ORIGINAL ARTICLE

Validation of the Job Content Questionnaire among hospital nurses in Vietnam

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Abstract

Objectives: The aim of this study was to examine the reliability and validity of the Job Content Questionnaire (JCQ) in Vietnamese among hospital nursing staff.

Methods: The 22-items version of the JCQ was used. This includes four scales: (a) psychological demands (5 items); (b) job control (9 items); (c) supervisor support (4 items); and (d) coworker support (4 items). All 1258 nurses in a general hospital in Vietnam, excluding 11 who were due to retire, were invited to complete the cross-sectional survey. The internal consistency reliability was estimated using Cronbach's α. Construct validity was examined using exploratory factor analysis (EFA). Convergent validity was evaluated by calculating correlations between the JCQ scores and DASS 21 and overtime work.

Results: In total, 949 (75%) of the 1258 eligible nurses completed the survey. Cronbach's α values demonstrated acceptable internal consistency in two scales (supervisor support α = .87; coworker support α = .86), while Cronbach's α was below the acceptable threshold of 0.70 for job control (α = .45) and job demand (α = .50). EFA assuming a four-factor structure showed a factor structure that was almost identical to the original JCQ, with two items loading on other scales. The subscales of

depression, anxiety, and stress response of DASS 21 and the subscales of JCQ were significantly correlated, as expected.

Conclusion: The results suggest that the JCQ in Vietnamese can be used with some reliability and validity for examining psychosocial work environment among nurses. Further studies should be done to confirm and expand our findings in a variety of occupational groups and in other Asian low- and middle-income countries.

1 | INTRODUCTION

Recent changes in the work environment in medical settings in South-East Asia have led to new problems. The increased medical needs due to rapid aging of the population have caused a severe deficit in the nursing workforce in South-East Asia including low- and middle-income countries (LMICs).[1] In South-East Asian countries, including in Vietnam,[2] work-related stress among nurses has increased. Burnout and depression in the context of work-related stress among health-care professionals has become an important occupational health problem in this occupational group.[3] In a recent study, more than 45% of hospital nurses in Vietnam reported at least one mental symptom (ie, depression, anxiety, and stress).[4] An adverse psychosocial work environment could contribute to poor mental health of nurses. This issue has been studied extensively under several theoretical models of job stress in developed countries.[5] It is important to know what psychosocial work environment would be most associated with poor mental health among nurses in these LMICs of South-East Asia and to develop an appropriate theory-based intervention that can improve the mental health and well-being of nurses in these countries. Karasek's Job Demands-Control (DC) Model[6] and its extended version, the Demand-Control-Support (DCS) Model,[7] developed in the 1980s, are among the most well-known theories of how the psychosocial work environment can affect health of workers.[8] This theory emphasizes that job strain (the combination of high demand and low control) and the combination of job strain with low workplace support are the important factors in deteriorating worker health. The DC/DCS models have been tested and found to predict stress symptoms and poor mental health among nurses in high-income countries.[9] Among nurses, research in Taiwan showed that about 17% of nurses were categorized in the "high job strain" group (eg, high job demand and low control).[10] The components of job strain (eg, high demand, low control and low levels of social support) were associated with lower well-being,[11] higher physical symptoms,[12] higher stress-related symptoms,[13] higher catecholamine excretion and higher blood pressure more than other workers in different occupation.[14] In addition, continuing to work despite such

physical/psychological reactions was correlated with supervisor support among the nurses with high strain.[15] Although DC/CDS model is a potentially useful explanatory framework for nurses' work environment, research on the DC/DCS models among nurses in LMICs is still limited.

The Job Content Questionnaire (JCQ) is a well-established and widely used self-report instrument that measures the work dimensions based on the DC/DCS model in the workplace.[16]. The core scales of JCQ consist of (a) decision latitude (ie, job control) composed of skill discretion and decision authority; (b) psychological job demands; and (c) social support (ie, supervisor/coworker support). For over 40 years, occupational health studies using the JCQ have shown evidence that high levels of job strain has negative effects on many health outcomes, including cardiovascular, musculoskeletal, and psychiatric disease[17,18] in various working populations, including in medical settings. Validation studies for the JCQ in some countries, such as Malaysia, the Islamic Republic of Iran, China, and Spain, were conducted with nurses as study participants.[19-22] Korean and Greek versions were developed for hospital medical staff, but not restricted to nurses.[23,24] While JCQ has been widely used internationally in medical settings, research using JCQ is still limited LMICs in South-East Asia, especially low- and lower middle-income countries.

