Linking challenge and hindrance stress to safety performance: The moderating effect of core self-evaluation

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A R T I C L E   I N F O

Article history:
Received 28 November 2013
Received in revised form 23 March 2014
Accepted 22 April 2014
Available online 20 May 2014

Keywords:
Core self-evaluation
Challenge stress
Hindrance stress
Safety performance
Personality

A B S T R A C T

The buffering effect of core self-evaluation (CSE) in stress research has received academic attention. However, most research in this area focused on its moderating effect on well-being. In the present study, we take a closer look at the moderating role of CSE in the relationship between challenge/hindrance stress and safety performance. Results indicated that challenge and hindrance stress were both negatively related to safety performance. More importantly, CSE acted as a buffer in the negative relationships between challenge stress and safety compliance and between hindrance stress and safety participation. Contrary to our prediction, the negative relationship between hindrance stress and safety participation was stronger for people higher on CSE. Based on our findings, we discuss the theoretical implications for personality and safety research.

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1. Introduction

Recently there has been an emerging trend to examine the critical role of higher-order personality constructs in personality research (Johnson, Rosen, & Chang, 2011; Judge, Locke, & Durham, 1997). Among them is the construct of core self-evaluation (CSE). According to Judge et al. (1997), core self-evaluation refers to the fundamental evaluations that people hold about themselves. Although originally proposed to explain its pivotal influence on job satisfaction (Judge et al., 1997), CSE has been studied in a wide array of areas such as decision making (Di Fabio & Palazzeschi, 2012) and stress (Creed, Lehmann, & Hood, 2009).

In the present study, we take a closer look at CSE in job stress research. CSE is the underlying trait of four personality traits: self-esteem, generalized self-efficacy, emotional stability, and locus of control (Judge et al., 1997). To better capture the common core underlying these personality factors, Judge, Erez, Bono, and Thoresen (2003) developed a 12-item scale to directly measure the fundamental trait of CSE. Although some criticisms exist regarding the limitation of directly measuring CSE (Johnson, Rosen, & Levy, 2008), this approach has been useful in capturing the underlying trait among the four personality indicators (Judge et al., 2003) and predicting a wide array of outcomes (e.g., Stanhope, Pond, & Surface, 2013). Moreover, since self-esteem (Rector & Roger, 1997), generalized self-efficacy (Jex & Bliese, 1999), emotional stability (Korotkov, 2008), and locus of control (Keenan & McBain, 1979) have similar moderating effects in the relationship between stressors and outcomes, directly assessing their shared underlying factor might prove to be equally, if not more, valuable in revealing its potential moderating effects in job stress research.

The construct of CSE readily lends itself to stress research in that the fundamental appraisal of self might “color” how people appraise and respond to stress (Judge et al., 1997; Lazarus & Folkman, 1984). Specifically, the main effect of CSE on stress has received consistent support such that people high on CSE tend to experience less stress (e.g., Creed et al., 2009). In addition to its main effect, personality researchers are also interested in its moderating effect in the stress process. Despite the intuitive appeal of CSE as a moderator, some studies failed to find empirical support (Judge, Locke, Durham, & Kluger, 1998; Kammeyer-Mueller, Judge, & Scott, 2009). Among studies that supported CSE as a moderator, the outcomes of interest were limited to well-being such as health (Tsaoosis, Nikolaoou, Serdaris, & Judge, 2007) and job satisfaction (Harris, Harvey, & Kacmar, 2009). Comparatively, there is a dearth of research examining the moderating effect of CSE on behavioral outcomes, which might lead one to question the bottom-line implications of CSE. As such, the present study is aimed to extend this line of research into a behavioral domain, safety performance. Safety performance is a proximal determinant of safety outcomes such as accidents and injuries (Christian, Bradley,
Wallace, & Burke, 2009). In doing so, we hope to add credibility to CSE as a leveraging personality factor in influencing people's behavioral responses to stress.

