Mental health issues in Chinese offshore oil workers

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Introduction

Occupational stress is a negative emotional experience resulting from stressors in the workplace [1] and a complex, multivariate and dynamic process in which stressors and perceived stress may directly or indirectly cause psychosomatic and physiological problems [1], such as mental disorders [1,2], cardiovascular diseases [3], musculoskeletal pain [4] and gastrointestinal disorders [5]. These effects may be moderated by other psychosocial factors, such as coping styles [1].

A number of previous studies have shown that occupational stress is an important risk factor for mental illness among onshore workers in a wide range of occupations. A meta-analysis by Stansfeld and Candy [6] provided robust consistent evidence that (combinations of) high demands and low decision latitude and (combinations of) high efforts and low rewards were prospective risk factors for common mental disorders. A longitudinal survey in the UK reported that an estimated annual average of 3642 new cases of work-related mental illness were diagnosed, and most of them were caused by work-related stress [7]. Positive associations of depression and anxiety with high demand and low control in the workplace were obtained in American [6] and Canadian studies [8].

Offshore oil platform work is widely regarded as a stressful occupation, and occupational stress has been shown to be an important risk factor for mental illness. Little, however, is known about the main and interactive effects of occupational stress and coping styles on the mental health of Chinese offshore oil platform workers.

Background

Offshore oil platform work is regarded as a stressful occupation, and occupational stress has been shown to be an important risk factor for mental illness. Little, however, is known about the main and interactive effects of occupational stress and coping styles on the mental health of Chinese offshore oil platform workers.

Aims

To explore the association of mental health with occupational stress, coping styles and their interaction among Chinese offshore oil platform workers.

Methods

A cross-sectional survey was conducted among 561 Chinese offshore oil platform workers. They were sent a self-administered questionnaire exploring their socio-demographic characteristics, occupational stress, coping styles and mental health. Hierarchical multiple regression was used to assess the main and interactive effects of occupational stress and coping styles on mental health.

Results

After controlling for age, educational level, marital status and years of offshore working, poor mental health was significantly positively associated with occupational stress, ‘internal behaviour’ coping methods and the interaction between occupational stress and internal behaviour coping.

Conclusions

The results of this study suggest that the mental health of Chinese offshore oil platform workers is associated with occupational stress, some coping styles and interactions of occupational stress and some coping styles.

Key words

Coping; mental health; occupational stress; offshore; oil.

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of stress on their health [11]. According to Lazarus and Folkman [12], coping is divided into problem-focused coping including information seeking and problem solving and emotion-focused coping involving expressing emotion and regulating emotions. Sometimes, the two factors are complemented by the third factor, appraisal-focused coping including denial, acceptance, social comparison, redefinition and logical analysis [11]. Generally, coping is regarded as a major component of the overall stress process and treated as a mediating link between stressors and psychological strain or as a moderator of the stress–strain relationship [11].

A few studies have surveyed the influence of occupational stress on mental health among offshore oil workers, but their results are inconsistent. The studies by Cooper and Sutherland [13] revealed that offshore workers reported more anxiety than the general population, and perceived stress from ‘relationships at work and at home’ was a strong predictor of anxiety in offshore workers. A study by Parkes [14] found that anxiety was significantly higher among offshore workers than onshore workers, and job level and neuroticism interactively affected anxiety. But, a similar study by Gann et al. [15] did not find differences in anxiety and depressive symptoms between onshore and offshore employees. Furthermore, how coping styles impact on the mental health of offshore oil workers has not been reported so far. The objectives of this paper therefore were to (i) assess the association between mental health and occupational stress, (ii) determine which kinds of coping styles were associated with poorer mental health and the interaction of occupational stress with coping styles.

Methods

A cross-sectional study was performed on a group of platform workers in an offshore oil company in South China. They were given a self-administered questionnaire that collected data on their socio-demographic characteristics of age, educational level, marital status, duration of offshore employment and job title, occupational stress, coping styles and mental health. More detailed information about the subjects and data collection has been reported in our previous publications [16,17].