Among the over 29 JCQ translated versions currently available, most were developed in American and Western European countries. Although several language versions have been developed and validated in Asian countries, only Thai and Malay versions are available in LMICs in South-East Asia to date.[19,25] Thailand and Malaysia are upper middle-income countries, and it remains uncertain whether the JCQ is applicable to nurses in low- and lower middle-income countries in South-East Asia. Although a DC/DCS model-based questionnaire, the Demand-Control Questionnaire (DCQ), was translated into Vietnamese,[26] it was criticized because a job strain category defined by the DCQ showed only moderate concordance with that defined by the JCQ.[27] It is important to develop the JCQ and test its reliability and validity among nurses in a LMIC in South-East Asia, such as Vietnam.

The purpose of this study was to examine the internal consistency reliability and construct validity of the Vietnamese version of the core 22-item JCQ among nurses in Vietnam. The study would permit extending the use of the JCQ among nurses, which is currently limited in high-income and upper middle-income countries, to a lower middle-income country in South-East Asia,

2 | SUBJECTS AND METHODS

2.1 | Study design

With permission from Professor Robert Karasek, the developer of the JCQ, we translated 22 core items of the JCQ into Vietnamese. A baseline survey was conducted for a stress management intervention study in a large general hospital in Hanoi, Vietnam,[28] from August to September 2018. The aims and procedures of the study were explained through the head nurse of each department and a written consent form was obtained with the baseline questionnaire. Participants were assured that the survey was anonymous, and no individual would be identified in analyzing and reporting the data. The Research Ethics Committee of the Graduate School of Medicine/Faculty of Medicine, The University of Tokyo (no. 11991-(1)), and the Ethical Review Board for Biomedical Research, Hanoi University of Public Health (no 346/2018/YTCC-HD3) reviewed and approved this study.

The study conformed to the Consensus-based Standards for the Selection of the Health Measurement Instrument (COSMIN) guideline, which is used to improve the quality of developing health-related self-reporting measurement instruments.[29] Each characteristic of the measure was reported according to the COSMIN checklist.

2.2 | Participants

An invitation to participate in the study, information about the study, an informed consent form, the questionnaires and a numbered envelope in which to anonymously return the completed questionnaire were distributed to all registered nurses (n = 1258) in the hospital, excluding those who were going to retire within 7 months (n = 11). Nurses individually returned the completed questionnaires in a sealed envelope into a box. The staff of Hanoi University of Public Health (HUPH) collected the completed questionnaires and numbered envelopes and information was entered into a database by HUPH staff.

2.3 | Measurements

2.3.1 | The job content questionnaire

The JCQ originally comprised 49 items.[16] We used four core scales of the JCQ (JCQ-22) that included 22 items of

the following scales: a five-item psychological demand scale, a nine-item decision latitude scale, a four-item supervisor support scale, and a four-item coworker support scale. Response categories for these items are on a four-point scale: "Strongly disagree," "Disagree," "Agree," and "Strongly agree"(range, 1-4). A sum of weighted item scores was used as a scaled score according to the following calculation formula:[30]

$$\text{Skill Discretion} = (Q3 + Q5 + Q7 + Q9 + Q11 + (5 - Q4)) * 2$$

$$\text{Decision Authority} = (Q6 + Q10 + (5 - Q8)) * 4$$

$$\text{Decision Latitude} = (\text{Skill Discretion}) + (\text{Decision Authority})$$

$$\text{Psychological Demand} = (Q19 + Q20) * 3 \\ + (15 - (Q22 + Q23 + Q26)) * 2$$