Safety performance refers to the behaviors that individuals carry out in the workplace to promote safety and consists of two dimensions, safety compliance and safety participation (Griffin & Neal, 2000). Safety compliance deals with the core safety activities that maintain safety whereas safety participation is citizenship behaviors that help promote workplace safety. In the workplace, stress can be either triggered by challenges, which have the potential to promote personal growth and mastery, or hindrances, which tend to thwart personal growth and goal attainment (Cavanaugh, Boswell, Roehling, & Boudreau, 2000; Clarke, 2012). Although meta-analytic evidence is available for challenges and hindrances and their relationships with safety behaviors (see Clarke, 2012), the putative intermediary role of stress was not directly examined. In the present study, we look directly into the relationship between challenge/hindrance stress and safety performance. By challenge/hindrance stress, we refer to the stress that an individual experiences as a result of encountering different job situations (i.e., challenges and hindrances; Cavanaugh et al., 2000).

Although evidence suggests conscientiousness and locus of control are positively whereas risk taking is negatively related to safety performance (Christian et al., 2009), the moderating role of personality in safety research received less attention. Despite the call to examine individual differences in challenge/hindrance stress research (Podsakoff, LePine, & LePine, 2007), few efforts were made to look at CSE as a buffer in the relationship between challenge/hindrance stress and safety performance. Taken together, the present study aims to examine the moderating role of CSE in the relationship between challenge/hindrance stress and safety performance. In doing so, we aim to extend this line of CSE research beyond well-being outcomes. Moreover, we also help to fill the void in safety research by looking at the relationship between challenge/hindrance stress and safety performance and examining CSE as a personality moderator.

1.1. Challenge and hindrance stress and safety performance

Challenge stress might be related to lower levels of safety performance. For example, challenge stress triggered by work overload might motivate individuals to work hard in an attempt to complete the task at hand. In order to do so, individuals might take shortcuts and overlook safety procedures to get the task done. In this sense, challenge stress resulting from these work conditions might divert individual's attention away from safety performance by motivating them to take shortcuts (Halbesleben, 2010; Wallace & Chen, 2006). Consequently, people experiencing challenge stress might not be able to deploy their resources to engage in safety behaviors. As such, challenge stress might be related to lower levels of safety performance (i.e., safety compliance and safety participation).

**Hypothesis 1**: Challenge stress will be negatively related to safety compliance (H1a) and safety participation (H1b).

Hindrance stress is experienced when individuals perceive work aspects as obstacles to goal achievement and personal growth (Cavanaugh et al., 2000). Hindrance stress has been shown to relate to exhaustion, which could leave employees inadequate resources for safety performance (Nahrgang, Morgeson, & Hofmann, 2011). Moreover, when employees experience such hindrances as red tape and role ambiguities, they do not have access to the necessary job resources to improve workplace safety. When employees run into red tape, they might perceive low support for safety performance. Role ambiguity might leave employees confused when they are trying to perform on their jobs. These job resources such as support and role clarity have been documented to be important antecedents to safety behaviors, without which employees are less likely to engage in safety behaviors (Griffin & Neal, 2000; Nahrgang et al., 2011). Taken together, hindrance stress is expected to negatively relate to safety performance.

**Hypothesis 2**: Hindrance stress will be negatively related to safety compliance (H2a) and safety participation (H2b).

1.2. The moderating role of CSE

As a fundamental evaluation that one holds about self, CSE might influence how people cope with stress. First, people high in CSE might be less sensitive to the potential effect of stress, consistent with the differential reactivity hypothesis (Kammeyer-Mueller et al., 2009). That is, people with greater personal resources such as CSE are less likely to perceive situations as threatening (Harris et al., 2009; Hobfoll, 2001). In other words, those with lower levels of CSE might demonstrate a stronger negative relationship between challenge/hindrance stress and safety performance because of their heightened reactivity to stress. Second, people with differing levels of CSE might also differ in the coping mechanisms they choose. People high in CSE might be more likely to use problem-focused coping and less likely to use avoidant coping (Kammeyer-Mueller et al., 2009). As a result, their productive coping style might enable them to effectively buffer the negative impact of challenge and hindrance stress on safety performance, consistent with the differential effectiveness hypothesis (Kammeyer-Mueller et al., 2009). From a resource perspective, people high in CSE have a greater pool of personal resources with which they can effectively cope with stress (Harris et al., 2009; Hobfoll, 2001). Empirical evidence also lends support to the buffering effect of CSE (Harris et al., 2009; Tsaoasis et al., 2007). Together, we expect that people with lower levels of CSE will demonstrate a stronger negative relationship between challenge/hindrance stress and safety performance.

