RESEARCH NOTE

RELIABILITY AND VALIDITY OF JOB CONTENT QUESTIONNAIRE FOR UNIVERSITY RESEARCH LABORATORY STAFF IN MALAYSIA

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Abstract. Job Content Questionnaire (JCQ) has been proven a reliable and valid instrument to assess job stress in many countries and among various occupations. In Malaysia, both English and Malay versions of the JCQ have been administered to automotive workers, schoolteachers, and office workers. This study assessed the reliability and validity of the instrument with research laboratory staff in a university. A cross sectional study was conducted among 258 research laboratory staff in Universiti Putra Malaysia (UPM). Malaysian laboratory staff who have worked for at least one year were randomly selected from nine faculties and institutes in the university that have research laboratory. A self-administered English and Malay version of Job Content Questionnaire (JCQ) was used. Three major scales of JCQ: decision latitude, psychological job demands, and social support were assessed. Cronbach's alpha coefficients of two scales were acceptable, decision latitude and psychological job demands (0.70 and 0.72, respectively), while Cronbach's alpha coefficient for social support (0.86) was good. Exploratory factor analysis showed five factors that correspond closely to the theoretical construct of the questionnaire. The results of this research suggest that the JCQ is reliable and valid for examining psychosocial work situations and job strain among research laboratory staff. Further studies should be done for confirmative results, and further evaluation is needed on the decision authority subscale for this occupation.

Keywords: JCQ, job strain, research laboratory staff, reliability, validity, Malaysia

INTRODUCTION

One of the most common and costly health problems in the work environment is job stress or occupational stress (National Institute for Occupational Safety and Health, 1999; WHO, 2010). Job stress may result in health problems, such as headaches, musculoskeletal disorders, anxiety, irritability, cardiovascular diseases, and other chronic diseases among workers (Walsinge, 2013). Furthermore, stress could lead to adverse effect on learning and cognitive functions (Abdulghani, 2008). Job stress occurs because of sources such as limitations at workplace, but job

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strain is one of the important sources of job stress (Karasek, 1979; Park, 2007; Abdulghani, 2008). Karasek (1979) developed a two-dimensional job demand-control model that was based on the interaction between workers and their job environment.

Karasek's job demand-control model explained job strain as the high psychological demands on the job in workers with low decision latitude (Karasek, 1979). Psychological job demand refers to "how hard workers work" (Meshkati *et al*, 1990); decision latitude is a combination of skill discretion and decision authority, where skill discretion evaluates the creativity and skills depending on level of the employee and degree of flexibility to make the decisions on the job. Decision authority assesses level of organization's possibilities and freedom for making decisions by its workers (Karasek *et al*, 1998). Social support includes supervisor support and co-worker support. Further, social support was included and is said to act as an arbitrator in the model, resulting in a three-dimensional model (Sale and Kerr, 2002).

Based on this theoretical construct, the Job Content Questionnaire (JCQ) was designed to assess job strain using three important scales, namely: job demands, social support, and job control (decision latitude) (Karasek *et al*, 1998). JCQ is an instrument for assessing job strain (Karasek and Theorell, 1990; Hurrell *et al*, 1998) and it is already available in 23 languages (JCQ Center, 2008) including the Malay version (Edimansyah *et al*, 2006). It has been shown that the items in JCQ are able to measure the "content" of a respondent's work tasks (Karasek *et al*, 1998; Sale and Kerr, 2002). This questionnaire can also be used for some micro-level scales; one of them is job dissatisfaction (Sale and Kerr, 2002).

Many studies on validity and reliability of JCQ were done among various jobs in developed countries such as USA, Sweden (Karasek *et al*, 1998) and Japan (Kawakami and Fujigaki, 1996). Reliability and validity studies on JCQ were also done in Iran (Choobineh *et al*, 2011), China (Li *et al*, 2004), Taiwan (Cheng *et al*, 2003), Malaysia (Azlihanis *et al*, 2006) and Brazil (De Araujo and Karasek, 2008). In Malaysia, researchers have used both versions (English and Malay) of JCQ for the reliability and validity of JCQ among automotive assembly workers, secondary school teachers, office workers and medical laboratory technicians (Aziah *et al*, 2004; Azlihanis *et al*, 2006; Edimansyah *et al*, 2006; Husna *et al*, 2009) but none has been done on research laboratory workers. The aim of this research was to assess the reliability and validity of the JCQ using three selected main scales (decision latitude, psychological job demands, and social support) among research laboratory staff at Universiti Putra Malaysia (UPM).