$$\text{Supervisor Support} = Q27 + Q28 + Q30 + Q31$$

$$\text{Coworker Support} = Q32 + Q33 + Q35 + Q37$$

The authors complied with the ISPOR taskforce guideline,[31] which is the standard procedure for translation and adaptation of self-reporting scales in other languages. The Vietnamese translation of JCQ22 items was prepared by the Vietnamese co-authors who are fluent in English and knowledgeable about occupational stress theory. The forward translation was reviewed and adjusted by collaborators in HUPH. A pilot test and discussion of the questionnaire items were conducted with 30 nurses to ensure that the items were relevant and meaningful to this population. Nurses were asked whether questionnaire items were easy to understand and applicable in the context of their work environment to determine whether alternative wording might be more appropriate and to check interpretation and cultural relevance of the Vietnamese translation. After these consultations with nurses, the wording of only a few items was revised, while ensuring that the original meaning was not altered, the (slightly) amended version was back-translated into English by an independent translator and reviewed by research members of the University of Tokyo, including the researcher who developed the Japanese version of JCQ22.[30] A pilot study was then conducted, with 150 nurse participants, in June 2018. As no problematic issues were identified in the pilot study, this was accepted as the final Vietnamese version of the JCQ.

2.3.2 | Overtime work

Respondents were asked to rate their overtime work in the prior 4 weeks (28 days). Overtime work was measured in two ways; extra work in addition to their regular working hours

TABLE 1 Demographic characteristics of the study participants from hospital nurses in Vietnam (N = 949)

	% (n)
Gender	
Men	15.1 (143)
Women	84.9 (806)
Age, mean (SD)	6.8 (33.1)
Education	
Vocation school	46.7 (443)
Colleges	14.4 (137)
University undergraduate	36.7 (348)
Postgraduate	1.8 (17)
Unknown	0.4 (4)
Marital status	
Single	14.4 (137)
Married	83.6 (793)
Divorced/widowed	1.7 (16)
Unknown	0.3 (3)
Employment contract	
Fixed-term, ≦1 y	23.2 (220)
Fixed-term, >1 y	3.2 (30)
No fixed-term	20.4 (194)
Permanent	53.2 (505)

Abbreviation: SD, standard deviation.

and holiday work, by asking "How many days did you come in early, go home late?" and "How many days did you work on your day off?," respectively.

2.3.3 | Depression, anxiety, and stress

The 21-item version of DASS measures symptoms of depression, anxiety, and stress with seven items for each of the three subscales.[32] All items were rated on a 4-point Likert-type scale, ranging from 0 "did not apply to me at all" to 3 "applied to me very much, or most of the time," accordingly. Each of the three subscale scores ranged from 0 to 21. The Vietnamese version of DASS 21 has previously been validated and confirmed.[33]

2.3.4 | Demographic variables

Demographic and occupational variables were assessed by a questionnaire, including gender (male or female), age, education status (vocational school, college, university undergraduate or postgraduate), marital status (single, married or divorced/widowed), and employment contract (fixed-term contract for <1 year, fixed-term contract for more than 1 year, unspecified-term contract, permanent contract, or others). Age was calculated based on the year of birth.

2.4 | Statistical analysis

Statistical significance was defined as $P < .05$. All the statistical analyses were performed using SPSS 25.0, Japanese version (SPSS Inc).

To assess the internal consistency, Cronbach's alpha (α) coefficients were calculated for each of four-factor scores (ie, psychological demand, decision latitude, supervisor support, and coworker support) of JCQ in Vietnamese. Cronbach's α > .7 was the criterion for acceptability.

In the exploratory factor analysis (EFA), factors with eigenvalues of more than 1.0 were extracted and the Promax rotation method was used to obtain factor structures, using a robust maximum likelihood estimation. Based on the previous research, authors hypothesized a four-factor structure. Before conducting EFA, the scores of five items were reversed as recommended in the JCQ guidelines:[34] two items for decision authority (Q4: "repetitive work" and Q8: "little decision freedom") and three items for psychological demand (Q22: "no excessive work," Q23: "enough time," and Q26: "no conflicting demands").

