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Anne-Perrine Cades

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Walden University
2017

Abstract

Influence of Psychological Capital and Thinking Perspectives on Construction Safety Climate and Performance

by

Anne-Perrine Cades

MS, City University of New York, 2010

MA, Université de Versailles Saint-Quentin, 2006

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Organizational Psychology

Walden University

February 2018

Abstract

Understanding safety factors in construction is critical to reducing accident frequency and severity. Grounded in the safety performance model, this study was conducted to examine the impact of psychological capital (PsyCap), which consists of the shared variance of hope, efficacy, resilience and optimism, and Past, Present, and Future thinking perspectives, on safety climate and performance. A nonexperimental quantitative design was used to determine whether PsyCap and thinking perspectives of construction project employees predicted safety performance and/or moderated the relationship between safety climate and performance across construction sites in different countries. 411 construction employees were recruited via a multistage and clustering strategy and took part in the study. The PsyCap Questionnaire, MindTime Profile Inventory, Group-Level Safety Climate Scale, and Safety Performance Measure were used to assess PsyCap, thinking perspectives, safety climate, and safety performance. Multiple regression was used to determine the effects of PsyCap and thinking perspectives on safety climate and safety performance. Results showed that Future and Present thinking predicted PsyCap as well as safety climate and safety performance in the construction industry. Further, safety performance accounted for variations in hope and efficacy, two PsyCap components. Findings might be used to influence thinking perspectives of team leaders in designing training, developing employees' efficacy levels, and preventing accidents and fatalities on construction sites.

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Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

Construction remains the most dangerous industry across the globe, with more than 100,000 recorded fatalities every year (Gao, Chan, Utama, & Zahoor, 2016; Okoye, 2016). Despite accounting for only 5% of the workforce (Mroszczyk, 2015), members of the construction industry represent between 30% and 40% of the total number of occupational accidents leading to fatalities (Okoye, 2016). The prevention of occupational fatalities, injuries, and work-related pains, also known as safety outcomes, is important to minimize the occurrence, severity, and costs associated with these events (Hollnagel, 2014; Sherratt, 2016).

Chapter 1 presents the main constructs of interest in this study, namely safety performance, psychological capital (PsyCap), thinking perspective, and safety climate. Next, the problem statement and the purpose of the research are presented, followed by the research questions (RQs), theoretical framework, and nature of the study. The scope, limitations, and significance of the study conclude Chapter 1.

Background

Safety Performance

Safety performance is one aspect of job performance (Christian, Wallace, Bradley, & Burke, 2009; Neal & Griffin, 2000). Burke, Sarpy, Telsuk, and Smith-Crowe (2002) defined safety performance as the "actions or behaviors that individuals exhibit in almost all jobs to promote the health and safety of workers, clients, the public, and the environment" (p. 432). Safety performance is the product of reciprocal actions between and among environmental, behavioral, and person-based factors (Geller, 2001). Research

has shown that variance in safety performance is directly related to individual differences in safety compliance and participation (Neil & Griffin, 2000). Together, safety participation and safety compliance constitute safety performance (Burke et al., 2002; Christian et al., 2009; Clarke, 2012; Neil & Griffin, 2000).

Employees who comply with safety rules and participate in safety programs not only experience less occupational injury but also contribute to the safety of others (Curcuruto, Conchie, Mariani, & Violante, 2015). Safety compliance refers to following safety procedures and carrying our work safely, whereas safety participation is voluntary and focuses on "helping coworkers, promoting safety program within the workplace, demonstrating initiative, and putting effort into improving safety in the workplace" (Neal & Griffin, 2000, p. 101). By its voluntary nature and positive organizational attributes, safety participation is a specific type of organizational citizenship behaviors (Hofmann, Morgesson, & Gerras, 2003). Curcuruto et al. (2015) defined safety participation as "acts such as helping co-workers with safety, seeking to promote the safety program, and making suggestions for change" (p. 318).

Safety participation includes prosocial and proactive behaviors, each of which can predict different safety outcomes (Curcuruto, Mearns, & Mariani, 2016). Specifically, Curcuruto et al. (2016) found that prosocial safety behaviors negatively predicted rates of microaccidents and property damage, and that proactive safety behaviors predicted low rates of lost-time injuries over time and high rates of near-miss events. Although researchers have explored the outcomes of safety participation, scant knowledge exists on

individual and cognitive characteristics that contribute to safety performance (Curcuruto et al., 2016).

Safety Climate

Psychological climate refers to employees' perceived work environment in regard to the characteristics of the job, leadership, group, system, and organization (Larson, Pousette, & Torner, 2008). Organizational climate refers to "the kinds of behaviors that get rewarded and supported" (Zohar, 2008, p. 1517). Climate includes a notion of relative priorities in organizations, alignment between espousals and enactments, internal consistency, shared cognitions or social consensus, and social verification (Zohar, 2008). Safety climate is one aspect of organizational climate. The organizational and safety climate results from the overall assessment and comparison of the conflicting priorities within an organization. Safety climate exists in the context of "other competing task domains" (Zohar, 2008, p. 1518). The idea of "walking the talk" is essential to organizational climate because it refers to divergence or convergence between the words and actions of organizational leaders. Compromises and situational characteristics are necessary to measure alignment levels within groups and thereby guide the understanding of the underlying organizational climate. Shared cognitions come from symbolic and social interactions (Zohar, 2008). The motivation for safety climate comes from the needs of social verification and actions compliant with those of others (Zohar, 2008). People confront their interpretations of the world to others to make sense of what is around.

Psychological Capital

PsyCap is a personal resource that relates to job performance (Avey, Luthans, Smith, & Palmer, 2010; Avey, Wernsing, & Luthans, 2008; Luthans, Youssef-Morgan, & Avolio, 2015), and it is a secondary construct comprising the shared variance of hope, efficacy, resilience, and optimism (Luthans & Youssef, 2004). PsyCap is positively related to organizational outcomes across countries (Avey et al., 2008; Avey, Luthans, Smith, et al., 2010; Siu, 2013).

Luthans, Avolio, Avey, and Norman (2007) defined PsyCap as

> An individual's positive psychological state of development characterized by (1) having confidence (efficacy) to take on and put in the necessary effort to succeed at challenging tasks; (2) making a positive attribution (optimism) about succeeding now and in the future; (3) persevering toward goals (hope) to succeed; and, (4) when beset by problems and adversity, sustaining and bouncing back and beyond (resilience) to attain success. (p. 3)

PsyCap has been associated positively with safety climate perceptions across different work sectors and age groups, and in air traffic controllers (Bergheim et al., 2013) as well as maritime workers (Bergheim, Nielsen, Mearns, & Eid, 2015).

Influence of Time on Behavior

Time affects behaviors in multiple ways (Abousselam, Naudé, Lens, & Esterhuyse, 2016; Doob, 1971; Keough, Zimbardo, & Boyd, 1999; Zimbardo, Keough, & Boyd, 1997). Present time perspective relates positively to risky driving (Zimbardo et al., 1997) and substance use (Keough et al., 1999), whereas future time perspective relates

negatively to risky sexual behaviors (Abousselam et al., 2016). Bjorgvinsson (1998) stated, “The higher the value of the future in comparison to the value of the present, the more cautious a person will be” (p. 3). Bjorgvinsson and Wilde (1996) argued that no safety behaviors theories (i.e., health belief model, subjective expected utility theory, protection motivation theory, or theory of reasoned action) have included the value of future as a factor in health and safety.

Time is a central precept of consciousness (Fortunato & Furey, 2010; Furey & Fortunato, 2014; Georges & Jones, 2000; Nyberg, Kim, Habib, Levine, & Tulving, 2010). The theory of MindTime posits that people perceive the world around them through the lens of time. Past thinking is the ability to recall experiences and access knowledge to analyze and evaluate a situation carefully for risk reduction (Fortunato & Furey, 2009, 2010). Future thinking is the ability to create and represent hypothetic events from a hopeful and optimistic perspective (Fortunato & Furey, 2009, 2010). Present thinking is the capacity to organize thoughts, including previous experiences and future events, and plan for long-term goals (Fortunato & Furey, 2009, 2010). The extent to which people use past, present, and future thinking together or independently influences their perceptions of the world (Fortunato & Furey, 2010; Furey & Fortunato, 2014).

Although significant progress in research on possible avenues to improve safety performance in organizations has been conducted, the number of victims of accidents on construction sites every year seems to reach a new plateau (Geller, 2001; Hollnagel, 2014). Behavior-based safety programs, leadership in safety training, or accident analysis

all contribute to preventing accidents on site (Geller, 2001; Hollnagel, 2014; Sherratt, 2016); however, these methods have not changed the trend, and the construction industry still pays a heavy toll in accidents and fatalities every year (Gao et al., 2016; Mroszczyk, 2015; Okoye, 2016). Further research is needed to understand to what extent people diverge in their ability to "think safety" and whether individual resources can help workers and employees on construction sites to "act safety."

Problem Statement

The problematic conditions that led to this study were the occupational accidents and fatalities that continue to occur frequently on construction sites across the globe. Millions of deaths and hundreds of millions of injuries occur at work every year (International Labour Organization [ILO], 2016a). There also are financial, social, and human costs associated with occupational accidents (ILO, 2016a). The organic nature of the construction industry, unlike the mechanistic nature of process-led organizations such as plants or manufacturing companies, makes the construction sector prone to occupational injuries and fatalities (Sherratt, 2016; Swuste, Frijters, & Guldenmaund, 2012).

Swuste et al. (2012) identified some of the sources of accidents on construction sites as material (equipment); environmental (climatic conditions, roads); individual (behaviors, fatigue, rules violations); and organizational (housekeeping). The prevention of occupational fatalities, injuries, and work-related pain, also known as safety outcomes, is important to minimize the occurrence, severity, and costs associated with these events (Hollnagel, 2014; Sherratt, 2016). Identifying the predictors of safety performance is

paramount to preventing occupational injuries and fatalities because safety performance directly relates to safety outcomes (Burke et al., 2002; Christian et al., 2009; DeArmond, Smith, Wilson, Chen, & Cigularov, 2011).

Over the past decade, there has been extensive research on the relationships between PsyCap and organizational outcomes (Avey et al., 2008; Avey, Luthans, Smith, et al., 2010; Jung & Yoon, 2015; Newman, Ucbasaran, Zhu, & Hirst, 2014; Siu, 2013) and job performance (Luthans, Avey, Avolio, & Peterson, 2010; Luthans et al., 2007). However, studies on the relationship between PsyCap and safety performance have been scant. In addition, despite the central role of time in organizational behaviors (Bluedorn & Denhardt, 1988), the relationship between thinking perspectives and safety performance has yet to be explored (see Figure 1).

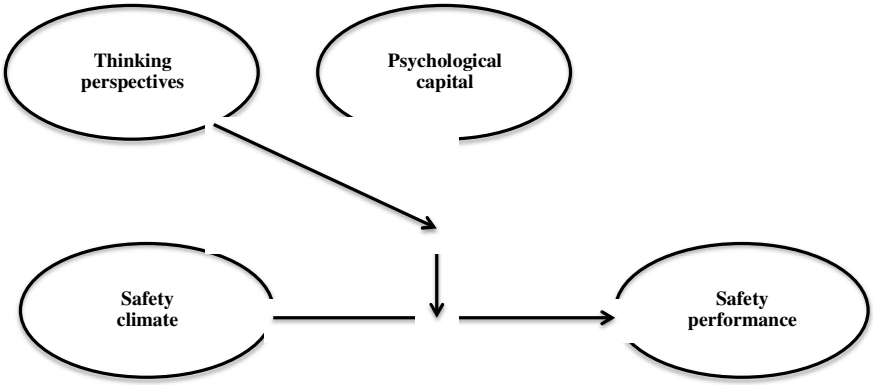

Figure 1. Conceptual diagram of the proposed relationships model.

Purpose of the Study

The purpose of this study was to examine the impact of PsyCap and thinking perspectives on safety climate and safety performance. Specifically, I attempted to determine to what extent PsyCap predicted safety performance and to what extent

individuals' past, present, and future thinking perspectives predicted PsyCap scores and safety performance. In addition, I examined the potential moderating effect of PsyCap and thinking perspectives on the relationship between safety climate and safety performance.

Research Questions

Results of extant research have shown that thinking perspectives are related to optimism and resilience, two of the four components of PsyCap. I examined the relationship between thinking perspectives and PsyCap in RQ1.

RQ1: Does thinking perspective, as measured by the MindTime Profile Inventory (Fortunato & Furey, 2009), predict PsyCap, as assessed by the Psychological Capital Questionnaire (PCQ-24; Luthans et al., 2007)?

H_{01}: Thinking perspective does not predict PsyCap.

H_{a1}: Thinking perspective predicts PsyCap.

Future and Present thinking positively predict PsyCap, whereas Past thinking negatively predicts PsyCap. Moreover, individuals' thinking perspectives, as measured by the MindTime Profile Inventory (Fortunato & Furey, 2009), also might independently predict safety performance, as measured by the Safety Performance Measure (SPM; Ford & Tetrick, 2011), as indicated in RQ2.

RQ2: Does thinking perspective predict safety performance?

H_{02}: Thinking perspective does not predict safety performance.

H_{a2}: Future and Past thinking positively predict safety performance, whereas present thinking negatively predicts safety performance.

I also sought to examine to what extent PsyCap, as measured by the PCQ (Luthans et al., 2007), moderated the relationship between safety climate, as measured by the Group-Level Safety Climate (GSC) Scale (Huang et al., 2013), and safety performance, as measured by the SPM (Ford & Tetrick, 2011) in the construction industry, as indicated in RQ3.

RQ3: Does PsyCap moderate the relationship between safety climate and safety performance in the construction industry?

H_{03}: PsyCap does not predict perceptions of safety climate or safety performance.

H_{a3}: PsyCap predicts perceptions of safety climate and safety performance.

I also examined to what extent PsyCap, as measured by the PCQ (Luthans et al., 2007), predicted safety performance, as measured by the SPM (Ford & Tetrick, 2011) in the construction industry, as indicated in RQ4.

RQ4: Does PsyCap predict safety performance in the construction industry?

H_{04}: PsyCap does not predict safety performance.

H_{a4}: PsyCap predicts safety performance.

H_{b4}: PsyCap hope predicts safety performance.

H_{c4}: PsyCap efficacy predicts safety performance.

H_{d4}: PsyCap resilience predicts safety performance.

H_{e4}: PsyCap optimism predicts safety performance.

Last, I examined to what extent PsyCap, as measured by the PCQ (Luthans et al., 2007), predicted safety climate, as measured by the GSC Scale (Huang et al., 2013) in the construction industry, as indicated in RQ5.

RQ5: Does PsyCap predict safety climate in the construction industry?

H_{05}: PsyCap does not predict safety climate.

H_{a5}: PsyCap predicts safety climate.

H_{b5}: PsyCap hope predicts safety climate.

H_{c5}: PsyCap efficacy predicts safety climate.

H_{d5}: PsyCap resilience predicts safety climate.

H_{e5}: PsyCap optimism predicts safety climate.

Theoretical Framework

There were three main theoretical frameworks in the study: safety performance model (Christian et al., 2009); PsyCap theory (Avey, Reichard, Luthans, & Mhatre, 2011; Luthans & Youssef, 2004); and the theory of MindTime (Fortunato & Furey, 2009). The safety performance model was built on a general model of job performance and Neal and Griffin's (2004) research on safety at work. Safety performance comprises safety compliance and safety participation (Christian et al., 2009; Curcuruto et al., 2015, 2016; Neal & Griffin, 2000) and predicts safety outcomes such as accidents and injuries (Burke et al., 2002; Christian et al., 2009; Curcuruto et al., 2015, 2016, Neal & Griffin, 2000). Predictors of safety performance are distal or proximal, as well as personal or situational (Christian et al., 2009). Safety motivation, safety knowledge, safety climate, and leadership predict safety performance (Christian et al., 2009; Curcuruto et al., 2015, 2016; Neal & Griffin, 2000). Safety motivation and safety knowledge are proximal, person-related factors of safety performance, whereas personality characteristics such as conscientiousness, neuroticism, extraversion, locus of control, and propensity for risk

taking are distal, person-related factors of safety performance (Christian et al., 2009). Moreover, safety climate and leadership are distal, situation-related factors of safety performance (Christian et al., 2009).

The second theory in this research was PsyCap theory, which is related to the field of positive organizational behavior (POB; Luthans & Youssef, 2004). PsyCap is a second-order construct made up of the shared variance of hope, efficacy, resilience, and optimism (Luthans & Youssef, 2004). PsyCap is sometimes referred to by its acronym, HERO, or the "hero within" (Luthans, 2012). Luthans et al. (2015) defined hope as "the will and the way" (p. 79). This definition drew from Snyder et al.'s (1991) conception of hope as "a positive motivational state that is based on an interactively derived sense of successful agency (goad-directed energy) and pathways (planning to meet goals)" (p. 287).

The efficacy of PsyCap is based on Bandura's (1977) view of self-efficacy and refers to the "beliefs and perception of the probability that we will be successful in our endeavours" (Luthans et al., 2015, p. 46). PsyCap resilience is "the capacity to rebound or bounce back from adversity, conflict, failure, or even positive event, progress, and increased responsibility" (Luthans et al., 2015, p. 144). PsyCap optimism is about a positive outlook of the future as well as the positive attribution of events. PsyCap optimism is "an explanatory style that attributes positive events to personal, permanent, and pervasive causes, and interprets negative events in term of external, temporary, and situation-specific factors" (Luthans et al., 2015, p. 118). According to PsyCap theory, the four constituents measured together are stronger predictors of performance in the

workplace and employees' well-being than each element measured individually (Luthans & Youssef, 2004).

The third theory that framed the study was the theory of MindTime (Furey & Fortunato, 2009; Fortunato & Furey, 2010, 2014). Fortunato and Furey (2010) contended that consciousness is based on the human capacity to travel mentally in time and is structured around three distinct, interdependent, and codependent thinking patterns: Past thinking, Present thinking, and Future thinking. Thinking perspectives relate to how people see the world. In other words, thinking perspectives influence individuals' perceptions, beliefs, values, motivation, and behaviors (Fortunato & Furey, 2010).

Nature of the Study

I used a quantitative, nonexperimental, cross-sectional design to determine to what extent individuals' PsyCap, as measured by the PCQ-24 (Luthans et al., 2007), and their thinking perspectives, as measured by the 45-item MindTime Profile Inventory (Fortunato & Furey, 2009), influenced the relationship between safety climate, as measured by the 19-item GSC scale (Huang et al., 2013), and safety performance, as measured by the 10-item SPM (Ford & Tetrick, 2011). The research design was appropriate because the intent of the study was to assess the direction and magnitude of relationships, not to establish causation. I measured the scores of the four variables concurrently for each participant. Perceived safety climate, PsyCap, and thinking perspectives were the independent variables (IVs), or predictor variables, and safety performance was the dependent variable (DV), or criterion variable. I conducted a multiple regression analysis to determine the interaction of safety climate and PsyCap

effect on safety performance, as well as the interaction effects of thinking perspectives and PsyCap on safety performance.

Scope and Delimitations

The focus of the study was safety performance in the construction industry, a sector that still has the highest rate of fatalities across industries, despite accounting for a proportionately small number of employees (Gao et al., 2016; Okoye, 2016). Safety performance has been studied in the construction industry, but no research has focused on the variables of cognitive differences influencing safety. I conducted this study with multiple organizations and obtained consent from each of them.

The target population comprised employees of companies specializing in construction and maintenance operations in the oil and gas sector. The sampling design was a convenience sampling approach. The sampling frame comprised construction project teams in the participating companies. Because employees working on sites have differences in regard to their experience of safety from those working at the companies' headquarters, employees who spent more than 50% of their working time on site were differentiated from those who spent more than 50% of their working time at the companies' headquarters.

Limitations

The target population comprised individuals working for multiple organizations in the construction industry. All of the instruments in this study were developed and validated in English and based on Western standards. All four instruments were administered in their English version, which is the working language in the industry.

Although no major challenge was expected in regard to English comprehension, English might not have been the primary language of all participants. To minimize the impact of having nonnative English speakers complete the English-only surveys, and based on the nationalities of the targeted companies, the survey also was available in French. The consent form indicated that the preferred language to complete the surveys was English, but the participants had the option to complete them in French. At the time of the study, only the PCQ-24 and the MindTime Inventory had French versions.

I used back-to-back translation with two independent bilingual safety professionals for the GSC and the SPM, neither of which had a French version. I first translated the original English versions into French and then asked the safety professionals to translate them back in English. I compared the translated versions from each safety professional with the original English versions to minimize misinterpretations in the translated items. I discussed any differences identified with the two safety professionals until agreement on the translation was reached. I shared the process and results of this exercise with the authors of the GSC. Prior to interpreting the results of the surveys, I measured and compared the internal consistency (i.e., Cronbach's alpha) of the French versions against the Cronbach's alpha of the original English versions of the instruments and confirmed that they were not significantly different.

Because safety is a sensitive topic in the construction industry, the data collection instruments were administered anonymously to prevent social desirability bias. In addition, construction workers and employees typically work long hours in an environment where schedule and progress are critical, so I allowed as much time as

possible to complete the survey. Time to complete the survey was around 20 minutes. Although research has supported the validity of each of the four instruments, they had not been used together and concurrently. The online nature of the survey did not alter the sequence of the questions in any of the instruments, with the exception of thinking perspectives, for which random sequencing of the questions formed part of the administration of the instrument; questions for the other instruments were presented one after another to facilitate a comparison of the participants' scores on each of the four variables (three IVs and one DV). All responses were anonymous.

Significance

This research might contribute positively to social change in two ways. First, the results might provide insight into the characteristics of individuals related to safety performance (Curcuruto et al., 2016). Understanding the impact of PsyCap and thinking perspectives on safety climate and safety performance might help to optimize organizational design, team dynamics, and group settings. Supervisors have a direct influence on the safety behaviors of employees on construction sites (Hofmann et al., 2003; Kark, Katz-Navon, & Delegach, 2015). Understanding Past, Present, and Future thinking of individuals might support the design of effective safety training and workshops to integrate thinking perspectives into the content and mode of delivery. The capacity to staff construction project sites with balanced teams and to deliver training targeted to the audience may be one way to reduce organizations' accident-related human, social, and financial liabilities, as well as to improve construction employees' safety and well-being.

