# The impact of changes in work stressors and coping resources on the risk of new-onset suicide ideation among Chinese petroleum industry workers

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## ARTICLE INFO

## ABSTRACT

*Objective:* Little is known about the relationship between changing psychosocial work conditions and suicidality. We examined whether or not changed work stressors and coping resources increase the risk of new-onset suicidal ideation.
*Methods:* A total of 1384 workers from the Occupational Health Study of Petroleum Industry Workers were included in this study. A baseline evaluation of work-related stress and coping resources was followed by a final evaluation after 2 years. The changes in task stressors and coping resources were measured using the Occupation Stress Inventory-Revised Edition, and changes in job control and organizational stressors were evaluated using the Instrument for Stress-Related Job Analysis (v. 6.0).
*Results:* Increased task stressors (RR = 2.87, 95% CI = 1.48, 6.15) and decreased coping resources (RR = 2.53, 95% CI = 1.31, 5.34) were associated with an elevated risk of new-onset suicidal ideation incidence. Effect magnitudes were higher than known suicidal risk factors. The main risk factors were increased role overload, increased role insufficiency, increased accident risk, and decreased recreation. Decreased coping resources also increased the negative effect of task stressors on new-onset suicidal ideation. However, increased coping resources did not decrease the effect.
*Conclusions:* These findings demonstrate that changes in work stressors and coping resources have a strong influence on new-onset suicidal ideation, highlighting the importance of preventive measures against adverse psychosocial work conditions and reduced coping resources for workplace suicide behavior prevention.

## 1. Background

Suicide is a global challenge and a significant public health problem around the world (Yip, 2011). Over 800 000 people die by suicide each year and 75.5% of deaths by suicide occur in low- and middle-income countries (WHO, 2014). Suicidal ideation is a strong risk factor for suicide attempts and death by suicide (ten Have et al., 2009). Therefore, it is highly important to understand the risk factors of suicidal ideation in order to prevent suicidal behavior. Psychosocial working conditions have become a major focus of

concern with regard to suicidal ideation (Milner et al., 2015). Several cross-sectional studies and a few cohort studies, albeit somewhat limited, have identified several psychosocial working conditions that are related to suicidal ideation, including job insecurity (Milner et al., 2016), degrading work experiences (Fridner et al., 2011), role conflict (Fridner et al., 2011), support at work (Fridner et al., 2011), workplace bullying (Nielsen et al., 2015), job demand (Ostry et al., 2007), job control (Tsutsumi et al., 2007), job security (Dalglish et al., 2015; Milner et al., 2016), monotonous work (Schneider et al., 2011), increased responsibility (Schneider et al., 2011), and stress at work (Feskanich et al., 2002). However, these findings are not always consistent. For example, Ostry et al. (2007) found an increased suicide risk when faced with low psychological job demands but not with low job control. In contrast, Tsutsumi et al., (2007) estimated higher suicide risks for subjects

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with high job control but not for those with low job demands. Recently, two longitudinal studies also reported inconsistent findings: Baumert et al., (2014) found that adverse psychosocial working conditions (disturbances and interruptions, urge for fast decisions, high responsibility for people, high responsibility for machines, strong competition) and job strain had no impact on subsequent suicide mortality risk. Nielsen et al. (2015) revealed an increased later suicidal ideation risk for subjects experiencing workplace bullying.

These inconsistent findings may result from methodological limitations such as cross-sectional designs (Fridner et al., 2011; Nielsen et al., 2015), lack of reliable measurement of adverse psychosocial working conditions (Feskanich et al., 2002), short-term measurement of suicidal ideation (e.g., during the past 7 days) (Milner et al., 2016; Nielsen et al., 2015), not adjusting for important confounding factors such as mental health (Fridner et al., 2011; Nielsen et al., 2015; Ostry et al., 2007; Tsutsumi et al., 2007), different outcomes (suicidal ideation/suicidal thoughts) (Dalglish et al., 2015; Fridner et al., 2011; Milner et al., 2016; Nielsen et al., 2015), suicide attempts (Ostry et al., 2007), and suicide deaths (Baumert et al., 2014; Feskanich et al., 2002; Ostry et al., 2007; Schneider et al., 2011; Tsutsumi et al., 2007). Moreover, all previous studies only assessed exposure at baseline (one-point exposure) except for a three-wave longitudinal Norwegian study (Nielsen et al., 2015) investigating the effect of work bullying on suicidal ideation.

