

Psychometric properties of the Korean version of the job content questionnaire: data from health care workers

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Abstract

Objectives To test the validity and reliability of selected scales, namely, decision latitude, psychological job demand, social support, job insecurity, and macro-level decision latitude from the Korean version of the job content questionnaire (K-JCQ), as part of a psychosocial epidemiological study among university hospital workers.

Methods K-JCQ was developed by translation and back translation complying with the JCQ usage policy,

and its psychometric properties were explored among 338 workers (290 females and 48 males) in a university hospital in Korea. Internal consistency was examined using Cronbach's alpha correlation coefficients. Factorial validity was tested using exploratory factor analysis. Pearson's correlation coefficients were used for test-retest reliability among a subset of 157 workers who responded to a repeat survey. Criterion-related validity was assessed by investigating the effects of the scales on job satisfaction and self-identity through work in multiple regression models.

Results Cronbach's alpha for all selected scales was higher than 0.6, except for job insecurity (0.53) and macro-level decision authority (0.52), indicating appropriate internal consistency. Correlation coefficients between test and retest scales of decision latitude, psychological job demand, and social support were 0.60, 0.41, and 0.35, respectively. Exploratory factor analysis found three- and four-factor models, i.e., with and without macro-level decision latitude, respectively, closely corresponding to the theoretical constructs. High levels of decision latitude and social support, and low levels of psychological job demand and job insecurity were significantly associated with high level of job satisfaction. Higher self-identity through work was positively related to decision latitude and social support.

Conclusions These findings suggest that K-JCQ is valid and reliable for assessing psychosocial job stress among Korean workers. Macro-level decision latitude showed a separate factorial structure and was strongly associated with task-level decision latitude.

Keywords Health care worker · Job content questionnaire (JCQ) · Macro-level decision latitude · Reliability · Validity

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Introduction

The job content questionnaire (JCQ), formulated by Karasek (1979) and based on the demand–control model, is a well-known self-administered instrument for measuring the social and psychological structure of the work situation (Karasek et al. 1998). This model predicts that the combination of job demand and control results in different degrees of perceived strain, stress-related risk, and active–passive behavioral correlates of jobs (Karasek 1981; Karasek and Theorell 1990; Karasek et al. 1998).

Numerous epidemiological studies have reported negative effects on various health outcomes from high levels of job strain, consistent with Karasek’s hypothesis (Karasek 1988; Karasek and Theorell 1990; Schnall et al. 1992, 1994; Theorell and Karasek 1996; Cheng et al. 2000). The model has been extended to incorporate the social support dimension because many studies have found a greater health effect of stress among workers with low social support (Johnson and Hall 1988; Johnson et al. 1989; Landsbergis et al. 1992).

Various population studies in North America and Europe suggest that job stress dimensions are critical determinants of worker health, including cardiovascular disease and muscular skeletal disease (Karasek and Theorell 1990; Schnall et al. 1994; Kawakami and Haratani 1999). Meanwhile, a few studies in Asia on instrument validity have become available (Kawakami et al. 1995; Cheng et al. 2003; Li et al. 2004). Because the JCQ was developed and used mostly in Western countries, its adaptability and utility need to be confirmed in different cultures, particularly in Asian countries where traditional societies are being intensely affected by globalizing economies, with restructuring of workplaces occurring frequently with rapid economic development.

South Korea has experienced dramatic economic growth since the 1960s. The per capita income has risen more than 100-fold from less than 100 dollars before 1960 (Paek and Hisanaga 2002). Over the same period, the population has grown from 25 million to more than 48 million, and the labor participation rate has risen, particularly among women, from 36.5 to 55.1%. Since 1997, South Korea has faced an economic crisis, which has resulted in the extensive restructuring of the labor market (Lee 2001), including large-scale layoffs and the introduction of flexible contracts across all industries. The proportion of precarious employment increased from 43% in 1996 to 52% in 2002 (Nam et al. 2005).