Summary and Transition

Extant research has shown that project and work design, as well as employee and leadership training, are useful tools to improve safety performance. Research started with Skinner's (1970) operant model, a top-down approach by management to give feedback with positive or negative reinforcement (Cooper, 2009; Hollnagel, 2014). In the 1980s, an opposite perspective appeared, with employees owning the process and providing feedback to one another or as a group (Cooper, 2009). Since the 1990s, a combination of both views has appeared, in which management work together with employees to build a culture of safety (Cooper, 2009; Geller, 2001). Despite this knowledge, the construction industry has reached a plateau in regard to safety performance (Hollnagel, 2014; Sherratt, 2016). Therefore, further research was needed to determine new avenues supporting the safety of workers in the construction industry and preventing accidents on construction sites.

Chapter 2 begins with an explanation of the search strategy for relevant literature. This explanation is followed by a discussion of the conceptual background, the safety performance model, PsyCap theory, and the theory of MindTime. I then present an empirical review of the extant literature on those three theories. Last, I discuss the implications of the literature on the study. Chapter 3 provides details about the methodology, including the target population and sampling strategy; the instruments used to measure PsyCap, thinking perspectives, safety climate, and safety performance, including validity and reliability; and the statistical analysis. Chapter 4 presents the findings of this study, detailing descriptive statistics and the hypothesis testing. In

Chapter 5, I discuss and interpret the findings, explain the theoretical and practical implications, and present the limitations of this research. Last, I offer recommendations for future research and present the implications for positive social change.

Chapter 2: Literature Review

Although occupational accidents involve workers on construction sites, the root causes of these events can be traced back far from the actual scenes of the accidents (Behm, 2005; Sherratt, 2016). More than 40% of fatalities on U.S. construction sites have been identified as being directly related to the design of the work itself (Behm, 2005). Mroszczyk (2015) noted that "design professionals have traditionally designed buildings to comply with building codes, fire codes, and safe building regulations that emphasize the safety of the end users, not the workers who construct the building" (p. 62). Other factors relevant to occupational accidents in the construction industry have been identified by researchers as competitive tendering for the awarding of contract (Swuste et al., 2012); the use of subcontracting and multiple partners in the procurement process (Manu, Ankrah, Proverbs, & Suresh, 2010; Sherratt, 2016); the temporary and trade-specific organization of the workforce (Sherratt, 2016); and the risk-taking pay practices designed to support progress (Hollnagel, 2014; Sawacha, Naoum, & Fong, 1999; Sherratt, 2016; Swuste et al., 2012).

Construction site safety is a complex and dynamic subject that has not been and cannot be studied in isolation of situation and context (Cooper, 2009; Geller, 2001; Hollnagel, 2014, Sherratt, 2016). Factors contributing to accident severity and frequency include equipment, work conditions, accident nature, training-related factors, use and type of personal protective equipment (PPE), housekeeping, and location and timing of accidents (Ahmad, Iraj, Abbas, & Mahdi, 2016). Ahmad et al. (2016) argued that the basic causes of occupational accidents are related to the failure of workers to interact with

their environments. In this study, I examined the impact of PsyCap and thinking perspectives on safety climate and safety performance. This chapter includes the literature search strategy followed by a discussion of the conceptual framework and an empirical review of the literature. The chapter ends with a summary of the review and a transition to Chapter 3.

Literature Search Strategy

I searched for relevant literature from the PsycINFO, Business Source Complete, PsycARTICLES, PsycBOOKS, PsycCRITIQUES, PsycEXTRA databases. The search was limited to peer-reviewed scholarly journals using the search terms *psychological capital* or *PsyCap* (611 results); *mental time travel* or *thinking perspective* (1,086 results); *construal-level theory* or *temporal focus* (1,372 results); *safety performance* or *construction safety* (8,408 results); and *organizational citizenship behaviors* or *OCB* (2,099 results). Next, the search was narrowed to articles published since 2006 using the same search terms across the same databases: *psychological capital* or *PsyCap* (553 results); *mental time travel* or *thinking perspective* (725 results); *construal-level theory* or *temporal focus* (786 results); *safety performance* or *construction safety* (2,176 results); and *organizational citizenship behaviors* (1,706 results).

I then added filters by subject and/or classification to the search term groups. Specifically, the classification filters *organizational behaviors*, *personality traits and processes*, and *industrial and organizational psychology* were added to *psychological capital* or *PsyCap* (83 results); the classification filters *cognitive process*, *organizational behaviors*, *personality traits and processes*, and *industrial and organizational psychology*

were added to *mental time travel* or *thinking perspective* (77 results) and to *construal-level theory* or *temporal focus* (116 results). The subject filters *construction projects*, *performance*, and *job performance* were added to the search terms *safety performance* or *construction safety* (103 results). Last, the filters subject *organizational citizenship behaviors* and classification *organizational behavior* were added to OCBs (128 results).

One last search across the same databases targeted peer-reviewed printed material that referred to a combination of the constructs of interest. Specifically, the search term combinations were *psychological capital*, *PsyCap*, and *safety* (24 results); *psychological capital* and *time orientation* or *time perspective*, or *thinking perspective,* or *temporal perspective*, or *temporal focus,* or *mental time travel*, or *construal-level theory* (six results); *accident*, OR *safety*, OR *construction site safety* and *time orientation*, or *time perspective*, or *thinking perspective*, or temporal perspective, or *temporal focus*, or *mental time travel*, or *construal-level theory* (155 results); *time perspective*, or *thinking perspective*, or *temporal perspective*, or *temporal focus*, or *mental time travel* or *construal-level theory* and *OCBs* (nine results).

The inclusion criteria for literature to be included in the review were as follows: (a) organizational-related articles, (b) non-medical-related articles, (c) relevance to the construction industry, and (d) written in English. The references list of selected articles led to seminal works from as far back as 1971 on temporal focus, construal-level theory (CLT), the theory of MindTime, mental time travel, safety performance models, and PsyCap. This research also included six books.

Conceptual Foundation and Safety Research Paradigms

Heinrich (as cited in Hollnagel, 2014) was a pioneer in the field of industrial safety. Heinrich's 300-29-1 model was based on the notion that a ratio exists among near-miss events, accidents, and fatalities, although it is unclear whether Heinrich supported the existence of such a ratio. In fact, in the Heinrich pyramid, the three categories refer to different types of outcomes, even though the causes might have been identical (as cited in Hollnagel, 2014). Only the severity of the outcomes is different.

Based on his decades of experience and significant numbers of accident analyses, Heinrich (as cited in Hollnagel, 2014) concluded that thousands of accidents do not result in injury. In fact, Heinrich would have expressed concern about using the terms *accident* and *injury* interchangeably because doing so would lead people to believe that an accident is only serious when the resulting injury is serious (as cited in Hollnagel, 2014). Despite criticism, Heinrich's work has been a significant inspiration for behavior-based safety and safety leadership programs (Geller, 2001; Hollnagel, 2014; Sherratt, 2016).

Over the past century, several theories have been developed to explain the reasons for the occurrence of accidents. The most frequently discussed theories in the literature have been the single-event theory, the chain-of-events theory, the determinant factors theory, the branched-chain-of-events theory, and the multilinear process theory (Benner, 1979). The single-event theory posits that accidents result from one cause and that identifying and correcting that one cause will prevent accidents from recurring (Benner, 1979). The chain-of-events theory, best known as the domino theory, was proposed by Heinrich (as cited in Hollnagel, 2014). A sequence of five factors constitutes the domino

theory: the ancestry and social environment, the fault of the person, the unsafe act or mechanical/physical hazard, the accident, and the injury (Benner, 1979; Hollnagel, 2014). According to the determinant factors theory, some people are prone to accidents (Benner, 1979). The branched-chain-of-events chain theory, or fault tree, is the fourth theory of accident causation. Although this theory is similar to the chain-of-events theory, it encompasses concurrent factors, rather than a sequence of factors, that each lead to accident causation (Benner, 1979). According to the multilinear process theory, accidents are the result of a sequence of interactions between people and activities in space and time (Benner, 1979).

Although these five theories are meant to explain the occurrence of accidents, they also influence the accident analysis and, to some extent, bias the understanding of the events (Benner, 1979; Hollnagel, 2014). A second important common attribute of these theories is that they all aim to understand accident causation. In other words, accident analyses investigate the phenomenon posteriori, so the focus is on corrective actions rather than preventive measures (Dekker, 2016; Hollnagel, 2014). Even though it could be argued that the results of accident analysis support the training or implementation of preventive measures (Cooper, 2009; Geller, 2001), preventing occupational accidents also includes understanding the factors of safety performance (Christian et al., 2009; Clarke, 2010; Neal & Griffin, 2000).

There are three paradigms in the field of accident and occupational safety research: normative or prescriptive theories, theories of error, and cognitive science theories (Rasmussen, 1997). The normative or prescriptive theories come from behavioral

sciences and are based on the idea of "acting people into thinking differently" (Geller, 2001, p, 26). Drawing from Skinner's work (as cited in Geller, 2001), normative or prescriptive theories posit that behaviors are influenced by preceding stimuli and following consequences. In other words, behaviors occur in response to stimuli, and whether the consequences are perceived as positive or negative will affect the recurrence of the behaviors. According to this approach, behaviors can be changed by acting on perceived associations between behaviors and consequences (Skinner, as cited in Geller, 2001).

The theory of error is based on the idea that accidents are the result of people not following instructions (Hollnagel, 2014). Heinrich (as cited in Hollnagel, 2014) noted that 88% of accidents are caused by human errors, 10% are the result of environmental factors, and the remaining 2% are unavoidable. The theory of errors led to assumptions that things go well because people follow the procedures of work "as-imagined" (Hollnagel, 2014, p. 40). Whereas prescriptive and error-based theories suggest an outside-in approach, the cognitive science theory recommends an inside-in approach to the psychology of safety (Geller, 2001).

Because task demand increases progressively during construction projects, it is critical to support the capabilities of workers to prevent their loss of control when demand exceeds capabilities (Mitropoulos, Cupido, & Namboordiri, 2009). The moving nature of the construction industry has increased task demands by "dynamic degradation processes" (Mitropoulos et al., 2009, p. 887) such as physical barriers, poor housekeeping, and decisions of one contractor impacting another's capacity to work

safely; progress (and related production pressure); loss of sight (e.g., an identified hazard upstream that might have been forgotten downstream); and fatigue (Mitropoulos et al., 2009; Sherratt, 2016).

To cope with increasing task demands during construction projects, Hollnagel (2014) argued that employees cannot simply follow job descriptions, that is, "the prescribed work" (p. 41). Hollnagel observed that "for work to succeed, it is necessary that performance is variable or flexible rather than rigid. In fact, the less completely a work system can be described, the more performance variability is needed" (p. 118). Hollnagel observed that performance adjustment is a correlate of system complexity. In other words, the steps required to complete an activity on a construction site are designed by people who are remote from the site and who might not have the capacity to understand the moving circumstances around the execution of the project (Behm, 2005; Sherratt, 2016). This is what Hollnagel defined as "sharp end" and "blunt end" (p. 115). The sharp end refers to the people on the construction site. They are the first-line employees, and they experience the reality of "work-as-done" (Hollnagel, 2014, p. 40). The blunt end refers to people removed in time and space from the work site. They are executives or designers who work at the company's headquarters and whose assessments and decisions are based on the "work-as-imagined" (Hollnagel, 2014, p. 40). In other words, performance adjustment results from the behavioral variance between the work as done and the work as imagined.

On one hand, the blunt end sees safety performance through the lens of lagging indicators such as severity and frequency rates, two measures of what went wrong

(Dekker & Woods, 2010; Hollnagel, 2014; Sherratt, 2016). On the other hand, the sharp end experiences the presence of behaviors that prevent accidents (Dekker & Woods, 2010; Hollnagel, 2014; Sherratt, 2016). To some extent, the blunt end focuses on learning from the past, and the sharp ends focuses on anticipating the future.

High-reliability organizations (HROs) have led the way in defining safety as a process that not only builds on past experiences but also focuses on identifying potential issues early enough to prevent future accidents (Dekker & Woods, 2010). HROs adopt the perspective that safety is "not being the absence of negatives, but rather the presence of certain activities to manage risk" (Dekker & Woods, 2010, p. 125). In fact, HROs invest not only in developing individuals' capacity to detect what and when things can go wrong but also in training people to equip them with the ability to take action when facing unexpected situations (Roberts & Bea, 2001). Based on Perrow's normal accident theory (as seen in Hollnagel, 2014), complex systems are meant to fail, and some accidents are unavoidable. Although the human factor often is tagged as the source of errors that causes accidents (Hollnagel, 2014), preparedness can result in "an accident that did not happen" (Roberts & Bea, 2001, p. 77).

In an extensive review of occupational accident analysis, Dekker (2016) discussed the issue of labeling accidents as human error. Dekker warned against the tendency to analyze accidents from an a posteriori perspective that has already identified the consequences of accidents. Working backward is not enough to understand what went wrong (Dekker, 2016). "Ceteris paribus" (i.e., all things being equal) does not make sense in an injury investigation because it might be unrealistic when contexts and environments

are taken into account (Hollnagel, 2014). Using a breadth-first approach rather than a depth-first approach can help to prevent bias when analyzing accidents (Hollnagel, 2014).

Consistent with Dekker's (2016) work, the cognitive approach of safety recommends shifting away from a focus on pure compliance and assessing the factors of task demands and capabilities of workers to manage task demands at the time of accidents (Mitropoulos et al., 2009). The normative paradigm has dominated the field to date (Mitropoulos et al., 2009), with more attention and efforts spent on controlling individuals' behaviors via compliance with safety rules rather than on the factors influencing these behaviors such as production systems or team functioning (Mitropoulos et al., 2009). A combination of both approaches would best support safety performance (Geller, 2001; Hollnagel, 2014).

Safety Performance

Burke et al. (2002) defined safety performance as "actions or behaviors that individuals exhibit in almost all jobs to promote the health and safety of workers, clients, the public, and the environment" (p. 432). Drawing from the job performance theories, Neal and Griffin's (2000) model of safety performance includes organizational climate and safety climate (i.e., the antecedents of safety performance); safety knowledge and safety motivation (i.e., the determinants of safety performance); and safety compliance and safety participation (i.e., the components of safety performance). The outcomes of safety performance are near-miss events, accidents, and fatalities (Burke et al., 2002; Christian et al., 2009; Curcuruto et al., 2015, 2016; Neal & Griffin, 2000).

Safety performance is a form of job performance that includes safety climate, safety participation, and safety compliance as key components. Specifically, safety climate is one of the predictors of safety performance (Clarke, 2010; Gao et al., 2016; Neal & Griffin, 2000), and safety participation and safety compliance are the constituents of safety performance (Christian et al., 2009; Clarke, 2010; Neal & Griffin, 2000).

Safety Climate and Performance

Previous research has shown that safety climate is related positively but moderately to safety performance behaviors (Clarke, 2010; Gao et al., 2016; Neal & Griffin, 2000), with stronger correlations to safety participation than to safety compliance. The results of a study conducted in Italy with emergency response personnel showed similar findings: Safety climate was positively related to safety compliance, specifically to adherence to safety procedures and the use of PPE (Prati & Pietrantoni, 2012).

The moderate strength of the relationship between safety climate and safety performance has been consistent in the research (Clarke, 2010) and has been explained by the different definitions of safety climate across studies. In fact, safety climate is a multidimensional concept that includes between two and 15 factors, depending on the study (Gao et al., 2016). Choudhry, Fang, and Lingard (2009) attempted to overcome this limitation and studied the factors of safety climate. Results of their study of the construction industry in Hong Kong showed that two main factors of safety climate contributed to the perception of safety performance, namely, management commitment

and employee involvement, as well as inappropriate safety procedures and work practices.

Safety Performance, Participation, and Compliance

Safety compliance and safety participation, the two behavioral constituents of safety performance, are stable over time (Neal & Griffin, 2006). In addition, when compared to accident records, Neal and Griffin (2006) found a positive influence of safety behaviors on recordable lost-time injuries at the group level. Specifically, group safety behaviors at Year 1 related negatively to accidents at Year 5. Moreover, safety motivation at Year 2 correlated positively with safety participation behaviors at Year 4. Results also showed a positive relationship between safety participation and subsequent changes in safety motivation and safety compliance. The investigation of these relationships was outside the scope of the current study, but cognitive dissonance might be an interesting avenue to explore. As Neal and Griffin stated, "When employees believe safety is important, they are more likely to carry out activities that do not necessarily contribute to their own safety, but that help to make the broader environment safer" (p. 950).

Prosocial safety behaviors and proactive safety behaviors are the two components of safety participation, and they predict different safety performance outcomes (Curcuruto et al., 2015). Specifically, Curcuruto et al. (2015) concluded that prosocial safety behaviors were statistically significantly and negatively related to microaccidents and property damage, whereas proactive safety behaviors were statistically significantly and positively related to near-miss reporting but negatively to lost workday injuries.

Building on prior findings about the role of safety participation in worksite safety, Curcuruto et al. (2016) investigated the psychological factors related to proactive safety participation. Results indicated that proactive safety-role orientation had statistically significant and positive relationships with role breath self-efficacy (i.e., self-confidence in the ability to successfully execute a larger role in the organization than the one prescribed, above and beyond the formal job description); psychological ownership; felt responsibility; improvement orientation; and anticipation orientation (Curcuruto et al., 2016).

Safety Performance Predictors

In a review of the literature on safety performance, Christian et al. (2009) looked at the predictors of safety performance. Christian et al. categorized safety performance predictors as person related or situational related. They further classified these predictors as proximal or distal, depending on the strength and magnitude of their relationships with safety performance and with the components of safety performance, that is, safety compliance and participation. This section follows a similar structure and presents other predictors of risk performance, such as propensity to take risk, risk perception, past experience, pressure at work, and work stress and challenges.

Individual predictors of safety performance. Individual differences have been correlated with safety performance across multiple studies. Acceptability of rules violations has been found to predict risk behaviors (Rundmo, 2001). These findings are in line with the risk homeostasis theory of Wilde (1998, 2014), who noted that people have an internalized target level of risk and adjust their behaviors based on the perceived risk

of a situation in comparison to their target risk. If the risk perceived in a situation is below their target level, people behave in a way that increases their potential exposure to the risk; if the risk perceived is higher than their target risk, people adjust their behaviors to reduce their risk exposure (Wilde, 1998, 2014). The propensity to take risks has had a moderate negative relationship to safety performance (Christian et al., 2009).

Perceptions of significant others' views of safety and personal past exposure to occupational accidents can predict risk perceptions (Cree & Kelloway, 1997). In addition, risk perceptions can predict turnover intentions and willingness to engage in health and safety programs. According to Cree and Kelloway (1997), significant others' risk perceptions are as strong a predictor of risk perception as individuals' personal accident histories are. They also asserted that the perceptions of risk can predict turnover intentions better than the intentions of individuals to participate in safety programs. Hence, risk perception has not been perceived as a strong predictor of safety performance.

Conscientiousness and locus of control have been identified as having positive but weak relationships to safety performance (Christian et al., 2009). Results of past research have found that safety performance strongly correlates positively to safety motivation and safety knowledge (Burke et al., 2002; Christian et al., 2009; Neal & Griffin, 2000). Conversely, safety knowledge does not significantly or weakly relate to safety outcomes (Burke et al., 2002; Christian et al., 2009). Interestingly, safety knowledge has been more strongly related to safety compliance than safety participation, whereas safety motivation has been more strongly related to safety participation than to safety compliance (Christian

et al., 2009; Neal & Griffin, 2000). These findings indicate that safety knowledge is not sufficient to prevent accidents. Consistent with the cognitive engineering model of construction site safety (Mitropoulos et al., 2009), the actual capacity to act makes the difference in regard to accident prevention (Christian et al., 2009).

Situational predictors of safety performance. Research has shown that safety performance also is related to situational factors. In a qualitative study of construction sites operatives' experience of safety, Choudhry and Fang (2008) examined the extent to which workers were aware of the hazards related to their jobs and the consequences of unsafe practices. Choudhry and Fang interviewed seven workers who had been the victims of occupational accidents in Hong Kong. The themes that emerged from the results showed that the workers' unsafe behaviors were related to a lack of awareness of safety, an attempt to be a "tough guy," work pressure to get things done fast, peer pressure to follow the group norm, and fear of losing their jobs. In fact, when asked to explain the circumstances around the occurrence of the accidents, most workers, including those directly involved, discussed the pressure as well as the unsafe but standard circumstances that preceded the accidents (Choudhry & Fang, 2008). These results were consistent with Dekker's (2016) argument that accidents are not isolated events, but the point at which the digression of the "work as done" from the "work as prescribed" (Hollnagel, 2014, p. 40) reaches a threshold.

Building on leader-member theory, Hofmann et al. (2003) found evidence of positive correlations between quality of leader-member exchange (LMX) relationships and workers' safety performance behaviors. Although the results showed positive and

stronger relationships between LMX and safety participation than safety compliance (Hofmann et al., 2003), neither LMX nor transformational leadership strongly related to safety performance overall and related only weakly to safety outcomes (Christian et al., 2009). Work stress factors such as obstacles and challenges did not show consistent correlations to safety performance. Specifically, hindrance factors related negatively to safety compliance and safety participation, but there was no significant relationship between challenge stressors and safety compliance, and only small and negative relationships between challenge stressors and safety participation and near-miss events (Clarke, 2012).

Larson et al. (2008) found support for direct and indirect relationships between psychological climate and the safety behaviors of blue-collar workers in the construction industry. Work climate also has been associated with actual safety outcomes in the offshore industry. In a longitudinal study of the relationship between hydrocarbon leaks and work climate on offshore oil platforms, Olsen, Naess, and Hoyland (2015) found significant and negative correlations between work climate dimensions and hydrocarbon leaks that occurred after the study survey period. Research on safety climate has identified a mean corrected correlation between safety climate and injury rate of -.38 and -.42, with Occupational Safety and Health Administration medical records, respectively (as cited in Zohar, 2008).

Safety training is a necessary but insufficient resource to sustain safety behaviors on construction sites (Hardison, Behm, Hallowell, & Fonooni, 2014). With a “promotion-focused” perspective of safety (Kark et al., 2015, p. 1333), Curcuruto et al. (2015, 2016)

suggested a positive approach to safety. Eid, Mearns, Larsson, Laberg, and Johnsen (2012) explained that individuals' self-efficacy is necessary to support confidence in the ability to succeed when facing challenging work tasks and production pressure. They also asserted that optimism is important in making reasonable and positive attributions in regard to present and future successes. Hope is critical to staying focused on safety behaviors and preventing complacency relevant to safety (Eid et al., 2012). Last, resilience helps individuals to stay focused when the temptation to give up is strong (Eid et al., 2012). Overall, those four elements together constitute a resource that can "facilitate safety focused behavior" (Eid et al., 2012, p. 58). Future research is needed to gain knowledge about the relationships between these four constructs and safety performance.