As a hypothesis test for construct validity, Pearson's correlation coefficients (rs) were calculated between the total score of the JCQ and two groups of variables: indicators of overtime working and DASS 21. This construct approach corresponded to convergent validity; comparison with other outcome measurement instruments. In addition, a one-way factorial ANOVA was performed to compare the scores of JCQ four scales among demographic and occupational variables.

3 | RESULTS

3.1 | Characteristics of participants

We received responses from 949 (75%) of the target sample. Female 85%, average age 33.1 years old. The demographic characteristics of the participants are shown in Table 1. Many of the participants had graduated from vocational school (46.7%) and were married (83.6%). Employment contracts of most nurses were permanent (53.1%).

3.2 | Internal consistency reliability

Table 2 shows mean scores and Cronbach's alphas (α) for all JCQ scales. The Cronbach's α coefficients were below the acceptability threshold (α > .7) for psychological demands (α = .50) and decision latitude (α=.45), but well above for supervisor support (α = .87) and coworker support (α = .86).

3.3 | Factor structure of JCQ in Vietnamese

The results of EFA are shown in Table 3. The EFA yielded four factors: all items of, two factors—Decision Latitude and

TABLE 2 Average, standard deviation (SD) of JCQ scores in a sample of hospital nurses in Vietnam (total N = 949)

Scales (Number of items) [possible range]	Mean	SD	Cronbach's α
Decision latitude (9) [24-96]	71.0	6.4	.45
Skill discretion (6) [12-48]	34.5	3.4	.43
Decision authority (3) [12-48]	33.5	4.1	−.04
Psychological job demands (5) [12-48]	31.6	4.4	.50
Social Support			
Supervisor (4) [4-16]	12.0	1.9	.87
Coworkers (4) [4-16]	12.2	1.5	.86

Note: Participants who had missing data were excluded from each analysis.
Abbreviation: SD, standard deviation.

Coworker Support—loaded most on the corresponding factors as expected. However, one item related to psychological demands (Q26: "no conflicting demands") was loaded most on a factor representing the Supervisor Support; an item related to decision latitude (Q9: "variety") loaded most on a factor of Psychological Demands.

3.4 | Convergent validity

Table 4 shows correlations between JCQ scores and overwork and DASS21. In the convergent validity, both of the two types of overwork and three subscales of DASS 21 were significantly but weakly correlated with high psychological demands ($0.11 \leq r \leq 0.22$). Supervisor and coworker support negatively correlated with all variables ($-0.04 \leq r \leq -0.20$). Most correlation coefficients, except the correlation between overwork and decision latitude, indicated good convergent validity.

Table 5 shows the results of variance analysis to examine the difference between each category of demographic characteristics. One-way ANOVA revealed some significant differences among variables (eg, associations between high education status (postgraduate) and higher psychological demands, short employment contract (fixed term below 1 year) and lower psychological demands and higher supervisor/coworker support).

4 | DISCUSSION

As far as we know, this is the first study to develop and test the JCQ in a South-East Asian lower middle-income country. Among scales of the newly translated Vietnamese version of the JCQ, supervisor and coworker support scales showed an acceptable level of internal consistency reliability, while it was lower for scales of psychological demands and decision latitude. In EFA, the four-factor model was well-adjusted for the JCQ in Vietnamese, except for two items. Most of the JCQ scale correlated highly with workload and stress symptoms measured by other scales in the theoretically expected directions, supporting the convergent validity of the scale. As shown by ANOVA, there were some significant differences in JCQ scores by demographic characteristics. The findings support that the Vietnamese version of supervisor and coworker support scales of the JCQ are a reliable and valid measures of these psychosocial job characteristics among Vietnamese nurses; however, a careful consideration is needed to apply the scales of psychological demands and decision latitude in this occupation in Vietnam, as other studies previously indicated.[19-21,23]

The strength of this study is the careful process of translating the scales, including consulting professionals and users on all contents (eg, items, tasks and parameters) in a qualitative way. Content validity, considered to be the most important measurement property by COSMIN, ensures that all contents of an outcome measurement instrument is relevant, comprehensive, and comprehensible with respect to the construct of interest and target population.[29] Therefore, the Vietnamese version of the JCQ was properly developed and tested, following the evidence-based guideline.

