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How safety-related stress affects workers' safety behavior: The moderating role of psychological capital

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ABSTRACT

Individuals' unsafe behavior is commonly identified as an important causal factor in workplace accidents. Research has demonstrated the effect of work-related stress on work performance, while the effect of safety-related stress on safety performance has received little attention. This paper examined the predictive powers of safety-related stress and psychological capital (PsyCap) on safety behavior, and the moderating role of PsyCap on the safety-related stress–behavior relationship. Questionnaire survey data were gathered from 359 construction workers in China. Results showed that high safety-related stress would impair safety behavior in terms of safety participation (SP) but not safety compliance (SC). PsyCap's positive influence on SC was stronger than that on SP. Furthermore, PsyCap moderated the relationship between safety-related stress and SP. For their sub-dimensions, it was found that (1) three selected safety-related stressors had negative influences on SP, while only safety role ambiguity had an effect on SC; (2) four sub-dimensions of PsyCap had stronger influences on SC than those on SP; (3) general PsyCap moderated the three safety-related stressors' effects on SP; and (4) four sub-dimensions of PsyCap moderated the effect of general safety-related stress on SP. This research contributes to the conception of safety-related stress by demonstrating its validity and its negative effect on SP. It also contributes to the study on the mechanisms of SC and SP by clarifying the differential influences of safety-related stress and PsyCap and by considering their combined effects. Measures for improving SC and SP from the perspective of safety-related stress and PsyCap are discussed.

1. Introduction

Although workplace safety has made great improvements in the past few decades (Guo and Yiu, 2015; Hinze et al., 2013a), accidents still happen in high-risk industries such as construction (Bergheim et al., 2015; Feng et al., 2015). As an example, 74 workers died in the electric concrete tower crane accident on November 24, 2016 in China's Jiangxi province. Even though standards of technology and equipment are considered to be critical causes of safety accidents, it is acknowledged that equipment operation largely depends on human behavior (Adie et al., 2005; Curcuruto et al., 2015; Dahl and Olsen, 2013; Johnson, 2007; McSween, 2003). Therefore, it is necessary to study individuals' safety behavior and its predictors. This can be useful in developing interventions for improving individuals' safety behavior, and thus promoting workplace safety.

High-risk industries are noted for job stress mainly because of their pressing working environments, which are characterized by peak workloads, high uncertainty, and complex tasks (Liu and Low, 2011; Turner et al., 2008), emphasis on the rate of process and standard operation (Asquin et al., 2010; Mohr and Wolfram, 2010), and role conflict and interpersonal conflict (Bowen et al., 2014). Job stress threatens the health of working people (Bowen et al., 2014; Health and Safety Executive (HSE), 2006) and impairs their work performance (Adebayo and Ogunsina, 2011; Brown et al., 2000; Leung et al., 2012; Safaria et al., 2010; Wei et al., 2016). However, rare literature has explicated the mechanism of safety-related stress on employees' safety performance in high-risk industries (Sampson et al., 2014). Furthermore, the effect of different stressors can be different on the two distinct types of safety performance, namely, SC and SP (Sonnetag and Frese, 2003; Wallace et al., 2009). Thus, further investigation on the mechanism by which different safety-specific stressors will influence SC and SP is required.

In additional to job stress, which is mainly derived by the environment (Chen and Cunradi, 2008), individuals' behavior can also be influenced by psychological perceptions, according to Social Cognitive Theory (Bandura, 2001). Many studies have verified the influences of individual characteristics on safety behavior, such as personality, attitude (Brande et al., 2016; Hunter, 2005) and personality stableness

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(Hystad and Bye, 2013). However, little research has focused on the relationship between PsyCap and safety behavior (Chen and Chen, 2014). According to PsyCap Theory (Luthans and Youssef, 2007), individuals with high levels of PsyCap tend to have positive attitudes and behaviors at work (Luthans et al., 2007a). For example, facing complex and difficult safety goals, workers with high self-efficacy (one sub-dimension of PsyCap) are likely to acquire knowledge and skills, integrate them confidently, and then do their job to a high standard (Judge and Bono, 2001).

This study aims to examine the predictive powers of safety-related stress and PsyCap on SC and SP, as well as the moderating effect of PsyCap on the relationships between safety-related stress and SC and SP. It will also explore whether the relationships vary with sub-dimensions of these two predictors. The conception of safety-related stress employed here was proposed by Sampson et al. (2014) who matched general job stress to safety. This research will contribute to the conception of safety-related stress by examining its value in conceptual modeling. It can also contribute to the study on the mechanisms of two kinds of safety performance (SC and SP) by considering the combination of safety-related stress and PsyCap which are important and specific to high-risk industries and demonstrating differential influences of these two variables. In high-risk industries, it is usually difficult and impractical to change the high stress that employees work under; thus, interventions to cognitive variables may be helpful in shaping their behavior (Hoffmeister et al., 2014).