Psychological Capital

PsyCap is a secondary construct built on several positive state-like constructs. In research, seven boundary conditions have been determined in regard to PsyCap operationalization (Avey, 2014). PsyCap is based on self-opinion; it also is multidimensional, domain specific, stable, and measurable; it is a predictor of performance; and it has been measured mainly at the individual level (Avey, 2014). In this section, I discuss the origin and the construct of PsyCap. Last, I review the antecedents, moderators, and outcomes of PsyCap.

Origin of Psychological Capital

In a seminal article on positive psychology, Seligman and Csikzentmihalyi (2000) reviewed the foundations of the positive psychology movement. Psychology missions not

only attend to the malfunctioning of human beings but also strengthen people's capacity and help them to realize their full potential (Luthans et al., 2015; Seligman & Csikzentmihalyi, 2000). The field of positive psychology is threefold (Seligman & Csikzentmihalyi, 2000): subjective level (well-being, contentment, and satisfaction); individual level (courage, interpersonal skill, aesthetic sensibility, perseverance, forgiveness, originality, and future mindedness); and group level (responsibility, nurturance, altruism, civility, tolerance, and work ethic). PsyCap belongs to the field of POB. According to Luthans et al. (2015), "PsyCap can trigger an upward spiral that engages cognitive, affective, conative, and social mechanisms, leading to exceptional performance and other desirable outcomes" (p. 282).

Psychological Capital as a Second-Order Construct

Human capital, social capital, and PsyCap are organizational competitive advantages (Luthans & Youssef, 2004). Education and experience, two well-known components of human capital used extensively in organizations to recruit candidates, predict job performance only very mildly, with correlation coefficients of .10 and .18, respectively (Schmidt & Hunter, 1998). Luthans et al. (2007) proposed that positive PsyCap is a robust avenue to explore ways to improve performance in the organization.

PsyCap is anchored in the POB movement (Seligman & Csikzentmihalyi, 2000) and is based on the theory of the conservation of resources (Hobfoll, 1989). PsyCap is a secondary construct made up of the shared variance of the four HERO constructs (i.e., hope, efficacy, resilience, and optimism). Those four constructs positively relate to performance and well-being independently. Taken together, they form PsyCap, which is a

stronger predictor of people's performance at work and well-being than each component measured individually (Avey, Luthans, Smith, et al., 2010; Siu, 2013).

PsyCap is a state-like construct (Avey, Luthans, Smith, et al., 2010; Luthans, 2012; Luthans et al., 2007). PsyCap is an individual resource (Avey et al., 2008) that increases employees' performance, which can then increase organizational performance (Luthans & Youssef, 2004). Participants' PsyCap levels were successfully developed with a short training intervention across two studies (Luthans, Avey, & Patera, 2008; Luthans et al., 2010). In addition to increasing employees' well-being and performance in the organization, PsyCap development might impact organizations' revenues (Luthans, Avey, Avolio, Norman, & Combs, 2006). Using a standard utility formula in companies with a mean of $1.7 billion in revenue and a standard deviation of $1.3 billion, Luthans et al. (2006) calculated that a 2% increase in employees' PsyCap could increase annual revenues by $10 million.

Psychological Capital Predictors, Outcomes, and Moderators

A robust body of knowledge on PsyCap has been available in the literature for more than a decade. Two meta-analyses (Avey et al., 2011; Newman et al., 2014) presented a systematic review of PsyCap research. This section presents the different elements known about PsyCap and its predictors, outcomes, and moderators in particular.

Predictors of PsyCap. There are several known factors influencing PsyCap, including demographics, individual differences, and contextual factors (Luthans et al., 2015. The results of two studies (N = 1,264 and N = 529) reported by Avey (2014) showed that individual differences (i.e., core self-evaluation and collectivism) and

supervision (i.e., empowerment of leadership and ethical leadership) were the strongest predictors of PsyCap, with an explained variance of 24% and 23%, respectively. None of the demographic variables of age, tenure, and gender was a significant predictor of PsyCap in Avey's (2014) study. Results were consistent with previous research on the positive relationship between supervisors' support and employees' PsyCap, which predicted high performance (Y. Liu, 2013).

Previous results also have shown that PsyCap can mediate correlations between organizational climate and employees' performance (Luthans et al., 2008); transformational leadership and followers' job performance and OCBs (Gooty, Gavin, Johnson, Frazier, & Snow, 2009); organizational socialization (i.e., "buddying") and work engagement (Nigah, Davis, & Hurrell, 2012); and the relationship between leadership styles and safety outcomes (Eid et al., 2012). Furthermore, employees' perceptions of the prestige of their organizations (Mathe & Scott-Halsell, 2012) and individual ethnic identities (Combs, Milosevic, Jeung, & Griffith, 2012) are related positively to PsyCap, whereas uncertainty is related inversely to PsyCap (Epitropaki, 2013).

Outcomes of PsyCap. PsyCap has been associated with employees' outcomes. Research has shown that PsyCap is related positively to desirable employee attitudes such as organizational commitment (Avey, Luthans, & Youssef, 2010; Newman et al., 2014); job satisfaction (Avey, Luthans, & Youssef, 2010; Cheung, Tang, & Tang, 2011; Newman et al., 2014; Siu, 2013); and job performance and the propensity to stay late to support coworkers or help newcomers (Anjum, Ahmed, & Karim, 2014; Avey, Luthans,

& Youssef, 2010; Newman et al., 2014), but negatively to undesirable employee attitudes and behaviors such as cynicism; intention to quit; and counterproductive working behaviors (Avey, Luthans, & Youssef, 2010; Newman et al., 2014; Schulz, Luthans, & Messersmith, 2014) or burnout (Cheung et al., 2011). A longitudinal study by De Waal and Pienaar (2013) showed that PsyCap can predict work engagement.

Research also has indicated that the relationships of the components of PsyCap to outcome variables can vary significantly. Although a study conducted with hotel employees in Korea replicated previous findings on positive correlations of PsyCap and OCBs (Jung & Yoon, 2015), only the constructs of hope and resilience had statistically significant and positive relationships with hotel employees' OCB scores; optimism and efficacy did not.

In a different study on the relationship between PsyCap and smoking habits, L. Liu, Xu, Wu, Yang, and Wang (2015) did not find support for a relationship between the construct of PsyCap and smoking. Two of the components of PsyCap, optimism and resilience, both related significantly to smoking, but in the opposite direction (L. Liu et al., 2015). Specifically, optimism negatively correlated with current smoking, and resilience related positively to current smoking (L. Liu et al., 2015). Further research on PsyCap relationships with other constructs should examine not only relationships at the secondary construct level of PsyCap but also relationships with each one of the four components of PsyCap (e.g., HERO) to understand the direction and strength of PsyCap relationships with other variables.

Moderators of PsyCap. A few moderators of the correlation between PsyCap and employees' outcomes have been identified. Previous research has shown that U.S. versus non-U.S. settings, as well the service industry versus the manufacturing industry, can moderate the relationship between PsyCap and employees' outcomes (Newman et al., 2014). Specifically, Newman et al. (2014) reported that the relationship between PsyCap and employees' attitudes and behaviors was stronger in the U.S. samples than the non-US samples, as well as in the service industry than in the manufacturing industry.

In a study on the relationship between PsyCap and stress (Baron, Franklin, & Hmieleski, 2013), results showed that age moderated the relationship. Correlations between PsyCap and stress were moderately significant for entrepreneurs at the 10th percentile of age (37 years old in this study) but highly significant at the 50th (49 years old) and 90th (65 years old) percentiles of age. One limitation of Baron et al.'s (2013) study was that the low participation rate might have impacted the representativeness of the entrepreneurs' sample.

To date, the literature has been more focused on the outcomes of PsyCap than on the factors influencing PsyCap (Luthans, 2012; Newman et al., 2014). Moreover, proportionally, there has been a paucity of research on the moderating variables between PsyCap and employees' outcomes (Newman et al., 2014). Luthans et al. (2007) claimed that individuals' PsyCap levels are related to their beliefs about future challenges and outcomes and that "these positive psychological states motivate individuals to exert greater effort and perform well in their job which in turn enhances their job satisfaction"

(p. 126). In fact, Luthans (2012) argued that PsyCap is critical to understanding not only who people are but also whom they could become in the future.

According to Luthan et al. (2015),

> PsyCap provides a viable mechanism for positive appraisals to be formed for past, present, and future events, based on positive explanatory styles of past, motivated effort and perseverance in the present, and positive expectancies and intentional goal pursuit in the future. (p. 290)

Hence, future research is needed to understand to what extent people's consciousness moderates the relationship between PsyCap and safety performance.

Theory of MindTime

According to the theory of MindTime, the way people approach time is a cognitive process. In addition, the way that people think is an independent predictor of how they perceive the world around them. In this section, the discussion revolves around the construct of time first and the theory of MindTime next. Last, results of previous research on the relationship among thinking perspectives, behaviors, and personalities are reviewed.

Patterning of Time

In most cultures, time has three dimensions: past, present, and future (Doob, 1971). Although the concept of objective time is straightforward, defining the construct of subjective time is complex. In a seminal review of time, Doob (1971) discussed seven key concepts of temporal behaviors: (a) regulation of activities and relations; (b) psychological present (with recollection of the past, renunciation of the present, and

anticipation of the future); (c) temporal judgment (duration and intervals); (d) temporal orientation (direction awareness); (e) objective time (or clock time); (f) duration of interval (ephemeral, transitory, or extended); and (g) judgments of these intervals against subjective or objective standards. Doob argued that time exists around the psychological present and that it "moves backward or forward along a continuum ranging from the past to the future" (p. 12).

The notion of delayed gratification or renunciation of the present for future anticipation illustrates the dynamic tension between psychological present and future (Doob, 1971). Actions or interventions draw on the belief that gratification is attainable in the future, but not in the present (Doob, 1971). Likewise, interventions in the present are based on knowledge gained from previous experiences. As Doob (1971) noted, "Since present behavior results from past experience or from future intentions […], recollecting, anticipating, and intervening are universal and inevitable; therefore, all persons everywhere are oriented periodically toward the past, the present, and the future" (p. 52).

MindTime Thinking Patterns

Human consciousness is based on the three thinking patterns of past, present, and future (Furey & Fortunato, 2014). Mental time travel enables human beings to conceptualize events in different temporalities: past, present, and future thinking. These temporal dimensions determine representations and understanding of the world. According to Furey and Fortunato (2014), people's attitudes, decisions, and behaviors are based on the ways in which people use their past, present, and future thinking, be it

independently or in combination. Furey and Fortunato argued that the theory of MindTime can facilitate an understanding of people's interactions with their environments across domains, situations, and cultures. Specifically, Furey and Fortunato posited that the theory of MindTime is an avenue to assess the person-environment fit in organizations and then smooth the progress of work team effectiveness.

Evidence of the existence of three patterns of mental activities has been supported by previous research derived from the CLT. According to the CLT, decisions in regard to future events relate to the temporal distance between the psychological present and future events. Consequently, responses to future events are dependent upon people's construed representations of such events (Liberman & Trope, 1998; Trope & Liberman, 2000). The perceived temporal distance between self and future events or objects relates to the desirability of the events or objects, which then influences the attitudes, decisions, and behaviors concerning the events or objects.

Building on the CLT, Shipp, Edwards, and Lambert (2009) developed the 12-item Temporal Focus Scale to measure people's attention to past, present, and future time. A confirmatory factor analysis confirmed that a three-factor model best fit the data. Shipp et al. determined that people can have one, several, all (hypertemporal), or none (atemporal) of the three temporal foci. Shipp et al. also found supportive evidence of the relationship between temporal focus and perceived job characteristics in the past, future, and present. In a study with working adults ($N = 359$), Shipp et al. determined that future temporal focus was statistically significantly and positively related to the perceived future job characteristics of autonomy, opportunity, pay, and recognition. Moreover, the

participants' current temporal focus was statistically significantly and positively related to the current and future perceived job characteristics of autonomy, opportunity, pay, and recognition. These results showed that the individuals' temporal focus influenced what they paid attention to, something that impacted their perceptions of the job characteristics.

Mental Time Travel and Thinking Perspectives

The theory of mental time travel was first hypothesized by Tulving (1985). Tulving (2002) argued that autonoetic, or self-knowing, consciousness precedes the neurocognitive capacity of chronesthesia, the awareness of subjective time. Specifically, Tulving (2002) defined chronesthesia as "a form of consciousness that allows individuals to think about the subjective time in which they live and that makes it possible for them to 'mentally travel' " (p. 311). The capacity to travel in time mentally is thought to be a core element of human evolution (Furey & Fortunato, 2014). Doob (1971) asserted that "awareness of the passage of time is the point of departure for human evolution" (p. 49).

Nyberg et al. (2010) found that mental time travel activated different and distinct brain regions of the participants in their study when they mentally traveled, remembering past events, visualizing actions in the present, and projecting events in the future. Similarly, Fortunato and Furey (2010, 2012) found support for activation of variance of thinking perspectives based on individuals' time perspectives. The combined activation of Past, Present, and Future thinking was related to the individuals' past, present, and future time perspectives.

Thinking Perspectives and Personality

Fortunato and Furey (2009) tested the relationship between thinking perspectives and personality by comparing Past, Present, and Future thinking with the Big Five personality traits of (a) openness to experience, (b) conscientiousness, (c) extraversion, (d) agreeableness, and (e) neuroticism of 819 students from a U.S. university. Fortunato and Furey found a statistically significant negative relationship between Past thinking and extraversion but a statistically significant positive correlation to neuroticism. Future thinking correlated statistically significantly and positively to extraversion and openness but negatively to neuroticism. Present thinking related statistically significantly and positively to conscientiousness but negatively to openness (Fortunato & Furey, 2009). Overall, these results indicated that the three thinking perspectives were related individually and differently to personality dimensions. These researchers concluded that thinking perspectives influence perceptions and understanding of the world.

Implications of Past Research on Present Research

The purpose of the current study was to examine the impact of PsyCap and thinking perspectives on safety climate and safety performance. Table 1 presents the most recently published and most significant studies that have mentioned the relationship among thinking perspectives, PsyCap, safety climate, and safety performance. The five studies reported on the relationships of either thinking perspectives, PsyCap (or its constituents), or safety climate (or its constituents) as IVs and PsyCap constituents, employees' attitudes and outcomes, safety climate, safety perception or safety performance behaviors as DVs. The articles are listed in alphabetical order and present

the IVs, the DVs, and the moderating/mediating variables where applicable, as well as the sample size and key findings of each study.

Table 1

Previous Studies on the Relationships Among PsyCap, Thinking Perspectives, and Safety Performance

Author/ Year	IVs	DVs	Moderating/ Mediating variables	Population of interest (*N* = sample)	Key findings
Avey, Reichard, Luthans, & Mhatre (2011)	• PsyCap	• Job satisfaction • Organizational commitment • Psychological well-being • Organizational citizenship behaviors • Job performance • Cynicism • Turnover intentions • Job stress and anxiety • Deviance.	None	Employees from different organizations and jobs (*N* = 12,567)	PsyCap was statistically significantly and positively related to job satisfaction, organizational commitment, psychological well-being, organizational citizenship behaviors, and job performance but negatively related to cynicism, turnover intentions, job stress and anxiety, and deviance.
Bergheim et al. (2013)	• PsyCap • Hope • Efficacy • Resilienc y • Optimism	• Safety climate	• Positive affectivity • Negative affectivity	Air controllers from Norway (*N* = 77, 38)	PsyCap related positively to safety climate and explained 15.5% of the variance in safety climate. Hope and optimism statistically significantly related positively to safety climate. Neither positive nor negative affectivity mediated the relationship between PsyCap and safety climate.
Bergheim, Nielsen, Mearns, & Eid (2015)	• PsyCap	• Safety climate	• Work role • Job satisfaction	Employees in the maritime industry in Norway (*N* = 486, 594)	PsyCap statistically significantly and positively related to perception of safety climate. There were significant interactions between PsyCap and both work role and job satisfaction in regard to perception of safety.

Author/ Year	IVs	DVs	Moderating/ Mediating variables	Population of interest (*N* = sample)	Key findings
					Table 1 Cont'd
Fortunato & Furey (2011)	• Past thinking • Future thinking • Present thinking	• Resiliency, • Optimism, • Cynicism, • Anxiety and depression	None	U.S.-based students (*N* = 580).	Present and Future thinking correlated positively with optimism and resiliency, but negatively with anxiety and depression. In addition, Present thinking correlated negatively with cynicism. Conversely, Past thinking correlated positively with cynicism, anxiety, and depression but negatively with resiliency and optimism.
Guo, Yiu, & Gonzalez (2016)	• Safety climate (e.g., Manage-ment safety commit-ment • Social support, • Produc-tion pressure) • Safety know-ledge • Safety motiva-tion	• Safety performance (e.g., Safety compliance and safety participation)	None	Construction workers in New Zealand (*N* = 215)	Social support statistically significantly and positively related to safety compliance. Production pressure statistically significantly and negatively related to both safety compliance and safety participation. Both safety knowledge and safety motivation significantly statistically and positively related to safety participation but not to safety compliance.
Hystad, Bartone, & Eid (2013)	• PsyCap • Age (control) • Gender (control)	• Safety climate	None	Offshore workers in Norway (*N* = 220, 513)	PsyCap statistically significantly and positively related to perceptions of safety climate, when controlling for both age and gender.

In a meta-analysis that included 51 independent samples (*N* = 12,567), Avey et al. (2011) studied the relationship between PsyCap and employees' outcomes and attitudes. Avey et al. found that PsyCap was statistically significantly and positively related to job satisfaction, organizational commitment, psychological well-being, organizational citizenship behaviors, and job performance. Conversely, PsyCap also was statistically significantly and negatively related to cynicism, turnover intentions, job stress and

anxiety, and deviance. These results provided evidence of positive associations between PsyCap and employees' attitudes and behaviors, including, but not limited to, job performance and psychological well-being.

Another construct related to psychological well-being is thinking perspective. Fortunato and Furey (2011) studied the relationship between thinking perspectives and psychological well-being with a sample of 580 U.S.-based students. Future thinking was statistically significantly and positively related to optimism and resiliency, and Past thinking was statistically significantly and negatively related to resiliency and optimism. Present thinking was statistically significantly and positively related to resiliency and optimism. Fortunato and Furey concluded that the way people think is related to their levels of resiliency and optimism.

Three investigations (Bergheim et al., 2013, 2015; Hystad et al., 2013) focused on the relationship between PsyCap and safety climate. In two studies conducted with air traffic controllers in Norway (N = 77, 38), Bergheim et al. (2013) found a statistically significant and positive relationship between safety climate and PsyCap. Likewise, Hystad et al. (2013) found a statistically significant and positive relationship between PsyCap and perceptions of safety climate in their studies of the relationship of authentic leadership, safety climate, and PsyCap to the subjective perception of risk in the offshore and supply shipping industries in Norway (N = 220, 513).

Bergheim et al. (2015) replicated their findings of a positive relationship between PsyCap and safety climate in two studies of the relationship of work role, job satisfaction, and PsyCap to safety climate perceptions in the maritime industry in Norway (N = 486,

594). When controlling for other variables, Bergheim et al. found a statistically significant and positive relationship between PsyCap and safety climate, with PsyCap alone explaining 12% of the variance in safety climate.

When examining the relationship of the key factors of safety climate (management safety commitment, social support, and production pressure); safety knowledge; and safety motivation to the two safety performance behaviors of safety participation and safety compliance, Guo et al. (2016) found that the best fit for the data was for a model in which the commitment to management safety was statistically significantly and positively related to social support and negatively to production pressure. They also found that social support was statistically significantly and positively related to safety motivation, safety knowledge, and safety compliance, and production pressure was statistically significantly and negatively related to safety knowledge, safety motivation, safety compliance, and safety participation. Last, they noted that safety knowledge and safety motivation were statistically significant and positively related to safety participation. Guo et al.'s findings support the existence of a relationship between perceptions of safety climate and safety behaviors.

Building on the research of Avey et al. (2011); Bergheim et al. (2013, 2015); and Hystad et al. (2013), future researchers might wish to investigate the relationship between PsyCap and safety performance. Despite supportive evidence of significant and positive relationships between PsyCap and job performance, PsyCap and organizational citizenship behaviors, and PsyCap and safety climate, there have been no studies on the relationship between PsyCap and safety performance.

Although the results of the studies by Bergheim et al. (2013, 2015) and Hystad et al. (2013) identified a positive relationship between the intrapersonal construct of PsyCap and perceptions of safety climate, in Bergheim et al.'s (2013) research, only hope and optimism were statistically significantly and positively related to safety climate. One limitation of the work of Bergheim et al. (2013, 2015) and Hystad et al. (2013) is that the three studies were conducted with organizations from one country.

Guo et al. (2016) found evidence of a positive correlation between safety climate factors and safety performance components (compliance and participation) in their sample of New Zealand construction workers. One limitation of their study was that it was conducted in a single country. Future research is needed to test whether similar findings can be replicated across multiple countries. Another avenue for research is on individual differences that might moderate the relationship between safety climate factors and safety performance components.

Past researchers have examined the relationships between the cognitive processes of thinking perspectives and two of the four components of PsyCap (optimism and resiliency), but no literature was found on any association between Past, Present, or Future thinking and hope or self-efficacy, the two other constituents of PsyCap. Based on the theory of MindTime (Fortunato & Furey, 2011), the ways in which people think about the world influence their perceptions and behaviors. Hence, I sought to examine the extent to which the four constituents of PsyCap are associated with Past, Present, and Future thinking. In addition, I wanted to extend previous research by studying the relationship between PsyCap and thinking perspectives on a target population of working

adults. Another possible avenue to explore was the moderating role of thinking perspectives between PsyCap as the IV and safety performance as the DV.

Summary and Transition

In reviewing the available research on PsyCap, safety, and thinking perspectives, several major themes emerged from the literature. Although safety performance models exist with identified predictors (safety knowledge and safety motivation), constituents (safety participation and safety compliance), and outcomes (accidents and near-miss events), the cognitive approach to safety performance has not been as broadly studied as its two competitive approaches, normative theories and theories of error, to improve safety performance.

