

Occupational Stress and Its Related Factors among University Teachers in China

Wei SUN¹, Hui WU² and Lie WANG²

¹Department of Environmental Health and ²Department of Social Medicine, School of Public Health, China Medical University, P.R. China

Abstract: Occupational Stress and Its Related Factors among University Teachers in China: Wei SUN, et al. Department of Environmental Health, School of Public Health, China Medical University, P.R. China—Objectives: University teachers in China are expected to suffer serious occupational stress due to the expanding enrollment in universities without a proportional increase in teacher resources and the fact that all promotions for university teachers are determined based on not only teaching but also the outcome of scientific research. This study was designed to assess the occupational stress among university teachers in China and clarify its risk factors. **Methods:** A cross-sectional study was performed in Liaoning Province, the centralized area of higher education in Northeast China. Eight universities (2 multidiscipline and 6 specialized) and 10% of academic staff each were randomly sampled. Questionnaires pertaining to occupational stress indicated by the Chinese Version Personal Strain Questionnaire (PSQ) and demographic characteristics, health status, work situations, and personal and social resources were distributed in October 2008. A total of 827 effective respondents (response rate 76.4%) became our participants. **Results:** The average raw score of PSQ was 91.0 among the university teachers. General linear model analysis showed that the factors significantly associated with the PSQ score were, in standardized estimate (β) sequence, mental health, role overload, role insufficiency, social support, monthly income, role limitations due to physical problems, research finance and self-rated disease with adjustment for age and sex. **Conclusion:** We concluded that, in comparison to work-related factors and social support, mental health is a prominent

risk factor for occupational stress in university teachers in China. Improvement of mental health and organizational climate should be considered to lessen the occupational stress of university teachers. (J Occup Health 2011; 53: 280–286)

Key words: China, Mental health, Occupational stress, University teachers

Occupational stress is a complex biopsychosocial situation and has been recognized worldwide as a major health hazard for employees^{1–4}). Thus, assessment of occupational stress and its risk factors has become an accelerating interest in recent years.

With the rapid technological development in recent decades, the education sector, as the heart of the education and training system, has experienced a considerable transformation in China. This change resulted in increasing competition particularly in university due to the combination of both education and scientific research. In comparison to primary school and high school, all promotions for university teachers are directly linked to the outcome of their research in addition to teaching. Moreover, the expansion of enrollment in universities implemented by the Ministry of Education of the People's Republic of China in 1999 resulted in admission of 5.99 million students in 2008, more than 5 times than that in 1998. Unfortunately, the increase in teacher resources, the majority of which took teaching task at universities, was less proportional to the amount of students. This contradiction inevitably placed a great teaching burden on university teachers. All these facts increase the likelihood that university teachers in China might suffer serious occupational stress. However, to our knowledge, few studies pertaining to occupational stress among university teachers have been reported in China.

The present study was designed to assess occupational stress among university teachers in China and to clarify its related factors. Previous studies conducted in Australian

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Correspondence to: L. Wang, Department of Social Medicine, School of Public Health, China Medical University, 92 Bei'er Road, Heping District, Shenyang, 110001, P.R. China (e-mail: liewang@mail.cmu.edu.cn)

universities reported that lack of research finance, lack of support, task overload, poor leadership and job insecurity were the major sources of stress^{5, 6}. In New Zealand, dissatisfaction due to work overload was found to be the main cause of stress for university staffs⁷. In the UK, job insecurity, lack of control and problems in communication were shown to be related to higher job stress among university staff^{8, 9}. Besides, poor physical conditions and difficulty in meeting job and family demands were also reported to be able to result in occupational stress for university academic staff as reviewed by Biron¹⁰. Excluding conclusions drawn from university staff, studies conducted among other professions revealed that age, sex, education, health outcome, role insufficiency, self-care and coping strategy were significantly associated with occupational stress¹¹⁻¹⁴. Taking into consideration of previous conclusions and the biopsychosocial complexity of occupational stress, we investigated demographic characteristics, health status, work situations and personal and social resources in the present study to explore the factors in relation to occupational stress with the purpose of lessening the occupational stress of university teachers in China.