MATERIALS AND METHODS

Study location and population

A cross-sectional study was conducted among research laboratory staff of UPM. Nine faculties and institutes that have research laboratory in the university were included in this study; from which the laboratory staff who were Malaysian citizen and who had more than 1-year working experience in their respective laboratories were randomly selected. Laboratory staff who were on leave, absent, or quit during the data collection period were excluded. Two hundred eighty-five laboratory staff was recruited for this study.

Ethical considerations

The Medical Research Ethics Committee of Faculty of Medicine and Health Sciences, UPM approved this study (Ref Nº UPM/FPSK/100-9/2-MJKEtika [JKK (12) 01]; 2012 Oct 03). Permission for data collection was obtained from the deans of faculties and directors of institutes involved in this study. Informed written consent was obtained and confidentiality assured before distributing the self-administered questionnaire, which were then collected immediately after. Permission for using JCQ was obtained from JCQ center. The individual data will be treated confidentially.

Questionnaire

Framingham version (the recommended format) of the validated JCQ, in both the English and Malay language, excluding job insecurity items, was used in this research. Three major scales of JCQ (decision latitude, psychological job demand and social support) containing 21 items were chosen in this study: 8 items for decision latitude (skill discretion and decision authority), 5 items for psychological job demand and 8 items for social support scale (supervisor support and co-worker support). This is based on the formulae for Job Content Instrument Scale Construction in JCQ user guide. A Likert scale was used in the study for measuring the items from 1 (strongly disagree) to 4 (strongly agree). Sociodemographic data, including age, gender, race, marital status, and education level were added to the questionnaire. Job factors – job title, duration of present job and working hours were also included.

Statistical analysis

Statistical Package for Social Sciences (SPSS®; version 21.0; IBM, Armonk, NY) was used for data entry and data analysis. Measures of central tendency and dispersion were determined and normality test was carried out for continuous variables. Since all continuous variables were normally distributed, means were used as cut-off points. To assess internal consistency, Cronbach's alpha coefficients and item-total correlations were calculated for the scales. Cronbach's alpha of 0.70-0.95 was considered acceptable (Tavakol and Dennick, 2011). The JCQ construct validity was tested with exploratory factor analysis (principal components extraction with varimax rotation). Measure of sampling adequacy considered was more than 0.3 for factor loading. The *p*-value was set at 0.05 as the level of significance.

RESULTS

Of 299 laboratory staff recruited, 285 respondents returned the questionnaire and answered the JCQ completely, giving a response rate of 95%. Table 1 illustrates socio-demographic factors of the respondents. The mean (SD) age of laboratory staff was 36.9 (9.6) years; 148 (51.9%) of them were female and 137 (48.1%)male. Most of the staff (96.1%) were Malay, and 242 (84.9%) staff were married. Most of the respondents (58.6%) were diploma holders and had no academic degree. The mean (SD) duration of present work was 9.7(8.9) years. Based on job title, 59.3% of respondents were science officers, and 40.7% were laboratory assistants. Average working hours per working day was 8(0.2) hours.

Reliability (Internal consistency)

Table 2 shows Cronbach's alpha coefficients and item-total correlations that were calculated for 21 items of the instrument's scales. Cronbach's alpha coefficients were acceptable for decision lati-

Table 1
Socio-demographic items of 285 research laboratory staff at UPM.

Variable	Mean (SD)	Frequency (%)
Age (years)	36.9 (9.6)	
Working hours per day	8.0 (0.2)	
Duration of present work (years)	9.7 (8.9)	
Job title		
Science officer		169 (59.3)
Lab assistant		116 (40.7)
Education		
Degree		118 (41.4)
Non academic degree (Diploma)		167 (58.6)
Gender		
Female		148 (51.9)
Male		137 (48.1)
Race		
Malay		274 (96.1)
Chinese		7 (2.5)
Indian		4 (1.4)
Marital Status		
Married		242 (84.9)
Single		43 (15.1)

tude (0.70) and psychological job demand (0.72), and were good for social support (0.86). The item-total correlations for most items were higher than 0.30. However, there were two items–Q4 (repetitive work) in the decision latitude scale and Q54 (co-worker personal interest in me) in social support scale–that showed lower item-total correlation coefficient than other items (0.12 and 0.14, respectively).