**Hypothesis 3**: CSE will moderate the relationships between challenge stress and safety compliance (3a) and between challenge stress and safety participation (3b) such that the negative relationships between challenge stress and safety performance dimensions will be stronger for people low in CSE.

**Hypothesis 4**: CSE will moderate the relationships between hindrance stress and safety compliance (4a) and between hindrance stress and safety participation (4b) such that the negative relationships between hindrance stress and safety performance dimensions will be stronger for people low in CSE.

2. Method

2.1. Participants and procedures

Participants in the present study were employees working for a large gold mine company in China. All of the participants were front-line workers. A total of 400 questionnaires were distributed and 335 of them were returned (response rate = 83.75%). 271 questionnaires turned out to be usable. The majority of the study sample were male (75.3%). 89.7% of the participants were 30 years or older and 86.7% of the participants had been working in the company for five years or longer.

2.2. Measures

2.2.1. Core self-evaluation

Core self-evaluation was measured using the Core Self-Evaluation Scale (CSES; Judge et al., 2003). The twelve items were scored on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). An example item is “When I try, I generally...
succeed”. Since the scale was originally developed in English, the back-translation process was followed to ensure the quality of the translation (Brislin, Lonner, & Thorndike, 1973). Previous validation research suggests that CSE demonstrated the same single factor structure in the Chinese context (Du, Zhang, & Zhao, 2012).

2.2.2. Challenge and hindrance stress
Challenge and hindrance stress was measured using the scale developed by Cavanaugh et al. (2000). Challenge stress was measured by six items and hindrance stress was measured by five items. Participants were asked to indicate how much stress they experienced as a result of each stressor. Each item was scored on a five-point Likert scale ranging from 1 (produces no stress) to 5 (produces a great deal of stress). An example item for challenge stress is “the lack of job security I have”. This scale for hindrance stress is “the amount of time I spend at work” and an example item for hindrance stress is “the lack of job security I have”. This scale was also back-translated from English. Based on our similar factor structure in the Chinese context (Du, Zhang, & Zhao, 2012), to provide evidence concerning the factor structure of the scale, confirmatory factor analysis was conducted. A model with every item loading on the same factor was fitted to the data first (RMSEA = 0.14, 90% CI = [0.12, 0.15]). A second model consistent with the original factor structure was then fitted to the data (RMSEA = 0.06, 90% CI = [0.04, 0.08]). The second model fitted significantly better than the first model (Δχ²(1) = 184.28, p < .01), thus lending support to the distinction between challenge stress and hindrance stress.

2.2.3. Safety performance
Safety performance was measured using the safety performance scale by Neal and Griffin (2006). Safety compliance and safety participation were each measured by three items using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). An example item for safety compliance is “I use all the necessary safety equipment to do my job” and an example item for safety participation is “I promote the safety program within the organization”. The Chinese version of the scale was validated by Jiang, Yu, Li, and Li (2010).

2.2.4. Control variables
Gender, job tenure, job level, and job contract type were measured as control variables.

3. Results

3.1. Descriptive statistics
The means, standard deviations, alpha levels, and correlations of all study variables are presented in Table 1. CSE was positively related to safety compliance (r = .15, p < .05) and safety participation (r = .16, p < .05). Challenge stress was negatively related to safety compliance (r = –.26, p < .01) and safety participation (r = –.34, p < .01). Likewise, hindrance stress was negatively related to safety compliance (r = –.37, p < .01) and safety participation (r = –.34, p < .01). Challenge stress was positively related to hindrance stress (r = .30, p < .01) and safety compliance was positively related to safety participation (r = .57, p < .01).

