THE DETERMINANTS OF SAFETY CLIMATE: A CONCEPTUAL MODEL TO EXPLORE HOW PSYCHOLOGICAL CAPITAL AND WELL-BEING AFFECT SAFETY LEADERSHIP BEHAVIOURS

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Safety in the construction industry is a major issue in the United Kingdom and the United States, representing about 20% and 31% of all fatal injuries respectively in 2013. Research suggests a strong predictor of safety performance is safety climate, while safety climate is mainly cultivated by safety leadership behaviours. Although psychological constructs is an important factor influencing behaviours, there has been scant attention to which positive psychological constructs might drive the positive safety leadership behaviours. To narrow such a research gap, we examined how positive psychological constructs studied in positive organisational behaviour (POB) theory may inform our understanding of human mechanisms that affect safety leadership. Specifically, we looked into how psychological capital and well-being may be associated with safety leadership behaviours which in turn affect safety climate in construction organisations. We accomplish these objectives by putting forth a conceptual model and methodological suggestion with related limitations.

Keywords: positive organisational behaviour, psychological capital, safety leadership, safety climate, well-being.

INTRODUCTION

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Construction is a high-risk industry. It has accounted for the highest number of fatal work injuries of any industry section in the United States and the United Kingdom. According to the U.S. Bureau of Labor Statistics, the industry hired 4% of the employees in the United States in 2013, but it accounted for about 20% of total fatal injuries. Statistics from the U.K. Health and Safety Executive indicated that although the construction industry accounted for only 5% of employees in Britain, it accounted for 31% of total fatal injuries in 2013. Given this disproportionate safety performance, construction organisations (e.g., contractors) have devoted considerable efforts to improve safety and prevent accidents, while researchers have supported these efforts by investigating what leading factors are associated with safety performance. Many of these studies suggested that safety performance can be predicted by safety climate (e.g., Neal & Griffin, 2006; Zohar, 2010). Safety climate is generally accepted as a 'snapshot' of employees' perceptions about safety (Mearns, 1999). In other words, to improve safety performance, organisations need to enhance their safety climate.

Although researchers found that safety leadership behaviour is a critical factor linked to safety climate (e.g., Yule, 2003; Flin et al., 2004; Hystad et al., 2014), little is known about the antecedents of positive safety leadership behaviours. In particular, scant attention has been paid to which positive psychological constructs could drive the positive safety leadership behaviours. This aspect of psychological factors, however, is important because psychological constructs are recognised as effective predictors of behavioural outcomes (Harms & Luthans, 2012). Hence, there is a need to explore this new dimension in the management of safety climate from the psychological perspective.

The studies of positive psychological constructs are grounded in the emerging research of positive organisational behaviour (POB) theory which has found that psychological capital (hope, self-efficacy, optimism, and resilience) and well-being are the two most important positive psychological constructs leading to positive work behaviours (e.g., employee engagement and organisational citizenship) Donaldson & Ko, 2010; Russell, 2008). Therefore, we posit that psychological capital (PsyCap) and well-being are possible underlying mechanisms leading to positive safety leadership behaviours; this, in turn, helps to sustain a positive safety climate in construction organisations.

In this paper, we first identify the literature gap in studying safety leadership behaviours; delineate positive psychological constructs, safety leadership behaviours and safety climate in a concept-by-concept manner; and synthesise these concepts into a conceptual model as shown in figure 1. We conclude by suggesting a methodological approach in pursuing this exploration, and revealing limitations of the approach.