Construct validity

Table 3 shows the results of exploratory factor analysis on three scales of JCQ (decision latitude, psychological job demand and social support) with 21 items. Five components were found; they were Factors 1,2,3,4, and 5. Decision latitude had factor loading that ranged from 0.34 to 0.93. Five of eight items (Q3-Q5, Q7, and Q11) in this scale were associated with Factor 3. Only three items: Q6 (allow own decisions), Q8 (little decision freedom), and Q10 (lot of say) were associated with factor 2. For psychological job demand, all 5 items were correlated with factor 5. This scale had a sufficient load ranging from 0.33 to 0.84. Four items of social support scale were associated with the first factor (Q48, Q49, Q51, Q52); the other four items (Q53, Q54, Q56 and Q58) of social support were correlated with Factor 4. Factor loading range in this scale was good (0.48-0.94).

DISCUSSION

This study examined the psychometric properties of three major scales in JCQ. We found that the internal consistency of all the evaluated scales were acceptable where the Cronbach's alpha coefficient for deci-

Table 2
Corrected item-total correlation and Cronbach's - α coefficients for JCQ scales (*N*=258).

Scale	Item	Corrected item-total correlation	Cronbach's α
Decision latitude			0.70
Q3	Learning new things	0.35	
Q4	Repetitive work	0.12	
Q5	Requires creative	0.37	
Q6	Allows own decisions	0.52	
Q7	High skill level	0.49	
Q8	Little decision freedom	0.52	
Q10	Lot of say	0.53	
Q11	Develop own abilities	0.49	
Psychological job demands			0.72
Q19	Work fast	0.52	
Q20	Work hard	0.33	
Q22	No excessive work	0.53	
Q23	Enough time	0.30	
Q26	Conflicting demands	0.32	
Social support			0.86
Q48	Supervisor is concerned	0.79	
Q49	Supervisor pay attention	0.78	
Q51	Helpful supervisor	0.78	
Q52	Supervisor good organizer	0.78	
Q53	Co-worker competent	0.44	
Q54	Co-worker interest in me	0.14	
Q56	Friendly co workers	0.43	
Q58	Co-workers helpful	0.45	

sion latitude was 0.70 and psychological job demand was 0.72; in addition, the internal consistency of social support scale was good (Cronbach's alpha coefficient 0.86). In contrast, study among Chinese health care worker showed Cronbach's alpha range for decision latitude and psychological job demand were lower (0.69 - 0.72 and 0.52 - 0.65, respectively) but comparable for social support scale (0.81 - 0.85) (Li *et al*, 2004). A reliability study among hospital nurses in Iran and on formal and informal jobs in Brazil showed lower Cronbach's alpha (0.54 and 0.55, respectively) for decision latitude (De Araujo and Karasek, 2008; Choobineh *et al*, 2011).

However, research among a large population (8,263 workers) in France reported that the range of Cronbach's alpha coefficients for decision latitude scale were good (0.81-0.83) (Brisson *et al*, 1998). A Malaysian study among office workers showed an acceptable value of 0.76 (Husna and Tahir, 2009). In this study, the internal consistency of decision latitude scale was only acceptable due to the poor inter-item correlation of Q4 (repetitive work) with the overall scale score. This could possibly be explained by the job characteristic of the study subjects who

Table 3
Exploratory factor analysis using principal component extraction and varimax rotation and Kaiser normalization of JCQ scales.