In the last decade, compensation claims for work-related musculoskeletal disease, cardiovascular disease,

and mental illness increased sharply in Korea (Korean Ministry of Labor 2005). This has been attributed to job stress associated with the dynamic working conditions and unstable labor market. Therefore, application of the JCQ to the Korean working population may provide an opportunity to further generalize its validity, as well as to obtain insights for future modifications in the light of the globalizing economy.

Here, we present findings from administering the K-JCQ to health care workers. In addition to evaluating the validity and reliability of core items, we assessed the properties of the macro-level decision latitude scale included in the recommended JCQ format, which has rarely been examined.

Methods

Study subjects

In 2001, a survey about job stress and health status was conducted at a university hospital in Ansan City, Korea. A self-reported questionnaire, including JCQ questions among others, was distributed to all nurses, technicians, administrative personnel, and employees in the nutrition department. Physicians were excluded from the study because of difficulty in obtaining responses. Completed questionnaires were returned by 338 employees (290 females and 48 males). The participation rate was highest among nurses (82%), followed by pharmacists and technicians (59%), and non-medical employees (39%). Four and a half months after the first survey, a second survey was conducted to assess the test–retest reliability. Of the first survey participants, 157 returned completed questionnaires and were included in the test–retest analysis.

Job content questionnaire

The job content questionnaire containing 49 JCQ items, i.e., the “Full recommended JCQ” (Karasek et al. 1998; Table 1), was translated into Korean, and then translated back into English by a bilingual speaker. Dr. Karasek reviewed the back-translated English version for comparison with the original version and some items were corrected. The scale calculation method is available in the “JCQ User’s Guide” (<http://www.jcqcenter.org>; Karasek 1985). Of the 49 question items in the recommended JCQ format, most studies have included “the three best-known scales”: decision latitude (nine items), psychological job demand (five items), and social support (eight items; Kawakami et al. 1995; Cheng et al. 2003; Li et al. 2004).

Table 1 Demographic characteristics of the study population

Job category	Nurse	Pharmacist	Technician	Non-medical ^a	Total
<i>N</i>	203	7	36	92	338
% Female	100	100	31	75	86
Age (year)	26.6	27.6	29.9	34.9	29.2
Education (year)	14.8	16.0	14.4	12.6	14.2
Annual salary (USD)	20,319	21,191	20,019	15,171	18,974
% Union membership	81.8	42.9	52.8	27.2	63.0

^a Personnel in administration, nutrition, and maintenance departments

In our study, we added three other scales existing in the “Full recommended JCQ” and “JCQ User’s Guide”: macro-level decision latitude (six items), job insecurity (three items), and physical exertion (one item). Consequently, there were 32 question items.

The JCQ Center provided two additional scales that could be used as tests of criterion-related validity: job satisfaction and self-identity through work (<http://www.jcqcenter.org>). Job satisfaction included five items (Cronbach’s $\alpha = 0.81$), and the score was calculated to range from 0 (complete dissatisfaction) to 100 (complete satisfaction). Self-identity through work included six items (Cronbach’s $\alpha = 0.66$), with a range from 1 (lowest self-identity) to 24 (highest self-identity). Self-identity through work addressed the importance of one’s own work being recognized by customers, the company, and society at large.

The self-administered questionnaire also included questions on demographics, medical status, health behavior, job title, and musculoskeletal symptoms. Specifically, designated job titles were listed on the questionnaire and subjects were grouped into the following four categories: nurse, pharmacist, technician, and non-medical personnel. A cover letter guaranteed subject confidentiality, and the data were collected anonymously.

Statistical analysis

Internal consistency was examined using Cronbach’s alpha for each scale and subscale.