Perceived occupational stress was measured by the Occupational Stress Scale consisting of 51 items covering factors intrinsic to the job, career and achievement, relationship with others in the work, safety, managerial role and interface between job and social, family life, and its validity and reliability have been demonstrated [16]. A total score of these 51 items was calculated to represent the level of perceived occupational stress with high scores denoting a high level of perceived stress.

The coping scale was adapted from the Occupational Stress Indicator [18] and the coping questionnaire developed by Hingley and Cooper [19]. It consisted of 20 coping responses, and factor analysis on the 20 items identified five domains with eigenvalue > 1 [17]. According to the context of the items loading on each domain, they were respectively defined as ‘eating behaviour’, ‘external/social behaviour’, ‘avoidant/negative behaviour’, ‘positive attitude/denying behaviour’ and ‘internal behaviour’ [17]. Among the five identified domains, external/social behaviour belonged to problem-focused coping, the remaining four others to emotional-focused coping. A total score for each domain was calculated, and higher scores on each domain indicated greater use of that coping strategy.

The 12-item abbreviation of the General Health Questionnaire (GHQ)-12 [20] was used to assess the mental well-being of the subjects, which has been successfully utilized to measure occupational mental health in the Chinese population [21]. The items were scored using four Likert points (0, 1, 2, 3), and a total score of these 12 items was calculated to represent the level of mental health with high scores denoting poor mental health.

Pearson correlation analysis was used to examine the univariate correlation of mental health with occupational stress and the five domains of coping style. The main and interactive effects of occupational stress and the five domains of coping style on mental health were assessed using hierarchical multiple regression conducted [22], described in the previously published paper [17].

Results

The basic characteristic of the workers have been reported in detail elsewhere [16,17]. All workers were male and had a mean age of 32.4 (SD = 8.7) and a mean platform working experience of 8.2 years (SD = 7.4). Over 77% had received at least high school education; 68% were married.

The mean GHQ score among the group of platform workers was 10.2 (SD = 5.0) and was significantly positively associated with occupational stress (correlation coefficient, r = 0.423, P < 0.001), and the coping styles of ‘eating behaviour’ (r = 0.221, P < 0.001) and internal behaviour (r = 0.186, P < 0.001) and was not significantly associated with eating behaviour (r = 0.029, P > 0.05), escaping/abreaction behaviour (r = 0.035, P > 0.05) and positive attitude/denying behaviour (r = 0.051, P > 0.05).

The results of hierarchical liner regression are shown in Table 1. After controlling for age, educational level, marital status and years of offshore working, poor mental health was significantly positively associated with occupational stress and avoidant/negative behaviour coping styles. Moreover, a significant positive two-way interaction effect between occupational stress and internal behaviour coping styles on mental health was obtained.
Following Cohen et al. [22], the form of interaction was plotted with occupational stress values chosen at ±1 SD from the mean. Figure 1 shows that respondents with high perceived occupational stress significantly reported poor mental health increasingly using ‘internal behaviour’ coping styles compared to those with medium and low perceived occupational stress.

**Discussion**

This study found that occupational stress and coping styles might directly and interactively affect mental health after controlling for potential confounding factors. Our results support previous findings suggesting that psychosocial factors play an important role in the development of mental health problems [23,24].

When interpreting our results, however, it is necessary to point out some limitations in this study. First, owing to the cross-sectional nature of the study design, the stability of the questionnaire could not be assessed. The cross-sectional design of the study meant that a causal–effect relationship between the occupational stressors and the health outcomes could not be determined.

Second, 27% of the variance explained by the statistical analysis was relatively low. The reason for this, as explained by Zapf et al. [25], was that it is impossible and inappropriate to build a deterministic model that covers all the factors influencing well-being in social science; moreover, moderating effects imply that stress relation-

ships are valid only for a subgroup of individuals; thus, interactions may explain the variance only in selected sub-
samples and weaken the size effect in the total sample; in addition, the specific time lag needed by stressors or coping to affect well-being may be the key for explaining substantial amounts of variance.