3.2. Hypotheses testing
Prior to testing our hypotheses, we regressed safety compliance and safety performance on the four potential control variables, respectively. Out of the four control variables, only tenure significantly predicted safety compliance and safety performance. Thus, we only controlled for tenure in subsequent analysis to reserve statistical power (Becker, 2005). When testing moderating hypotheses, we used the centered scores of the predictor variables and created the interaction terms. Challenge stress and hindrance stress were entered in the regression simultaneously, which enabled us to control for the suppressor effect of hindrance stress (Cavanaugh et al., 2000).

Hypotheses 1a and 1b, which examined the relationships between challenge stress and safety performance dimensions, were supported (β = –.19, p < .01 for safety compliance; β = –.28, p < .01 for safety participation; see Table 2). Hypotheses 2a and 2b, which examined the relationships between hindrance stress and safety performance dimensions, were supported (β = –.26, p < .01 for safety compliance; β = –.23, p < .01 for safety participa-
tion; see Table 2). Challenge stress and hindrance stress explained 13% of the variance in safety compliance and 17% of the variance in safety participation over and above tenure.

To test hypotheses 3 and 4, we entered control variable in the first step, followed by CSE, challenge stress, and hindrance stress in the second step. In the third step, the two interaction terms were entered. When predicting safety compliance (see Table 3), the interaction between CSE and challenge stress ($\beta = .19, p < .01$) and the interaction between CSE and hindrance stress ($\beta = -.14, p < .05$) were both significant. The two interaction terms explained an additional 5.4% variance ($f^2; Aiken & West, 1991$) in safety compliance. The interaction between CSE and challenge stress was further plotted (see Fig. 1). A simple slope test (Aiken & West, 1991) showed that the negative relationship between challenge stress and safety compliance was stronger for people low in CSE ($\beta = -.32, p < .01$) than those high in CSE ($\beta = .02, p = .79$), thus supporting hypothesis 3a. However, the negative relationship between hindrance stress and safety compliance was stronger for people with higher levels of CSE ($\beta = -.41, p < .01$) than those with lower levels of CSE ($\beta = -.13, p = .10$), contrary to hypothesis 4a (see Fig. 2).

When predicting safety participation (see Table 3), the interaction between CSE and hindrance stress was significant ($\beta = .11, p < .05$) whereas the interaction between CSE and challenges stress was not significant ($\beta = .08, p = .17$). An additional 2.6% of the variance ($f^2; Aiken & West, 1991$) in safety participation was explained by the interactions. The significant interaction was further graphed (see Fig. 3). People low in CSE demonstrated a stronger negative relationship between hindrance stress and safety participation ($\beta = -.35, p < .01$) than those high in CSE ($\beta = -.13, p = .10$), thus lending support to hypothesis 4b. Therefore, hypothesis 4b was supported whereas hypothesis 3b did not receive support. It is also important to note that CSE was also positively related to safety compliance ($\beta = .12, p < .05$) and safety participation ($\beta = .10, p = .06$).

4. Discussion

Despite the accumulating evidence documenting the importance of CSE, there is a dearth of research attempting to investigate its moderating role in the stress-behavioral outcome relationship. To fill this gap, the present study sought to examine the moderating effect of CSE in the relationship between challenge/hindrance stress and safety performance. We tested our study hypotheses in a sample of gold mine workers and made several contributions to CSE and safety research.

First, we found support for the moderating role of CSE in the relationship between challenge/hindrance stress and safety performance. People low on CSE had stronger negative relationships between challenge stress and safety compliance and between hindrance stress and safety participation than people high on CSE. Therefore, people low on CSE are especially vulnerable to the negative impact of challenge and hindrance stress. They might be more reactive to the negative impact of stress and less effective in coping with stress (Kammeyer-Mueller et al., 2009). Moreover, CSE itself was also positively related to safety compliance and safety participation, adding to the importance of CSE in influencing safety behaviors. As such, the present study contributed to personality research by revealing the unique role of CSE in the relationship between challenge/hindrance stress and safety performance. We extended the line of research examining the moderating role of CSE to an important behavioral domain, safety performance.