Cronbach's alpha coefficients were high for supervisor and coworker support (0.87 and 0.86, respectively), indicating that these scales are acceptably reliable. However, Cronbach's alpha coefficients of psychological demands (α = .50) and decision latitude (α = .45) were below the acceptability criterion (α > .7). Reliability for psychological demands has often been reported as low to moderate in Asian studies, ranging from 0.41 to 0.58 among nurses[19-21,23] and 0.23 to 0.65 among general workers.[25,30,35] The result of this study is consistent with previous research in Asia. Authors of previous research studies suggested that five questions in this scale might too few for various psychological demands encountered at the workplace in Asian countries, particularly those experiencing rapid changes. Medical employees have been required to learn new technologies, which they have found psychologically demanding.[23] For the nurses, some studies have also demonstrated similarly low internal consistency for decision latitude; ranging from 0.54 to 0.72 among nurses[19-21,23] and 0.68 to 0.84 among general workers[25,30,35] in Asia, while the result of this study was lowest. In this study, two items; Q4: "repetitive work" and Q8: "little decision freedom" which must be reversed, correlated with other scales of decision latitude (data available upon request) even before reversing, contrary to theory. After dropping these two items, the alpha coefficients increased to an almost acceptable value (α = .67). This indicated that these two items correlated poorly with other items in the decision latitude scale. These items thus would be inappropriate to the context of medical settings in Vietnam.

Item†		Factor			
		1	2	3	4
Factor 1 Supervisor support					
Q49 (SS)	Supervisor pays attention	**.973**	−.127	−.038	.010
Q51 (SS)	Helpful supervisor	**.844**	.052	−.122	.073
Q52 (SS)	Supervisor good organizer	**.742**	.124	−.102	.086
Q48 (SS)	Supervisor is concerned	**.705**	−.029	.063	−.053
Q26R (PD)	No conflicting demands	**−.291**	−.043	−.041	.101
Factor 2 Coworker support					
Q56 (CS)	Friendly coworkers	−.109	**.851**	−.017	.025
Q58 (CS)	Coworkers helpful	.001	**.804**	.022	.021
Q54 (CS)	Coworker interest in me	.065	**.767**	−.047	−.026
Q53 (CS)	Coworkers competent	.129	**.642**	.017	−.031
Factor 3 Decision latitude					
Q5 (SD)	Requires creative	.016	−.079	**.680**	−.078
Q3 (SD)	Learn new things	.022	.013	**.570**	−.010
Q7 (SD)	High skill level	.049	−.011	**.538**	.135
Q6 (DA)	Allows own decisions	.029	.041	**.361**	.093
Q4R (SD)	Repetitive work	.104	−.007	**−.325**	−.120
Q11 (SD)	Develop own abilities	.265	.066	**.306**	−.130
Q10 (DA)	Lot of say	.179	.221	**.241**	−.030
Q8R (DA)	Little decision freedom.	.148	−.051	**−.174**	−.073
Factor 4 Psychological job demand					
Q20 (PD)	Work hard	.002	−.029	.094	**.724**
Q19 (PD)	Work fast	.025	.087	.091	**.510**
Q9 (SD)	Variety	−.035	−.046	.254	**.417**
Q23R (PD)	Enough time	−.240	−.002	−.144	**.262**
Q22R (PD)	No excessive work	−.152	−.046	−.079	**.257**

Primary loadings for each items are in bold.

Abbreviation: R, reversed items.

†The items are abbreviated. Letters in the parentheses indicate a scale that the item originally belong to: SS, supervisor support; CS, coworker support; SD, skill discretion. DA, decision authority; PD, psychological job demand. SD and DA are subscales of decision latitude.

