

The Association of the Reporting of Somatic Symptoms with Job Stress and Active Coping among Japanese White-collar Workers

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Abstract: The Association of the Reporting of Somatic Symptoms with Job Stress and Active Coping among Japanese White-collar Workers: Kyoko NOMURA, et al. Department of Hygiene and Public Health, Teikyo University School of Medicine—To assess the associations between job stress and somatic symptoms and to investigate the effect of individual coping on these associations. In July 2006, a cross-sectional study was conducted during a periodic health check-up of 185 Japanese male office workers (21–66 yr old) at a Japanese company. Job stress was measured by job demand, control, and strain (=job demand/control) based on the Job Content Questionnaire (JCQ). Major somatic symptoms studied were headache, dizziness, shoulder stiffness, back pain, shortness of breath, abdominal pain, general fatigue, sleep disturbance, and skin itching. Five kinds of coping were measured using the Job Stress Scale: active coping, escape, support seeking, reconciliation, and emotional suppression. Comorbidities of hypertension, diabetes, obesity, depression, and anxiety were also evaluated. The most frequently cited somatic symptom was general fatigue (66%), followed by shoulder stiffness (63%) and sleep disturbance (53%). Of the five kinds of coping, only “active coping” was significantly and negatively associated with the number of somatic symptoms. The generalized linear models showed that the number of somatic symptoms increased as job strain index ($p=0.001$) and job demand ($p=0.001$) became higher, and decreased as active coping ($p=0.018$) increased, after adjusting for age and comorbidities. There was no statistical interaction among active coping, the number of somatic symptoms, and the three JCQ scales. Reporting somatic symptoms may be a simple indicator of job stress, and active coping could be used to alleviate somatization induced by job stress.

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Key words: Active coping, Job Content Questionnaire, Job control, Job stress, Somatic symptoms

Workers often complain of various somatic symptoms, such as musculoskeletal pain, insomnia, and abdominal and cardio-respiratory symptoms, that are not medically explained. According to our previous reports^{1,2}, those with psychological distress are likely to complain of a variety of somatic symptoms, and the number of somatic symptoms is a powerful predictor of impairment in physical, psychological, and social functioning^{3,4}. Although the complaints of general somatic symptoms are routinely recorded in Japanese health check-ups, they have not been adequately studied or used for health care of employees in the workplace.

The impact of job stress on health outcome has been extensively studied since the publication of Karasek's model in 1981⁵. Three psychosocial factors are considered to be important for the health and well-being of workers—job demands, job control, and social support—based on the hypothesis that the combination of high job demands and low freedom to make job decisions (low control or low decision latitude) is related to a poor health outcome. To date, it seems to be well-established that job strain, an indicator of job stress characterized using the ratio of job demand to job control, is an independent risk factor for cardiovascular diseases^{6,7}, hypertension^{8,9}, and mental ill health^{10,11} among workers. However, the impact of job strain on somatic symptoms has been rarely studied and still requires justification through empirical evidence.

Furthermore, given that somatic symptoms are associated with job stress and mental illness, it is quite useful for industrial health professionals to understand how individual workers cope with the experience of somatic symptoms when instituting measures to counter job stress. According to the coping theory originally developed by Folkman and Lazarus¹², differences in the conceptualization of coping determine health

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consequences when faced with perceived stressors. There are various coping scales and our study focused on the Japanese version of the Job Stress Scale developed by Kosugi¹³. We investigated five kinds of coping (i.e., active coping, escape, seeking support, reconciliation, and emotional suppression) which are used when workers are faced with stressors in the workplace.

The purpose of this study was threefold. First, we assessed the association between somatic symptoms and job stress among workers. Second, we tried to determine which kinds of coping were used when workers were faced with stressors in the workplace and its association with somatic symptoms. Third, referring to studies¹⁴⁻¹⁶ which have reported that the effect of individual coping was enhanced when sufficient job control and support were provided, we investigated the interactive effect of coping on the relationship between somatic symptoms and job stress.

Methods

Participants

This investigation was conducted as part of a periodic health check-up of office workers at a Japanese non-ferrous resource company in July 2006. We invited all employees to answer a self-administered questionnaire. The target population included 413 employees, and 222 responded to the questionnaire (response rate 54%). Among the respondents, we excluded 37 female workers because the sample number was too small to use in multiple analyses. Hence, 185 male workers with a median age of 43 yr and an inter-quartile range of 36 to 51 became our study subjects. This study was approved by the Occupational Safety and Health Committee, which was comprised of representatives from the company, managers and workers. The content of the study was explained to the candidate participants, with written information on the study protocol, and only those who provided written consent were included in the study.