LITERATURE GAP

Since the notion of 'safety climate' was introduced by Zohar (1980), numerous research found that it is highly related to 'management commitment to safety' (Dedobbeleer & Béland, 1991; Flin, 2003;; Glendon & Litherland, 2001; Michael, Evans, Jansen, & Haight, 2005); however, the term has been used rather vaguely to include a broad range of managerial activities and roles (O’Dea & Flin, 2001). Recent studies attempted to operationalise 'management commitment to safety' in terms of a range of leadership behaviours that are consistently related to good safety
performance. Bryden (2002) found that there were a number of critical managers' behaviours related to safety outcomes in an oil company: articulating an attainable vision of future safety performance; demonstrating personal commitment to safety symbolically; engaging everyone with relevant experience in decision-making; and being clear and transparent when dealing with safety issues. Yule et al., (2007) identified that leadership behaviours such as intellectual stimulation, idealised consideration and contingent rewards were significantly related to lower accident rates in a power generating company. Wu et al., (2008) reported that safety coaching, safety caring and safety controlling were the leadership behaviours being linked to safety performance in universities' laboratories. Lu & Yang (2010) indicated that leadership behaviours on safety motivation, safety policy and safety concern affected the safety behaviours of container terminals' operators. Hoffmeister et al., (2014) found that leaders who acted as role models on safety issues, clearly articulated safety missions, and asked for new ideas for improving safety performance were critical for cultivating safety climate in construction organizations.

While these works illustrated leaders do play a pivotal role in promoting safety climate through their behaviours, there is a research gap in the existing literature, because it remains unclear what underlying mechanisms help drive these positive leadership behaviours. Psychological constructs are widely regarded as important factors influencing an individual's work behaviours in organisational behavioural research (Harms & Luthans, 2012). As such, we infer that positive psychological constructs could be effective predictors of positive safety leadership behaviours as well. Since positive psychological constructs, which can be measured, developed and effectively managed for improving work performance, are studied in positive organisational behaviour (POB) theory (Luthans, 2002 p.59), we suggest examining how POB constructs may affect safety leadership behaviours, In particular, we call for the attention on psychological capital (PsyCap) and well-being, the two most important psychological constructs emerging in POB, in this study.

PSYCHOLOGICAL CAPITAL

Psychological capital (PsyCap) has emerged as a core construct of positive organisational behaviour (POB). It is a higher-order constellation of four positive psychological constructs: self-efficacy ('having confidence to take on and put it in the necessary effort to succeed at challenging tasks'); hope ('persevering towards goals and when necessary redirecting paths to goals'); optimism ('making a positive attribution about succeeding now and in the future'); resilience ('when beset by problems and adversity, sustaining and bouncing back and even beyond to attain success') (Luthans & Youssef, 2007 p.3). PsyCap yields higher correlations with performance outcomes than its constructs independently (Avolio et al., 2007). In addition, PsyCap can be developed and improved through training (Luthans et al., 2010).

We consider that psychological capital may be a potential antecedent of safety leadership behaviours in several ways. Leaders who are more hopeful tend to set higher standards on safety performance and be role models of safety behaviours. They are highly motivated to make their followers comply with the safety standard through various actions such as establishing a safety responsibility system, acting on safety policies, and recognizing followers' safety behaviours. Furthermore, their efficacious and optimistic beliefs about succeeding with their objectives on safety improvement
lead them to put in the effort and persistence required to succeed. Finally, highly resilient leaders are more able to bounce back from adversity, and stay focused on handling safety issues. As a result, they can find ways around difficulties to achieve better safety performance.

Substantial empirical research has indicated that PsyCap has significant positive relationships with desirable employee attitudes and behaviours (i.e., job satisfaction, organisational commitments, psychological well-being, and organisational citizenship) (Avey, Reichard, Luthans, & Mhatre, 2011; Peterson, 2011; Qadeer & Jaffery, 2014). As regards the impact of leaders' PsyCap specifically, Walumbwa et al. (2010) pointed out that leaders who score higher in PsyCap not only show more positive behaviours and higher performance themselves, but they also serve as role models for followers, and thus lead them to attain similarly positive behavioural outcomes. Considering that positive safety behaviours are part of desirable employee behaviours, we, therefore, infer that leaders' PsyCap could be positively related to safety leadership behaviours. This leads to our first research hypothesis (see figure 1):

**H-1: Leaders' psychological capital is positively related to safety leadership behaviours.**

**WELL-BEING**

Well-being is recognized as one of the important psychological constructs in POB (Avey et al., 2010; Linley & Joseph, 2004). It is defined as 'optimal psychological functioning and experience' (Ryan & Deci, 2001, p.142), and can be separated into hedonic, eudaimonic and evaluative well-being (Jeffrey et al., 2014; Ryan & Deci, 2001).