Scale	Item	Loading on 5 factors*				
		F1	F2	F3	F4	F5
Decision latitude (skill discretion and decision authority)	Q3 Learn new things			0.75		
	Q4 Repetitive work			0.34		
	Q5 Requires creative			0.69		
	Q6 Allows own decision		0.90			
	Q7 High skill level			0.78		
	Q8 Little decision freedom		0.93			
	Q10 Lot of say		0.91			
	Q11 Develop own abilities			0.71		
Psychological job demands	Q19 Work fast					0.77
	Q20 Work hard					0.53
	Q22 No excessive work					0.84
	Q23 Enough time					0.71
	Q26 Conflicting demands					0.33
Social support (supervisor support and co-worker support)	Q48 Supervisor is concerned	0.92				
	Q49 Supervisor pays attention	0.93				
	Q51 Helpful supervisor	0.94				
	Q52 Supervisor good organizer	0.91				
	Q53 Co-worker competent				0.73	
	Q54 Co-worker interest in me				0.48	
	Q56 Co-worker friendly				0.86	
	Q58 Co-worker helpful				0.82	

*Only items with factor loading >0.30 are shown.

work only in the laboratory using standard procedures, which may be perceived as repetitive by some subjects.

In this study, we demonstrated an acceptable Cronbach's alpha coefficient for the psychological job demand scale (0.72). This is comparable with a large-scale study in France that obtained Cronbach's alpha coefficient value of 0.73-0.74 (Brisson *et al*, 1998). However, other studies in Iran, mainland China, Malaysia, and Brazil showed poor internal consistency of this scale (0.52-0.65) (Li *et al*, 2004; De Araujo and Karasek, 2008; Husna and Tahir, 2009; Choobineh *et al*, 2011).

The variation in background and culture of the populations, which are not assessed in JCQ, may be the reasons for the different results (Azlihanis *et al*, 2006). Social support scales in our study showed the highest internal consistency (Cronbach's alpha coefficient value of 0.86) as compared with studies in Iran, China, Brazil, and France (Cronbach's alpha 0.65-0.85)(Brisson *et al*, 1998; Li *et al*, 2004; De Araujo and Karasek, 2008; Choobineh *et al*, 2011). Most items in social support scale showed good item-total correlation with overall scale except for Q54 (co-worker take personal interest in me) where the

correlation was low (0.14). This item might have been perceived as personal and misinterpreted by the respondents, who were generally Malay.

In exploratory factor analysis, 5 factors were extracted from the items where each factor (factors 1, 3-5) was distinctly associated with decision latitude, psychological job demands, supervisor support, and co-worker support scales. This result corresponds to the 3-dimensional model (job demand-control-support model) that was the theoretical construct for JCQ. This result is similar to the results of two research studies in Malaysia that explained the 3 - dimensional model of job strain (Azlihanis *et al*, 2006; Edimansyah *et al*, 2006). In contrast, a study done in Brazil whereby a comparison of formal and informal jobs showed JCQ corresponds to the two-dimensional model (De Araujo and Karasek, 2008). Validation of the French version of JCQ also showed the similar outcomes (Brisson *et al*, 1998).

Interestingly, we found that items (Q6, Q8, Q10) that constitute decision authority subscale in decision latitude were associated to another factor of its own (Factor 2). We postulate that this result is closely related to the job characteristic of our respondents who work in research laboratories in a higher education institution, whereby work is done according to standard procedures and predetermined objectives.

Social support scales were distinctly loaded on two other factors based on supervisor support and co-worker support. This is in contrast from findings by Cheng *et al* (2003) who found that supervisor's attention (Q49) was loaded along decision latitude scale among women in Taiwan.

The limitation in our study was that the majority of our respondents were of Malay ethnicity (96.1%); therefore, this may affect perception on certain items. Only 3.9% of the respondents were Chinese and Indians whereas in another study in Malaysia, the ethnicity was fairly well distributed (Malay 33%, Chinese 23%, Indians 37%) (Husna and Tahir, 2009).

This study illustrated that the JCQ (three scales) is likely a reliable and valid instrument to measure psychosocial work situations and job strain among research laboratory staff. However, this was only a preliminary study. More confirmative test such as test-retest reliability analysis, confirmatory factor analysis to test goodness-of-fit, and convergent validity of the scales by using other methods are needed. Multitasking should be encouraged among research laboratory staff to avoid the sense of repetitiveness in their daily work. Further studies is recommended among research laboratory staff of more public and private universities to increase representativeness, and involving a more varied ethnicity to further evaluate the decision authority subscale among this occupation and to get a confirmative result.

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