Measures

1) Frequency of somatic symptoms

Respondents were asked how often they perceived somatic symptoms in the most recent month, and they could choose a response from “never,” “sometimes,” and “always.” Based on previous studies¹⁻³, the nine symptoms analyzed were: headache, dizziness, shoulder stiffness, back pain, shortness of breath, abdominal pain, general fatigue, sleep disturbance, and skin itching ($\alpha=0.71$). Responses of “always” or “sometimes” were regarded to be affirmative answers, and each somatic symptom was divided into a binary variable (i.e., “always” and “sometimes” versus “never”). The sum of the somatic symptoms reported was calculated for each worker².

2) Job stress

Psychological stress at work was measured by the Japanese version of the Job Content Questionnaire (JCQ), whose reliability and validity are considered excellent for assessing job stressors among Japanese employees¹⁷. The JCQ used in the present study was developed based on Karasek's job demand-control model¹⁸. Job demands are conceptualized as stressors present in the work environment and five item questions related to “work fast,” “intense concentration,” “no excessive work,” “excessive work,” and “conflicting demands” were used ($\alpha=0.55$)¹⁹. Job control is measured by two theoretically distinct subdimensions of decision latitude: skill discretion and decision authority. Skill discretion is measured by a set of questions that assesses the level of skill and creativity required on the job and the flexibility permitted the worker in deciding what skills to use (i.e., “learn new things,” “repetitive work,” “requires creativity,” “high skill level,” “variety,” and “develop own abilities”; six items, $\alpha=0.69$). The second subdimension, decision authority, assesses the organizationally mediated possibilities for workers to make decisions about their work (i.e., “allows own decisions,” “little decision freedom,” and “a lot of say”; three items, $\alpha=0.75$)¹⁹. Items were scored on a 4-point Likert-type scale, using anchors of 1 for “agree” and 4 for “disagree.” Job strain was estimated by job demand divided by job control, and the three variables of job demand, job control, and job strain were used as job stress indices²⁰.

3) Individual coping

Coping was assessed using the Japanese version of the Job Stress Scale and by measuring five kinds of coping, namely, active coping, escape, support seeking, reconciliation, and emotional suppression¹³. Examples of the five kinds of coping are “taking active actions to get rid of problems” for active coping (nine items, $\alpha=0.88$), “expanding interests and activities outside work” for escape (seven items, $\alpha=0.63$), “seeking help from others” for seeking support (five items, $\alpha=0.79$), “acceptance of the situation without taking any action” for reconciliation (five items, $\alpha=0.75$), and “to control and suppress one's emotions” for emotional suppression (five items, $\alpha=0.54$). Respondents were asked to identify the most distressing problem that they had experienced in the workplace during the previous 3 months, and then to indicate the extent to which they had used particular stress-coping strategies described by the items of the scale, using anchors of 1 for “not used at all” and 4 for “used a great deal” for the respondent-identified problem. The score of each coping was calculated by the summation of the corresponding number of question items.

4) Comorbidities

Based on the literature referring to the association

between job stress and the presence of systemic organic illnesses²¹⁻²³, the physical comorbidities of hypertension, diabetes, and obesity, and the mental comorbidities of depression and anxiety were assessed based on the following definition. Hypertension was characterized by systolic blood pressure (SBP) ≥ 130 or diastolic blood pressure (DBP) ≥ 80 mmHg, diabetes by HbA1c $\geq 6.4\%$, obesity by body mass index (BMI) > 25 kg/m², and depression by scores on Zung's Self-rating Depression Scale (SDS) ≥ 40 . Anxiety was counted if subjects responded that they perceived anxiety without any specific reasons "sometimes" or "always" in the most recent month, while the alternate response option was "never". The number of physical comorbidities was calculated by the summation of the counts of systemic illnesses. The mental comorbidity was treated as a binary variable (i.e., presence or absence); patients were considered to have a mental comorbidity if they met the criterion of either depression or anxiety.