Hedonic well-being refers to people's emotions or feelings such as happiness and pleasure (Ryan & Deci, 2001). Eudaimonic well-being includes motivational and behavioural aspects (Ryff, 1989; Ryff & Keyes, 1995). From a motivational perspective, eudaimonic well-being refers to seeking self-realization. Behaviourally, it involves optimal positive functioning, and act of striving (Ryff, 1989; Ryff & Singer, 1998). Therefore, eudaimonic well-being leads people to perceive themselves as mentally growing, engaged and productive (Waterman, 1993). Evaluative well-being refers to how people evaluate their lives. It can be a particular aspect of their lives such as job satisfaction (Jeffrey et al., 2014).

Culbertson et al., (2010) concluded that PsyCap and well-being may have some overlap, but these two constructs are theoretically different. We deduce from this conclusion that PsyCap is related to well-being. PsyCap is regarded as personal psychological resources and capabilities, and affects how an individual interprets a life experience, and thus they have an impact on one's emotional status (e.g., wellbeing). In other words, PsyCap could contribute to individual well-being. For instance, leaders with high PsyCap tend to interpret negative experience (e.g. setbacks that occur during a process of improving safety performance) in a positive way. They regard negative events as a temporary one, and do not let them affect too many aspects of their lives (optimism). In addition, they can quickly bounce back from negative emotions aroused by the experience (resilience), generate possible solutions to improve the situation (hope), and are confident to implement those solutions (self-efficacy). The ability to successfully cope with negative experience makes them more likely to have better well-being status.
While there is little research on the relationships between PsyCap and well-being, studies that have looked into the relation have used limited conceptualisation of well-being. For example, Avey et al., (2010) indicated that employees' PsyCap is related to hedonic well-being. In addition, Culbertson et al., (2010) concluded that there are positive relationships between PsyCap, and employees' hedonic and eudaimonic well-being. Therefore, researchers have called for using a more comprehensive assessment of well-being to study the relationships. This study tries to redress this by investigating the relation between PsyCap and three different dimensions of well-being (hedonic, eudaimonic and evaluative). This leads to our second research hypothesis (see figure 1):

**H-2: Leaders' psychological capital is positively related to their well-being.**

Although substantial research shows that well-being relates to work performance and outcomes (e.g., job satisfaction, employee retention, workplace accidents, sick days, absenteeism, engagement, quality defects, and profitability), research examining the causal relationships is limited. To bridge this gap, Harter & Agrawal (2012) used a longitudinal sample of 11,500 U.S. Gallup Panel members to explore the causal relationships among a composite of wellbeing antecedents (career, social, financial, physical and community) and a list of work outcomes (e.g. employee engagement and workplace turnover). They found wellbeing is a stronger cause than consequence, and wellbeing at work is most highly predictive of employee engagement. Engagement has been defined as 'a positive attitude held by employees towards the organisation and its values. An engaged employee is aware of business context, and works with colleagues to improve performance within the job for the benefit of the organisation' (Robinson et al., 2004). From this, we infer that leaders higher in well-being are engaging leaders. They are more likely to care about the safety performance which is one of the key performance indicators of construction organisations. Under the circumstances, they are more willing to work with their team members to improve safety performance through showing positive leadership behaviours (e.g., encouraging subordinates to provide safety suggestions). This leads to our third research hypothesis (see figure 1):

**H-3: Leaders' well-being is positively related to their safety leadership behaviours.**

Based on the hypothesised relation that PsyCap is positively related to well-being and that the hypothesised relation that well-being is positively related to safety leadership behaviours, we expect that well-being will mediate the relationship between PsyCap and the safety leadership behaviours.