Materials and Methods

Study population

Shenyang City is the capital of Liaoning Province and the centralized area of higher education in Northeast China, with all kinds of universities including multidiscipline and specialized universities focusing on engineering, agriculture science, architecture, chemical technology, aeronautics and astronautics and medicine. Eight universities (2 multidiscipline universities and 1 university from each of the 6 focuses) were randomly selected, and 10% of the academic staff were randomly sampled from each selected university, a total of 1083 people. After obtaining written informed consent concerning conduct of the survey, questionnaires were distributed to all these individuals through the labor union of each university in October 2008. We received effective responses from 827 individuals (response rate 76.4%), and these people became our participants. The study received ethics approval from the Committee on Human Experimentation of China Medical University.

Selection of the indicator of occupational stress

In regard to the assessment instruments, the occupational stress inventory¹⁵, job strain model¹⁶, effort-reward imbalance model¹⁷ and occupational stress indicator^{18, 19} were available to measure occupational stress. Among these indicators, the occupational stress inventory based on the transactional model including work environmental stressors, resultant psychological strain and available coping resources has been widely applied among the Chinese population with good reliability and validity²⁰⁻²³.

Since an individual's perception of strain could lead directly to a health disorder, we focused our attentions on the subjective consequence of the occupational stressors, rather than assessment of the environmental stressors. Therefore, the Personal Strain Questionnaire (PSQ) included in the Occupational Stress Inventory-Revised (OSI-R), which has been used particularly as the indicator of resultant psychological strains, was selected to assess occupational stress in this study.

Assessment of occupational stress

The Chinese version PSQ (40 items) was obtained from Zhu's report²⁴. It included 4 subscales: vocational strain, psychological strain, interpersonal strain and physical strain. Vocational strain (10 items) measured the attitudes towards work and the problems in work quality or output. Psychological strain (10 items) assessed the extent of psychological and/or emotional problems being experienced by an individual. Interpersonal strain (10 items) examined the level of interpersonal disruption. Physical strain (10 items) measured the physical illness and/or poor self-care. PSQ integrated the four subscales and measured the outcome of the occupational stressors, as manifested in personal strain. Each item had five answer possibilities, "never," "seldom," "sometimes," "often" and "always." The response was scored from 1 for "never" to 5 for "always." The higher the score was, the greater the stress became. Cronbach's alpha was 0.93 in the present study.

Measurements of demographic characteristics, health status, work situations and personal and social resources

Demographic characteristics included age, sex, education, marital status and monthly income. "Education" was dichotomized as "undergraduate course" and "graduate course," since people without a bachelor's degree cannot become academic staff at a university. "Marital status" was assessed as "single," "married," "cohabitation," "widow," "divorced" and "separated." "Monthly income" was divided into "<2,000 yuan," "2,000-3,000 yuan" and ">3,000 yuan" groups according to the payment scale for the educational employees.

Health status was assessed on the basis of 4 items: 1) self-rated disease, 2) physical functioning, 3) role limitations due to physical problems and 4) mental health. "Self-rated disease" included chronic diseases such as hypertension, cardiovascular disease, diabetes, stroke or peptic ulcers²⁵ and neurologic diseases such as neurasthenia, neurodermatitis and migraine that, in comparison to the general level in China (1.30%), were particularly prevalent among teachers (11.1%) and ranged in the top ten in the spectrum of diseases for teachers²⁶. It was assessed dichotomously as "presence" if any chronic disease or neurologic disease above had been diagnosed. "Physical

Table 1. The subject characteristics and correlations of the PSQ score with continuous variables

Variables	Total (N=827)	
	Mean \pm SD	<i>r</i>
PSQ scores	91.0 \pm 21.14	
Demographic characteristics		
Age (yr)	35.9 \pm 8.24	-0.01
Health status		
Physical functioning	82.3 \pm 20.23	-0.25**
Role limitations due to physical problems	79.3 \pm 33.80	-0.30**
Mental health	64.8 \pm 17.17	-0.59**
Work situations		
Working years	12.6 \pm 9.51	-0.00
Role overload	28.7 \pm 5.47	0.39**
Role insufficiency	25.4 \pm 4.74	0.42**
Personal and social resources		
Self-care	30.5 \pm 5.27	-0.29**
Rational/cognitive coping	33.3 \pm 6.34	-0.32**
Social support	36.2 \pm 5.97	-0.37**

**: $p < 0.01$.

functioning," "role limitations due to physical problems" and "mental health" were examined by referring to the Chinese SF-36 Health Survey²⁷).