Contrary to our expectation, the negative relationship between hindrance stress and safety compliance was stronger for people with higher levels of CSE. However, it is important to take a closer look at the pattern of the interaction. Specifically, safety compliance was higher for people high in CSE than for those low in CSE when hindrance stress was low. This is consistent with the main effect of CSE such that people with greater levels of CSE have more personal resources to demonstrate safety compliance. The interaction was primarily driven by the sharp decrease in safety compliance when people high in CSE experienced high levels of hindrance stress. Although the interaction was contrary to our expectation, we offer a tentative explanation for this pattern drawing on another study that examined the moderating role of CSE (Kacmar, Collins, Harris, & Judge, 2009). In that study, people with greater levels of CSE demonstrated a sharper decrease in performance than their counterparts when they perceived high levels of organizational politics. The reason to their performance decrement was that people with high levels of CSE were afraid that their
performance would not be rewarded given the ongoing organizational politics. Since hindrance stress and organizational politics both involve situations that are not instrumental for rewards and personal growth, people high on CSE might have the same concern and feel demotivated to maintain safety compliance when facing hindrance job stress.

Moreover, we found both challenge stress and hindrance stress to be negatively related to safety performance. Challenge stress might motivate individuals to bypass safety procedures to get the tasks done, thus leading to lower levels of safety performance. People experiencing hindrance stress might have insufficient resources to engage in safety behaviors. Given that few studies directly looked into the effects of challenge and hindrance stress on safety behaviors, the present study contributed to safety research by linking two distinct types of job stress to safety performance. We recognize that the study results concerning challenge stress appear to run counter to the proposition of Clarke (2012). However, in the meta-analysis the relationship between challenge stressors and safety participation turned out to be negative, which was contrary to the researcher’s proposition but consistent with our reasoning. Evidence from safety research also suggests that production performance is negatively related to safety performance (Wallace & Chen, 2006), which is consistent with our prediction that people experiencing challenge stress may strive for better task performance at the expense of safety performance. Given these intriguing results, we hope the current study can spur more research efforts to examine the effects of challenge and associated stress on safety performance.

5. Practical implications

Several practical implications can be derived from the study findings. First, our study suggests that challenge stress might be associated with undesirable outcomes for employees working in safety-related industries, although it has been shown to relate to better work-related outcomes for white-collar workers (Cavanaugh et al., 2000; Crawford, LePine, & Rich, 2010). Challenge stress triggered by job demands such as time pressure can decrease performance. Second, managers are advised to attend to employees who hold less positive evaluations about themselves because these employees are more likely to have lower safety performance when encountering stress. Since people low on CSE respond more favorably to idiosyncratic interaction with the organization (Ng & Feldman, 2010), individualized support from management might prove to be especially helpful for these employees. Third, job hindrances such as red tape and politics within the organization can be frustrating for employees high on CSE. Eliminating these job hindrances can help managers motivate employees who hold high potential for safety performance.

6. Limitations and future research

Our study findings should be interpreted in light of several limitations. First, study variables were measured using self-reports, which could raise the concern of common method bias. Second, we used a cross-sectional study design, which limited the credibility of our causal interpretations. Third, in the challenge/hindrance stress scale, participants were asked to indicate the extent of stress they experienced as a result of each stressor. Although this practice is acceptable (Cavanaugh et al., 2000), it runs the risk of blurring the distinction between stressors and strain (Jex, Beehr, & Roberts, 1992). Therefore, we encourage future research to measure challenge/hindrance stressors and strain separately to gain a clear understanding of their relationships with CSE and safety performance.

Acknowledgement

This work was supported by National Natural Science Foundation of China (Grant Number: 71071149), Chinese Academy of Sciences (Grant Number: KJZD-EW-L04), and the Special Fund for Beijing key Discipline Construction.

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