Third, in the data collection process, a self-

administered questionnaire was used, and information bias might be present. One such possibility was the under-reporting of health problems, for fear of redeplo-
cy (offshore workers in this study are better paid than their onshore counterparts). Another possibility of information bias might be the exaggeration of perceived work stress, with the underlying motive to prompt management to improve work conditions or pay packages to compensate for adverse working conditions. Moreover, the survey was conducted during the worker’s onshore rest period in which they might report less work stress than while working offshore, as during this time they are absent from the work environment. This potential information bias might distort the true association of mental health with occupational stress and coping styles. Although well-trained investigators were present in the whole process of data collection to help the workers complete the questionnaire, some poorly educated workers might still have misinterpreted some of the items in the questionnaire.

Fourth, selection bias was possible due to the ‘healthy worker effect’ (owing to the high physical demand of offshore work, those workers with more serious health problems might have stopped their work and redeployed or left the company) or there could have been a non-response bias as 3% of the sampled workers did not respond to the survey, and despite this low non-response, these workers might have less occupational stress and health problems. Both of these biases could affect the estimation of the associations between the psychosocial factors at work and the health outcomes in this study.

The mean score of GHQ-12 among 561 subjects in this study was 10.2 (5.0), higher than 8.8 (3.8) of 84 control room personnel in the study of Parkes [21]. However,
we could not conclude that the difference implied that the mental health of the UK offshore oil workers was better than the Chinese offshore oil workers, as the samples in the two studies were not comparable; Parkes only investigated the control room workforce, and the sample size was small, but our study included all occupational groups of workers on the platforms. Furthermore, cultural differences might have affected the subjects’ responses to the GHQ [26].

A number of studies have proved that occupational stress is an important risk factor for mental illness in a wide range of occupations [1,2,6–8]. Two studies by Cooper and Sutherland [13] found that the occupational stress was significantly and negatively related to the mental health of offshore oil workers in the North Sea of the UK sectors, while Parkes’s study revealed that anxiety was higher in offshore workers than onshore workers [14]. Consistent results were also observed in our study. All these results indicate that occupational stress from offshore oil work might produce a negative impact on the mental health of employees; therefore, it is necessary to try to decrease and eliminate stressors in offshore oil production.

Based on stress theory, there are two hypotheses for coping styles affecting health outcomes [11]. The first one is the main-effect hypothesis that suggests coping itself may directly affect health outcome [11]. Generally, problem-focused coping may be linked to better health, whereas emotion-focused coping is generally detrimental to their health [21,27,28]. In this study, of the identified five domains of coping styles, only avoidant/negative behaviour was significantly and positively associated with mental health problems, supporting the view that emotion-focused coping is generally harmful to health.

The second hypothesis for coping styles affecting health outcomes is the interactive effect, which suggests that coping style can moderate the relationship of occupational stressors with well-being [11]. With regard to this hypothesis, inconsistent interactive effects between the different types of coping and occupational stress on mental health were obtained in this study. Such as, the interaction of the internal coping behaviour with occupational stress significantly increased the risk of poor mental health, while the remaining coping patterns did not moderate the relationship between occupational stress and mental health. The negative association between the interaction of the internal coping behaviour and occupational stress meant that high internal coping behaviour predicted lower levels of mental health when medium and low levels of occupational stress were perceived and poorer mental health when high levels of occupational stress were perceived. This interaction suggested that those perceiving high levels of occupational stress should avoid adopting internal coping behaviour for their well-being. The inconsistent moderating role of coping could be explained by methodological reasons that the higher probability of committing Type II errors may constrain the finding of moderator effects and diminishes the power for detecting interactions, even if they exist [29]. For that reason, researchers are encouraged to continue research on the interactive effects of coping and stressors [30].

In summary, the results of this study support previous findings that psychosocial factors are in part related to poor mental health and also suggest that a longitudinal study is needed to determine which occupational stressors and coping styles might affect mental health problems and how these factors work together to affect them.

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**Key points**

- Perceived occupational stress positively increased the risk of mental illness among Chinese offshore oil workers.
- Avoidant/negative behaviour coping styles significantly worsen the mental health of Chinese offshore oil workers.
- ‘Internal coping behaviour’ might moderate the association between occupational stress and mental health in Chinese offshore oil workers.

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**Conflicts of interest**

None declared.

**References**