Work situations comprised 5 items: 1) working years, 2) professional position, 3) research finance, 4) role overload and 5) role insufficiency. "Professional position" was categorized as "assistant," "lecturer," "associate professor" and "professor." "Research finance" was dichotomized as "have" and "do not have." "Role overload" was used to assess workload¹⁵. It included 10 items, and a high score indicated an increasing, unreasonable, and unsupported workload. "Role insufficiency" comprised 10 items and described the fit between the teacher's skills and the job demand¹⁵. A high score represented a poor fit of the skills for job performance.

Personal and social resources included 4 items: 1) self-care, 2) rational/cognitive coping, 3) social support, and 4) family event. "Self-care" was examined according to whether an individual exercised regularly, slept 8 hours per day, made careful dietary choices, practiced relaxation techniques and avoided harmful substances¹⁵. "Rational/cognitive coping," drawn from the OSI-R scale¹⁵, was selected to assess the ability of an individual to have a systematic approach to solving problems, think through the consequences of their choice and be able to identify important elements of problems encountered. "Social support" was scored according to whether the individual knew at least one person who could be counted on, valued them and/or loved them¹⁵. "Family event" was described as "presence" if death, disease, unemployment or disappointment in love had happened to any family

members in the last year.

Statistical analysis

The raw score of PSQ was used to perform data analysis. The distributions of PSQ in categorical variables were examined by the Student's t-test and one-way ANOVA. For the categorical variable, groups for which the response rate was less than 5% were combined. In this study, only 11 participants (1.36%) belonged to the "widow/divorced/separated" group, and therefore, this group was combined with the "single" group for analysis of "marital status." Correlations of PSQ with all continuous variables were tested by Pearson correlation. General linear model analysis was used to explore the factors in relation to PSQ. Items with $p > 0.15$ were eliminated one at a time in the sequence of p value. When an item was eliminated, if the change in any remaining parameter estimate was greater than 20%, the item would remain in the model as a confounder. In this study, no confounder was found during elimination. SAS for Windows, Ver. 8.2, was used for all statistical analyses.

Results

The subject characteristics and correlations of the PSQ score with continuous variables are shown in Table 1. The average raw score of PSQ was 91.0. It was significantly correlated with physical functioning, role limitations due to physical problems, mental health, role overload, role insufficiency, self-care, rational/cognitive coping and social support. Among our subjects, the numbers of teachers working at the multidiscipline and specialized universities were 190 and 637 respectively. The factors

Table 2. The subject characteristics and distributions of the PSQ score in categorical variables

Variables		Total (N=827)	
		N	Mean \pm SD
Demographic characteristics			
Universities	Multidiscipline	190	91.9 \pm 21.47
	Specialized	637	90.7 \pm 21.05
Sex	Men	343	92.8 \pm 21.20*
	Women	484	89.7 \pm 21.02
Education	Undergraduate	236	91.6 \pm 21.56
	Graduate	591	90.7 \pm 20.98
Marital status	Married/cohabitation	702	90.9 \pm 21.03
	Single/widow/divorced/separated	99	90.1 \pm 21.72
Monthly income (yuan)	<2,000	92	88.7 \pm 22.02
	2,000–3,000	439	90.2 \pm 20.61
	>3,000	285	92.5 \pm 21.43
Health status			
Self-rated disease	Absence	610	88.6 \pm 21.13
	Presence	217	97.5 \pm 19.79**
Work situations			
Professional position	Assistant	143	88.9 \pm 21.42
	Lecturer	341	89.8 \pm 20.44
	Associate professor	248	93.8 \pm 21.12
	Professor	77	90.2 \pm 23.34
Research finance	Do not have	457	91.0 \pm 21.48
	Have	370	90.9 \pm 20.74
Personal and social resources			
Family event	Absence	642	90.0 \pm 21.56
	Presence	185	94.1 \pm 19.35*

* and **: $p < 0.05$ and $p < 0.01$, respectively.

significantly correlated with PSQ among these two groups were the same as those for the total population.

The subject characteristics and distributions of the PSQ score in categorical variables are shown in Table 2. The raw score of PSQ was significantly higher in men than in women, and it was significantly related to self-rated disease and family event.

The results of the general linear model analysis for exploring the factors associated with the PSQ score are shown in Table 3. With adjustment for age and sex, PSQ was significantly associated with, in standardized estimate (β) sequence, mental health, role overload, role insufficiency, social support, monthly income, role limitations due to physical problems, research finance and self-rated disease.