In addition, as previously discussed, PsyCap is regarded as personal psychological resources that could affect leaders' interpretation on safety activities, and thus their safety leadership behaviours. Specifically, leaders who have high PsyCap generally possess positive expectation for achieving the safety performance goals, and thus are more likely to be high in well-being at work. Well-being, particularly hedonic well-being is primarily an emotional experience. To be high on well-being is to be

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2 The Gallup Panel is one of the few research panels that are representative of the entire U.S. population http://www.gallup.com/services/172364/draft-gallup-panel.aspx.
simultaneously high on positive emotions and low on negative emotions (Cropanzano et al., 2003; Wright, 2004). According to Fredrickson's broaden-and-build theory (Fredrickson & Losada, 2005), positive emotions broaden one's momentary thought-action repertoires through expanding the obtainable array of potential thoughts and actions come to mind. In other words, leaders with high well-being could generate more pathways and actions to achieve safety performance. From this, we infer well-being is a mediating variable that transfers the effect from PsyCap to safety leadership behaviours because it helps convert positive interpretation into actions. This leads to our fourth research hypothesis (see figure 1):

**H-4: Leaders' well-being mediates the relationship between psychological capital and safety leadership behaviours.**

**SAFETY LEADERSHIP BEHAVIOURS**

Leaders play an important role in managing safety performance (Flin & Yule, 2004), as they are the ones who take safety policy of their organisations and show them through specific behaviours (Slates, 2008); this, in turn, affects employees' attitudes and behaviours for achieving safety goals (Wu et al., 2008). In particular, safety leadership behaviours are a range of managerial behaviours that are consistently related to safety performance (O’Dea & Flin, 2001). Several previous studies identified a number of critical leadership behaviours for safety (Bryden, 2002; Hoffmeister et al., 2014; Wu et al., 2008; Yule et al., 2007). All these leadership behaviours can generally be grouped into two types: transformational and transactional. Transformational leadership focuses on providing employees with an inspiring vision for safety and supporting them to achieve it rather than depending on formal contingencies such as procedures (Conchie, 2013); Transaction leadership focuses on linking rewards with safety performance (Inness et al., 2010).

Based on the different aspects of transformational and transactional leadership, Lu and Yang (2010) have recently developed a safety leadership scale that categorised safety leadership behaviours into three dimensions: safety motivation, safety policy, and safety concern. Safety motivation and safety concern are facets of transformational leadership; safety policy is closely linked to transactional leadership. Safety motivation refers to the extent to which a leader creates a motivation system to encourage followers' safety behaviours. Such a system may include 'rewarding safety behaviours, praising workers' safety behaviours, setting up a safety incentive system, reporting potential incidents and safety suggestions, and encouraging workers' participation in safety decision'(Lu & Yang, 2010 p.124). Safety policy refers to the extent to which a leader creates a clear mission, goal, and responsibility so as to set standards for employees, and to create a safety system correcting employees' safety behaviours. Safety concern refers to the extent to which a leader is a role model to employees; emphasises the importance of safety equipment; focuses their interest in acting on safety policies; is concerned about safety improvement; and coordinates with other departments to solve safety issues.

**SAFETY CLIMATE**

Safety climate is widely regarded as a good predictor of safety performance (e.g., accidents and injuries) in both Western and Eastern societies (Vinodkumar & Bhasi, 2010). Although safety climate is generally accepted as a 'snapshot' of employees' perceptions about safety (Cooper & Phillips, 2004; Yule et al., 2007), researchers are
in less agreement regarding the composition of safety climate. According to Yule et al., (2007), the main debate is whether the safety climate should be restricted to workforce perceptions on management commitment to safety (a single faceted approach), or whether the role of management is incorporated with other safety issues such as worker involvement, personal accountability, and safety training (a multifaceted approach). In our conceptual model, we use a multifaceted approach to operationalise safety climate so as to maximize the insights that we can gain from the study.