From the EFA of the 22-item JCQ, the factor patterns for decision latitude, psychological job demand, and social support clearly corresponded to the theoretical construct of the DCS model. However, there were two exceptions: the item Q26: "no conflicting demands" was negatively loaded on supervisor support, instead of psychological demands. It might be possible that nurses considered this question as the process of decision-making with supervisors, as opposed to with doctors or patients. The item of Q26: "no conflicting demands" has been criticized in other studies,[16,25,30,35,36]

being likely to have low loading values and sometimes belonging to the margin of other factors. The authors of the Taiwan-JCQ study noted that language and terminology occasionally influence the answers to this question, leading to misunderstanding in interpretation.[35] Meanwhile, the item Q9: "variety" was positively loaded on psychological demand. A previous study of hospital staff in Korea also reported a similar finding.[23] Among nurses, the degree of job variety could be perceived as a workload. In addition, the internal consistency was negative for the decision authority

TABLE 4 Pearson's correlation coefficients[†] between the total score of JCQ and overtime work (morning or night, or holiday) and depressive, anxiety, and stress symptoms among nurses in Vietnam

Variables (possible range)	N	Mean	SD	Psychological demands	Decision latitude	Supervisor support	Coworker support
Overwork							
Morning or Night (0-28 d/mo)	936	5.8	8.8	0.22**	0.04	−0.14**	−0.04
Holiday (0-28 d/mo)	941	2.1	1.7	0.11**	0.07*	−0.07*	−0.05
DASS21							
Depressive symptom (0-21)	933	3.0	2.9	0.17**	−0.15**	−0.20**	−0.20**
Anxiety symptom (0-21)	936	3.9	3.1	0.19**	−0.07	−0.16**	−0.11**
Stress reaction (0-21)	936	5.6	3.6	0.18**	−0.07*	−0.16**	−0.16**

Abbreviation: SD, standard deviation.

[†]Participants who had missing data were excluded from each analysis.

**$P < .01$,

*<.05.

subscale ($\alpha = -.04$). This is partly because Q8: "little freedom of decision" (reversed) was independent of the other items of the subscale, Q6: "allows own decisions" and Q10: "lot of say," as indicated by the EFA. Actually, the Q8 asks the decision on how to work. Nurses usually work on allocated tasks in a team. They may not have the freedom of decision on how to work, while they still have a chance to make own decision and lot of say on their allocated tasks. The decision latitude scale of the JCQ could be revised or reorganized considering specific characteristic of nursing job. Removing Q9: "variety" and separating task-level (eg, Q6 and Q10) and team-level (eg, Q8) decision authority may improve the measurement of decision latitude among nurses using the JCQ.

As expected, most of the scores on the JCQ correlated with the indicators of overtime work (morning or night, or holiday) and depressive, anxiety, and stress symptoms, except for the association between overwork and decision latitude. However, this may be reasonable because health-care workers are likely to have longer working time and higher job control than other occupations.[37] Nurses with high control in the hospital in Vietnam might be likely to work actively with authority, which would lead to a longer work hours. Long working hours, even with high control, are associated with lower self-rated health, compared with short working hours.[38] This association has suggested a possible target population among nurses for intervention.

One-way ANOVA showed statistically significant differences among each variable; high education status (postgraduate) and high psychological demand, short job contract (fixed-term, ≦1 year) and low psychological demand and high supervisor/coworker support, marital status (divorced/widowed) and low supervisor support, and women scored higher on coworker support than did men. In a Vietnam hospital, nurses with short-term jobs are more likely to be involved in a low-pressure environment, low

demand and high support. Previous research with nurses, however, has not shown the length of tenure to be associated with psychosocial job environment as a common antecedent of job stress.[39] In the hospital in which this study was conducted, nurses might be assigned different work according to their education, history, and contract tenure.

5 | LIMITATIONS

Finally, some possible limitations should be noted. First, the repetitive stability of the scale is uncertain because test-retest reliability was not examined. In the JCQ validation studies, test-retest reliability has rarely been tested, except for a few studies,[23,35,40] because work conditions change easily, which could cause an underestimation of true stability. Second, as an important form of construct validity, cross-cultural validity has not been examined in this study. However, structural validity and hypotheses testing were conducted and well-evaluated, indicating sufficient construct validity. Third, participants were all nurses. It is unclear whether the Vietnamese version of JCQ can be applicable for other occupations. Fourth, this study has validated only the core 22-item JCQ, not the recommended format of 49 items.[34] However, because workplaces in LMICs such as Vietnam are so busy and complicated, especially in medical settings, the shorter form of the scale is likely to be more feasible.