Discussion

To our knowledge, the present study is the first to assess the occupational stress and its risk factors among university teachers in China. Academic teachers from both multidiscipline universities and specialized universities

focusing on engineering, agriculture science, architecture, chemical technology, aeronautics and astronautics and medicine composed our study population. The average age of these participants was almost the same as the general level for higher educational institution staff (36.3 yr) according to the data of the Ministry of Education of the People's Republic of China. The ratio of men to women among these respondents was 1:1.4, which is similar to the value (1:1.3) obtained especially from academic university teachers in other province²⁸). Therefore, our study population seemed to have a good representation, which increased the generalization of the study conclusion. Among this study population, the average raw score of PSQ was 91.0, 4.7% and 9.8% higher than the levels obtained from doctors¹¹) and teachers in primary and high schools²⁹) respectively. Our results revealed the fact that, as we hypothesized, academic university teachers in China suffer a rather serious occupational stress.

With respect to the risk factors, health status has been consistently regarded as the base among the causes of any

Table 3. The general linear model analysis for exploring the factors associated with PSQ score

Variables	Parameter estimate (B)	Standardized estimate (β)	Model R-Square
Intercept	104.11		
Age (yr)	-0.24***	-0.09	
Sex (male vs. female)	0.98	0.02	
Mental health	-0.50***	-0.41	
Role overload	0.87***	0.22	
Role insufficiency	0.97***	0.22	
Social support	-0.46***	-0.13	
Monthly income (2,000–3,000 vs. >3,000)	-4.86**	-0.07	
Monthly income (<2,000 vs. >3,000)	-3.18**	-0.08	
Role limitations due to physical problems	-0.04**	-0.06	
Research finance (do not have vs. have)	2.10*	0.05	
Self-rated disease (no vs. yes)	-2.09*	-0.04	0.5118***

*, ** and ***: $p < 0.15$, $p < 0.05$ and $p < 0.01$, respectively; age and sex were fixed in the model.

disorder or illness, and therefore, various items related to health status were assessed in the present study. Our results indicated that physical conditions such as role limitations due to physical problems and self-rated disease and mental health could affect the occupational stress of university teachers. Moreover, mental health was found to have the strongest association with occupational stress in both univariate and multivariate analysis, rather than work-related factors as reported among academic staff at universities in foreign countries^{6,7} or other professions^{11,12}. In the studies pertaining to occupational stress, physical conditions have been well considered^{5–12}. In regard to mental health, most attention has been focused on the effect of occupational stress on mental disorders^{30–32}. However, an individual who is more easily influenced by nervous, excited, downhearted or tired mood tends to more seriously sink into dissatisfied or even negative affectivity, which, in turn, results in an adverse perception of work environment. This adverse perception could cause a kind of stress and aggravate the stress. Actually, poor mental health could make an individual prone to occupational stress, and the latter could also deteriorate mental health. It seems to be a vicious cycle. Unfortunately, as the first attempt, our attention was initially focused on exploring the risk factors. The indirect or mediated effects and the causative relation were not able to be examined by this design. Even so, we still recommend that not only physical conditions but also mental health status should be considered during the assessment of occupational stress.

In regard to work-related factors, role overload, role insufficiency and lack of research finance have been reported to strongly affect occupational stress among academic staff at universities^{5–8}. In the present study, we also confirmed their strong associations with occupational stress of university teachers in China. The transformation

of the education system and expanding enrollment strategy implemented in 1999 produced an immense workload for university teachers in China, which was able to increase the probability of teachers falling into the feeling of working under tight deadlines and needing more help. Inevitably, the immense teaching burden was also able to cause the teachers to become depressed about the sufficiency of their skills and knowledge to meet the demands of their job. In addition, differing with the teachers in other schools, university teachers only have chance to compete for promotions if they can obtain research funding. Correspondingly, the lack of research finance is expected to impose another strain on university teachers. Therefore, decreasing the workload, enhancing role sufficiency and improving the regulations for promotions seem to be a way to lessen occupational stress for the academic staff of universities.

Personal and social resources have been reported as other major risk factors for occupational stress^{13,14}. In regard to the academic staff of universities, family-job conflict and lack of social support and communication have been documented as being the main social sources of occupational stress^{5,8}. In this study, the effect of family events on occupational stress was also found to be significant in the univariate analysis. In comparison to the teachers without the occurrence of family events, teachers with higher demands from family would have difficulty coping with their workload well, which will inevitably result in a kind of stress. However, taking into consideration of health status and work-related factors, the effect of social support, rather than family demand, on occupational stress was found to be significant in the multivariate analysis. Since the creed of Confucianism is the great intellectual achievement of China, emotional support from friends, families and relatives seems to be

considerably effective for Chinese to relieve strain and decrease conflicts. Thus, the establishment and maintenance of a kind social network seems to be particularly important for university teachers to obtain social support aimed at lessening occupational stress.

