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**The influence of the psychological contract on the safety of performance of  
construction workers in China**

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# The influence of the psychological contract on the safety of performance of construction workers in China

## Abstract

**Purpose** – In the absence of previous work, this study investigates how the psychological contract (PC) influences the safety performance of construction workers in China.

**Design/methodology/approach** – The literature is first consulted to obtain a set of PC and safety performance measures that fits the specific situation of construction workers, which is then moderated by five construction experts. A questionnaire survey of 206 workers from 4 different construction sites is followed by a descriptive statistical analysis of the nature of the PC and level of the safety performance of the respondents. Finally, a regression analysis is used to ascertain the level of influence of the PS, and an analysis is made of the influence of PC on safety performance.

**Findings** – A set of PC and safety performance measures is identified that fits in the construction workers' specific situation. The PC of the respondents is found to be intact and well-performed, and their safety performance is maintained at a high level. Safety performance is highly influenced by the state of the PC, with the three dimensions of safety performance (safety result, safety compliance, and safety participation) positively correlated with the three dimensions of the PC (normative, interpersonal, and developmental).

**Originality/value** – Suggestions are made to improve safety production management and safety performance by providing adequate material and economic conditions, helping the workers establish good interpersonal relationships, and realize their personal values.

**Keywords** Psychological Contract; Safety Performance; Safety Production Management

**Paper type** Research paper

## 1. Introduction

Construction has been one of the pillar industries in national economies for a long time (National Bureau of Statistics of China, 2018; Tong *et al.*, 2021). Construction sites are labor-intensive, and their workers are often placed in a rugged environment, involving a high level of technical and

1 operating difficulties (Chan *et al.*, 2017). As a result, accidents occur relatively frequently. Safety  
2 management is therefore of great importance, and how to improve safety is an issue of serious  
3 concern.

4 Previous studies indicate individual unsafe behavior to be a major direct cause of accidents  
5 (Heinrich, 1959; Bird, 1974; Wu *et al.*, 2017; Song, 2017) through the "domino effect" in  
6 triggering a chain reaction leading to an accident (Heinrich, 1959). Currently, construction workers  
7 in China and many other countries have a generally low level of education and a minimum  
8 awareness of safety precautions, largely relying on subjective experience and frequently failing to  
9 comply with safety norms (Xu *et al.*, 2021). Such behaviors easily lead to safety accidents:  
10 therefore, reducing unsafe worker behavior is the primary task of construction safety management.

11 One approach to this is through the *psychological contract* (PC), an important perspective that  
12 has become an increasingly popular research topic in this journal in particular over the years,  
13 including in employee career expectations (Dainty *et al.*, 2000), the expectations of project  
14 managers (Dainty *et al.*, 2004), improved organizational innovations (Egbu, 2004), the motivation  
15 of workers (Liu *et al.*, 2007), knowledge sharing (Wang and Shi, 2019), the efficacy of trust (Wang  
16 *et al.*, 2019), construction manager burnout (Franz *et al.*, 2021), and renegotiating relationships  
17 within the PPP scheme (Feng *et al.*, 2022). In terms of construction safety, studies involving PC  
18 are replete, with major contributions by Newaz (2018), Newaz *et al.* (2016a, 2016b, 2018, 2019a,  
19 2019b, 2019c, 2020a, 2020b, 2021a, 2021b), Novieto (2021) and many others.

20 These show that the performance of the employees' PC has a significant effect on their work  
21 attitude, behavior, and performance. Whenever workers enter their working environment, they are  
22 considered to form a PC relationship with the employer, which determines their attitude and  
23 behavior. By establishing the PC, individuals can gauge the balance of the responsibilities and  
24 obligations of both parties and then adjust their attitudes and behaviors accordingly – ultimately  
25 affecting the individual's work performance (Marques, 2011).

1           However, none of these studies have considered the construction safety dimensions of safety  
2 compliance and safety participation, for instance, which have been identified as being important  
3 different perceptions of the work environment and perceptions of performance related to safety  
4 (Griffin and Neal, 2000). Similarly, yet to be considered in the context of construction safety are  
5 Li's (2002) "normative", "interpersonal", and "developmental" dimensions of PC (identified in  
6 studying 796 Chinese employees). Therefore, the present study examined the relationship between  
7 the dimensions of PC and the safety of construction workers through a questionnaire survey of 206  
8 construction workers on four different construction sites in Foshan, Qingyuan, and Guangzhou in  
9 southeast China. Two hypotheses were tested – that *the employees' PC has a significant effect on*  
10 *safety performance as a whole* and that *there is a positive correlation between different dimensions*  
11 *of PC and different dimensions of safety performance.*

12           The paper is organized as follows. First, a brief literature review is presented to provide  
13 background to the study and form an initial set of PC and safety measures to fit the specific  
14 situation of construction workers. Then, the two hypotheses are proposed, followed by a  
15 description of the method used to test them. The results are then presented and discussed, along  
16 with suggested practical implications for management practice.