Test–retest reliability was assessed using Pearson’s correlations of two scores obtained 4.5 months apart. Most previous factorial validity studies have explored factorial structures estimated from individual-level scales, particularly the core items of decision latitude, psychological job demand, and social support, based on the demand–control support model (Kawakami et al. 1995; Pelfrene et al. 2001; Niedhammer 2002; Sale and Kerr 2002; Cheng et al. 2003; Li et al. 2004; Sanne et al. 2005). However, Karasek, who formulated the demand–control model, suggested the possibility of a multilevel structure for each dimension of demand, control, and support, especially emphasizing high-level

control, such as macro-level decision latitude (Karasek 2005). Therefore, we included macro-level decision latitude with the traditional core items in the factor analysis. Exploratory factor analysis was conducted for factorial validity of 28 items, including the 22 core items and the 6 macro-level decision latitude items, with principal axis extraction and Varimax rotation. Loadings with an absolute value ≥ 0.3 were considered important. For the criterion-related validity, the effects of decision latitude, psychological job demand, social support, job insecurity, and macro-level decision latitude on job dissatisfaction and self-identity were assessed using multiple regression models. All analyses were conducted using SAS (SAS Institute, Cary, NC, USA).

Results

Demographic characteristics

There were more females (86%) than males: all nurses and pharmacists were women, as were 31% of the technicians and 75% of the non-medical workers (Table 1). The average age was 29.2 years, the mean length of education was 14.2 years, and 63% of the employees were union members (Table 1).

Skill discretion, psychological job demand, physical exertion, and self-identity through work were all significantly higher among nurses than among other workers (Table 2). Nurses had higher decision latitude, psychological job demand, and social support, indicating an ‘active collective’ job category (Johnson and Hall 1988). Nurses had higher self-identity through work, but lower job satisfaction compared to other employees.

Internal consistency

Cronbach’s alpha for decision latitude, psychological job demand, and social support was >0.6 , indicating acceptable internal consistency, whereas macro-level decision latitude and job insecurity were 0.52 and 0.53, respectively (Table 3). The item ‘union influence/company’

Table 2 Means and standard deviations of the JCQ scales (32 items), self-identity through work, and job satisfaction

Scale (number of items)	Nurses (<i>N</i> = 203)		Others (<i>N</i> = 135)		<i>P</i>
	Mean	SD	Mean	SD	
JCQ scales (32)					
Decision latitude (9)	60.6	7.8	58.4	10.9	0.04
Skill discretion (6)	32.1	3.9	29.8	5.2	<0.01
Decision authority (3)	28.5	5.3	28.6	6.9	0.94
Psychological job demand (5)	36.9	4.0	34.5	4.6	<0.01
Social support (8)	23.3	2.3	23.2	2.9	0.88
Coworker support (4)	12.0	1.1	11.9	1.3	0.80
Supervisor support (4)	11.3	1.7	11.3	2.4	0.96
Job insecurity (3)	8.2	4.1	7.5	4.0	0.14
Macro-level decision latitude (6)	5.1	1.6	6.4	2.0	<0.01
Physical exertion (1)	3.3	0.6	3.0	0.7	<0.01
Self-identity through work (6)	16.7	2.3	15.4	2.8	<0.01
Job satisfaction (5)	45.1	19.1	58.4	22.8	<0.01

Table 3 Internal consistency of JCQ scales, self-identity through work, and job satisfaction (Cronbach's alpha coefficients)

Scale (number of items)	Nurses (<i>N</i> = 203)	Others (<i>N</i> = 135)	All (<i>N</i> = 338)
JCQ scales (31) ^a			
Decision latitude (9)	0.66	0.80	0.74
Skill discretion (6)	0.56	0.72	0.66
Decision authority (3)	0.57	0.68	0.63
Psychological job demand (5)	0.58	0.61	0.63
Social support (8)	0.71	0.72	0.71
Coworker support (4)	0.63	0.68	0.65
Supervisor support (4)	0.69	0.72	0.71
Job insecurity (3)	0.49	0.59	0.53
Macro-level decision latitude (6)	0.57	0.51	0.52
Self-identity through work (6)	0.64	0.70	0.68
Job satisfaction (5)	0.77	0.83	0.81

^a Excluding physical exertion (one item)

(correlation coefficient: 0.29) of macro-level decision latitude had an item-total correlation <0.3 (data not shown), and job insecurity had a small number of items (three items), which could explain this low internal consistency. Generally, internal consistency was higher among "Others," probably because of the heterogeneous composition of this group.

