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The association of work stress with somatic symptoms in Chinese working women: a large cross-sectional survey

Jian Li [a], Hui Ding [b,c,*], Wei Han [d], Lei Jin [e], Ling-Na Kong [e], Kang-Na Mao [f], Hong Wang [g], Jiang-Ping Wu [h], Ying Wu [h], Liu Yang [i], Yu Zhou [f], You-Xin Wang [j,k], Wei Wang [j,k], Adrian Loerbroks [a], Peter Angerer [a]

[a] Institute of Occupational, Social and Environmental Medicine, Centre for Health and Society, Faculty of Medicine, University of Düsseldorf, Düsseldorf, Germany
[b] Beijing Obstetrics and Gynecology Hospital, Beijing, China
[c] School of Public Health, Capital Medical University, Beijing, China
[d] Shaanxi Provincial People's hospital, Xi'an, China
[e] Tongzhou Maternity and Child Health Care Hospital, Beijing, China
[f] Haidian Maternity and Child Health Care Hospital, Beijing, China
[g] Shenzhen Maternity and Child Health Care Hospital, Shenzhen, China
[h] Nanjing Maternity and Child Health Care Hospital, Nanjing, China
[i] Shenyang Women and Children Health Care Center, Shenyang, China
[j] Beijing Municipal Key Laboratory of Clinical Epidemiology, School of Public Health, Capital Medical University, Beijing, China
[k] School of Medical and Health Sciences, Edith Cowan University, Perth, Australia

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ABSTRACT

Objective: It has been suggested that the relationship between work stress and somatic symptoms (e.g., cardiopulmonary, gastrointestinal complaints, general pain, and fatigue) is particularly pronounced in women. As evidence from China is sparse, we used a large sample of Chinese working women to test those potential associations.

Methods: Data were obtained from a cross-sectional study of 6826 working women in five urban areas in China who were free from major clinical disease. The sample was drawn from five occupations (physicians, nurses, school teachers, bank employees, and industrial workers). The Effort-Reward Imbalance Questionnaire and Patient Health Questionnaire-15 were used to measure work stress and somatic symptoms, respectively. Multivariate ordinal logistic regression was performed to analyze the associations.

Results: 52.6% participants reported high work stress in terms of concurrent high effort and low reward. The distribution of severity of somatic symptoms covered the full range from minimal (37.3%) and low (30.6%), to medium (19.7%) and high (12.4%). The adjusted odds ratio of somatic symptoms by high work stress was 2.45 (95% confidence interval = 2.24–2.68), and all single psychosocial work factors (effort, reward, and over-commitment) exerted substantial effects on somatic symptoms (odds ratios > 2.00).

Conclusions: Work stress is strongly associated with somatic symptoms in Chinese working women. Future longitudinal studies and intervention studies are needed to understand and improve women's psychosocial work environment and their psychosomatic health in China and elsewhere.

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1. Introduction

Somatic symptoms include a wide spectrum of complaints ranging from pain and disturbances attributed to organ dysfunction (e.g., dizziness, cardiovascular, gastrointestinal, or sensorimotor complaints) to fatigue and exhaustion [1]. Somatic symptoms are frequent (4–10% in general population) and are linked to high cost [2].

The causes of somatic symptoms are not well understood [1]. It has been suggested that psychosocial stress generally contributes to perceptions and interpretations of symptoms [3]. In this context, stress due to one's work has received special attention [4–6]. To date, several cross-sectional [7–16] and longitudinal studies [17–20] have examined the potential associations of a whole range of somatic symptoms with theory-based measures of work stress. Notably though, most of the evidence stems from western countries.

Another important issue in this research area is gender. It has been suggested that women report higher levels of both somatic symptoms [21] and work stress [22] than men. It is therefore of special interest to examine potential links between those two factors in women. To date,

* Correspondence to: H. Ding, Beijing Obstetrics and Gynecology Hospital; School of Public Health, Capital Medical University, Yaojiayuan Road 251, 100026 Beijing, China.
E-mail address: dingdingumea@163.com (H. Ding).

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three studies reported such associations among employed female workers [9,15,19]. Interestingly, one study found a significant moderating effect of female gender on the relationship between work stress and somatic symptoms, indicating stronger associations in women [15].

As insights from non-Western countries remain sparse, we aimed to contribute data from women in the largest Asian country, i.e., China, given the fact that more than 90% of women participate in labor market [23]. Three prior studies have specifically addressed work stress and somatic symptoms in Chinese working women [24–26]. Those studies had several drawbacks however, including their focus on single symptoms rather than the full range of somatic symptoms [25,26] and utilization of work stress measure as one-item perception [24,26], which is neither theory-based nor able to capture experienced work stress in depth. Therefore, the aim of our study was to examine the association between work stress and somatic symptoms in Chinese working while overcoming the above-mentioned limitations.