2. Literature review and hypotheses development

2.1. Safety behavior

Safety performance refers to safety-related work performance (Burke et al., 2002). Traditionally, safety performance was mainly measured by lagging indicators, such as accident rate (Barling et al., 2002; Cooper, 2009; Hofmann and Morgeson, 1999; Tuncel et al., 2006) and mortality (Hinze et al., 2013b; Martínez-Córcoles et al., 2011; Vredenburgh, 2002; Zohar, 2000, 2002). However, these methods have limitations. They may form a skewed distribution by the use of accident frequency measurement (Christian et al., 2009). Furthermore, they cannot provide advanced warning for safety-related accidents (Guo and Yiu, 2015). Thus, based on work performance (Borman and Motowidlo, 1993), Griffin and Neal (2000) conceptualized safety performance as personal work behavior that relates to organizational safety, which is bound to its psychological antecedents and can be evaluated by a system (Burke et al., 2002). Griffin and Neal (2000) further proposed two sub-dimensions of safety behavior: SC and SP. Similar to task performance, SC refers to the core safety activities that need to be carried out by individuals to maintain workplace safety, including procedural compliance, wearing safety equipment, etc. Parallel to contextual performance, SP refers to employees voluntarily participating in safety activities or safety meetings (Griffin and Neal, 2000), which is beneficial to the improvement of safety concerns (Mullen, 2005) and the organization's safety program (Cree and Kelloway, 1997). SC belongs to in-role behavior, while SP is more voluntary, containing extra-role behavior (Clarke and Ward, 2006). This study adopts the definition and components of safety behavior developed by Griffin and Neal (2000).

Numerous studies have demonstrated that SC and SP can be related to injuries and accidents in high-risk industries (e.g., Christian et al., 2009; Clarke, 2006; Neal and Griffin, 2006; Seo et al., 2015). For instance, Goldenhar et al. (2003) indicated that compliance with safety procedures was negatively related to near-misses. Curcuruto et al. (2015) proved that two kinds of participatory behaviors, i.e. prosocial safety behaviors and proactive behaviors, can produce a reduction in safety accidents. As the construction industry is one of the most risky industry (Li et al., 2015; Wang et al., 2016), SC and SP can be important for reducing injuries and accidents in this sector. In addition, research specific to the construction industry also indicated that SC and SP were critical to accident prevention in this field. For example, Christian et al. (2009) found that SC and SP were related to occupational accidents and injuries; DeArmond et al. (2011) illustrated that SC and SP were negatively related to occupational injuries. To summarize, it merits research on the antecedents of these two types of safety behavior which can contribute to injuries and accidents prevention.

2.2. Job stress and safety behavior

Job stress mainly can be caused by the individual, organization, and external environment (Robbins, 2001). Different stressors include such as role ambiguity (Tubre and Collins, 2000), role conflict (Taylor, 1999), role overload (Yuan et al., 2015), job insecurity (Mäkikangas and Kinnunen, 2003), rewards (Chang et al., 2005; Karasek et al., 1988), job characteristics (Yuan et al., 2015), employees' ability (Rice, 1992), interpersonal safety conflicts (McCabe et al., 2008), and safety restrictions (Sampson et al., 2014). Among these stressors, the present study focuses on three types of stressors, namely, role ambiguity, role conflict, and interpersonal conflict. *Role ambiguity* indicates that an individual is unclear about or inadequate for his/her role given current information and resources (Jackson and Schuler, 1985; Rizzo et al., 1970). Because of an unclear division of labor within the group, workers do not know specific duties. *Role conflict* refers to the presence of inconsistencies between job performance expectations and performance evaluation criteria (Kahn et al., 1964; Tuten and Neidermeyer, 2004). As an example, a subordinate may receive multiple directions from a superior simultaneously, and not know which should be done first. Or, when a subordinate receives commands at odds with each other from more than one superior, he/she will find it difficult to follow both. *Role ambiguity and role conflict* will drive individuals into an ambiguous position, where they may feel puzzled about how to achieve the goal, what is right or wrong, and which superior's feedback is effective. *Interpersonal conflict* refers to cases where existing opinions, such as discrepancies in equipment operation, creating conflicts between individuals and others in the organization (Gittleman et al., 2010). To summarize, due to negative aspects of the three types of stressors, it is possible that they will elicit adverse effects on safety behavior.

Furthermore, the mechanisms by which job stress influences SC and SP may be different (Sampson et al., 2014; Sonnetag and Frese, 2003; Wallace et al., 2009). This may be because when under stress, the performance of compliance and participation to safety may be both undermined, employees may try their best to first finish the required work (SC) with limited energy, while have less energy to engage in participatory activities (SP). Namely, employees under high stress will scarify SP at a larger degree compared to SC. In addition, different stressors can exert various influences on safety behavior, for example, Gilboa et al. (2008) found that role ambiguity had a stronger negative influence on safety behavior than role conflict. Eatough et al. (2011) proved that a stronger relationship existed between role conflict and SP than that between role conflict and SC. To summarize, it needs further research on the influences of different job stressors on different kinds of safety behavior.

Specific to safety, few studies exist on safety-related job stress and safety behavior apart from Sampson et al. (2014), who compared the relationships between three safety-related stressors (safety role ambiguity, safety role conflict, and interpersonal safety conflict) and SC and SP. However, it has not been supported by enough follow-up studies, and no study has further explored the predictive powers of safety-related stressors. Thus, this paper examines the effects of the three different safety-related stressors on two distinct safety behavior:

H1. Safety-related stress has negative influences on SC (H1a) and SP (H1b).

H2. Three safety-related stressors, namely: safety role ambiguity (H2a), safety role conflict (H2b), and interpersonal safety conflict (H2c) have