In addition, demographic characteristics such as age and sex have been linked with occupational stress^{11, 12}. Their effects on occupational stress were also found in this study. With aging, occupational stress decreased significantly among university teachers. This might due to the decreased tension of competition for the elder staff in comparison with younger staff. The healthy worker effect might be another reason. For the elder individuals, those more prone to occupational stress and ill health might have been more likely to leave, drop out and become unwell, whereas those who kept working might have tended to be more resilient individuals. In regard to the sex difference, the level of occupational stress was higher in male university teachers than in female university teachers, even if the difference was not significant with consideration of other factors. The same result was also found among Chinese doctors¹¹. Interestingly, monthly income was found to be adversely associated with occupational stress among university teachers in our study. This might due to the fact that, in universities in China, salary is directly linked to professional position. The higher the professional position a staff member achieves, the higher a salary he/she gets. Even for the same position, the salary varies within a considerable range due to performance-based management measures in China, which suggests that the teachers with a higher monthly income might be confronted with more responsibility and pressure, which is one approach to stress.

There are four limitations to the present study. First, the assessment of health status such as physical disease and mental health was self-reported by the participants, which might affect the accuracy in assessing the effect of health status on occupational stress. Second, the difference between nonparticipants and participants was not examined. For the nonresponders, a second investigation was conducted by telephone. However, their concern about the protection of personal information resulted in it being impossible to compare the characteristics between these two groups. Third, our study was limited by its cross-sectional design. We were unable to draw any causal conclusion between occupational stress and the risk factors. Fourth, in view of the first attempt, our attentions were initially focused on clarifying the related factors, and the pathway of risk factors acting on occupational stress was not examined. All findings obtained in the present study need to be confirmed in future prospective studies.

In conclusion, our study is the first attempt to assess occupational stress and related factors among university teachers in China. Our findings reveal that university teachers in China are exposed to a high level of

occupational stress. Health status, especially mental health, is a prominent risk factor for occupational stress for university teachers. Work load and sufficiency, research finance and social support seem to have a considerable effect on occupational stress of university teachers. Attention should be focused on improvement of mental health and organizational climate during transformation of the educational system with the purpose of lessening occupational stress among university teachers in China.

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References

- 1) Byrne DG, Espnes GA. Occupational stress and cardiovascular disease. *Stress & Health* 2008; 24: 231–8.
- 2) Collins SM, Karasek RA, Costas K. Job strain and autonomic indices of cardiovascular disease risk. *Am J Ind Med* 2005; 48: 182–93.
- 3) Clays E, De Bacquer D, Leynen F, Kornitzer M, Kittel F, De Backer G. Job stress and depression symptoms in middle-aged workers—prospective results from the Belstress study. *Scand J Work Environ Health* 2007; 33: 252–9.
- 4) Park SG, Min KB, Chang SJ, Kim HC, Min JY. Job stress and depressive symptoms among Korean employees: the effects of culture on work. *Int Arch Occup Environ Health* 2009; 82: 397–405.
- 5) Gillespie NA, Walsh M, Winefield AH, Dua J, Stough C. Occupational stress in universities: staff perceptions of the causes, consequences and moderators of stress. *Work & Stress* 2001; 15: 53–72.
- 6) Winefield AH, Jarrett R. Occupational stress in university staff. *Int J Stress Manage* 2001; 8: 285–98.
- 7) Chalmers A. *Workload and Stress in New Zealand Universities in 1998*. Wellington: New Zealand Council for Educational Research; 1998.
- 8) Tytherleigh MY, Webb C, Cooper CL, Ricketts C. Occupational stress in UK higher education institutions: a comparative study of all staff categories. *Higher Educ Res & Dev* 2005; 24: 41–61.
- 9) Kinman G. Pressure points: a review of research on stressors and strains in UK academics. *Educ Psychol* 2001; 21: 473–92.
- 10) Biron C, Brun JP, Ivers H. Extent and sources of occupational stress in university staff. *Work* 2008; 30: 511–22.
- 11) Wu H, Zhao Y, Wang JN, Wang L. Factors associated with occupational stress among Chinese doctors: a cross-sectional survey. *Int Arch Occup Environ Health* 2010; 83: 155–64.
- 12) Buddeberg-Fischer B, Klaghofer R, Stamm M, Siegrist J, Buddeberg C. Work stress and reduced health in young