PsyCap is a robust predictor of organizational and employee performance. With the exception of a positive relationship between PsyCap and safety climate, little is known about the relationship between PsyCap and safety performance. The theory of MindTime proposes a cognitive framework in which optimism and resiliency, two of the four constituents of PsyCap, are related to thinking perspectives, especially future thinking.

In addition to identifying a relationship between optimism and resiliency, two of the four components of PsyCap, and thinking perspective, the theory of MindTime posits that future thinking refers to "the extent to which people are hopeful and optimistic" (Fortunato & Furey, 2010, p. 437). Although the relationship between thinking perspectives and optimism has been studied, future researchers should test the relationships of optimism, hope, resilience, and self-efficacy to Past, Present, and Future

thinking. The participants in Fortunato and Furey's studies (2009, 2010, 2011, 2012) on thinking perspectives were students attending U.S. universities. Further research is needed to test the relationship between thinking perspectives and PsyCap across countries using a target population of working adults. Previous results have shown that thinking perspectives are related to at least two of the four dimensions of PsyCap, and considering the correlation between PsyCap and safety climate, further research will help to determine a potential relationship between thinking perspective and safety.

Results of the current study will extend knowledge in organizational psychology by providing insight into the individual variables that relate to safety performance. HROs have demonstrated the benefits of "pulling learning forward in time" (Dekker & Woods, 2010, p. 123) to improve safety performance. In fact, HROs not only leverage accident analysis to "build an organizational memory of what happened and why" (Roberts & Bea, 2001, p. 74) but also prepare people for unforeseen events. Still, research combining safety and time perspective in a cognitive framework of safety performance has been scant.

Supervisors have a direct influence on the safety behaviors of their team members on construction sites (Hofmann et al., 2003; Kark et al., 2015). Hence, fostering a more in-depth understanding of PsyCap, thinking perspectives, and safety performance relationships can help to prevent occupational accidents through organizational design. Specifically, results of the study might help to facilitate the selection of supervisors who will lead their teams' safety performance by informing the selection process with PsyCap and thinking perspectives assessments. In addition, the results can support the effective

design of safety training and workshops that can integrate thinking perspectives into the content and mode of delivery. These actions have the potential not only to reduce the accident-related human, social, and financial liabilities of organizations but also to improve construction employees' safety and well-being.

To understand the mechanisms of PsyCap and the relationship of thinking perspective to safety performance across countries, and to be consistent with extant research, I took a quantitative approach to examine the relationship of PsyCap, safety climate, and thinking perspectives to safety performance. With the exception of Choudhry and Fang's (2008) research, safety performance, PsyCap, safety climate, and thinking perspectives have been studied from a quantitative approach. The purpose of this study was to determine the impact of PsyCap and thinking perspectives on safety climate and safety performance. This study also aimed to examine to what extent individuals' Past, Present, and Future thinking moderates the relationship between PsyCap and safety performance.

Chapter 3, which details the rationale for the research design, begins with a short introduction to the statistical analysis that was used. The Methodology section presents information about the target populations in the participating companies, the sampling strategy, and the recruitment approach. The data collection process, potential threats to validity, and expected benefits of participation, along with the strategies to maintain data confidentiality and integrity, are reviewed. Then, each of the four instruments (i.e., one for each variable in this study) that was administered concurrently online is detailed and

its respective validity presented. An explanation of the statistical analysis, namely, multiple regression, follows. Chapter 3 ends with a summary.

Chapter 4 presents the findings of the study, starting with the participation rate, sample demographics, and descriptive statistics. Then, the assumptions of the multiple regression are discussed followed, by presentation of all three hypotheses testing. Chapter 4 concludes with a summary. In Chapter 5, I discuss and interpret the findings in the context of this study. Then, I review the theoretical and practical implications, and discuss the limitations of this research. Last, I offer recommendations for future research and present the implications for positive social change.

Chapter 3: Research Method

The purpose of the study was to examine the impact of PsyCap and thinking perspectives on safety climate and safety performance. To understand not only if these interactions have an effect but also when and how they have an effect, I conducted a multiple regression analysis following Hayes and Preacher's (2013) recommendations. In this section, the research design and rationale are presented, followed by details of the methodology. Then, information on the target population, sampling size, and sampling strategy, as well as the recruitment process, is presented, followed by descriptions of the data collection instruments. Potential threats to the validity of the study conclude this section.

Research Design and Rationale

The purpose of the study required a quantitative approach. I conducted a multiple regression analysis to measure the relationships between the IVs and the DV. I designed the study to assess the interactions of several IVs (safety climate, PsyCap, and thinking perspectives) on one continuous DV (safety performance). Multiple regression analysis refers to the assessment of combined effect, also known as interaction effect, between several IVs and one DV. The purpose of this study was to assess the impact of PsyCap and thinking perspectives on safety climate and safety performance. To conduct the statistical analysis, I used SPSS with the PROCESS tool (Hayes, 2012).

Methodology

As with all linear models, several assumptions had to be met before conducting a multiple regression analysis. These assumptions were linearity of data, nonexistence of

multicollinearity, homoscedasticity, and normality (Statistics Solutions, 2013). To check the linearity of the data, I designed scatter plots. Multicollinearity refers to the relationships among the IVs. Specifically, I tested the relationships among safety climate, PsyCap, and thinking perspectives. I tested homoscedasticity, the identical variance between variables often referred to as noise, by looking at a plot of residuals versus predicted values. To meet the assumptions of homoscedasticity, residuals should not grow as a function of the predicted values. The last assumption of multiple regression is normality, or the bell curve shape of the distribution.

Target Population

The aim of the study was to understand the impact of person-related factors (i.e., PsyCap and thinking perspectives) on safety climate and safety performance in the construction industry to identify possible strategies to prevent accidents and fatalities. The construction industry includes multiple trades and operations. The target population comprised employees of companies specializing in construction and maintenance operations in the oil and gas sector. The participants were construction project employees. Only employees working on construction sites were invited to participate. At the time of the study, employees working in the companies' headquarters were not confronted with the same safety realities as on-site workers, so I differentiated employees spending more than 50% of their working time in the companies' headquarters from those spending more than 50% of their working time on construction sites.

Sampling and Sampling Procedures

The sampling design followed a multistage and clustering strategy. First, I contacted key personnel in the targeted companies via social media (e.g., LinkedIn) and professional networks (direct e-mails). Three companies accepted my invitation to participate in the study. Once I obtained letters of cooperation from the participating companies, I sent invitations via e-mail to employees who were working on project sites. I received project lists of construction sites that served as the sampling frame. Employees whose e-mail addresses appeared on those lists were invited to participate.

I approached the targeted companies' representatives after receiving approval from Walden University's Institutional Review Board (IRB approval #05-01- 17-0361574). To support statistical power, I connected with contacts in my professional network via LinkedIn. I sent an e-mail explaining the purpose of the study and inviting them to complete an online survey. My e-mail indicated that the potential participants were welcome to forward the invitation to their peers in the construction industry.

Target populations must satisfy specific criteria to join studies. Considering that I intended to assess the impact of the individual and cognitive factors of PsyCap and thinking perspectives on safety climate and safety performance on construction sites, I invited only adults working on construction sites to participate. Specifically, only employees of the construction industry who were working on sites were eligible to join the study. I used this sampling approach until an acceptable sample size for the study was reached.

Statistical power is the probability that a given statistical test will detect an effect that exists in real life. The three factors influencing statistical power are alpha level, effect size, and sample size. Alpha level refers to a Type I error, which refers to the probability that a significant effect is found in the study, but does not exist in the real population. The larger the alpha level is, the larger the rejection region becomes, and the less likely it will be to find a Type I error. I set the alpha level at .05, which meant that correct conclusions were expected to be achieved 95% of the time.

The second factor influencing statistical power is effect size, which refers to the mean difference. A standard measure of effect size is Cohen's *d*. According to Cohen's *d* standard, in the case of a multiple regression analysis, R^2 below .13 indicates a small effect size, between .13 and .26 indicates a medium effect size, and above .26 indicates a large effect size.

The third factor influencing statistical power is sample size. To ensure sufficient statistical power at the conventional .8, confidence level of 95%, and confidence interval of 5%, and based on an estimated total population of more than 180 million employees in the construction industry (Building and Woodworkers International, 2006), I needed a sample of 384 participants to reach statistical power (Creative Research Systems, 2012).

Recruitment, Participation, and Data Collection

Prior to recruiting the participants, I obtained permission from the IRB to conduct the study. Once I received approval, I contacted key personnel at the targeted companies and also made contact with individuals in the construction industry via a professional network such as LinkedIn and direct e-mails. Once I obtained letters of cooperation from

the organizations, I asked for a list of employees working on construction sites. I contacted these employees by e-mail via the participating companies. Individuals and employees who agreed to be in the study constituted the sampling frame.

The e-mail invitation contained a one-sentence explanation of the purpose of the study and a link to the online survey. The e-mail also ensured interested individuals that their participation was voluntary and that their identities would remain anonymous. The online survey also served to obtain informed consent from the participants: The initial item on the survey asked the participants to confirm and acknowledge that they had read and understood the formal consent form to participate in the study.

Data collection took place between May 15 and August 4, 2017. The sample comprised four cohorts: Three groups were from the participating construction companies, and the fourth group were contacts from my professional network in the construction oil and gas industry. Initially, only employees from participating companies were targeted to be in the sample; however, a few weeks into the data collection process, it appeared that it would be challenging to reach statistical power through this medium only. Therefore, I added contacts in my own network as my fourth source of participants. Of the 1,774 employees who were invited to participate, 600 started the survey, and 425 completed it, indicating an overall participation rate of 24%.

I conducted an ANOVA to test whether there were statistically significant differences among the four groups in regard to age, gender, tenure, nationality, main workplace, and position in their respective organizations, and whether any differences among the groups could be accounted for the groups to which the participants belonged. I

conducted these tests to ensure that the groups did were not different and could be combined into one single data set for analysis. In addition, I conducted an ANOVA to test whether the responses of the French participants to the survey in French were different from their responses to the survey in English. The result was statistically significant at $p < .01$, indicating that the language in which the French participants took the survey did not influence their responses. Last, I conducted an ANOVA to test whether difference in SPM, GSC, PCQ, or thinking perspectives could be accounted for by variances in age; tenure; main work locations (e.g., site or offices); and status (e.g., individual contributors, managers of individual contributors, or managers of managers).

Prior to conducting the analyses, I checked for missing data and outliers. Participants who completed the survey only partially were removed from the data set. In total, 176 participants were removed from the data set. In addition, I used Mahalanobis, Cooks, and Leverage tests as my criteria to exclude outliers. In this study, the IV of thinking perspective was used to measure the three thinking perspectives of past, present, and future. I also studied PsyCap as a secondary construct as well as each of its four components individually. As a conservative measure and to ensure consistent sample size across the analyses, I based my calculation of the Mahalanobis, Cooks, and Leverage tests on 10 variables (safety climate, PsyCap, hope, efficacy, resilience, optimism, Past thinking, Future thinking, Present thinking, and safety performance). Scores that exceeded the cutoff on at least two of these three tests were excluded from my analyses, which resulted in three records being removed from the data set. Last, I conducted a

monotony test to check records with a variance of zero. Five additional records were removed from the data set. The final sample comprised 411 participants.

In the present study, the SPM and GSC showed a Cronbach's alpha of .92. The Cronbach's alpha for the PCQ was .88, with coefficients of reliability of .85, .86, .59, .33 for Hope, Efficacy, Resilience, and Optimism, respectively. Last, the thinking perspective scales of Past, Present, and Future showed Cronbach's alphas of .94, .90, and .93, respectively. SPSS was used to analyze the reliability.

Although a Cronbach's alpha below .70 appeared in previous research for the scales of Resilience and Optimism (Luthans et al., 2007), low scores of .33 for the Optimism scale and even a low .59 for the Resilience scale were unusual and challenged the instruments' internal validity in my research. Upon closer examination, the statistics per item showed that the reverse items were significantly lowering the coefficient alpha. In the case of the Resilience scale, deletion of the reverse item would have moved the Cronbach's alpha up to .74. For the Optimism scale, removing both reverse items would have increased the internal reliability coefficient to .69. In view of these results, I removed all three reverse items, which included the Resilience and the Optimism scales of the PCQ, from the analyses. After removing all three reverse items, the PCQ Cronbach's alpha moved up to .92. All the other scales used in this study showed reliability scores consistent with prior research.

The size of the sample required to be representative of the larger construction industry was 384 participants. With 411 participants, the sample size was sufficient to contribute to statistical power. In addition, the sample characteristics of gender, age, and

tenure were in line with the characteristics of the construction industry (ILO, 2016b). From an external validity perspective, the sample met the criteria to be representative of the larger target population of interest.

Potential risks and benefits. Apart from potential fatigue and slight discomfort in completing the survey, there was no expected risk to the participants for being in the study. The purpose of this study was to foster an understanding of the factors influencing safety performance. Participants in the study (i.e., companies and individuals) contributed positively to social change by sharing knowledge that could help to prevent accidents on construction sites and save lives.

Data integrity and confidentiality. Participation in the study was voluntary and anonymous. No names or any other identifiers were linked to any of the participants' responses. I exported the collected data from the survey website onto an Excel spreadsheet. I then secured the data in a password-protected file stored on my password-protected laptop. I locked the laptop when not in use. I will retain the data for 5 years, as required by Walden University's IRB.

Potential conflicts of interest. Although some of the key personnel and individuals whom I contacted initially to recruit for the study formed part of my professional network, I saw no current or perceived conflicts of interest in soliciting their participation.

Instrumentation and Operationalization of Constructs

Each of the four constructs was measured with a distinct instrument. I used the PCQ-24, the MindTime Profile Inventory, the GSC Scale, and the SPM to assess PsyCap,

thinking perspectives, safety climate, and safety performance, respectively. All four scales were administered online via SurveyMonkey. In addition to six questions that I asked to ensure the eligibility to be in the study (e.g., gender, age, tenure in the company, country of origin, time spent on site versus headquarters, and hierarchical status in the company), 98 question-items composed the survey.

PCQ. The 24-item PCQ (Luthans et al., 2007), which includes Hope, Efficacy, Resilience, and Optimism, the four dimensions of PsyCap, is anchored on a 6-point Likert scale that ranges from 1 (strongly disagree) to 6 (strongly agree). An example of the Hope scale of the PCQ-24 is this item: "If I should find myself in a jam at work, I could think of many ways to get out of it" (Luthans et al., 2007, p. 554). An example of the Efficacy scale is this item: "I feel confident helping to set targets/goals in my area of work" (Luthans et al., 2007, p. 554). An example of the Optimism scale is this item: "I always look on the bright side of things regarding my job" (Luthans et al., 2007, p. 554). An example of the Resilience scale is this item: "I usually manage difficulties one way or another at work" (Luthans et al., 2007, p. 554). Internal validity reported in previous research exceeded .70 for all four scales, and the reliability alpha of the composite scale was greater than .90 (Luthans et al., 2010). I studied the second-order construct of PsyCap and its four scales and generated an overall PsyCap score. Permission to use and reproduce the PCQ-24 was obtained from the authors (see Appendix A).

MindTime Profile Inventory. I used the 45-item version of the MindTime Profile Inventory to measure the thinking perspectives of the participants (Fortunato & Furey, 2014). The tool is anchored on a 100-point scale, but for this study, a 7-point

Likert scale ranging from 1 (*not at all well*) to 7 (*extremely well*) was used. An example of the Past Thinking scale is this item: "Past experiences strongly inform my decision making" (Fortunato & Furey, 2009, p. 243). An example of the Present Thinking scale is this item: "People think of me as organized" (Fortunato & Furey, 2009, p. 243). An example of the Future Thinking scale is this item: "I am known for generating ideas" (Fortunato & Furey, 2009, p. 243). Previous results have shown reliability coefficients of the scales of .80, .91, and .84, respectively (Fortunato & Furey, 2009, 2010). Permission to use and reproduce the MindTime Profile Inventory was obtained from the authors (see Appendix B).

GSC Scale. The 19-item GSC Scale (Huang et al., 2013) includes three factors: 12 items on supervisory care, four items on participation encouragement, and three items on safety straight talk. The GSC Scale measures participants' perceptions of their direct supervisors on these factors using a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Internal consistency (i.e., Cronbach's alpha) of the GSC Scale has varied between .92 and .93 (Huang et al., 2013). An example of a supervisory care factor is this item: "takes the time to listen to my concerns regarding safety" (Huang et al., 2013, p. 82). An example of a participation encouragement factor is this item: "discusses with us how to improve safety" (Huang et al., 2013, p. 82). An example of a safety straight talk factor is this item: "talks about safety but pressures us to complete work on time" (Huang et al., 2013, p. 82). Permission to use and reproduce the GSC Scale was granted for research purposes (see Appendix C).

SPM. The 10-item SPM (Ford & Tetrick, 2011) includes two factors: four items on the use of PPE derived from Burke et al. (2002) and six items on safety participation derived from Hoffman et al. (2003). The coefficient alpha for each scale is .93 and .94, respectively. The safety performance measure uses a 5-point frequency Likert scale ranging from 1 (*much less than the average employee*) to 5 (*much more than the average employee*). An example on the Use of PPE scale is this item: "correctly store all personal protective equipment" (Ford & Tetrick, 2011, p. 65). An example on the Safety Participation scale is this item: "help other staff members learn about safer work practices" (Ford & Tetrick, 2011, p. 66). The four instruments that measured the four constructs of interest were anchored on Likert scales, and interval data were generated to assess the construct. Permission to use and reproduce the SPM was granted for research purposes (see Appendix D).

Threats to Validity

Potential threats to the validity of the study were related to the use of self-reported measures that could have been interpreted as social desirability bias as well as common-method variance. To mitigate the potential for any social desirability bias, I ensured that the survey was anonymous. The raw data were coded and stored, and they did not have any links to individual participants. The consent form encouraged honest responses by indicating that there were no right or wrong answers on the survey.

Different strategies were applied to address common-method variance, which is "variance that is attributable to the measurement method rather than to the constructs the measures represent'' (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003, p. 879). Although

different perspectives about the threats of common-method variance can be found in the literature (e.g., Chang, van Witteloostuijn, & Eden, 2010), I took several ex-ante actions to minimize the threats of common-method variance in this study. First, I guaranteed the anonymity and confidentiality of the participants' responses to the survey items. In addition, I clearly communicated to the participants that there were no right or wrong answers to the survey items (Chang et al., 2010). Another action to reduce the threat of common-method variance involved the use of instruments with different scale anchors to measure the IVs and the DV. In this study, three of the four scales had different options in the number and wording of the items. Another potential threat to the validity of the study was related to the validity and reliability of the four instruments when administered together. To facilitate the collection of data on the four variables, all four instruments were administered concurrently as one single survey.

Although all four instruments had been developed and validated against Western standards, they had not been normed for French speakers. Hence, I tested whether the answers of the French participants who completed the survey in French were different from the answers of the French participants who completed the survey in English. In addition, because the country of origin and its associated culture could have impacted the participants' responses, I ran an ANOVA to see if any differences in the participants' response could have been accounted for by the language of the survey or the country of origin.

One last potential limitation of the study had to do with the normality of the distribution of the safety performance variable. In this research, safety performance was

operationalized by a combined measure of safety participation (e.g., voluntary behaviors to support safety) and safety compliance (e.g., use of PPE). Although employees who spent more than 50% of their working time on construction sites were differentiated from those who spent more than 50% of their working time at the companies' headquarters, safety performance scores might not have been distributed normally within the group of employees who spent most of their working time on construction sites. In fact, the safety performance experience of a professional welder or a scaffolder was not the same as the experience of a quality assurance manager or a planning engineer. To control for the potential issue of normality of the DV residuals distribution, I used bootstrapped confidence intervals (Field, 2013).

Summary and Transition

In this chapter, I presented details of the methodology. Information about the target population, sample size, and sampling strategy was presented, followed by discussions of the recruitment process, data integrity and confidentiality assurances, potential risks and benefits of being in the study, and potential conflicts of interest. I also described the four instruments used to measure the construct of PsyCap, thinking perspectives, safety climate, and safety performance, together with their internal validity. Last, threats to validity were presented, and ways to mitigate those threats were mentioned.

Chapter 4 presents the results of the study. After a short introduction, I detail the participation rate and sample demographics, followed by a review of the descriptive statistics and multiple regression assumptions prior to conducting the actual analyses. I

then present the hypothesis testing and the results of the analyses. Chapter 4 concludes with a summary.

In Chapter 5, I discuss and interpret the findings in the context of this study. I then review the theoretical and practical implications, followed by an explanation of the limitations. I also offer recommendations for future research and present the implications for positive social change. Next, I review the results of the analyses of each of the three hypotheses testing and conclude Chapter 4 with a summary.

Chapter 4: Results

In the current study, I examined the impact of PsyCap and thinking perspectives on safety climate and safety performance. Five main RQs and their hypotheses structured this study:

RQ1: Does thinking perspective, as measured by the MindTime Profile Inventory (Fortunato & Furey, 2009), predict PsyCap, as assessed by the PCQ-24 (Luthans et al., 2007)?

H_{01}: Thinking perspective does not predict PsyCap.

H_{a1}: Thinking perspective predicts PsyCap.

RQ2: Does thinking perspective predict safety performance?

H_{02}: Thinking perspective does not predict safety performance.

H_{a2}: Future and Past thinking positively predict safety performance, whereas present thinking negatively predicts safety performance.

RQ3: Does PsyCap moderate the relationship between safety climate and safety performance in the construction industry?

H_{03}: PsyCap does not predict safety climate or safety performance.

H_{a3}: PsyCap predicts safety climate and safety performance.

RQ4: Does PsyCap predict safety performance in the construction industry?

H_{04}: PsyCap does not predict safety performance.

H_{a4}: PsyCap predicts safety performance.

H_{b4}: PsyCap hope predicts safety performance.

H_{c4}: PsyCap efficacy predicts safety performance.

H_{d4}: PsyCap resilience predicts safety performance.

H_{e4}: PsyCap optimism predicts safety performance.

RQ5: Does PsyCap predict safety climate in the construction industry?

H_{05}: PsyCap does not predict safety climate.

H_{a5}: PsyCap predicts safety climate.