Specifically, three safety climate dimensions are used in our model (see figure 1), namely: management commitment in safety, individual involvement in safety, and safety management system. These dimensions were developed based on 15 safety climate studies published in the past 30 years (Brown & Holmes, 1986; Cheyne et al., 1998; Cox & Cox, 1991; Cox & Flin, 1998; Dedobbeleer & Béland, 1991; Glendon & Litherland, 2001; Lee, 1998; Lin et al., 2008; Mearns et al., 1998; Mearns et al., 2001; Mohamed, 2002; R. Sunindijo & Zou, 2012; Williamson et al., 1997; Zohar, 1980; Zohar & Luria, 2005). Management commitment in safety refers to the workforce perceptions about how management prioritises and supports safety management in an organisation. Individual involvement relates to the perceptions about how an individual is supported to perform his or her job safely, and is encouraged to participate in safety improvement. Safety management system refers to workforce perceptions about whether an organisation obtains systematic and organisation-wide processes to identify safety issues, control associated risks, and continuously improve safety performance.

As previously discussed, management clearly has an important role to play in safety climate. Indeed, Zohar (1980) who first introduced the concept of safety climate suggests that safety climate is highly related to employees' perceptions of the safety attitudes and behaviours of management. Similar propositions have been found in other research across industries (Arboleda, Morrow, Crum, & Shelley II, 2003; Dedobbeleer & Béland, 1991, 1998; Donald & Canter, 1994; Eyssen, Hoffmann, & Spengler, 1980; Flin, 2003; Niskanen, 1994; Ostrom, Wilhelmson, & Kaplan, 1993; Wu et al., 2008; Wu, Chang, Shu, Chen, & Wang, 2011). Following these suggestions, we propose the last hypothesis (see figure 1): H-5: Safety leadership behaviours are positively related to safety climate in construction organisations.

PSYCAP, WELL-BEING, SAFETY LEADERSHIP BEHAVIOURS AND SAFETY CLIMATE - A CONCEPTUAL MODEL

Figure 1 summarises the conceptual model, showing the hypothesised relations among PsyCap, well-being, safety leadership behaviours, and safety climate. The model posits that leaders' PsyCap exert a positive influence on safety leadership behaviours, both directly and indirectly through their well-being. The direct influence of leaders' PsyCap on safety leadership behaviours reflects that their positive interpretation on safety performance poses a positive impact on their actions to implement safety measures. The indirect influence of PsyCap on safety leadership behaviours is through the enhancement of leaders' well-being; this, in turn, helps to strengthen the conversion from positive interpretation to actions. Subsequently, safety leadership behaviours influence on safety climate.
CONCLUSIONS

Practical implications
This paper explores how psychological constructs could affect safety leadership behaviours that relate to safety climate. The proposed model links the cognitive, emotional and behavioural aspects of leadership to the followers' perceptions on safety climate in construction organisations. This represents a promising new perspective on antecedents of safety climate and leadership behaviours, and in turn provides a new lens to the future research in safety science through looking into psychological factors of management as a source of improving safety climate. In addition, it also offers a new direction to the construction industry on how to effectively select and train their safety leaders based on the assessments and intervention on their PsyCap and well-being status. Last but not least, the propositions and model are also the recognition that in addition to the institutional variables such as safety management system, human variables, specifically their psychological and behavioural aspects, are an equally important dimension in safeguarding construction safety performance.

Methodological suggestion
To examine the relationships among PsyCap, well-being, safety leadership behaviours, and safety climate outlined in the model (figure 1), we propose to use a mixed methods design which combines questionnaire and semi-structured interview. The questionnaire helps to identify what the relationships are among the variables,
while the interview is used as a complementary method to the questionnaire because it enables us to take a closer examination on the identified relationships by the questionnaire, and to further investigate the reasons leading to these relationships.