Test–retest reliability

Pearson's correlation coefficients between test and retest were 0.60 ($P < 0.01$) for decision latitude, 0.41 ($P < 0.01$) for psychological job demand, 0.35 ($P < 0.01$) for social support, 0.47 ($P < 0.01$) for job

insecurity, and 0.63 ($P < 0.01$) for job satisfaction. The mean values for the scales were not significantly different between test and retest, except for psychological job demand, which declined by 4% in the second test.

Construct validity

Exploratory factor analysis of 22 core items clearly followed the theoretical structure. The first factor was highly related to decision latitude (loading range: 0.36–0.65). The second factor was associated with social support (loading range: 0.39–0.59). The third factor was highly associated with psychological job demand (Table 4).

We also explored the factorial structure of macro-level decision latitude. After adding this scale, the factorial structure of core items became more obvious, and the macro-level decision latitude scale had two components: two union-related items, 'union influence over company' and 'have union influence' loaded as an independent factor with a loading above 0.7, and the other three items, 'significant influence in group,' 'democratic group,' and 'supervise others,' loaded together with the usual task-level decision latitude.

Correlation

Task-level decision latitude was positively correlated with education for all of the participants combined, and in nurses as a separate group. Psychological job demand was correlated with job insecurity and physical exertion. Self-identity through work was correlated with task-level decision latitude and social support, and job satisfaction was significantly correlated with all of the JCQ scales (Table 5).

Table 4 Factor analysis of the 22-item JCQ (Model 1) and 28-item JCQ (Model 2) using principal axis extraction and varimax rotation ($N = 338$)

Scale		Model 1			Model 2			
		Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	Factor 4
Decision latitude	Learn new things	0.39		0.34	0.41			
	Repetitive work			-0.31		-0.31		
	Requires creativity	0.65			0.54			
	Allow own decisions	0.65			0.62			
	High skill level	0.64			0.59			
	Little freedom of decision	0.36			0.37			
	Variety			0.30				
	Lot of say	0.63			0.66			
Psychological job demand	Develop own abilities	0.64			0.65			
	Work fast			0.64		0.61		
	Work hard			0.67		0.62		
	No excessive work			0.58		0.61		
	Enough time			0.44		0.44		
Social support	Conflicting demands							
	Supervisor is concerned		0.49			-0.37	0.41	
	Supervisor pays attention		0.39			-0.33	0.33	
	Helpful supervisor		0.57				0.49	
	Supervisor good organizer		0.48				0.39	
	Coworkers competent		0.38				0.41	
	Coworkers interested in me		0.44				0.47	
	Friendly coworkers		0.59				0.63	
Coworkers helpful		0.52				0.55		
Macro-level decision latitude	Significant influence in group				0.55			
	Democratic group				0.33	-0.42		
	Some influence/company							
	Supervise others				0.45			
	Union influence/company							0.77
	Have union influence							0.71

The loading values are shown for loadings with an absolute value >0.30

Criterion-related validity with self-identity and job satisfaction

Cronbach's alpha for self-identity and job satisfaction was 0.66 and 0.81, respectively. After adjusting for sex, age, education, salary, all the scales such as decision latitude, social support, psychological demand and job insecurity were associated with job satisfaction in the predicted direction (Table 6). Decision latitude and social support were positively associated with self-identity. Macro-level decision latitude was associated with job satisfaction, but was slightly short of statistical significance.

Discussion

This validation study of the K-JCQ demonstrated that decision latitude, psychological job demand, and social support provide adequate measures of psychosocial properties in hospital workers, in terms of construct validity and reliability. Macro-level decision latitude,

as defined in the recommended JCQ format, was significantly correlated with task-level decision latitude and appears to have two-dimensional structure.