H_{b5}: PsyCap hope predicts safety climate.

H_{c5}: PsyCap efficacy predicts safety climate.

H_{d5}: PsyCap resilience predicts safety climate.

H_{e5}: PsyCap optimism predicts safety climate.

In this chapter, I describe the data collection process, including time frame, recruitment, and response rates, as well as descriptive and demographic characteristics of the sample. Next, I detail the statistical model that I used to analyze the data, present the assumptions of the statistical analysis, and report the results of hypothesis testing. Chapter 4 concludes with a summary and a transition to Chapter 5.

Sample Demographics

Although the participants represented more than 40 nationalities, the countries that were represented the most often were France (23%), Norway (12%), Singapore (12%), India (10%), Algeria (7.5%), Philippines (6%), United Kingdom (4%), and Belgium (3%). Participants from Malaysia, the United States, Australia, Netherlands, Angola, Portugal, and South Africa contributed to less than 2% of the total sample for each country; all other countries represented less than 1% of the total sample. Male participants composed 95% of the sample, a percentage that matched the construction

industry benchmark (ILO, 2016b). Participants ranged in age from 20 years to more than 70 years, with 64% of participants between 30 and 49 years of age. The median age was between 40 and 49 years, and tenure in the industry ranged from less than 4 years to more than 26 years, with the median tenure between 15 and 19 years.

In the sample, 34% of the participants were working primarily (i.e., more than 50% of their working time) on construction sites (S), and 66% were working primarily in the companies' headquarters (O). Most (50%) participants served in manager of individual contributors (MIC) roles, 35% were in individual contributor (IC) roles, and 15% were in manager of managers (MM) roles. Table 2 presents a summary of the sample demographics, including a breakdown by group.

Table 2

Sample Group Demographic Breakout

Group	Gender (Male)	Age	Tenure	Main workplace	Country of origin	Hierarchical status	*n*
G1	(91%)	40-49 (37%)	15-19 (26%)	O (61%)	Norway (48%)	MIC (50%)	108
G2	(94%)	30-39 (52%)	5-9 (29%)	S/O (50%)	France (47%)	MIC (76%)	62
G3	(100%)	50-59 (45%)	> 26 (55%)	O (95%)	Belgium (40%)	IC/MIC (45%)	20
G4	(97%)	40-49 (32%)	15-19 (23%)	O (71%)	France (21%)	MIC (46%)	221
Total	(95%)	30-39 (34%)	15-19 (22%)	O (66%)	France (26%)	MIC (50%)	411

Descriptive Statistics

I calculated descriptive statistics for all four variables (safety performance as the DV, or criterion variable, and PsyCap, safety climate, and thinking perspectives as the three IVs, or predictor variables) in the overall sample and across each of the four groups. Of the three predictors in this study, thinking perspectives related to Past, Future, and Present thinking. I analyzed each thinking perspective independently from the two other

thinking perspectives. Likewise, I studied PsyCap and each of its four components independently. In the following analysis, I indicate when PsyCap is studied as one construct and when each of its four components (efficacy, hope, resilience, and optimism) is studied individually.

On average, participants across the entire sample scored above the midpoint on the SPM ($M = 4.02$, $SD = 0.66$), with a range between 1.80 and 5.00. These measures showed a positive and consistent perception of safety performance across the sample. Similarly, on average, participants scored above the midpoint on the GSC Scale ($M = 3.76$, $SD = 0.62$) with a range between 1.95 and 5.00, indicating that overall scores of safety climate in the sample were positive and consistent. The PCQ scores ranged between 2.57 and 6.00 ($M = 4.56$, $SD = 0.62$). Once again, the average score was above the midpoint, with a small standard deviation indicating positive and consistent perceptions of PsyCap across the sample.

To advance extant knowledge on PsyCap, I was interested not only in PsyCap as a construct but also in the four elements that made up this construct. According to the descriptive statistics of the four components of the PCQ, the scores on the Hope scale ranged from 1.50 to 6.00, with a mean score of 4.59 ($SD = 0.75$). The scores on the Efficacy scale ranged from 2.17 to 6.00, with a mean score of 4.81 ($SD = 0.73$). The scores on the Resilience scale, without the reversed item, ranged from 1.60 to 6.00, with a mean score of 4.46 ($SD = 0.72$). The scores on the last scale of the PCQ, the Optimism scale, without the two reversed items, ranged from 2.00 to 6.00, with a mean of 4.24

(*SD* = 0.80). The descriptive statistics of PsyCap components indicated that on average, scores were the highest for Efficacy, followed by Hope, Resilience, and Optimism.

The last measures were the perspectives relevant to Past, Future, and Present thinking. The scores on the Past scale ranged from 2.80 to 7.00, with a mean score of 5.44 (*SD* = 0.78). The scores on the Future scale ranged from 2.60 to 7.00, with a mean score of 5.07 (*SD* = 0.85). The scores on the Present scale ranged from 3.13 to 7.00, with a mean score of 5.29 (*SD* = 0.73). The mean scores on all scales exceeded the midpoint, indicating that the participants had higher than average scores on safety performance; safety climate; PsyCap (and its four components); Past thinking, Future thinking, and Present thinking. In addition, all standard deviation values were below 1, indicating overall consistency across the scores. Table 3 presents the minimum, maximum, mean, and standard deviation for each scale across the sample. The details for each group are provided in Appendix E.

Table 3

Safety Performance, Safety Climate, PsyCap, and Thinking Perspectives Means and Standard Deviations

Research variable	*M*	*SD*	Min	Max
Safety performance	4.02	0.65	1.80	5.00
Safety climate	3.76	0.62	1.95	5.00
PsyCap	4.56	0.61	2.57	6.00
Hope	4.58	0.75	1.50	6.00
Efficacy	4.81	0.73	2.17	6.00
Resilience	4.46	0.72	1.60	6.00
Optimism	4.25	0.79	2.00	6.00
Thinking perspective				
Past thinking	5.44	0.78	2.80	7.00
Future thinking	5.07	0.85	2.60	7.00
Present thinking	5.29	0.73	3.13	7.00

$N = 411$

T Tests

Prior to combining the data of the four groups of participants, I tested whether there were statistically significant differences among the groups in regard to age, genders, tenure, nationality, main workplace, and position in their respective organizations. To analyze the effects of main work location (S vs. O) on safety performance, safety climate, PsyCap, and thinking perspectives, I conducted repeated independent-samples *t* tests on my data set. Specifically, I conducted six independent-sample *t* tests. To avoid a Type I error (e.g. incorrectly rejecting the null hypothesis) and to ensure that all comparisons remained at .05, I conducted a Bonferroni correction. I divided the standard critical *p* value of .05 by 6, the number of tests conducted. I adjusted the significance level for each test comparing the effects of main work locations on safety performance, safety climate, PsyCap, and thinking perspectives to .008.

Main Work Location

Safety performance. I conducted an independent-samples *t* test to compare the safety performance scores of employees working more than 50% of the time on construction sites and employees working more than 50% of the time in their companies' headquarters. As presented in Table 4, at the adjusted *p* value of .008, there was no significant difference in the safety performance scores, $t(409) = -2.56$, $p = .011$, between the employees working on site ($M = 3.91$, $SD = 0.65$) and those working in headquarters ($M = 4.08$, $SD = 0.65$). These results suggested that the employees' main work location did not have an effect on their safety performance scores in the construction industry.

Table 4

Independent t *Test of Safety Performance Means for OnSite and Headquarters Employees*

	M	*SD*	*t*	*df*	*p* value
Onsite	3.91	0.65	-2.56	409	.011
Headquarters	4.08	0.65			

Safety climate. Next, I conducted an independent-samples *t* test to compare the safety climate scores of employees working more than 50% of the time on construction sites and employees working more than 50% of the time in their companies' headquarters. There was not a significant difference in the safety climate scores, $t(409) = -2.51$, $p = .013$, between employees working on site ($M = 3.66$, $SD = 0.63$) and employees working in headquarters ($M = 3.82$, $SD = 0.60$). These results suggested that main work location did not have an effect on employees' safety climate scores in the construction industry (see Table 5).

Table 5

Independent t *Test of Safety Climate Means for On Site and Headquarters Employees*

	M	*SD*	*t*	*df*	*p value*
Onsite	3.66	0.63	-2.51	409	.013
Headquarters	3.82	0.60			

PsyCap. I then compared the PsyCap scores of employees working more than 50% of the time on constructions sites and employees working more than 50% of the time in their companies' headquarters. Table 6 presents the results of the independent-samples *t* test, indicating a significant difference in PsyCap scores, $t(409) = -4.67$, $p < .001$, between employees working on construction sites ($M = 4.36$, $SD = 0.59$) and employees working more than 50% of their time in headquarters ($M = 4.65$, $SD = 0.60$). These results suggested that the construction industry employees' main work location impacted their PsyCap scores. Employees working in headquarters scored higher on PsyCap than employees working on construction sites.

Table 6

Independent t *Test of PsyCap Means for Onsite and Headquarters Employees*

	M	*SD*	*t*	*df*	*p value*
Onsite	4.36	0.59	-4.67	409	< .001
Headquarters	4.65	0.60			

Past thinking. When I compared the Past thinking scores of employees working more than 50% of the time on construction sites and employees working more than 50% of the time in their companies' headquarters, the independent-samples *t* test indicated a significant difference, $t(306.823) = -3.18$, $p = .002$ (see Table 7). Work location impacted the Past thinking scores of employees in the construction industry. Specifically,

employees working in headquarters scored higher (M = 5.52, SD = 0.79) on Past thinking than employees working on constructions sites (M = 5.28, SD = 0.72).

Table 7

Independent t *Test for Past Thinking Means for Onsite and Headquarters Employees*

	M	*SD*	*t*	*df*	*p value*
Onsite	5.28	0.72	- 3.18	409	.002
Headquarters	5.52	0.79			

Future thinking. Likewise, there was a significant difference in Future thinking scores, $t(409) = -3.44$, $p = .001$, of employees working on construction sites (M = 4.87, SD = 0.84) and employees working in headquarters (M = 5.17, SD = 0.84). These results suggested that work location had an effect on the Future thinking scores of the participants, all of whom worked in the construction industry (see Table 8). Specifically, employees working in headquarters scored higher on Future thinking than employees working on construction sites.

Table 8

Independent t *Test for Future Thinking Means for Onsite and Headquarters Employees*

	M	*SD*	*t*	*df*	*p value*
Onsite	4.87	0.84	-3.44	409	.001
Headquarters	5.17	0.84			

Present thinking. When comparing the effects of main work locations on Present thinking, the variability in the two groups (i.e., employees working on constructions site and employees working in headquarters) was significantly different, $F(1,409) = 5.57$, $p = .02$. There was a significant difference in Present thinking scores, $t(330.01) = -4.98$, $p < .001$, between employees working on construction sites (M = 5.06, SD = 0.62) and employees working in headquarters (M = 5.40, SD = 0.75). Main work location impacted

the construction employees' Present thinking scores, with employees working in headquarters scoring higher on Present thinking than employees working on construction sites (see Table 9).

Table 9

Independent t *Test for Present Thinking Means for Onsite and Headquarters Employees*

	M	*SD*	*t*	*df*	*p value*
Onsite	5.06	0.62	-4.98	330.01	< .001
Headquarters	5.40	0.75			

Overall, construction employees working most of their time in headquarters reported higher scores in PsyCap and thinking perspectives than employees working most of their time on construction sites. Conversely, there was no significant difference between employees working onsite and employees working in headquarters on safety performance and safety climate.

ANOVA

Next, I analyzed the effects of tenure (years of experience in the construction industry); position (IC, MIC, or MM role); and age on safety performance, safety climate, PsyCap, and thinking perspectives. In addition, I explored whether differences in safety performance, safety climate, PsyCap, and thinking perspectives could be accounted for by each participant's country of origin.

Years of Experience

I conducted a one-way between-subjects ANOVA to compare the effect of years of experience on safety performance, safety climate, PsyCap, and thinking perspectives. As presented in Table 10, results of the analysis showed a significant effect of years of

experience at $p < .05$ only on PsyCap mean scores for the six categories of tenure in the study, $F(6,404) = 3.19$, $p < .001$. Post hoc comparisons using the Tukey HSD test indicated that the mean score for the group with less than 4 years of experience ($M = 4.16$, $SD = 0.65$) was significantly different from the group with 5 to 9 years of experience ($M = 4.60$, $SD = 0.65$); the group with 15 to 19 years of experience ($M = 4.60$, $SD = 0.59$); and the group with 20 to 25 years of experience ($M = 4.73$, $SD = 0.53$). However, the group with 10 to 14 years of experience ($M = 4.43$, $SD = 0.59$); the group with more than 26 years of experience ($M = 4.56$, $SD = 0.58$); and the group that preferred not to answer ($M = 4.56$, $SD = 0.62$) did not have significantly different scores from the group with less than 4 years of experience. Taken together, these results suggested that the effect of years of experience in the construction industry on PsyCap fluctuated. PsyCap increased after the 5th year of experience and then again between the 14th and the 25th years of experience.

Table 10

One-Way ANOVA of PsyCap by Years of Experience

Source	*df*	*SS*	*MS*	*F*	*p value*
Between groups	6	7.07	1.18	3.19	.00
Within groups	404	149.12	0.37		
Total	410	156.19			

Position

In this study, there were three position levels in the sample: IC, MIC, and MM. I conducted a one-way between-subjects ANOVA to compare the effect of position on safety performance, safety climate, PsyCap, and thinking perspectives. Results of the ANOVA identified a significant effect of position on safety performance mean scores at

the $p < .05$ level for the three type of positions, $F(2,408) = 8.44$, $p < .001$. These results are presented in Table 11. Post hoc comparisons using the Tukey HSD test indicated that the mean score for the IC group ($M = 3.84$, $SD = 0.69$) was significantly different from the MIC group ($M = 4.12$, $SD = 0.61$) and the MM group ($M = 4.11$, $SD = 0.63$). However, the scores for the MIC group ($M = 4.12$, $SD = 0.61$) and the MM group ($M = 4.11$, $SD = 0.63$) were not significantly different from one another. Taken together, these results suggested that the people managers in the construction industry tended to score higher on safety performance than the individual contributors did.

Table 11

One-Way ANOVA of Safety Performance by Position

Source	*df*	*SS*	*MS*	*F*	*p value*
Between groups	2	7.66	3.83	9.32	.00
Within groups	413	169.77	0.41		
Total	415	177.43			

Although the effect of position on Future thinking scores was significant, but with a p value close to the cut off value of .05 for the three groups, ($F(2,408) = 3.253$, $p = .040$), post hoc comparisons using the Tukey HSD test indicated that the mean score for the IC group ($M = 4.92$, $SD = 0.89$) was not significantly different from the score of the MIC group ($M = 5.13$, $SD = 0.85$) and the MM group ($M = 5.18$, $SD = 0.73$). The effect of age was not significant on any variable.

Country of Origin

The sample comprised French (24%), Singaporean (12%), Norwegian (12%), Indian (10%), Filipino (6%), and Others (36%) participants. I conducted a one-way

between-subjects ANOVA to compare the effect of country of origin on safety performance, safety climate, PsyCap, and thinking perspectives.

Safety performance. As presented in Table 12, results of the analysis showed a significant effect of country of origin at $p < .05$ on safety performance scores, $F(5,405) = 5.46$, $p < .001$.

Table 12

One-Way ANOVA of Safety Performance by Country of Origin

Source	*df*	*SS*	*MS*	*F*	*p value*
Between groups	5	11.05	2.21	5.46	.00
Within groups	405	164.03	0.41		
Total	410	175.08			

Post hoc comparisons using the Tukey HSD test indicated that the mean score for the Norwegian group ($M = 3.64$, $SD = 0.56$) was significantly different from the mean scores of all other groups. Specifically, the mean score of the Norwegian group was significantly different from that of the French group ($M = 4.13$, $SD = 0.57$); the Singaporean group ($M = 4.02$, $SD = 0.74$); the Indian group ($M = 4.27$, $SD = 0.58$); the Filipino group ($M = 4.10$, $SD = 0.66$) and the Others group ($M = 4.00$, $SD = 0.65$). Other groups' mean scores were not significantly different from each another. Taken together, these results suggested that the effect of country on safety performance applied only to the Norwegian participants. On average, the safety performance mean scores of the Norwegian participants were lower than the mean scores of all other participants.

Safety climate. Regarding the effect on country of origin on safety climate, as presented in Table 13, results of the analysis showed a significant effect of country of origin at $p < .05$, $F(5,405) = 5.20$, $p < .001$. Post hoc comparisons using the Tukey HSD

test indicated that the mean score for the Indian group (M = 3.99, SD = 0.43) was significantly different from that of the French group (M = 3.65, SD = 0.63) and the Norwegian group (M = 3.58, SD = 0.71). Similarly, the mean score of the Filipino group (M = 4.17, SD = 0.53) was significantly different from that of the French group (M = 3.65, SD = 0.63) and the Norwegian group (M = 3.58, SD = 0.71), as well as from the Others group (M = 3.75, SD = 0.56). Taken together, these results suggested that the effect of country on safety climate applied to the Indian and Filipino participants, who scored higher on safety climate than other participants did.

Table 13

One-Way ANOVA of Safety Climate by Country of Origin

Source	*df*	*SS*	*MS*	*F*	*P value*
Between groups	5	9.44	1.88	5.20	.00
Within groups	405	147.02	0.36		
Total	410	156.46			

PsyCap. As presented in Table 14, results of the analysis to test the effect of country of origin on PsyCap showed a significant effect of country of origin at $p < .05$, $F(5,405) = 19.74$, $p < .001$. Post hoc comparisons using the Tukey HSD test indicated that the mean score for the French group (M = 4.17, SD = 0.54) was significantly different from the mean scores of all of the other groups. Specifically, the French group was significantly different from the Singaporean group (M = 4.82, SD = 0.53); the Norwegian group (M = 4.49, SD = 0.50); the Indian group (M = 5.02, SD = 0.45); the Filipino group (M = 4.94, SD = 0.50), and the Others group (M = 4.54, SD = 0.63). Likewise, the mean score of the Singaporean group (M = 4.82, SD = 0.53) was significantly different from the Norwegian group (M = 4.49, SD = 0.50) as well as

the Others group (M = 4.54, SD = 0.63). The Norwegian group (M = 4.49, SD = 0.50) was significantly different from the Indian group (M = 5.02, SD = 0.45) and the Filipino group (M = 4.94, SD = 0.50). Last, the Others group (M = 4.54, SD = 0.63) was significantly different from the Indian group (M = 5.02, SD = 0.45) and the Filipino group (M = 4.94, SD = 0.50). Overall, the effect of country of origin on PsyCap scores applied across countries. On average, the Filipino and Indian participants scored higher on PsyCap than the other participants did. The Singaporean group had the next highest PsyCap scores; the French group scored the lowest ones.

Table 14

One-Way ANOVA of PsyCap by Country of Origin

Source	*df*	*SS*	*MS*	*F*	*p value*
Between groups	5	30.61	6.12	19.74	.00
Within groups	405	125.58	0.31		
Total	410	156.19			

Past thinking. Results of the analysis to test the effect of country of origin on Past thinking showed a significant effect of country of origin at $p < .05$, $F(5,405) = 7.28$, $p < .001$. These results are presented in Table 15. Post hoc comparisons using the Tukey HSD test indicated that the mean score for the Norwegian group (M = 5.01, SD = 0.71) was significantly different from all other groups. Specifically, the mean score of the Norwegian group was significantly different from the French group (M = 5.42, SD = 0.67); the Singaporean group (M = 5.73, SD = 0.77); the Indian group (M = 5.66, SD = 0.70); the Filipino group (M = 5.85, SD = 0.64); and the Other group (M = 5.38, SD = 0.82). Likewise, the Other group (M = 5.38, SD = 0.82) was significantly different from the Singaporean group (M = 5.73, SD = 0.77) and the Filipino group (M = 5.85,

SD = 0.64). In view of these results, the effect of country of origin on Past thinking scores applied very much to Norway and, to some extent, to Singapore and Philippines. The effect also applied to some extend to the Other group, but because of their low level of representation in this study, several countries were grouped together, making interpretation of the results difficult. On average, the Norwegian group scored lower on past thinking than other participants did. The Filipino group scored the highest, followed by the Singaporean group.

Table 15

One-Way ANOVA of Past Thinking by Country of Origin

Source	*df*	*SS*	*MS*	*F*	*p value*
Between groups	5	20.33	4.07	7.28	.00
Within groups	405	226.20	0.56		
Total	410	246.53			

Future thinking. As presented in Table 16, results of the analysis to test the effect of country of origin on Future thinking showed a significant effect at $p < .05$, $F(5,405) = 2.97$ $p = .012$. Post hoc comparisons using the Tukey HSD test indicated that only the mean score of the Norwegian group ($M = 4.77$, $SD = 0.86$) and the mean score of the Filipino group ($M = 5.46$, $SD = 1.01$) were significantly different from one another. The mean score differences among the other groups were not statistically significant at $p < .05$. In view of these results, the effect of country of origin on Future thinking scores applied very much to Norway and to Philippines, albeit in the opposite direction. On average, the Norwegian group scored much lower on Future thinking than the Filipino group did. The Filipino group also had a standard deviation slightly above 1, which indicated some degree of variance within this group in comparison to the other groups.

Table 16

One-Way ANOVA of Future Thinking by Country of Origin

Source	*df*	*SS*	*MS*	*F*	*p value*
Between groups	5	10.50	2.10	2.97	.01
Within groups	405	286.13	0.71		
Total	410	296.63			

Present thinking. I tested the effect of country of origin on Present thinking. Results of the analysis showed a significant effect at $p < .05$, $F(5,405) = 4.98$ $p < .001$. Table 17 presents these results. Post hoc comparisons using the Tukey HSD test indicated that only the mean score of the Filipino group ($M = 5.80$, $SD = 0.73$) was significantly different from that of the French group ($M = 5.17$, $SD = 0.59$); the Norwegian group ($M = 5.06$, $SD = 0.60$); and the Others group ($M = 5.26$, $SD = 0.72$). The mean score differences among the other groups were not statistically significant at $p < .05$. In view of these results, the effect of country of origin on Present thinking scores applied very much to the Filipino group when compared to the French and Norwegian groups. On average, the Filipino group scored much higher on Present thinking than the French and Norwegian ones did.