In addition to aforementioned work-related psychosocial factors, suicidal behavior may be influenced by coping resources (Nock et al., 2013). Protective resources against suicidal behavior include religious affiliation (Dervic et al., 2004), responsibility to one's family (Oquendo et al., 2005), and resilience (Johnson et al., 2011). According to the vulnerability-stress model of suicidal behavior (Lopez-Castroman et al., 2014), coping resources such as family support, social support, and religious affiliation can decrease the likelihood of suicidal behavior among those with known risk factors (e.g., mental disorders patients). The effect of psychosocial factors in the workplace on suicidal ideation may thus be influenced by coping resources. However, the influence of coping resources on suicidal ideation over time is poorly understood.

The petroleum industry plays a critical role in driving the global economy. It is therefore essential to identify factors that influence the health and safety of personnel within this important industry (Nielsen et al., 2013). The previous findings showed that petroleum industry workers report more psychosocial stressors and mental health problems (Lian et al., 2016; Nielsen et al., 2013). National workplace suicide trends in Japan show that the mining industry (including the petroleum industry) had the highest risk of suicide among men of working age (Wada et al., 2016). However, there is still an evident lack of knowledge about the factors causing suicidality in this specific occupational setting. From both an organizational and a public policy perspective, knowledge about psychosocial working conditions as potential risk factors for later suicidal ideation is important when managing a work environment. To our knowledge, no prospective study has evaluated the effect of naturally occurring changes in psychosocial working conditions on suicidal ideation. In addition, above-mentioned previous studies on the effects of changes in exposure to working conditions on suicide behavior have focused primarily on psychosocial working conditions and often only examined adverse changes. If favorable changes are followed by lower suicide incidence, suicide behavior might be reduced by promoting favorable changes instead of merely preventing adverse changes.

In the current 2-year prospective study, we evaluated whether changes in work stressors, including task stressors, organization stressors, job control, and coping resources, significantly affect new-onset suicidal ideation among Chinese petroleum industry workers. In addition, we evaluated the potential modifying effects of coping resources in the workplace.

## 2. Materials and methods

### 2.1. Participants

This study was part of the Occupational Health Study of Petroleum Industry Workers aimed at investigating the effects of occupational risk factors on health in the Xinjiang Autonomous Region of China (Lian et al., 2016). The baseline data collection was performed between January and December 2012. Two thousand workers were invited to participate. A total of 1780 participants (89.0%) responded to questionnaires about medically diagnosed diseases, sociodemographic factors, lifestyle factors (physical activity, body mass index (BMI), smoking and alcohol consumption), work stressors, coping resources, psychological distress, and suicidal ideation. Of these participants, 230 were excluded due to previous lifetime suicidal ideation, changed job, pregnancy, or long-term sick leave. We invited all respondents from the baseline interview to participate in a follow-up interview (between January and December 2014). All information was collected during the period of occupational health examination in the Kelamayi Centers for Disease Control of Xinjiang Autonomous Region. An announcement was sent to employees before the occupational health examination explaining that the survey was designed "to better understand occupational stress and health"; responses were confidential; participation would not affect health care benefits; and that participants would be given RMB 30 Yuan for participation. A total of 166 observations were excluded due to insufficient or missing information regarding psychological work factors and suicidal ideation. The final study population comprised 1384 participants. The research protocol for this cohort study was approved by the Ethics Committee of Xinjiang Medical University, China. Written informed consent was obtained from all participants.

### 2.2. Measures

#### 2.2.1. Suicidal ideation

Suicidal ideation was assessed using the following questions: (1) lifetime suicidal ideation: "In your lifetime, have you ever considered suicide?" (yes/no); (2) 24-month suicidal ideation: "During the past 24 months, have you ever considered suicide?" (yes/no). New-onset suicidal ideation was defined as occurring when a respondent did not report lifetime suicidal ideation at baseline but reported it at the follow-up interview. This single-item method has previously been established as a valid approach to the measurement of suicidal ideation (Dalglish et al., 2015; ten Have et al., 2009; Zhang et al., 2011).

#### 2.2.2. Work stressors

We measured task stressors using the Occupational Role Questionnaire subscales from the Chinese version of the Occupational Stress Inventory-Revised (OSI-R) (Li et al., 2001), originally developed by Osipow (1998). The OSI-R is a reliable and valid method for measuring work stressors in China (Lian et al., 2016; Wu et al., 2010). The subscale includes assessment of role overload, role insufficiency, role ambiguity, role boundary, responsibility, and physical environment, with each item scored on a Likert scale, ranging from 1 (lowest) to 5 (highest). The possible responses were defined as follows: 1, never; 2, rarely; 3, sometimes; 4, frequently; and 5, always. Role overload measures the extent to which one's job demands exceed resources and the degree to which the individual is able to accomplish workloads. Role insufficiency evaluates the