The psychometric properties of the K-JCQ in the study population were generally comparable to previous Western and Asian studies (Kawakami and Fujigaki 1996; Karasek et al. 1998; Cheng et al. 2003; Li et al. 2004). However, the nurses in this study showed higher psychological job demand and lower decision latitude compared to female workers in national representative samples from Western countries and Japan (Karasek et al. 1998), and relative to nurses in the United States (Morgan et al. 2002) and China (Li et al. 2004). A potential explanation for this may be the high level of job insecurity among the nurses in this study, with a mean of 8.2, a remarkably high value compared to those reported earlier in Western countries and Japan, where the range was between 3.1 and 4.5 (Karasek et al. 1998). Job insecurity was significantly associated with higher psychological job demand, lower decision latitude, and lower job satisfaction.

Table 5 Spearman's rank correlation coefficients for age, education, and the JCQ scales ($N = 338$)

		1. Age	2. Edu	3. DL	4. DLM	5. Ps.JD	6. SoS	7. J. Ins	8. Ph.Ex	9. Self	10. J.Sat
1. Age (year)	Total	1.00									
	Nurses	1.00									
2. Education (year)	Total	-0.10	1.00								
	Nurses	0.33**	1.00								
3. Decision latitude	Total	0.09	0.35**	1.00							
	Nurses	0.20**	0.16*	1.00							
4. Macro-level decision latitude	Total	0.22**	0.00	0.23**	1.00						
	Nurses	0.07	0.23**	0.44**	1.00						
5. Psychological job demand	Total	-0.29**	0.05	-0.06	-0.17**	1.00					
	Nurses	-0.09	-0.18**	-0.09	-0.08	1.00					
6. Social support	Total	-0.07	-0.01	0.18**	0.08	-0.07	1.00				
	Nurses	-0.15*	-0.16*	0.11	0.12	0.00	1.00				
7. Job insecurity	Total	-0.10	-0.17**	-0.29**	-0.10	0.23**	-0.12*	1.00			
	Nurses	-0.07	-0.21**	-0.26**	-0.12	0.32**	-0.11	1.00			
8. Physical exertion	Total	-0.26*	-0.08	-0.14*	-0.13*	0.50**	-0.08	0.22**	1.00		
	Nurses	-0.16*	-0.06	-0.10	-0.11	0.46**	-0.10	0.20**	1.00		
9. Self-identity through work	Total	-0.17**	0.23**	0.25**	-0.00	0.05	0.30**	-0.05	0.01	1.00	
	Nurses	-0.08	0.04	0.20**	0.06	0.01	0.32**	-0.03	-0.01	1.00	
10. Job satisfaction	Total	0.23**	0.02	0.33**	0.22**	-0.30**	0.37**	-0.34**	-0.29**	0.19**	1.00
	Nurses	0.04	0.11	0.37**	0.28**	-0.26**	0.33**	-0.37**	-0.26**	0.17*	1.00

* $P < 0.05$; ** $P < 0.01$ **Table 6** Predictors of self-identity and job satisfaction from multiple regression ($N = 338$)

Variable	Nurses		All	
	Self-identity	Job satisfaction	Self-identity	Job satisfaction
Sex				
Male				
Female			0.17	-4.6
Age	-0.08	-0.36	-0.03	0.12
Education (year)	0.31	0.29	0.11	-1.09
Salary (USD)				
<16,000				
16,000–20,000	-0.66	-2.99	-0.02	3.07
>20,000	-0.27	2.04	0.10	6.16
Missing	-0.34	-4.25	-0.62	0.12
Job title				
Other				
Nurse			0.65	-8.23*
Decision latitude	0.05*	0.40*	0.05*	0.43**
Psychological job demand	0.01	-0.79*	0.01	-0.67**
Social support	0.30**	1.99**	0.23**	2.31**
Macro-decision latitude	-0.06	1.66 ⁺	0.02	1.13 ⁺
Job insecurity	0.04	-1.11**	0.03	-0.92**

