventions to prevent work-related musculoskeletal disorders of the upper extremity. *Appl Ergon* 2002;33:337–47.
- [20] Imada AS. A macroergonomic approach to reducing work-related injuries. *Macroergonomics: theory, methods and applications*; 2002. p. 151–72.

- [21] Meisenheimer JR. The services industry in the good versus bad jobs debate. *Monthly Lab Rev* 1998;121:22.
- [22] Eurofound. Fifth European working conditions survey. Publications Office of the European Union Luxembourg; 2012.
- [23] Park JS. Working environment sample survey of Korean employees. Incheon (Korea): Occupational Safety and Health Research Institute; 2006. 124 p.
- [24] Linton SJ. Risk factors for neck and back pain in a working population in Sweden. *Work Stress* 1990;4:41–9.
- [25] Jeon SH, Lim JH, Park SG, Heo YS, Lee BJ, Moon SH, et al. Association among working hours, occupational stress, and presenteeism among wage workers: results from the Second Korean Working Conditions Survey. *Ann Occup Environ Med* 2014;26:6.
- [26] Heo YS, Chang SJ, Park SG, Leem JH, Jeon SH, Lee BJ, et al. Association between workplace risk factor exposure and sleep disturbance: analysis of the 2nd Korean Working Conditions Survey. *Ann Occup Environ Med* 2013;25:41.
- [27] Kim YS, Jo JN. A study on health-related PSR model using Korean working conditions survey data. *Korean J Appl Stat* 2014;27:1243–55.
- [28] Cho SN. Sophistication of working condition survey index. Ulsan (Korea): Occupational Safety and Health Research Institute; 2014. 258 p.
- [29] Moss S, Prosser H, Costello H, Simpson N, Patel P, Rowe S, et al. Reliability and validity of the PAS-ADD Checklist for detecting psychiatric disorders in adults with intellectual disability. *J Intellect Disabil Res* 1998;42:173–83.
- [30] Hair JF, Black WC, Babin BJ, Anderson RE, Tatham RL. *Multivariate data analysis*. Upper Saddle River, NJ: Prentice hall; 1998.
- [31] Hopkins A. Stress, the quality of work, and repetition strain injury in Australia. *Work Stress* 1990;4:129–38.
- [32] Hughes RE, Silverstein BA, Evanoff BA. Risk factors for work-related musculoskeletal disorders in an aluminum smelter. *Am J Ind Med* 1997;32:66–75.
- [33] Viikari-Juntura E, Vuori J, Silverstein BA, Kalimo R, Kuosma E, Videman T. A life-long prospective study on the role of psychosocial factors in neck-shoulder and low-back pain. *Spine (Phila Pa 1976)* 1991;16:1056–61.
- [34] Kim KS, Hong CW, Lee DK, Jeong BY. Factors affecting musculoskeletal symptoms of manufacturing workers. *J Korean Soc Occup Environ Hyg* 2009;19:390–402.
- [35] Kim YS, Park JY, Park SY. Relationship between job stress and work-related musculo-skeletal symptoms among hospital nurses. *J Muscle Jt Health* 2009;16:13–25.
- [36] Ahlberg-Hultén GK, Theorell T, Sigala F. Social support, job strain and musculoskeletal pain among female health care personnel. *Scand J Work Environ Health* 1995;435–9.
- [37] Bongers PM, Ijmker S, van den Heuvel S, Blatter BM. Epidemiology of work related neck and upper limb problems: psychosocial and personal risk factors (part I) and effective interventions from a bio behavioural perspective (part II). *J Occup Rehabil* 2006;16:279–302.
- [38] Kim IA, Bae KJ, Kwon SC, Song JC. Work-related musculoskeletal disorders and psychosocial factors. *J Ergono Soc Korea* 2010;29:465–71.
- [39] Woods V. Work-related musculoskeletal health and social support. *Occup Med (Lond)* 2005;55:177–89.
- [40] Cropanzano R, Howes JC, Grandey AA, Toth P. The relationship of organizational politics and support to work behaviors, attitudes, and stress. *J Organ Behav* 1997;18:159–80.
- [41] Einsenberger R, Cummings J, Aemeli S, Lynch P. Perceived organizational support, discretionary treatment, and job satisfaction. *J Appl Psychol* 1997;82: 812–20.
- [42] Howes JC, Cropanzano R, Grandey AA, Mohler CJ. Who is supporting whom?: Quality team effectiveness and perceived organizational support. *J Qual Manag* 2000;5:207–23.
- [43] da Costa BR, Vieira ER. Risk factors for work-related musculoskeletal disorders: a systematic review of recent longitudinal studies. *Am J Ind Med* 2010;53:285–323.
- [44] Hoogendoorn WE, van Poppel MN, Bongers PM, Koes BW, Bouter LM. Systematic review of psychosocial factors at work and private life as risk factors for back pain. *Spine (Phila Pa 1976)* 2000;25:2114–25.
- [45] Clays E, De Bacquer D, Leynen F, Kornitzer M, Kittel F, De Backer G. The impact of psychosocial factors on low back pain: longitudinal results from the Bel-stress study. *Spine (Phila Pa 1976)* 2007;32:262–8.
- [46] Toomingas A, Theorell T, Michélsen H, Nordemar R. Associations between self-rated psychosocial work conditions and musculoskeletal symptoms and signs. *Scand J Work Environ Health* 1997;130–9.
- [47] Skov T, Borg V, Orhede E. Psychosocial and physical risk factors for musculoskeletal disorders of the neck, shoulders, and lower back in salespeople. *Occup Environ Med* 1996;53:351–6.
- [48] Jung HJ, Park DJ, Kang SC, Ko YJ, Kim JB, Kim TS, et al. The relationship between worker's job stress and musculoskeletal workload in the super-market workers. *Korean J Public Health* 2015;52:75–85.
- [49] Choi YB, Lee SJ, Song JC, Bae KJ, Park H. Association between job-related factors and musculoskeletal symptoms in university hospital healthcare workers. *Ann Occup Environ Med* 2012;24:217–28.
- [50] Svensson HO, Andersson GB. Low-back pain in 40- to 47-year-old men: work history and work environment factors. *Spine (Phila Pa 1976)* 1983;8: 272–6.
- [51] Janssen O. Fairness perceptions as a moderator in the curvilinear relationships between job demands, and job performance and job satisfaction. *Acad Manag J* 2001;44:1039–50.
- [52] Gross JJ. Antecedent-and response-focused emotion regulation: divergent consequences for experience, expression, and physiology. *J Pers Soc Psychol* 1998;74:224.
- [53] Johansson G. Job demands and stress reactions in repetitive and uneventful monotony at work. *Int J Health Serv* 1989;19:365–77.
- [54] Karasek Jr RA. Job demands, job decision latitude, and mental strain: implications for job redesign. *Adm Sci Q* 1979:285–308.