Table 17

One-Way ANOVA of Present Thinking by Country of Origin

Source	*df*	*SS*	*MS*	*F*	*p value*
Between groups	5	12.54	2.51	4.98	.00
Within groups	405	203.93	0.50		
Total	410	216.47			

Correlation Matrix

I looked at the Pearson correlation coefficient between all variables in the sample to measure the relationship between the constructs. As presented in Table 18, all Pearson correlation coefficients were positive and statistically significant at $p < .01$, with the exception of the relationship between safety climate and resilience.

Table 18

Pearson Correlation Results of Research Variables

Research variables	1	2	3	4	5	6	7	8	9	10
1. Safety performance	(.92)									
2. Safety climate	.312*	(.92)								
3. PsyCap	.349*	.278*	(.92[1])							
4. Hope	.328*	.322*	.891*	(.85)						
5. Efficacy	.381*	.241*	.845*	.681*	(.86)					
6. Resilience	.201*	**.037**	.802*	.596*	.575*	(.74[1])				
7. Optimism	.208*	.249*	.751*	.611*	.458*	.505*	(.69[1])			
8. Past thinking	.398*	.173*	.402*	.374*	.354*	.295*	.292*	(.94)		
9. Future thinking	.416*	.070*	.480*	.417*	.405*	.395*	.365*	.593*	(.92)	
10. Present thinking	.454*	.195*	.504*	.460*	.447*	.379*	.363*	.753*	.760*	(.90)

Note. Coefficient alpha estimates of reliability are in parentheses on the diagonal.
*$p < .01$, two-tailed tests. $N = 411$ [1] reverse items removed

Safety performance was positively related to safety climate, $r = .31$, $p < .01$. Likewise, safety performance related positively to PsyCap, $r = .35$, $p < .01$; Past thinking, $r = .40$, $p < .01$; Future thinking, $r = .42$, $p < .01$; and Present thinking, $r = .45$, $p < .01$. Looking at each dimension of PsyCap, safety performance correlated positively to efficacy, $r = .38$, $p < .01$; hope, $r = .33$, $p < .01$; and resilience and optimism, but less so with $r = .20$, $p < .01$, and $r = .21$, $p < .01$, respectively.

Safety climate was positively related to PsyCap, $r = .26$, $p < .01$, as well as Past thinking and Present thinking, with Pearson coefficients of .17 and .19, $p < .01$, respectively. Safety climate also was positively related to Future thinking but marginally

so, $r = .07$, $p < .01$. Regarding each dimension of PsyCap, safety climate correlated positively to efficacy, $r = .24$, $p < .01$; hope, $r = .32$, $p < .01$; and optimism, $r = .25$, $p < .01$. The correlation between safety climate and resilience was not statistically significant at $p < .01$.

Efficacy correlated positively to Past thinking, $r = .35$, $p < .01$; Future thinking, $r = .40$, $p < .01$; and Present thinking, $r = .45$, $p < .01$. Hope correlated positively to Past thinking, $r = .37$, $p < .01$; Future thinking, $r = .42$, $p < .01$; and Present thinking, $r = .46$, $p < .01$. Resilience correlated positively to Past thinking, $r = .30$, $p < .01$; Future thinking, $r = .40$, $p < .01$, and Present thinking, $r = .38$, $p < .01$. Last, optimism correlated positively to Past thinking, $r = .30$, $p < .01$; Future thinking, $r = .37$, $p < .01$, and Present thinking, $r = .36$, $p < .01$.

PsyCap related positively to Past thinking, $r = .40$, $p < .01$; Future thinking, $r = 48$, $p < .01$; and Present thinking, $r = .50$, $p < .01$. Thinking perspectives were strongly correlated to one another. Past thinking related positively to Future thinking, $r = .59$, $p < .01$, and even more so to Present thinking, $r = .75$, $p < .01$. Future thinking related to Present thinking, $r = .76$, $p < .01$.

Test of the Assumptions

Prior to conducting multiple linear regressions, I tested the four main assumptions of this statistical test: linearity, normality, homoscedasticity, and multicollinearity.

Linearity

To test linearity, I produced scatter plots of the relationship between each IV and the DV. The diagram representing the relationship between each IV and the DV (see

Figures 2-9) could be modeled by a straight line, suggesting that the relationship between these variables was linear. Figures 2 to 6 present the relationship between safety performance and the IVs. The direction and concentration of the points in the top right corner of the diagrams showed linear but positively skewed relationships between safety performance and both safety climate and PsyCap (see Figures 2-3). The relationships between safety performance and the three thinking perspectives (see Figures 4-6) were also linear and positive but more spread in the diagrams. Last, Figures 7 to 9 present the points showing that the relationships between PsyCap and the three thinking perspectives were distributed along a line. The assumption of linearity was met.

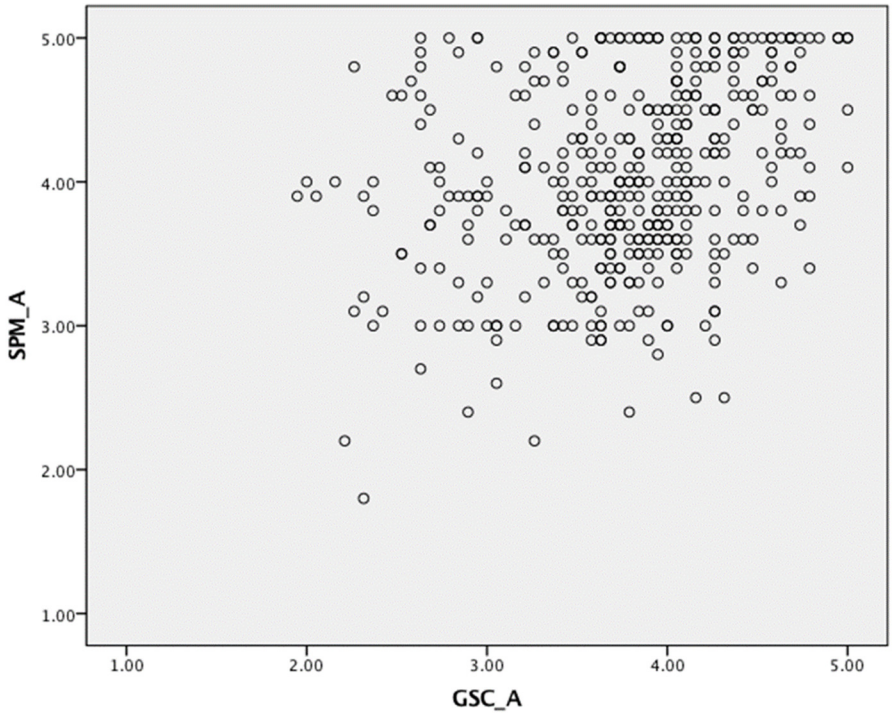

Figure 2. Scatter diagram with safety performance as criterion and safety climate as predictor.

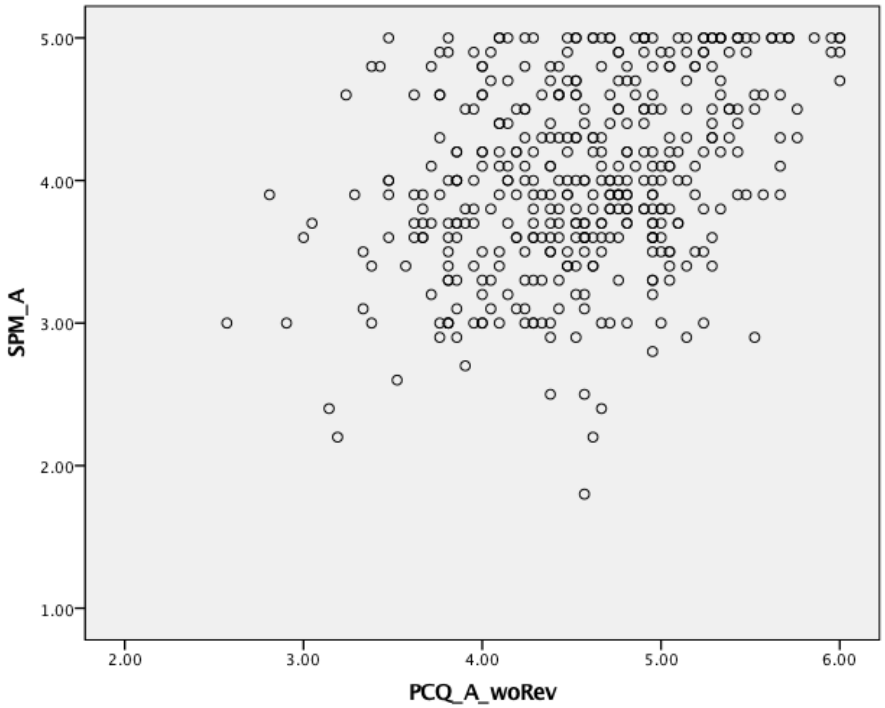

Figure 3. Scatter diagram with safety performance as criterion and PsyCap as predictor.

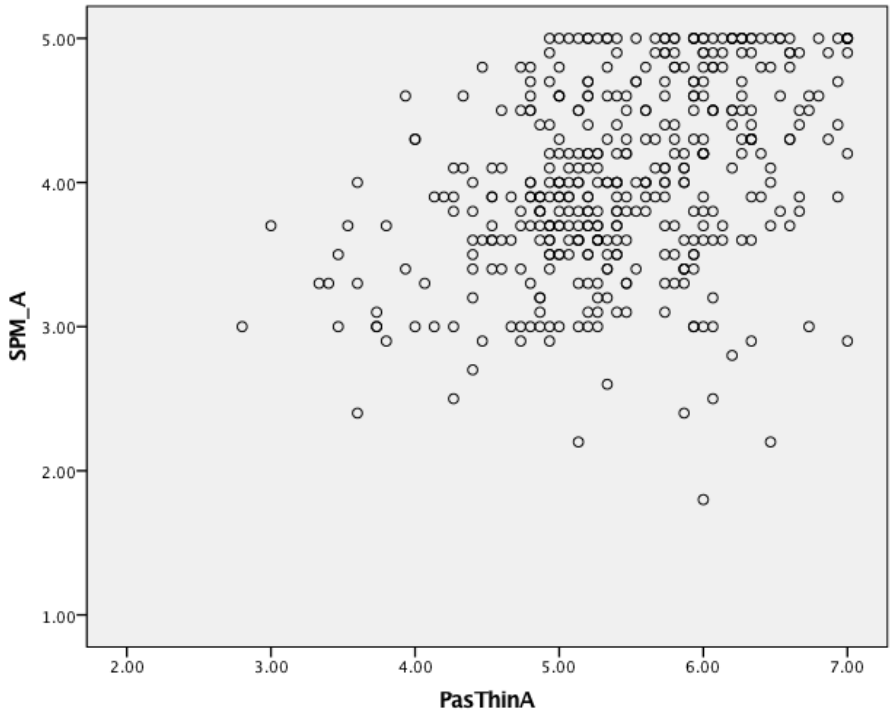

Figure 4. Scatter diagram with safety performance as criterion and Past thinking as predictor.

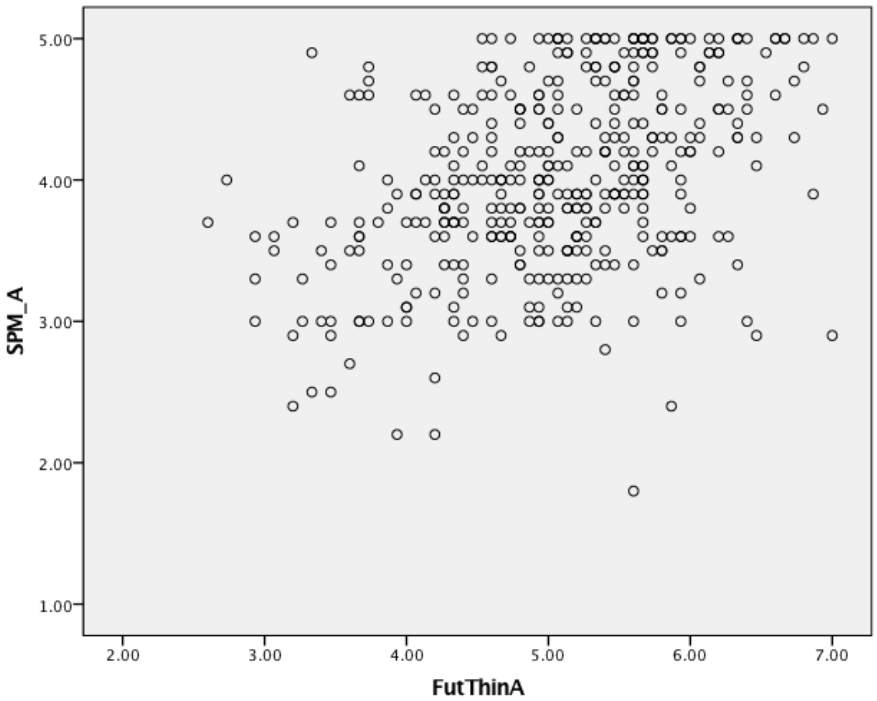

Figure 5. Scatter diagram with safety performance as criterion and Future thinking as predictor.

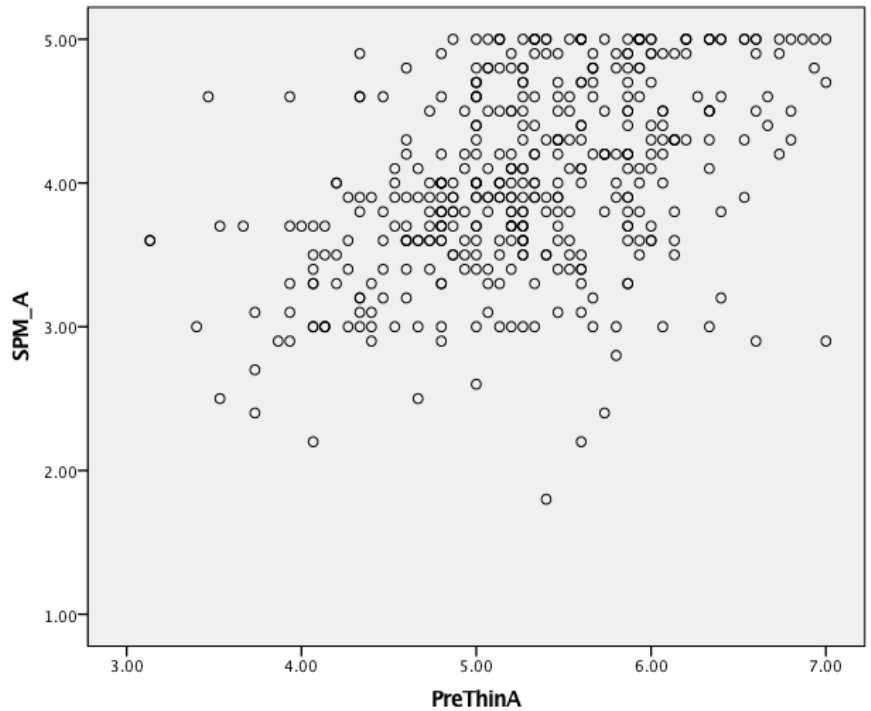

Figure 6. Scatter diagram with safety performance as criterion and Present thinking as predictor.

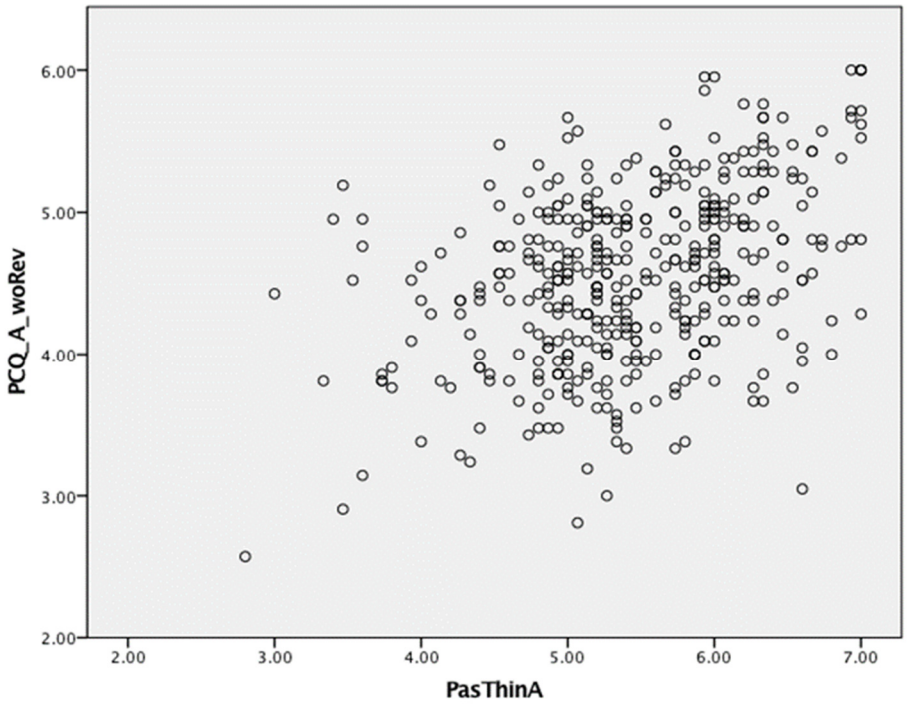

Figure 7. Scatter diagram with PsyCap as criterion and Past thinking as predictor.

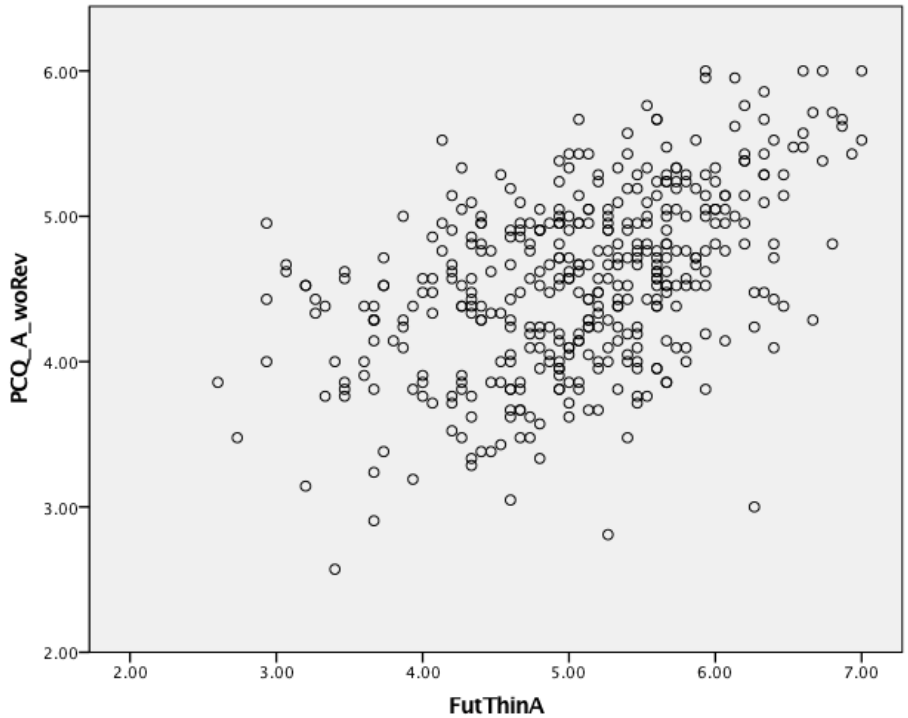

Figure 8. Scatter diagram with PsyCap as criterion and Future thinking as predictor.

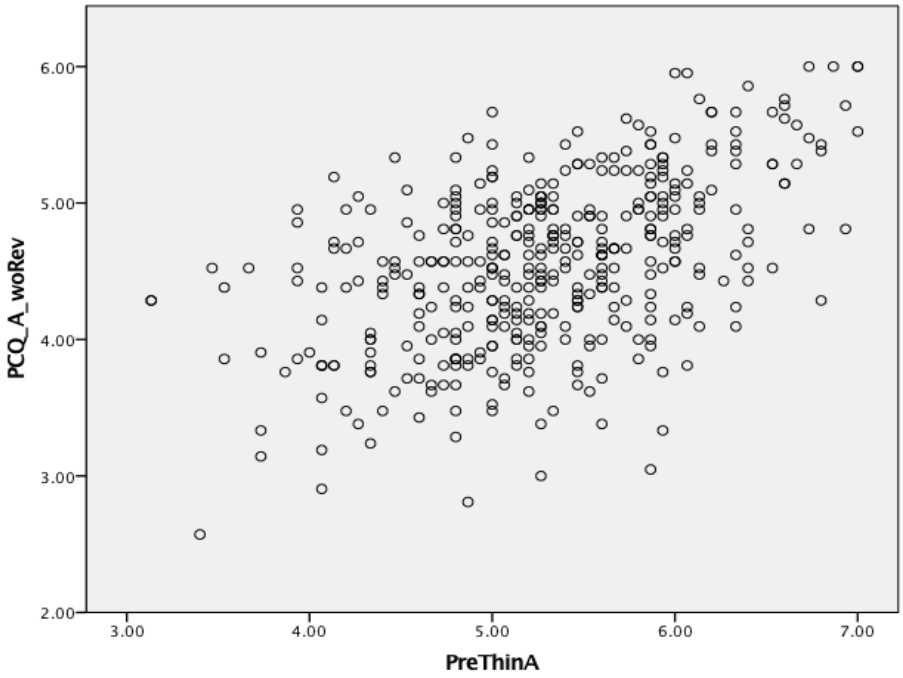

Figure 9. Scatter diagram with PsyCap as criterion and Present thinking as predictor.

Equality of Variance

To test the equality of variance, I plotted the residual versus the predicted value of the DV for safety performance and PsyCap (see Figures 10-11). Although the diagram representing the relationships between the residual versus the predicted value of safety performance was slightly slanted to the bottom right, these diagrams did not show obvious signs of funneling, suggesting that the variance of the residuals was constant and the assumption of homoscedasticity had been met.