Data analyses

The data analyses were conducted using SAS version 8.12 for Windows. All tests were two-sided with a significance level of 5%. The five kinds of coping were then assessed by the correlation with both the number of somatic symptoms and the three job stress indices using the Spearman rank order correlation coefficient. Finally, the generalized linear model (GLM) of the SAS program was used to assess the association between the number of somatic symptoms and job stress indices, while adjusting for age, active coping, and physical and mental comorbidities. For co-linearity problems, job demand and job control were used in Model I, and job strain as the variable of job stress indices was used in Model II. The corresponding regression coefficients reflect either an increase or decrease in the number of somatic symptoms per unit increase in each variable. To examine the specific interactive effects of active coping between the number of somatic symptoms and job stress indices, the statistical interaction with the number of somatic symptoms was assessed by including an interaction term "active coping \times job stress indices" in the multivariate regression model.

Results

The most frequent somatic symptom was general fatigue (66%), followed by shoulder stiffness (63%), sleep disturbance (53%), lower back pain (45%), skin itching (30%), abdominal pain (30%), and headache (29%). The median and inter-quartile range of the number of somatic symptoms, the JCQ scores and the active coping score of the study population were 3 and 2-5% for somatic symptoms, 31 and 28-34% for job demand, and 70 and 64-78% for job control, and 22 and 19-26% for active coping. Table 1 shows subjects' characteristics. Our

study subjects were generally middle-aged workers with relatively high job control and a moderate degree of job demand compared to previous studies of Japanese workers¹⁷. Table 2 shows the Spearman rank order correlation coefficient of coping with the number of somatic symptoms and job stress indices. Of the five kinds of coping, active coping was the only significant variable associated with both the number of somatic symptoms and job stress: it was significantly and positively correlated with job control, and negatively correlated with somatic symptoms and job strain (all $p < 0.001$). Both support seeking and reconciliation were significantly associated with job control and job strain and support seeking tended to have an inverse relationship with the number of somatic symptoms. Based on the findings in Table 2, active coping was selected as one of the explanatory variables to assess the association between somatic symptoms and job stress. Table 3 shows multiple regression analyses of job stress and active coping on the number of somatic symptoms. The number of somatic symptoms was significantly and positively associated with job strain, job demand, and mental comorbidities, and was significantly and negatively associated with job control and active coping. These associations were consistently observed in two age-

Table 1. Subjects' characteristics (n=185)

Subject characteristics	Median	IQR ^c
Age, years	43	30-51
Job stress indices (range), scores		
Demand (12-48)	31	28-34
Control (24-96)	70	64-78
Job strain	0.44	0.38-0.5
Coping skills (range), scores		
Active (9-36)	22	19-26
Escape (7-28)	11	9-13
Support seeking (5-20)	9	7-11
Reconciliation (5-20)	9	7-10
Emotional suppression (5-20)	11	10-13
Comorbidities		
	N	%
Physical illness		
Hypertension	99	54
Diabetes	8	4.3
Obesity	44	24
Mental illness		
Depression	18	11
Anxiety	74	40

^aInter-quartile range (25%-75% of its distribution).

Table 2. Spearman rank order correlation coefficient of coping with somatic symptoms and job stress indices (n=185)

Coping	The number of somatic symptoms	Job stress indices		
		Job demand	Job control	Job strain
Active	-0.260‡	0.033	0.433‡	-0.310‡
Escape	0.064	0.051	-0.133	0.110
Support seeking	-0.111	-0.032	0.229†	-0.193*
Reconciliation	0.140	0.005	-0.266‡	0.197†
Emotional suppression	0.021	0.073	-0.025	0.091

* $p < 0.05$, † $p < 0.01$, ‡ $p < 0.001$ **Table 3.** Multiple regression analyses of the number of somatic symptoms on job stress and active coping

Variables	Univariate analyses (n=185)			Multivariate analysis					
	β	Standard error	p -value	Model I ^a (n=172; R^2 : 23%)			Model II ^a (n=172; R^2 : 22%)		
				β	Standard error	p -value	β	Standard error	p -value
Job stress indices									
Job strain (job demand/control)	7.441	1.590	<0.0001	–	–	–	4.298	1.686	0.012
Job demand	0.106	0.033	0.002	0.087	0.032	0.008	–	–	–
Job control	-0.040	0.015	0.007	-0.019	0.016	0.231	–	–	–
Active coping	-0.108	0.030	0.000	-0.088	0.032	0.006	-0.081	0.029	0.007
Age	-0.022	0.017	0.195	-0.016	0.016	0.308	-0.020	0.016	0.208
^b Physical comorbidities	0.261	0.209	0.213	0.302	0.191	0.116	0.311	0.191	0.106
^c Mental comorbidities	2.256	0.529	<0.0001	1.577	0.529	0.003	1.604	0.530	0.003

^aModel I used job demand and job control and Model II used job strain as job stress indices. ^bPhysical comorbidities included hypertension, diabetes, and obesity. ^cMental comorbidities included depression and anxiety. β , Unstandardized partial regression coefficient. R^2 , Unadjusted multiple coefficient of determination.

adjusted regression analyses (i.e., Models I and II), but the result of job control was exceptional (not significant in Model I). No statistical interaction was observed between somatic symptoms and the three job stress indices with active coping.