* $P < 0.05$; ** $P < 0.01$;⁺ $P = 0.08$; ⁺⁺ $P = 0.07$

South Korea has suffered from an economic crisis since 1997, which has resulted in a rapid increase in the flexibility of the labor market (Lee 2001). Massive restructuring of industry during 1996–2000 involved the use of inside contracting, spin-off, and outsourcing (Kim 2004). These changes led to large-scale layoffs and job insecurity. Although the unemployment rate was in a relatively low range in Korea, the rate rose from 2.0% in 1996 to 3.1%, and precarious employment increased from 43 to 52%. The monthly probability of job loss

rose during 1996–2001 from 1.7 to 2.7 for males and 3.6 to 4.9 for females (Korean Ministry of Labor 2005; Nam et al. 2005). These contexts were reflected by the very high levels of job insecurity in our study.

The internal consistency was comparable to that in previous Western and Asian studies (Kawakami et al. 1995; Kawakami and Fujigaki 1996; Brisson et al. 1998; Karasek et al. 1998; Niedhammer 2002; Cheng et al. 2003; Li et al. 2004; Sanne et al. 2005). Cronbach's alpha for all core scales was >0.60, with that for social

support being the highest. Psychological demand had a relatively low alpha (0.63), in agreement with previous national and international studies (Karasek et al. 1998). For the nurses in this study, internal consistency was low for skill discretion (Cronbach's $\alpha = 0.56$) and decision authority (Cronbach's $\alpha = 0.57$). Li et al. (2004) reported a similarly low internal consistency for skill discretion among female health care workers, most of whom were nurses. The item 'repetitive work' of skill discretion had a low item-total correlation coefficient (0.38). When this item was omitted, Cronbach's α became >0.6 , both in our study and a Chinese study (Li et al. 2004). The Cronbach's reliability of job insecurity is generally low in many other studies (Karasek et al. 1998; Landsbergis 1988), because some of the items show non-normal distribution in the responses.

A few studies have tested the reliability of the JCQ. Cheng et al. (2003) tested the correlation between a first and second survey conducted 3 months apart on a subsample of 48 employees. Compared to our results, Cheng reported higher correlations for all core scales, ranging from 0.36 for supervisor support to 0.73 for skill discretion.

Our study interval was 1.5 times longer than in Cheng et al.'s (2003) study and likely contributed to the lower correlations. However, the mean values of the scales in our study did not change significantly between the two surveys, except for psychological job demand, which showed a 4% decrease. During the 4.5-month interval between the test and retest surveys, the hospital adopted an Order Communication System (Jhun et al. 2004). This change in working conditions may have resulted in a decrease in job demand and contributed to the lower correlations. Despite these factors, all of the scales showed sufficient test–retest reliability. The response rate in the follow-up survey was higher among females (49%) than males (33%). Because of the relatively low response rate, particularly in males, more attentive participants with higher reliability in their responses may have been over-represented. Therefore, the reliability in a larger population may be somewhat lower than that observed here.

The factor patterns for decision latitude, psychological job demand, and social support clearly corresponded to the theoretical construct of the demand–control–support model. There was one interesting exception: the item 'learn new things' was positively loaded not only on decision latitude, but also on psychological demand. Similar results were reported for Japanese employees of telecommunication and electric power companies (Kawakami et al. 1995), and Chinese health care workers (Li et al. 2004). Niedhammer (2002) also raised concerns about the item 'learn new things'

because of the relatively low loading value on decision latitude in exploratory factor analysis.

We suspect that Asian countries, particularly China and South Korea, have experienced rapid economic development and labor market changes, and employees have been required to learn new technologies, which they have found psychologically demanding. An additional interesting result was that both supervisor and coworker support were clearly loaded on the same factor. Kawakami et al. (1995) and Niedhammer (2002) reported factorial discrepancy between supervisor support and coworker support. However, recent Asian studies (Cheng et al. 2003; Li et al. 2004) have reported social support as one scale.