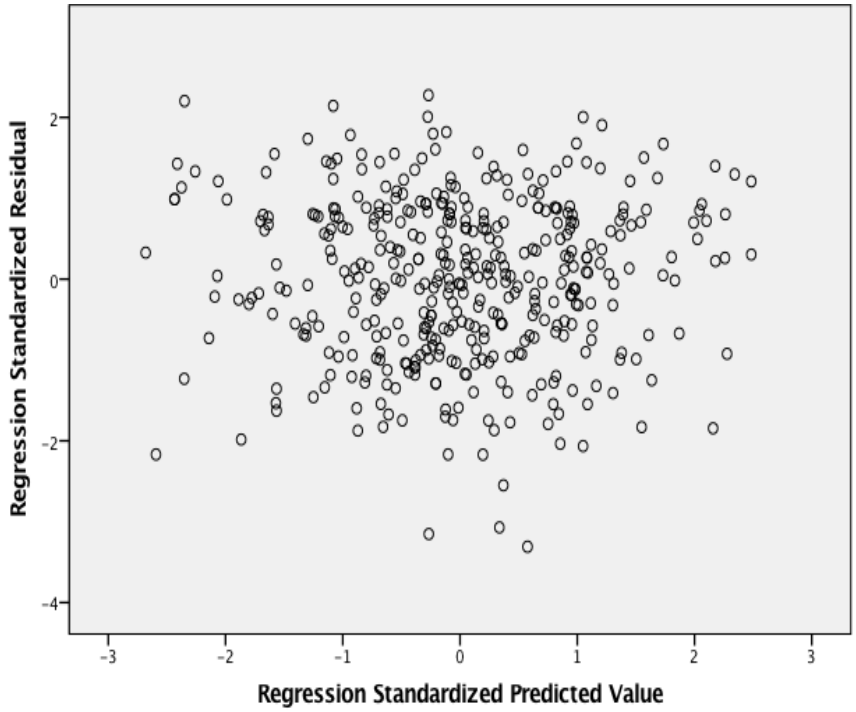

Figure 10. Scatter plot of residual versus predicted value of safety performance.

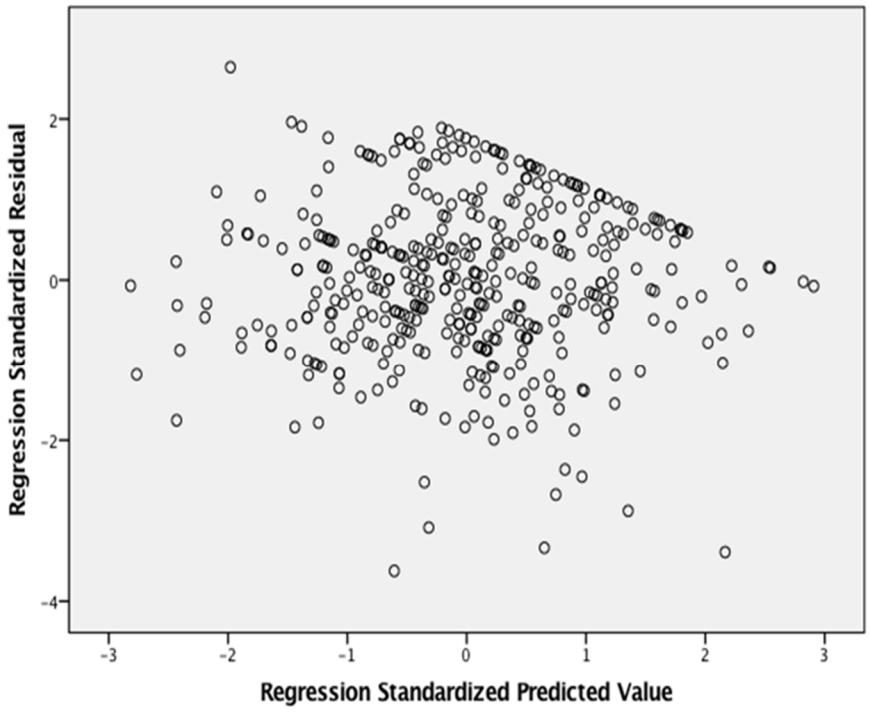

Figure 11. Scatter plot of residual versus predicted value of PsyCap.

Multicollinearity

Then, I used Durbin-Watson's *d* and the Variance Inflation Factor (VIF) statistic to test multicollinearity of safety performance, PsyCap, and thinking perspectives. I did not test for collinearity for the components within each psychometric test because the questionnaires used in this study had been validated in previous studies. For the model with PsyCap as the criterion, Durbin-Watson's *d* was 1.66; for the model with safety performance as the criterion, Durbin-Watson's *d* was 2.14. The tolerance measures were above 0.2 and below 1, and they ranged between .28 for Present thinking and .43 for Past thinking. The VIFs were well below 10 and ranged between 2.32 for Past thinking and 3.56 for Present thinking. Next, the Pearson coefficients among safety climate, PsyCap and its four components, and thinking perspectives were smaller than .08. Hence, the results of these tests supported the absence of multicollinearity. In addition, because Durbin-Watson's *d* was close to 2, the assumption of independence of the residuals' values has been met.

Normality

To assess the normal distribution of the values of the residuals of safety performance and PsyCap, I plotted P-P plots for the two models. Both graphs showed that residuals' values for safety performance and PsyCap did not depart significantly from the line, indicating that the assumption of normality was met (see Figures 12-13).

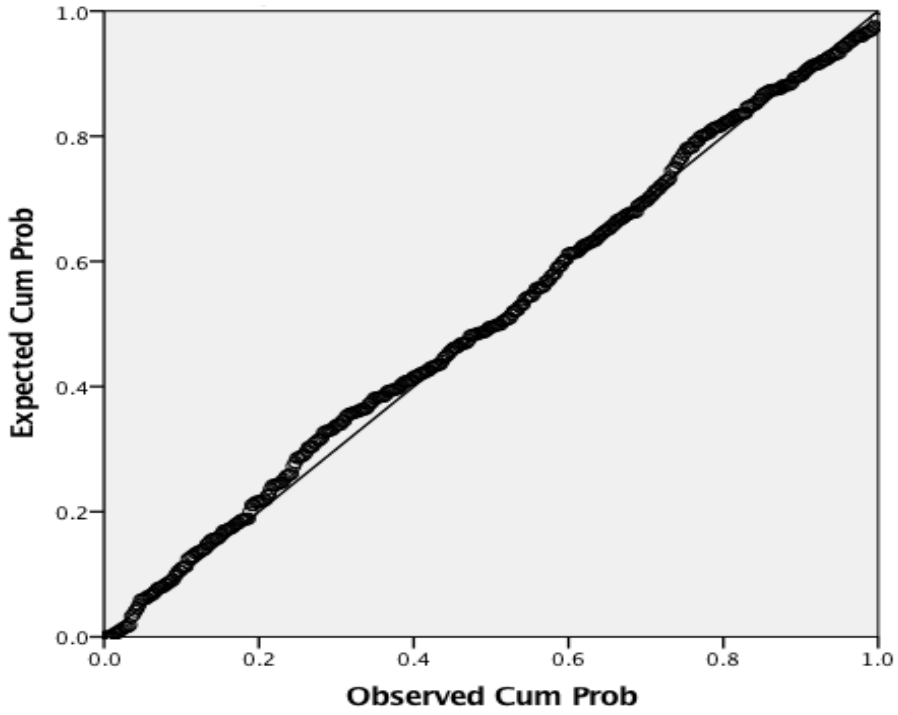

Figure 12. P-P plot of residuals values of safety performance.

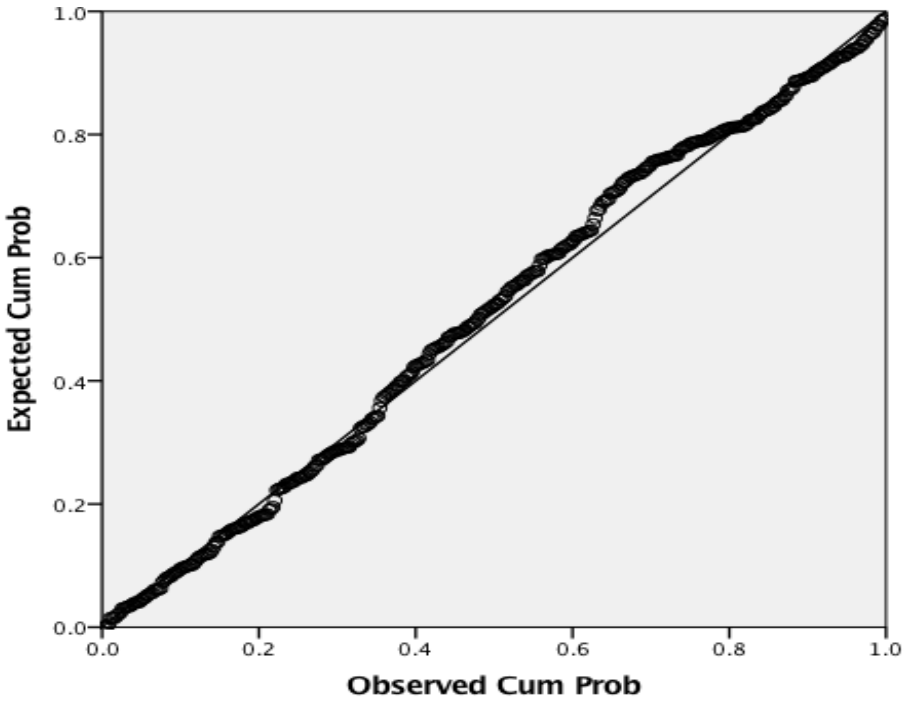

Figure 13. P-P plot of residuals values of PsyCap.

Hypothesis Testing

Research Question 1

RQ1: Does thinking perspective, as measured by the MindTime Profile Inventory (Fortunato & Furey, 2009), predict PsyCap, as assessed by the PCQ-24 (Luthans et al., 2007)? The results of the multiple regression analysis are presented in Table 19. The three thinking perspectives of future thinking, present thinking, and past thinking were used in a standard regression analysis to predict PsyCap. All three perspectives were entered together and in this order into SPSS for the analysis. The prediction model was statistically significant, $F = 52.042$, $df = 3,412$, $p < .001$, and accounted for about 28% of the variance in PsyCap scores

($R^2 = .277$, Adj. $R^2 = .272$), indicating a strong effect of thinking perspectives on PsyCap and that 28% of the variance in PsyCap could be explained by Past thinking, Future thinking, and Present thinking.

Table 19

Regression Analysis of PsyCap on Thinking Perspective Variables

Predictors	*B*	*SE(B)*	*Beta*	*P value*
Constant	2.193	0.201		.000
Past thinking	0.032	0.051	0.041	.526
Future thinking	0.165	0.047	0.227	.001
Present thinking	0.256	0.068	0.301	.000
N	410			
F	52.042			.000
R^2	0.272			

In this analysis, among the three IVs of Past thinking, Future thinking, and Present thinking, only Future thinking and Present thinking were statistically significant predictors of PsyCap. The positive unstandardized coefficients of the Future Thinking

scale ($B = 0.165$, $p < .001$) and the Present thinking scale ($B = 0.256$, $p < .000$) indicated that as Future thinking and Present thinking scores increased, PsyCap scores also increased. Consequently, Future thinking and Present thinking positively predicted PsyCap. Past thinking was not a significant predictor of PsyCap.

Hypothesis 1 stated that Future and Present thinking would positively predict PsyCap and that Past thinking would negatively predict PsyCap. Although the analysis provided evidence that Future thinking and Present thinking positively predicted PsyCap, Past thinking was not a significant predictor of PsyCap. Hence, my findings failed to reject Null Hypothesis 1.

Research Question 2

RQ2: Does thinking perspectives predict safety performance? The results of the multiple regression analysis are presented in Table 20. The three thinking perspectives, Past thinking, Future thinking, and Present thinking, were entered together and in this order into SPSS for the analysis. The F statistic was significant, $F = 39.287$, $df = 3,407$, $p < .001$. The coefficient of determination (Adj. R^2 value) was .219, indicating a moderate effect size and that about 22% of the variance in safety performance could be explained by Past thinking, Future thinking, and Present thinking.

Table 20

Regression Analysis of Safety Performance on Thinking Perspective Variables

Predictors	*B*	*SE(B)*	*Beta*	*p value*
Constant	1.699	0.220		.000
Past thinking	0.101	0.056	0.120	.072
Future thinking	0.124	0.052	0.162	.017
Present thinking	0.217	0.074	0.241	.004
N	410			
F	39.287			.000
R^2	0.225			

In this analysis, among the three IVs of Past thinking, Future thinking, and Present thinking, only Future thinking and Present thinking were statistically significant predictors of safety performance. The positive unstandardized coefficients of the Future thinking scale ($B = 0.124$, $p = .017$) and the Present thinking scale ($B = 0.217$, $p = .004$) indicated that as Future thinking and Present thinking scores increased, safety performance scores also increased. Future thinking and Present thinking positively predicted safety performance, but Past thinking was not a significant predictor of safety performance.

Hypothesis 2 was that Future and Past thinking would positively predict safety performance, whereas Present thinking would negatively predict safety performance. Although the analysis provided support that Future thinking was a positive predictor of safety performance, and contrary to my predictions, it also revealed that Present thinking was a positive predictor of safety performance and that Past thinking was not a significant predictor of safety performance. Hence, my findings failed to reject Null Hypothesis 2.

Research Question 3

RQ3: Does PsyCap moderate the relationship between safety climate and safety performance in the construction industry? Using Model 1 of the PROCESS tool in SPSS, PsyCap was entered as moderator of the relationship between safety climate and safety performance. The interaction between PsyCap and safety climate fell short of statistical significance, $F(3, 407) = 0.53$, $p = .47$, $R^2 = .001$. The results presented in Table 21 failed to reject Null Hypothesis 3.

Table 21

Safety Performance Predicted From Safety Climate and PsyCap

Predictor	β	*p value*	95% CI	
Safety climate	.489	.140	-.160	1.138
PsyCap	.496	.066	-.032	1.024
Safety climate X PsyCap	-.052	.465	-.193	.088

*$p < .05$

Similarly, the interactions between all three thinking perspectives and safety climate fell short of statistical significance, with Past thinking, $F(3, 407) = 0.17$, $p = .68$, $R^2 = .0003$; Future thinking, $F(3, 407) = 1.03$, $p = .32$, $R^2 = .002$; and Present thinking, $F(3, 407) = 0.3915$, $p = .53$, $R^2 = .0007$. These results are presented in Table 22, 23, and 24, respectively.

Table 22

Safety Performance Predicted From Safety Climate and Past Thinking

Predictor	β	*p* value	95% CI	
Safety climate	.133	.683	-.510	.777
Past thinking	.210	.334	-.222	.642
Safety climate X Past Thinking	.023	.684	-.091	.138

*$p < .05$

Table 23

Safety Performance Predicted From Safety Climate and Future Thinking

Predictor	β	*p* value	95% CI	
Safety climate	.578	.038	.033	1.123
Future thinking	.504	.012	.111	.897
Safety climate X Future Thinking	-.053	.312	-.156	.050

*$p < .05$

Table 24

Safety Performance Predicted From Safety Climate and Present Thinking

Predictor	β	*p* value	95% CI	
Safety climate	.445	.167	-.187	1.076
Present thinking	.507	.025	.063	.950
Safety climate X Present Thinking	-.037	.532	-.154	.079

*$p < .05$

Hypothesis 3 was that PsyCap would moderate the relationship between safety climate and safety performance. Analysis of the data indicated that the interaction effect between PsyCap and safety climate was not statistically significant. These findings failed to reject the null Hypothesis 3.

Research Question 4

RQ4: Does PsyCap predict perceptions of safety performance in the construction industry? I conducted multiple regression analyses to assess the relationship between PsyCap as an overall construct, PsyCap components, and safety performance. In the first model, PsyCap was entered as one construct. Results of the multiple regression are

presented in Table 25. The *F* statistic was significant, $F = 56.632$, $df = 1,409$, $p < .001$. The coefficient of determination (Adj. R^2 value) was .119, indicating a low to medium effect size and that 12% of the variance in safety performance could be explained by PsyCap. The positive unstandardized coefficients of the PsyCap IV ($B = 0.369$, $p < .000$) indicated that as PsyCap scores increased, safety performance scores also increased. Consequently, PsyCap positively predicted safety performance.

Table 25

Regression Analysis of Safety Performance on PsyCap

Variables	*B*	*SE(B)*	*Beta*	*P value*
Constant	2.342	0.226		.000
PsyCap	0.369	0.049	0.349	.000
N	410			
F	56.632			.000
R^2	0.119			

PsyCap is made of four distinct dimensions, and because these dimensions correlated differently with safety performance, a second model, including each of the four dimensions of PsyCap, was tested. In this model, the four dimensions of PsyCap, namely, hope, efficacy, resilience, and optimism, were entered together and in this order into SPSS for the analysis. Results of the multiple regression are presented in Table 26. The *F* statistic was significant, $F = 18.967$, $df = 4,406$, $p < .001$. The coefficient of determination (Adj. R^2 value) was .149, indicating that 15% of the variance in safety performance could be explained by hope, efficacy, resilience, and optimism, which was a medium effect size. In this analysis, among the four IVs of hope, efficacy, resilience, and optimism, only efficacy and hope were statistically significant predictors of safety performance. The positive unstandardized coefficients of the IV of efficacy ($B = 0.285$,

p = .000) and the IV of hope (B = 0.134, p = .033) indicated that as efficacy and hope scores increased, safety performance scores also increased. Consequently, efficacy and hope positively predicted safety performance, but resilience and optimism did not.

Table 26

Regression Analysis of Safety Performance on Hope, Efficacy, Resilience, and Optimism

Variables	*B*	*SE(B)*	*Beta*	*p value*
Constant	2.326	0.224		.000
Hope	0.134	0.063	0.154	.033
Efficacy	0.285	0.058	0.317	.000
Resilience	- 0.071	0.055	- 0.078	.201
Optimism	0.007	0.049	.008	.894
N	410			
F	18.967			.000
R^2	0.157			

Hypothesis 4 was that PsyCap would predict safety performance. Analysis of the data indicated that PsyCap was a positive predictor of safety performance. Hence, Alternative Hypothesis a4 was supported. Furthermore, analysis of the data indicated that efficacy and hope positively predicted safety performance, but resilience and optimism did not. Alternative Hypotheses b4 and c4 were supported, but Alternative Hypotheses d4 and e4 were not.

Research Question 5

RQ5: Does PsyCap predict safety climate in the construction industry? Results of the multiple regression analysis are presented in Table 27. The F statistic was significant, F = 30.715, df = 1,409, p < .001. The coefficient of determination (Adj. R^2 value) was .070, indicating that 7% of the variance in safety climate could be explained by PsyCap.

Table 27

Regression Analysis of Safety Climate on PsyCap

Variables	*B*	*SE(B)*	*Beta*	*p value*
Constant	2.556	0.219		.000
PsyCap	0.265	0.048	0.264	.000
N	410			
F	30.715			.000
R^2	0.070			

PsyCap was a statistically significant predictor of safety climate. The positive unstandardized coefficient of the PsyCap predictor ($B = 0.265$, $p < .001$) indicated that as PsyCap scores increased, safety climate scores also increased. From an effect size perspective, PsyCap was a low predictor of safety climate in this sample. To understand the PsyCap relationship to safety climate, I tested a multiple regression model with the individual constructs of hope, efficacy, resilience, and optimism entered together and in this order in the model. Results of the multiple regression analysis are presented in Table 28. The F statistic was significant, $F = 19.590$, $df = 4,406$, $p < .001$. The coefficient of determination (Adj. R^2 value) was .154, indicating that a medium effect size of about 15% of the variance in safety climate could be explained by hope, efficacy, resilience, and optimism.

Table 28

Regression Analysis of Safety Climate on Hope, Efficacy, Resilience, and Optimism

Variables	*B*	*SE(B)*	*Beta*	*p value*
Constant	2.693	0.212		.000
Hope	0.272	0.059	0.331	.000
Efficacy	0.107	0.055	0.126	.052
Resilience	- 0.263	0.052	- 0.306	.000
Optimism	0.113	0.046	0.144	.015
N	410			
F	19.590			.000
R^2	0.154			

In this analysis, among the four predictors of hope, efficacy, resilience, and optimism, only hope, resilience, and optimism were statistically significant predictors of safety climate at $p < .05$. The positive unstandardized coefficients of the hope predictor ($B = 0.272$, $p < .001$) and the optimism predictor ($B = 0.113$, $p = .015$) indicated that as hope and optimism scores increased, safety climate scores also increased. Conversely, the negative unstandardized coefficient of the resilience predictor ($B = - 0.306$, $p < .001$) indicated that as resilience scores increased, safety climate scores decreased. Hope and optimism both predicted safety climate positively, whereas the dimension of resilience predicted safety climate negatively.

Hypothesis 5 was that PsyCap would predict safety climate. Analysis of the data indicated that PsyCap was a positive predictor of safety climate. Hence, Alternative Hypothesis a5 was supported. Furthermore, analysis of the data indicated that hope and optimism positively predicted safety climate, whereas resilience negatively predicted safety climate. Efficacy was not a significant predictor of safety climate. Alternative Hypotheses b5, d5, and e5 were supported, but Alternative Hypothesis c5 was not.

In view of previous results, I tested one last model to assess the effects of Present thinking and efficacy on safety performance. Both variables were the strongest predictors of safety performance in previous models that I tested in the current study. The two IVs were entered together and in this order in the model. Table 29 presents the results of the multiple regression analysis. The *F* statistic was significant, $F = 66.568$, $df = 2,408$, $p < .001$. The coefficient of determination (Adj. R^2 value) was .246, indicating that about 25% of the variance in safety performance could be explained by Present thinking and efficacy.

Table 29

Regression Analysis of Safety Performance on Present Thinking and Efficacy

Variables	*B*	*SE(B)*	*Beta*	*p value*
Constant	1.376	0.232		.000
Present thinking	0.319	0.043	0.355	.000
Efficacy	0.200	0.043	0.222	.000
N	410			
F	66.568			.000
R^2	0.246			

Present thinking and efficacy were statistically significant predictors of safety performance. The positive unstandardized coefficients of the IV of Present thinking ($B = 0.319$, $p = .000$) and the IV of efficacy ($B = 0.200$, $p = .000$) indicated that as Present thinking and efficacy scores increased, safety performance scores also increased. Present thinking and efficacy positively predicted safety performance.