Discussion

This study investigated the association between the reporting of somatic symptoms and job stress, which kinds of coping were used when workers faced stressors in the workplace and the association of coping with somatic symptoms, and how these coping methods interact with the association between the number of somatic symptoms and job stress. Our results indicate that the reporting of somatic symptoms increased with job stress, and of the five kinds of coping studied, active coping was significantly correlated with job stress indices and associated with the number of somatic symptoms.

In addition, no statistical interaction was observed with active coping in the association between the number of somatic symptoms and job stress.

The strengths of this study include, first, that there is a great need for the accumulation of scientific research on the association between somatization and job stress, and our study provides evidence that job stress is of importance in the etiology of somatic symptoms. Indeed our previous study²⁾ indicated that somatic symptoms such as lower back pain and dizziness were significant risk factors for major depression the following year at the workplace, and therefore, the result of the present study suggests that the reporting of somatic symptoms by individual workers might be a simple indicator of poor mental health.

Furthermore, this study has potential implications for the use of active coping for health intervention at the workplace. Studies of “coping” in healthy workers have

found that active or problem-focused coping is effective for reducing stress¹⁴⁻¹⁶, which was also observed in this study: active coping and support seeking were generally and negatively correlated with the number of somatic symptoms. Previous studies have also reported that the effect of active coping on health and well-being of workers was enhanced when job control or support was higher. Although our study failed to prove statistical interaction among active coping, the number of somatic symptoms and job control, active coping was significantly and positively correlated with job control, negatively correlated with job strain, and negatively associated with the number of somatic symptoms after adjusting for possible confounders. Hence, it may be suggested that active coping can be used for stress management intervention in the workplace. For example, improving extra skill discretion and decision authority at work may be useful for workers who use more active coping, while for those who use less active coping, a specific training program with extra job control to enhance their active coping may be recommended not only to improve mental health, but also to maintain the physical health of individual workers^{14-16, 24}.

Moreover, in a recent attempt to identify the psychosocial determinants of employee health, health and work research has paid special attention to organizational justice. This refers to the extent to which employees are treated justly in their workplace and consists of two components: justice concerning decision-making procedures and interpersonal treatment²⁵. Previous studies have shown that lower levels of justice are associated with lower well-being, higher self-reported morbidity, higher medically certified absences, increased mental health problems, and a greater likelihood of maladaptive coping²⁵⁻²⁸. Hence, the introduction of a health program that improves active coping may be useful for improving the levels of perceived justice.

In generalizing the analyses, we should consider several limitations of the results. First, because of the relatively small sample size, the results may have been caused by chance. However, the consistency of the main results in the analyses suggests a relatively firm and strong relationship between the somatic symptoms and job stress indices, even after adjusting for possible confounders. Second, because of the cross-sectional nature of this study, our results do not immediately indicate a causal relationship between job stress and the reporting of somatic symptoms. Third, both exposure to job stress and the outcome of somatic symptoms were self-reported, and more objective measurements are needed in future studies. Fourth, the response rate was relatively low and limited to white-collar male workers at one Japanese company, with a relatively lower Cronbach's alpha value of job demand than in a previous study of Japanese workers¹⁷, which may have caused sampling bias.

Although our additional analyses showed that the reporting rate of each somatic symptom was not significantly different between the respondent and non-respondent groups, our results need to be interpreted carefully. Finally, multiple coefficients of determination (i.e., R^2) in the logistic regression model were relatively low (e.g., 0.22 in Model I and 0.23 in Model II), which suggests that unmeasured confounders existed. According to the literature, some of the somatic symptoms, such as musculoskeletal symptoms, may have been induced by the employees' working posture²⁹ and working conditions (i.e., work time at a video display station)³⁰, which could not be adjusted for in this study. This is an area that requires further investigation.

In conclusion, our findings suggest that the reporting of somatic symptoms is a simple indicator of job stress, and active coping could be used to alleviate somatization induced by job stress. Occupational health staff may need to pay attention to the levels of somatization and active coping among workers, and to contribute to health promotion in the workplace in collaboration with individual workers, occupational health professionals, and the occupational safety and health committee.

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