After adjusting for sex, age, education, salary, and increased decision latitude, social support and job insecurity were associated with job satisfaction, as predicted by the demand–control–support model. Social support and decision latitude were positively associated with self-identity, as well as job satisfaction. Social support had the greatest effect size, suggesting that the social support dimension accounts for great variability in job satisfaction. This finding is in agreement with a Taiwanese study (Cheng et al. 2003). In addition, the effect size on self-identity was greatest for social support, whereas no significant effect of psychological demand was observed.

A major limitation was the low participation rate among non-medical workers in the hospital studied. Generally, workers with high job demand tend to be excluded when participation is low. It is possible that job demand could have been underestimated for the non-medical group. However, internal consistency and factorial validity would not have been seriously affected.

Another limitation was that there were six times more women than men, which might have some consequences for the results. Psychosocial responses are likely to be dependent on gender. For example, women report lower levels of decision latitude than men in most populations (Karasek et al. 1998) and had a higher Cronbach's alpha for decision latitude in a Japanese study (Kawakami et al. 1995). Our results represent a typical gender distribution among health-care workers, which distribution is dominated numerically by women. Analyses of internal consistency and factorial validity restricted to female workers show similar results to those among all workers (data not shown). Therefore, an additional study of male workers is required.

Another limitation was that our study did not include a wider variety of occupations. Further applications of the K-JCQ to workers in other occupations

would corroborate the reliability and validity observed here. Particularly, more detailed study is needed for macro-level decision latitude scale.

In conclusion, the results suggest that the K-JCQ is reliable and valid for evaluating psychosocial work properties among the Korean working population. Macro-level decision latitude appeared as a separate construct, and was strongly associated with task-level decision latitude.