2. Methods

2.1. Study sample

Using a multistage random sampling process, women were recruited from five occupations (i.e. physicians, nurses, school teachers, bank employees, and industrial workers) in five Chinese cities (i.e., Beijing, Nanjing, Shenzhen, Xi'an, and Shenyang). In total, 10,000 women were approached between March and June 2015, and 8502 of them participated (response rate = 85.0%). As somatic symptoms are implicated in most clinical diseases [27], we excluded 737 individuals who reported any clinical diseases in order to minimize confounding by manifest conditions. Furthermore, 939 individuals with missing data on the key variables (see below) were excluded, yielding a sample of 6826 participants for the current report. As expected, the excluded individuals were older, more often single, less educated, and unhealthier with respect to physical and mental health functioning. This study protocol was approved by the research ethics committee of Capital Medical University, China, and was performed in accordance with the Declaration of Helsinki. Written informed consent was obtained from each participant.

2.2. Measures

Somatic symptoms were measured by the Patient Health Questionnaire (PHQ)-15 [28], a well-established instrument covering experience of 15 symptoms (e.g., cardiopulmonary and gastrointestinal complaints, pain and fatigue) during the last 4 weeks. The respondents rated the extent to which they had been bothered by each symptom and those responses are scored on a 3-point scale (0 = not bothered at all, 1 = bothered a little, 2 = bothered a lot). The potential total score varies from 0 to 30, and is categorized into four groups to represent different levels of somatic symptoms severity ranging from minimal (0–4), low (5–9), and medium (10–14) to high (15–30) [28]. We used the validated Chinese version of the PHQ-15 [29] with a satisfactory Cronbach's alpha coefficient 0.89 in our study.

The measurement of work stress was based on an internationally established theoretical model: the Effort-Reward Imbalance (ERI) model [30]. This model focuses on failed reciprocity between effort and reward which elicits stress reactions with adverse effects on health. In addition, a unfavorable coping pattern termed 'over-commitment' may aggravate stressful experience at work [30]. We used the short version of the ERI questionnaire [31], whose validated Chinese version is available [32]: three scales of 'effort' (3 items), 'reward' (7 items), and 'over-commitment' (6 items), with satisfactory Cronbach's alpha coefficients (0.76, 0.73, and 0.75, respectively). Responses to all the items are scored on a 4-point scale (1 = full disagreement, 4 = full agreement with statement). Consequently, with such a scoring, the range for the scale 'effort' is 3 to 12, for the scale 'reward' 7 to 28, and for the scale 'over-commitment' 6 to 24. Moreover, according to a predefined algorithm, a ratio between the two scales 'effort' and 'reward' (E-R ratio, weighted by item numbers) is calculated to quantify the degree of mismatch between high cost and low gain at individual level [31,32]. In this study, median points of the three scales (effort, reward, and over-commitment) and scores above or below 1.0 of the E-R ratio were used to define dichotomous levels of adverse psychosocial work conditions.

In addition, information on age, marital status, education, occupation, and health-related behaviors was collected (see Table 1 for details on the operationalization). These variables were included as covariates in the regression models, as suggested in prior studies [7–20].

2.3. Statistical analysis

Firstly, descriptive statistics were run. Means and standard deviations (SDs) were calculated for continuous variables, and relative frequencies were examined for categorical variables. Secondly, we conducted ordinal logistic regression analyses to test associations of work stress with severity of somatic symptoms, adjusting for relevant covariates, such as age, marital status, education, occupation, and health-related behaviors. The results are shown as odds ratios (ORs) and 95% confidence intervals (CIs). In the present statistical analyses, the dichotomized scores and continuous Z scores of three work stress scales (effort, reward, and over-commitment) and of the E-R ratio were used as independent variables. All analyses were conducted by the software SAS 9.2.

3. Results

The mean age of participants was 34 years, and about 70% of the participants were married (Table 1). One third of the participants engaged in physical exercise, while smoking and alcohol drinking were reported far less frequently. More than half of participants reported high work stress (E-R ratio > 1), and the percentages of respondents according to

Table 1
Characteristics of study subjects (n = 6826).

Variables		N (%)
Age (years)	(mean ± SD)	34.11 ± 8.45
Marital status	Single	1922 (28.16)
	Married	4904 (71.84)
Education	Below high school	218 (3.19)
	High school	517 (7.57)
	Technical college	1634 (23.94)
	University	3601 (52.76)
	Master or PhD	856 (12.54)
Occupation	Physicians	1190 (17.44)
	Nurses	1529 (22.40)
	School teachers	1390 (20.36)
	Bank employees	1357 (19.88)
	Industrial workers	1360 (19.92)
Smoking	Yes	149 (2.18)
	No	6677 (97.82)
Alcohol drinking	Yes	483 (7.08)
	No	6343 (92.92)
Physical exercise	Yes	2299 (33.68)
	No	4527 (66.32)
Effort	(mean ± SD)	8.10 ± 1.67
Reward	(mean ± SD)	18.34 ± 2.46
E-R ratio	(mean ± SD)	1.06 ± 0.32
Over-commitment	(mean ± SD)	15.78 ± 2.68
Somatic symptoms	Minimal	2548 (37.33%)
	Low	2091 (30.63%)
	Medium	1342 (19.66%)
	High	845 (12.38%)

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