- physicians: prospective evidence from Swiss residents. *Int Arch Occup Environ Health* 2008; 82: 31–8.
- 13) Pisarski A, Bohle P, Callan VJ. Effects of coping strategies, social support and work-nonwork conflict on shift worker's health. *Scand J Work Environ Health* 1998; 24: 141–5.
 - 14) Rutter DR, Lovegrove MJ. Occupational stress and its predictors in Radiographers. *Radiography* 2008; 14: 138–43.
 - 15) Osipow SH. Occupational stress inventory, revised edition. Odessa (FL): Psychological Assessment Resources, Inc. 1998.
 - 16) Karasek R, Brisson C, Kawakami N, Houtman I, Bongers P, Amick B. The job content questionnaire (JCQ): an instrument for internationally comparative assessments of psychosocial job characteristics. *J Occup Health Psychol* 1998; 3: 322–55.
 - 17) Unterbrink T, Hack A, Pfeifer R, et al. Burnout and effort-reward-imbalance in a sample of 949 German teachers. *Int Arch Occup Environ Health* 2007; 80: 433–41.
 - 18) Wu SY, Li J, Wang MZ, Wang ZM, Li HY. Intervention on occupational stress among teachers in the middle schools in China. *Stress Health* 2006; 22: 329–36.
 - 19) Cooper CL, Sloan SJ, Williams S. Occupational Stress Indicator, Management Guide. Windsor (UK): NFER-Nelson; 1988.
 - 20) Wang Z, Lan Y, Li J, Wang M. Appraisal of occupational stress and strain in primary and secondary school teachers. *Hua Xi Yi Da Xue Bao* 2001; 32: 392–5 (in Chinese).
 - 21) Xu B, Yang H, Chen B, Ni Z. Structural equation model analysis of relationship between occupational stress and work ability. *Wei Sheng Yan Jiu* 2008; 37: 59–62 (Chinese).
 - 22) Yang XW, Jin TY, Wang ZM, Yao H. Appraisal of occupational stress and its influential factors in executive group. *Wei Sheng Yan Jiu* 2005; 34: 744–6 (in Chinese).
 - 23) Yang XW, Liu ZJ, Zhao PQ, et al. A study of the occupational stress norm and its application for the technical group and scientific research group. *Wei Sheng Yan Jiu* 2006; 35: 781–4 (in Chinese).
 - 24) Zhu W, Feng Z. Investigation on the relationship between occupational stress and mental health in nurses. *Chin Occup Med* 2009; 36: 138–41 (in Chinese).
 - 25) Sun W, Watanabe M, Tanimoto Y, et al. Factors associated with good self-rated health of non-disabled elderly living alone in Japan: a cross-sectional study. *BMC Public Health* 2007; 7: 297.
 - 26) Ding F, Wang X, Niu X. Study of disease spectrum among teachers in high education sector. *J Soc Sci Hum Med Univ* 2009; 11: 66–9 (in Chinese).
 - 27) Lam CL, Gandek B, Ren XS, Chan MS. Tests of scaling assumptions and construct validity of the Chinese (HK) version of the SF-36 Health Survey. *J Clin Epidemiol* 1998; 51: 1139–47.
 - 28) Chen L, Xu S, Liu J, Chai T, Chen H. Analysis on health risk factor appraisal of teachers in 5 universities in Hubei province. *Chin Occup Med* 2009; 36: 442–3 (in Chinese).
 - 29) Wang Z, Lan Y, Li J, Wang M. Appraisal of occupational stress and strain in primary and secondary school teachers. *Hua Xi Yi Da Xue Bao* 2001; 32: 392–5 (in Chinese).
 - 30) Chen WQ, Wong TW, Yu TS. Review article: influence of occupational stress on mental health among Chinese off-shore oil workers. *Scand J Public Health* 2009; 37: 766–73.
 - 31) Ghaddar A, Mateo I, Sanchez P. Occupational stress and mental health among correctional officers: a cross-sectional study. *J Occup Health* 2008; 50: 92–8.
 - 32) Pflanz S. Occupational stress and psychiatric illness in the military: investigation of the relationship between occupational stress and mental illness among military mental health patients. *Mil Med* 2001; 166: 457–62.