References

- Brisson C, Dion G, Blanchette C, Moisan J, Guimont C, Ve'zina M, Dagenais GR, Masse L (1998) Reliability and validity of the French version of the 18-item Karasek job content questionnaire. *Work Stress* 12:322–336
- Cheng Y, Kawachi I, Coakley E, Schwartx J, Colditz G (2000) Association between psychosocial work characteristics and health functioning in American women: a prospective study. *Br Med J* 320:1432–1436
- Cheng Y, Luh WM, Guo YL (2003) Reliability and validity of the Chinese version of the job content questionnaire in Taiwanese workers. *Int J Behav Med* 10:15–30
- Jhun HJ, Park JT, Cho SI (2004) Changes of job stress, musculoskeletal symptoms and complaints of unfavorable work conditions among university hospital nurses after adopting a computerized order communication system. *Int Arch Occup Environ Health* 77:363–367
- Johnson JV, Hall EM (1988) Job strain, work place social support, and cardiovascular disease: a cross-sectional study of a random sample of the Swedish working population. *Am J Public Health* 78(10):1336–1342
- Johnson JV, Hall EM, Theorell T (1989) Combined effects of job strain and social isolation on cardiovascular disease morbidity and mortality in a random sample of the Swedish male working population. *Scand J Work Environ Health* 15(4):271–279
- Karasek R (1979) Job demand, job decision latitude, and mental strain: implications for job redesign. *Adm Sci Q* 24:285–308
- Karasek R (1981) Job decision latitude, job demands, and cardiovascular disease: a prospective study of Swedish men. *Am J Public Health* 61(7):694–705
- Karasek R (1985) Job content questionnaire and user's guide. University of Massachusetts Lowell, Department of Work Environment, Lowell
- Karasek R (1988) Job characteristics in relation to the prevalence of myocardial infarction in the US Health Examination Survey (HES) and the Health and Nutrition Examination Survey (HANES). *Am J Public Health* 78(8):910–918
- Karasek RA (2005) The stress-disequilibrium model: toward an integrating physiological theory of stress-related chronic disease development. Explaining the illness and disability consequences of low workplace social control. Satellite Programme Special Lecture 26 August 2005, 2nd ICOH International Conference on Psychosocial Factors at Work, Okayama, Japan
- Karasek R, Theorell T (1990) The psychosocial work environment. In: *Healthy work-stress, productivity, and the reconstruction of working life*. Basic Books, New York, pp 31–82
- Karasek R, Brisson C, Kawakami N, Houtman I, Bongers P, Amick B (1998) The job content questionnaire (JCQ): an instrument for internationally comparative assessments of psychosocial job characteristics. *J Occup Health Psychol* 3:322–355
- Kawakami N, Fujigaki Y (1996) Reliability and validity of the Japanese version of job content questionnaire: replication and extension in computer company employees. *Ind Health* 34:295–306
- Kawakami N, Haratani T (1999) Epidemiology of job stress and health in Japan: review of current evidence and future direction. *Ind Health* 37(2):174–186
- Kawakami N, Kobayashi F, Araki S, Haratani T, Furui H (1995) Assessment of job stress dimensions based on the job demands-control model of employees of telecommunication and electric power companies in Japan: reliability and validity of the Japanese version of the job content questionnaire. *Int J Behav Med* 2:358–375
- Kim DB (2004) Human resource management. In: Lee W (ed) *Labor in Korea 1987–2002*. Korea Labor Institute, Seoul, p 263
- Korean Ministry of Labor (2005) *Analyses of industrial accidents in 2004*. Ministry of Labor, Seoul
- Landsbergis PA (1988) Occupational stress among health care workers: a test of the job demands-control model. *J Organ Behav* 9:217–239
- Landsbergis PA, Schnall PL, Deitz D, Friedman R, Pickering T (1992) The patterning of psychological attributes and distress by “job strain” and social support in a sample of working men. *J Behav Med* 15:379–405
- Lee JS (2001) A study on neo-liberalistic restructuring and the change in South Korea (in Korean). Dissertation, Korea University, pp 1–290
- Li J, Yang W, Liu P, Xu Z, Cho SI (2004) Psychometric evaluation of Chinese (mainland) version of job content questionnaire: a study in university hospitals. *Ind Health* 42:260–270
- Morgan DG, Semcbuk KM, Stewart NJ, D'Arcy C (2002) Job strain among staff of rural nursing homes. *J Nurs Adm* 32(3):152–161
- Nam JR, Ryu GG, Choi HM (2005) Insecure workers and the directions of employment policy. Korea Labor Institute, Seoul, pp 15–43
- Niedhammer I (2002) Psychometric properties of the French version of the Karasek job content questionnaire: a study of the scales of decision latitude, psychological demands, social support and physical demands in the GAZEL cohort. *Int Arch Occup Environ Health* 75:129–144
- Paek D, Hisanaga N (2002) Occupational health in South Korea. *Occup Med* 17(3):391–408
- Pelfrene E, Vlerich P, Mak R, Smet PD, Kornitzer M, Backer GD (2001) Scale reliability and validity of the Karasek ‘Job Demand-Control-Support’ model in the Belstress study. *Work Stress* 15(4):297–313
- Sale JEM, Kerr MS (2002) The psychometric properties of Karasek's demand and control scales within a single sector: data from a large teaching hospital. *Int Arch Occup Environ Health* 75:145–152
- Sanne B, Torp S, Mykletun A, Dahl AA (2005) The Swedish Demand-Control-Support Questionnaire (DCSQ): factor structure, item analyses, and internal consistency in a large population. *Scand J Public Health* 33:166–174
- Schnall PL, Schwartz JE, Landbergis PA, Warren K, Pickering TG (1992) The relation between job strain, alcohol and ambulatory blood pressure. *Hypertension* 19:488–494
- Schnall PL, Landsbergis PA, Baker D (1994) Job strain and cardiovascular disease. *Annu Rev Public Health* 15:381–411
- Theorell T, Karasek RA (1996) Current issues relating to psychosocial job strain and cardiovascular disease research. *J Occup Health Psychol* 1:9–26