6 | CONCLUSION

In conclusion, the findings of this study indicate that the Vietnamese version of the JCQ has acceptable in reliability and validity for assessing psychosocial work conditions among Vietnamese nurses, in spite of relatively low internal consistency

TABLE 5 Comparison with the participant characteristics for four scales of JCQ in Vietnamese (One-way ANOVA)

Category (number)	Psychological demands Mean (SD)	F	P	Decision latitude Mean (SD)	F	P	Supervisor support Mean (SD)	F	P	Coworker support Mean (SD)	F	P
Gender												
Men (143)	31.2 (4.6)	0.86	.35	71.5 (7.1)	0.79	.38	12.0 (2.0)	0.09	.77	12.0 (1.9)	4.21	.04
Women (806)	31.6 (4.4)			71.0 (6.3)			12.0 (1.8)			12.2 (1.4)		
Age												
20-29 (349)	31.3 (4.4)	0.92	.40	70.7 (6.5)	1.36	.26	12.1 (1.9)	1.12	.33	12.3 (1.5)	2.57	.08
30-39 (428)	31.5 (4.4)			71.4 (6.4)			11.9 (1.9)			12.1 (1.5)		
>40 (172)	31.9 (4.5)			70.9 (6.4)			11.9 (1.8)			12.1 (1.3)		
Education												
Vocation school (443)	31.7 (4.5)	3.50	.02	71.3 (6.4)	1.19	.31	12.1 (1.9)	2.46	.06	12.3 (1.4)	1.06	.37
Colleges (137)	30.5 (4.5)			70.2 (6.8)			12.2 (2.0)			12.3 (1.6)		
University (348) undergraduate	31.7 (4.2)			71.1 (6.4)			11.8 (1.8)			12.1 (1.4)		
Postgraduate (17)	33.2 (4.2)			72.0 (5.9)			11.6 (2.3)			12.4 (1.9)		
Marital status												
Single (137)	31.1 (4.6)	0.84	.43	70.7 (5.8)	1.71	.18	12.4 (1.9)	10.0	<.01	12.5 (1.7)	2.67	.07
Married (793)	31.6 (4.4)			71.2 (6.5)			12.0 (1.8)			12.2 (1.5)		
Divorced/widowed (16)	31.3 (3.5)			68.4 (8.2)			10.3 (2.3)			12.0 (0.5)		
Employment contract												
Fixed-term, ≦1 y (220)	30.7 (4.5)	3.36	.02	70.8 (6.0)	0.46	.71	12.4 (1.9)	4.04	<.01	12.6 (1.5)	6.93	<.01
Fixed-term, >1 y (30)	32.5 (4.2)			70.4 (5.3)			11.8 (1.9)			11.9 (2.1)		
No fixed-term (194)	31.9 (4.4)			71.4 (7.2)			11.9 (1.9)			12.0 (1.5)		
Permanent (505)	31.6 (4.4)			71.1 (6.3)			11.9 (1.8)			12.1 (1.4)		

Abbreviation: SD, standard deviation.

reliability of psychological demand and decision latitude. The structure of the Vietnamese JCQ by factor analysis was slightly different from the original instrument. A careful consideration is needed to apply the JCQ scales of psychological demands and decision latitude in this occupation in Vietnam, as in other countries, because few items may not correctly address these psychosocial factors at work. Further research needs to test the Vietnamese JCQ in a variety of occupational groups.

DISCLOSURE

Approval of the research protocol: This study was approved by The Research Ethics Committee of the Graduate School of Medicine/Faculty of Medicine, The University of Tokyo (no. 11991-(1)), and the Ethical Review Board for Biomedical Research, Hanoi University of Public Health (no 346/2018/YTCC-HD3) regarding research protocol. *Informed consent*: Written informed consent was obtained from all participants with full disclosure and explanation of the purpose and procedures of this study. We explained that their participation was voluntary, and they can withdraw from the study at any time even after voluntarily participating without any reason. *Registry and the registration no. of the study/trial*: N/A. *Animal studies*: N/A. *Conflict of interest*: None declared.

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