Specifically, the questionnaire contains two parts. The first part includes questions about demographic information and safety climate. The second part of the questionnaire includes questions about the PsyCap, well-being and safety leadership behaviours. The first part of the questionnaire is self-rating; the second part is informant rating which means respondents need to evaluate their direct supervisors' PsyCap, well-being and safety leadership behaviours based on their observations. All questionnaires use a 5- or 7-point Likert scale format ranging from strongly disagree to strongly agree.

Except for the questions of demographic information, all the other questions in the questionnaires are from four established instruments which showed adequate internal reliability (Cronbach's alpha > .80) in previous published studies. Safety climate is assessed with a 20-item Construction Safety Climate questionnaire created by Sunindijo & Zou (2011). The 12-item Psychological Capital Questionnaire is used to measure psychological capital (Luthans et al., 2007; Luthans & Youssef, 2007; Avey, Avolio, & Luthans, 2011). Well-being is measured with the 40-item Happiness at Work survey developed by New Economic Foundation (Jeffrey et al., 2014). The 16-item Safety Leadership Attributes questionnaire developed by Lu & Yang (2010) is used to measure safety leadership behaviours.

A pilot study with the involvement of experts and practitioners in the construction industry will be conducted to ensure that all items in the questionnaire are clear and have adequate content validity. The questionnaire will then be distributed as a web-based online survey. Using a convenience sampling approach, two major construction companies (each has more than 2,000 employees) headquartered in the United States are invited to participate in the questionnaire. Based on the results of the questionnaire, we identify a focus group on which we conduct semi-structural interview.

As all the variables in the model are latent variables which are estimated from several observed variables, we might use structural equation modelling (SEM) to evaluate the appropriateness and fit of the proposed model because it enables to test the structural relations between latent variables. By using SEM, we can first verify the validity of the measurement portion of the model through conducting confirmatory factor analyses which test whether the data fit a hypothesised measurement model.

After confirming a good fit for the measurement model, we can proceed to examine the full structural model, and test the hypothesised relationships. Model fit will be judged by reviewing the magnitude and statistical significance of factor loadings, the chi-square value, and a series of commonly used goodness-of-fit statistics such as the comparative fit index (CFI), the standardized root mean square residual (SRMR), and the root mean square error of approximation (RMSEA), with its 90% confidence interval.

To test for mediation of well-being on the relationships between psychological capital and safety leadership behaviours, we suggest using the Baron and Kenny (1986) four-step procedure through using hierarchical linear modelling followed up with a bootstrapped analysis of indirect effects.

**Study Limitations**
There are two methodological limitations need to be recognised in this study. First no causal conclusions can be drawn as the study design is neither experimental manipulation nor random assignment. Therefore, causal effects between PsyCap and well-being, between PsyCap and safety leadership behaviours, between well-being and safety leadership behaviours, and between safety leadership behaviours and safety climate cannot be determined. To minimize this limitation, we will conduct post hoc analyses to test several competing theoretical models through utilizing path analysis in SEM. Although model comparison does not demonstrate the 'absolute' causality, it does demonstrate which model provides the optimal fit of the data, and thus it provides us with a better inference for directionality of the tested model at least to some extent.

Second, as both independent and dependent variables will be collected from the same respondent, this is one of the potential sources of common method bias which can lead to inflated relationships (Podsakoff et al., 2003). Thus, this study will follow their recommendation to methodologically separate the measures by having respondents complete the measurement of the predictor variables (PsyCap, well-being and safety leadership behaviours) in informant rating, and complete the measurement of criterion variable (e.g. safety climate) in self-rating. This procedure can help minimize but obviously does not eliminate this limitation. Yet, some organisational research methodologists have recently argued that the threat of common method biases may not be as serious a problem as once expected (Spector, 2006).
REFERENCES