Summary and Transition

Results of the analyses provided partial support for the hypotheses. For RQ1, results of the multiple regression indicated that 28% of the variation in PsyCap scores

could be accounted for the variance in thinking perspectives scores. Moreover, Future thinking and Present thinking positively predicted PsyCap. Past thinking was not a significant predictor of PsyCap in the construction industry. For RQ2, I found that variances in thinking perspectives also explained 22% of the variation in safety performance scores. Specifically, Future and Present thinking were positive predictors of safety performance in the construction industry, whereas Past thinking was not. The analysis of RQ3 did not support the hypothesis that PsyCap moderated the relationship between safety climate and safety performance. For RQ4, I found that differences in PsyCap scores explained 12% of the variance in safety performance. Furthermore, hope and efficacy predicted safety performance, but resilience and optimism did not. Last, for RQ5, I found that changes in PsyCap scores explained 15% of the variance in safety climate. Hope and optimism positively predicted safety climate, whereas resilience negatively predicted safety climate. Efficacy was not a significant predictor of safety climate. A final model testing the effect of Present thinking and efficacy on safety performance indicated that close to 25% of the variance in safety performance could be explained by changes in Present thinking and efficacy scores. These findings show that Present thinking and efficacy were positive predictors of safety performance in the construction industry.

In Chapter 5, I discuss and interpret the findings in the context of this study. I then review the theoretical and practical implications, followed by an explanation of the limitations. I also offer recommendations for future research and present the implications for positive social change.

Chapter 5: Discussion, Conclusions, and Recommendations

The problematic conditions that led to this study were the occupational accidents and fatalities that continue to occur frequently on construction sites across the globe. This research added to the safety performance model (see Christian et al., 2009). According to this model, safety performance predicts safety outcomes. Therefore, fostering knowledge on predictors of safety performance may contribute to reducing accidents and fatalities. The purpose of this quantitative study was to examine the impact of PsyCap and thinking perspectives on safety climate and safety performance in the construction industry.

Results of this study showed that 28% of the difference in PsyCap scores could be explained by the variance in thinking perspectives scores, with both Future thinking and Present thinking positively predicting PsyCap. Moreover, 22% of the variation in safety performance scores could be explained by the variances in thinking perspectives, with Future and Present thinking being positive predictors of safety performance in the construction industry. Past thinking was not a significant predictor of PsyCap or safety performance in the construction industry. I found no evidence that PsyCap was a moderator of the relationship between safety climate and safety performance. Whereas PsyCap positively predicted safety performance, only hope and efficacy were significant predictors of safety performance. PsyCap positively predicted safety climate, but only hope, resilience, and optimism were significant predictors of safety climate. Last, I tested the effect of Present thinking and efficacy on safety performance and found that close to 25% of the variance in safety performance could be explained by changes in Present

thinking and efficacy scores, indicating that Present thinking and efficacy were positive predictors of safety performance in the construction industry.

I also looked at the relationship between thinking perspectives and safety climate. The three thinking perspectives of Past thinking, Future thinking, and Present thinking were entered together and in this order into SPSS for the analysis. The *F* statistic was significant, $F = 7.836$, $df = 3,407$, $p < .001$. The coefficient of determination (Adj. R^2 value) was .055, indicating that about 6% of the variance in safety climate could be explained by Past thinking, Future thinking, and Present thinking. This result translated as a small effect size.

In this analysis, among the three predictors of Past thinking, Future thinking, and Present thinking, only Future thinking and Present thinking were statistically significant predictors of safety climate. The unstandardized coefficients of the Future thinking scale ($B = - 0.137$, $p = .011$) was negative, whereas the unstandardized coefficient of the Present thinking scale ($B = 0.285$, $p = .002$) was positive. These results indicated that as Future thinking scores increased, safety climate scores decreased. As Present thinking scores increased, safety climate scores increased. Future thinking and Present thinking both predicted safety climate, but in opposite directions. The dimension of Past thinking was not a significant predictor of safety climate.

Interpretation of Findings

This study adds to the theoretical field of knowledge on safety research paradigms by suggesting a cognitive approach to safety performance in which Present thinking, Future thinking, hope, and efficacy can predict safety performance. Eid et al. (2012)

argued that the four elements of hope, efficacy, resilience, and optimism could "facilitate safety focused behavior" (p. 58). My findings supported that all four elements related positively to safety performance but that only hope and efficacy predicted it. Consistent with Curcuruto et al.'s (2016) positive approach to safety, and with Curcuruto et al.'s findings on the positive relationship between role breadth self-efficacy and safety participation, one component of safety performance, I found evidence of a positive relationship between safety performance and efficacy. Hope also positively predicted safety performance Results of this study further confirmed prior findings on the moderate relationship between safety climate and safety performance (Clarke, 2010; Gao et al., 2016; Neal & Griffin, 2000). Likewise, these findings add to extant research on safety climate and safety performance because the participants were international working adults from multiple trades in the construction oil and gas industry.

Results of the present study confirmed prior findings on relationships between PsyCap and safety climate (Bergheim et al., 2013, 2015; Hystad et al., 2015). Bergheim et al. found that PsyCap related positively to safety climate and explained 15.5% of the variance in safety climate. Likewise, I found that PsyCap related positively to safety climate and explained 15% of the difference in safety climate. Unlike Bergheim et al.'s results (2013, 2015) showing that only hope and optimism significantly and positively related to safety climate, I also found that resilience was a significant and negative predictor of safety climate.

Avey et al. (2011) found positive relationships between PsyCap and job performance. I also found evidence of positive relationships between PsyCap and the

particular type of job performance that is safety performance. Moreover, I tested relationships between safety performance and each component of PsyCap individually. All results were significant and positive. Hollnagel (2014) argued that the blunt end, which refers to employees in offices, and the sharp end, which refers to employees onsite, have different perceptions of safety. When comparing employees spending more than 50% of their working time onsite with employees spending more than 50% of their working time in the office or headquarters, I found that perceptions of safety climate and safety performance were not significantly different. Therefore, Hollnagel's argument was not supported in this study.

Although the findings of the present study broaden the existing research on thinking perspectives with an international audience of working adults, contrary to existing knowledge, all three perspectives of Past, Future, and Present thinking positively and strongly correlated with one another. In extant research, Present and Future thinking correlate positively with optimism and resiliency whereas Past thinking correlates negatively with resiliency and optimism (Fortunato & Furey, 2011). In the present study, I found evidence for positive relationships between the three thinking perspectives and PsyCap, as well as between the three thinking perspectives and the four dimensions of PsyCap measured individually, namely, hope, efficacy, resilience, and optimism. I also found that only Future and Present perspectives were statistically significant predictors of PsyCap. Similarly, Future and Present perspectives were statistically significant predictors of safety performance.

This study built on the safety performance model (see Christian et al., 2009) and drew from the field of positive psychology and PsyCap in particular. In Christian et al.'s (2009) model, the predictors of safety performance are safety knowledge and safety motivation. Results of this study identified efficacy as a positive predictor of safety performance. Self-efficacy is a core construct in Bandura's (1977) social learning theory. Bandura (1994) defined self-efficacy as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (p. 71). Given that self-efficacy is a significant predictor of safety performance, it seems worthwhile to promote self-efficacy to improve safety performance on construction sites.

In line with a cognitive approach to safety in the construction industry, I found that Future and, to a strong extent, Present thinking predicted safety performance. According to Fortunato and Furey (2009, 2010), Future thinking is the ability to create and represent hypothetical events from a hopeful and optimistic perspective, whereas Present thinking is the capacity to organize thoughts, including previous experiences and future events, and plan for long-term goals. Based on the definition of Present thinking, my findings support the importance of people's value of the future in their adoption of safe behaviors (see Bjorgvinsson, 1998). These findings also support the inclusion of time perspectives in safety adopted by HRO that consist of preparing employees for what is to come and training them to take action when facing unexpected situations (see Roberts & Bea, 2001). Past thinking was not a significant predictor of safety performance. Past thinking is the ability to recall experiences and access knowledge to

analyze and evaluate a situation carefully toward risk reduction (Fortunato & Furey, 2009, 2010). Findings from the current study support the existence of risk perception as having only a distal relationship with safety performance (see Christian et al., 2009).

Limitations of the Study

When testing the internal validity of the instruments used to collect the data, I noted low scores for Cronbach's alpha of the Resilience and Optimism scales of the PCQ. Although removing the items that impacted the internal validity of the scales allowed me to strengthen the reliability coefficients, this modification made the comparison with current and future research on PsyCap and these two scales challenging. In addition, the instruments used to collect the data had all been developed with Western standards. Although English is the working language onsite, and despite the French translation available, the absence of questionnaires in other languages could have prevented the participation of non-English and non-French speakers. Moreover, although I made all efforts to keep the time required to complete the questionnaire within 20 minutes, this time might have appeared excessive to some employees.

Although the aim of this study was to understand the predictors of safety performance in the construction industry, logistical constraints might have prevented workers onsite from participating in the same proportion as employees working more than 50% of their time in offices. Last, although targeted organizations took part in this study, more than 50% of the participants came from a convenience sample. Because data collection occurred via a self-administered online survey, and although the participants acknowledged that they met the criteria to join the study, some participants might not

have met all of the criteria and still might have participated, an event that could have impacted the quality of the sample.

Two other potential limitations to this study pertain to the participants' education level and their potential prior exposure to similar safety surveys. In fact, participants' educational background could have influenced their understanding of the instruments survey questions. Additionally, participants' potential experience with or participation to safety related surveys could have influenced their responses to the instruments.

Recommendations

I conducted this study in the construction industry within the oil and gas sector. Future researchers might test the generalizability of this study's findings and assess whether similar effects among self-efficacy, Present thinking, and safety performance can be replicated in other industries. The differences that I found in the level of thinking perspectives and PsyCap scores, depending on the employees' work locations, seemed to indicate that the work environment impacted the participants' views of the world. Furey and Fortunato (2010, 2012) argued that the theory of MindTime is an avenue to explore the person-environment fit in organizations and build effective teamwork. Future researchers might wish to examine the effect of various work environments such as workplace and working conditions on people's consciousness and perceptions of the world in different industries. Another possible avenue for future research is the relationship between self-efficacy and safety motivation. Based on Bandura's (1994) social learning theory, "self-beliefs of efficacy play a key role in the self-regulation of

motivation" (p. 73). Further researchers might address the extent to which efficacy predicts safety motivation.

Implications for Positive Social Change

The purpose of this study was to broaden knowledge of the predictors of safety performance to prevent accidents on construction sites. I found that self-efficacy predicted safety performance across nationalities and organizations. There are four sources of self-efficacy: performance experience, vicarious experience, verbal persuasion, and emotional arousal (Bandura, 1977, 1994). A combination of factors can develop self-efficacy. Managers or team leaders can enable the performance accomplishments by removing obstacles in the way of their teams' direct experiences of success. Providing the right tools, explaining how to do the work at the start of the day, and sharing the necessary precautions to execute jobs safely are practical examples of actions that managers can take to support their team members' efficacy and safety performance accomplishments.

The second source of self-efficacy is vicarious experience, the indirect experience of social models' successes (Bandura, 1994). Witnessing the successes of others who are similar to oneself gives confidence in one's capacity to succeed (Bandura, 1977, 1994). According to Hofmann et al.'s (2003) LMX theory, there is a positive relationship between the quality of leader-member relationships and workers' safety performance. Managers have a powerful influence on their team members. Building on this theory, by modeling safety performance, leaders can inspire team members to become safety champions who can subsequently become role models for colleagues.

Verbal persuasion from others and self is the third source of self-efficacy. Being told that one has what it takes to succeed or/and using self-talk as a way to strengthen one's beliefs in future successes can create a positive framework to develop safety performance. The fourth and last source of self-efficacy is emotional arousal, the interpretation of somatic and psychological states (Bandura, 1977, 1994). Interpretations of physiological reactions influence individuals' understanding of situations and act as lenses through which to see the world. Someone with a low level of efficacy will tend to see nervousness as a sign of stress and incompetence, whereas others with a high level of efficacy will perceive nervousness as a sign of excitement about a new challenge. The connection between emotional arousal and self-efficacy can either trigger a vicious or a virtuous cycle of self-efficacy (Bandura, 1977, 1994). Although the two last sources of self-efficacy, namely verbal persuasion and emotional arousal, are not as powerful as the two others in isolation, the four combined contribute best to self-efficacy development (Bandura, 1977, 1994).

Equipping employees and team leaders with the training and strategies to develop their self-efficacy can have a positive impact on safety performance in the construction industry. Developing employees' self-efficacy will contribute to increasing not only their safety performance on the job but also their safety off the job, as well as their well-being in general. Supporting employees with the self-beliefs that they have the power to act on their own and others' safety on construction sites can have a positive societal social change. In other words, the construction industry could build safety champions by developing team-leaders' self-efficacy levels.

Given the effect of Future and Present thinking on employees' safety performance, the content and design of safety training to educate and raise awareness of work rules should include thinking perspectives. Specifically, the materials and the facilitation of training sessions should provide opportunities for participating employees to travel mentally so that they can imagine situations in the future that they would approach with hope and optimism, as well as work on plans to ensure that they achieve safety performance. Moreover, workshops targeting safety performance should focus on providing opportunities for participants to practice safety intervention with other colleagues via role-playing and feedback sessions (performance experience and vicarious experience).

Conclusion

Including self-efficacy assessment in employees' selection and development processes and integrating thinking perspectives into training and organizational design are consistent approaches with the cognitive engineering model of construction site safety proposed by Mitropoulos et al. (2009). Employees with high levels of self-efficacy will feel confident in improving their existing capacity and future capability to take actions toward accident prevention. Encouraging employees to think about the long-term consequences of current behaviors (Present thinking) while offering workable alternatives with safe outcomes will contribute to building safety-oriented teams.

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Appendix A: Permission to Use and Reproduce the PsyCap Questionnaire

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www.mindgarden.com

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Instrument: *Psychological Capital Questionnaire*

Authors: *Fred Luthans, Bruce J. Avolio and James B. Avey.*

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Sincerely,

Robert Most
Mind Garden, Inc.
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Psychological Capital Questionnaire

Self-Rater Form, Rater Form, Scoring Key

By Fred Luthans, Bruce J. Avolio & James B. Avey

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Psychological Capital Questionnaire

English: Self-Rater Form, Other Rater Form, Scoring Key

French: Self-Rater Form, Other Rater Form

By Fred Luthans, Bruce J. Avolio & James B. Avey

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From: Mind Garden <info@mindgarden.com>
Date: 23 February 2017 at 03:27:47 GMT+8
To: Anne-Perrine Cades <anne-perrine.cades@waldenu.edu>
Subject: Re: PCQ copyright info

Hello Anne-Perrine,

Thank you for including a screenshot from your online surveys. The copyright statements are acceptable.

Best wishes on your research!

Ken
Mind Garden, Inc.
650-322-6300

On Tue, Feb 21, 2017 at 6:16 AM, Anne-Perrine Cades <anne-perrine.cades@waldenu.edu> wrote:

> To whom it may concern,
>
> I am writing to share a screen shot of the survey page where the PCQ copyright information are captured.
>
> Can you please review and confirm that you are satisfied with the appearance of the copyright information?
>
> Thank you.
>
> Best,
>
> Anne-Perrine

Appendix B: Permission to Use and Reproduce the MindTime Profile Inventory

mindtime foundation

Basic academic research license

The mindtime foundation provides accredited scientists with access to its intellectual property under certain conditions. The MindTime Profile Inventory™ (also known as the TimeStyle Inventory™, GPS for the Mind™, and the Thinking Perspective Inventory™) is provided for research purposes ONLY under the following conditions.

- Use of the MindTime Profile Inventory is for scientific, non-commercial, research purposes only. All other uses, including but not limited to those involving commercial, business, and personal, whether for-profit or not-for-profit is prohibited. To use the MindTime Profile Inventory for any purpose other than for the scientific research described in the application and Appendix A of this document, a license must be obtained from the mindtime foundation.
- At no time will any research be conducted whose purpose might be construed to be an attempt to reverse engineer the MindTime Profile Inventory™.
- The MindTime Profile Inventory is proprietary and is a registered intellectual property of the mindtime foundation. Dissemination of the MindTime Profile Inventory and all related materials to any person, entity, LLC, or corporation except the individual or entity indicated below is prohibited.
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Appendix A

Nature of research (please state clearly the purpose of your study and/or your research questions):

A nonexperimental, quantitative design will be used to determine whether psychological capital (PsyCap) and thinking perspectives predict safety performance and whether they moderate the relationship between safety climate and safety performance across several construction sites in different countries. The Psychological Capital Questionnaire, the MindTime Profile Inventory, the Group-Level Safety Climate Scale, and the Safety Performance Measure will assess PsyCap, thinking perspectives, safety climate, and safety performance respectively. A multiple regression analysis will be conducted to assess the effect of PsyCap and thinking perspectives on safety climate and safety performance.

Estimated number of research or study participants: n = 380

Estimated date of start of data collection: May 2017

Estimated date of conclusion of data collection: June 2017

mindtime foundation

Institution. Name and full address

Walden University

100 Washington Avenue South, Suite 900

Minneapolis, MN55401

Department.

Organizational Psychology

Principal researcher assuming responsibility for the terms and conditions entered into in this agreement.

Anne-Perrine Cades
Name

Title

I/we agree to the terms and conditions of this scientific license and specifically agree to be responsible for our institution's compliance.

Signature

3 February 2017
Date

Signature

Date

From: Vincent J. Fortunato, Ph.D. [mailto:vincentfortunato@mindtime.com]
Sent: Wednesday, 22 February, 2017 2:12 AM
To: Cades, Anne-Perrine <Anne-Perrine.Cades@fisglobal.com>
Subject: Re: MindTime copyright info

Anne-Perrine,

There is no need for the author listing under "Safety Performance" and the copyright below it.

Instead, just use the following: The MindTime Profile Inventory.TM, Copyright (2017), the mindtime foundation.

Best,

Dr. F.

Vincent J. Fortunato, Ph.D.
Co-founder and
Chief Science Officer
the mindtime project
Helping People to Understand People

mindtime.com
mindtimemaps.com

Talk: (208) 570 3997
Wake Up to Your True Nature!

On Feb 21, 2017, at 7:09 AM, Cades, Anne-Perrine <Anne-Perrine.Cades@fisglobal.com> wrote:

Dr Fortunato,

I am writing to share a screen shot of the survey page where the MindTime Profile Inventory copyright information are captured.
Can you please review and confirm that you are satisfied with the appearance of the copyright information?

Thank you.
Best,

Anne-Perrine

Appendix C: Permission to Use and Reproduce the Safety Climate Scale

PsycTESTS®

Safety Climate Scale
Version Attached: Full Test

PsycTESTS Citation:
Huang, Y.-H., Zohar, D., Robertson, M. M., Garabet, A., Murphy, L. A., & Lee, J. (2013). Safety Climate Scale [Database record]. Retrieved from PsycTESTS. doi: http://dx.doi.org/10.1037/t28134-000

Instrument Type:
Rating Scale

Test Format:
This measure utilizes a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

Source:
Supplied by author.

Original Publication:
Huang, Yueng-Hsiang, Zohar, Dov, Robertson, Michelle M., Garabet, Angela, Murphy, Lauren A., & Lee, Jin. (2013). Development and validation of safety climate scales for mobile remote workers using utility/electrical workers as exemplar. Accident Analysis and Prevention, Vol 59, 76-86. doi: 10.1016/j.aap.2013.04.030

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Appendix D: Permission to Use and Reproduce the Safety Performance Measure

PsycTESTS®

Safety Performance Measure
Version Attached: Full Test

Note: Test name created by PsycTESTS

PsycTESTS Citation:
Ford, M. T., & Tetrick, L. E. (2011). Safety Performance Measure [Database record]. Retrieved from PsycTESTS. doi: http://dx.doi.org/10.1037/t35525-000

Instrument Type:
Survey

Test Format:
The 10 items on the Safety Performance Measure were answered using the following scale of frequency: 1 = much less than the average employee, 2= less than the average employee, 3 = about the same as the average employee, 4 = more than the average employee, and 5 = much more than the average employee.

Source:
Ford, Michael T., & Tetrick, Lois E. (2011). Relations among occupational hazards, attitudes, and safety performance. Journal of Occupational Health Psychology, Vol 16(1), 48-66. doi: 10.1037/a0021296

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Appendix E: Means and Standard Deviations of Variables by Group

Variables	*M*	*SD*	Min	Max
Group 1 (*n* = 108)				
Safety performance	3.83	0.60	2.40	5.00
Safety climate	3.67	0.66	1.95	4.79
PsyCap	4.33	0.63	2.57	5.95
Hope	4.35	0.76	1.50	6.00
Efficacy	4.60	0.75	2.83	6.00
Resilience	4.26	0.79	1.60	6.00
Optimism	4.01	0.79	2.00	6.00
Past thinking	5.19	0.82	2.80	7.00
Future thinking	4.86	0.83	2.73	6.87
Present thinking	5.14	0.69	3.40	6.80
Group 2 (*n* = 62)				
Safety performance	4.12	0.65	2.60	5.00
Safety climate	3.76	0.65	2.00	4.95
PsyCap	4.09	0.41	3.29	4.81
Hope	4.16	0.58	2.83	5.83
Efficacy	4.25	0.49	3.00	5.00
Resilience	4.05	0.46	2.80	5.00
Optimism	3.85	0.60	2.75	5.00
Past thinking	5.49	0.72	3.60	6.80
Future thinking	4.95	0.70	2.93	6.27
Present thinking	5.19	0.59	3.73	6.33
Group 3 (*n* = 20)				
Safety performance	4.01	0.50	3.10	5.00
Safety climate	3.71	0.45	2.84	4.32
PsyCap	4.65	0.40	3.95	5.33
Hope	4.52	0.56	3.17	5.33
Efficacy	5.03	0.46	4.33	6.00
Resilience	4.62	0.67	3.20	6.00
Optimism	4.31	0.52	3.25	5.00
Past thinking	5.32	0.59	4.13	6.60
Future thinking	4.91	0.62	3.60	6.00
Present thinking	5.16	0.67	4.07	6.33
Group 4 (*n* = 221)				
Safety performance	4.09	0.68	1.80	5.00
Safety climate	3.81	0.60	2.16	5.00
PsyCap	4.78	0.57	2.90	6.00
Hope	4.82	0.71	2.50	6.00
Efficacy	5.06	0.68	2.17	6.00
Resilience	4.66	0.67	2.60	6.00
Optimism	4.47	0.79	2.00	6.00
Past thinking	5.56	0.75	3.00	7.00
Future thinking	5.21	0.89	2.60	7.00
Present thinking	5.39	0.77	3.13	7.00