## 17 **2. Literature review**

### 18 *2.1 The psychological contract*

19           There are many different interpretations of the PC. The term was first used by Argyris and Ditz  
20 (1960) as a result of interviewing workers and supervisors in factories to describe the perception  
21 and embedding of values held by both parties (organizations and individuals) in the employment  
22 relationship. He found that when the supervisor guarantees and respects the informal culture of  
23 employees, such as by encouraging them to work independently and providing them with adequate  
24 wages and job security, they tend to maintain high productivity and make fewer complaints. At  
25 first, the PC was defined as a non-written contract reflecting the expectations of organizations and

1 employees of each other (Levinson et al., 2013): it is an implicit and unexpressed expectation of a  
2 future relationship that has been formed before the formal employment relationship. Argyris and  
3 Ditz (1960) and Levinson et al.'s (2013) PC has two perspectives: individual and organizational.  
4 However, it is impractical to compare the expectations of different perspectives. Finding someone  
5 who can represent the organization to elaborate on the contract from an organizational perspective  
6 is almost impossible. As a result, based on previous studies, Rousseau (1990) proposed a narrower  
7 definition, in that involving the contract should focus on an individual perspective of the  
8 *employees'* perception of their mutual responsibility to *employers*. While some studies supported  
9 this, many also held that the contract embodies a belief of the employees' mutual responsibility  
10 with the organization: it is based on their subjective understanding of commitment, but these  
11 beliefs are not necessarily realized by the organization (Morrison and Robinson, 1997).

12 The PC involves thousands of aspects that are difficult to summarize comprehensively.  
13 Therefore, studies usually divide it into two-, three-, or even multi-dimensions, categorizing the  
14 content of similar attributes into the same dimension. For the *two-dimensional* version, Rousseau  
15 (1990), for example, analyzed a situation involving 129 MBA graduates about to start their jobs in  
16 three weeks, using a questionnaire to investigate their perceptions of both the employer and  
17 employee's responsibilities. A correlation analysis obtained two pairs of typical variables,  
18 comprising a "transaction contract" and a "relationship contract". The "transaction contract"  
19 includes the exchange of interests between employees and employers. Employees hope to obtain  
20 a high remuneration, bonuses, and development opportunities by working hard and taking on jobs  
21 beyond their remit. The "relationship contract" includes the exchange of emotions between  
22 employees and employers, the organization providing employees with adequate job security, and,  
23 in exchange, employees being loyal to the organization and wanting to work in the organization  
24 for a long time. Chen *et al.*'s (2004) principal component analysis of a survey of 642 employees  
25 from different industries found that both the employer and employee's responsibility contain the  
26 two factors of "realistic responsibility" and "developmental responsibility". For *the organization*,

1 realistic responsibility refers to protecting its employees' normal lifestyle by paying reasonable  
2 wages and bonuses. In contrast, development responsibility refers to employee development  
3 opportunities, such as creating promotion opportunities and long-term performance returns. For  
4 *employees*, realistic responsibility means they maintain the normal operation of the organization,  
5 such as striving to create benefits for the organization, being loyal, and constantly improving work  
6 skills, while development responsibility means they help the organization's future development,  
7 including accepting transfers, combining personal development with organizational development,  
8 and making suggestions for organizational development.

9 For the *three-dimensional* structure, Rousseau and Tijoriwala (1996), for instance, proposed  
10 an extra "team dimension" – stressing the importance of team cooperation – based on their study  
11 of U.S. registered nurses. Lee and Tinsley (1999) also extracted the transaction, relationship, and  
12 team factors in investigating and analyzing the employer and employee responsibilities of work  
13 teams in Hong Kong and the United States - finding that employees place a different emphasis on  
14 the PC structure because of their different social cultures. The United States employees pay more  
15 attention to transaction factors. In comparison, Hong Kong employees pay more attention to team  
16 factors – attributed to the extra importance of interpersonal contact and help during working hours  
17 in the context of Chinese culture. Li (2002), on the other hand, identified "normative",  
18 "interpersonal", and "developmental" dimensions in studying 796 employees. Here, *normative*  
19 responsibility is related to economic interests: it includes employers providing employees with a  
20 reasonable salary, and stable job security, and employees creating a performance for the  
21 organization; *interpersonal* responsibility is related to the development of interpersonal  
22 relationships, including the organization providing humanistic care and a harmonious  
23 interpersonal environment for employees, with employees, in turn, creating a good interpersonal  
24 environment for the organization; while *developmental* responsibility includes the organization  
25 providing training, promotion opportunities for employees, and the employees taking the initiative  
26 to undertake additional work.

1       The *multi-dimensional* structure was also proposed by Rousseau (2002), dividing the PC into  
2 *seven* dimensions: stability, loyalty, short-term transactions, limited liability, dynamic  
3 performance, and internal and external development. These were all validated by a questionnaire  
4 survey of 630 employees in Singapore and the United States.

## 5 *2.2 Psychological safety*

6 Psychological safety, which has a history that can be traced back to the 1960s (Schein and Bennis,  
7 1966), focuses on people's perceptions of the consequences of taking interpersonal risks in the  
8 workplace (Edmondson and Lei, 2014). The studies of psychological safety can be divided into  
9 three groups at the individual, team, and organizational levels. From the perspective of individuals,  
10 psychological safety refers to an individual subjective perception of the impact on their image,  
11 personal status, and career (Khan, 1990). A higher level of psychological safety can enhance the  
12 employees' work enthusiasm and increase their willingness to express themselves in the  
13 workplace. Psychological safety is the shared cognition of team members of whether they will be  
14 punished for the interpersonal risks they are involved in at the team level (Edmondson, 1999). For  
15 a work team, a higher psychological safety degree is constructive to the interpersonal relationships  
16 within the team and helps form a team-friendly atmosphere. For organizations, psychological  
17 safety is related to their members' support for organizational management, self-positioning, and  
18 the atmosphere of expression (Brown and Leigh, 1996). Compared to the individual level, team  
19 and organization psychological safety emphasizes the environmental characteristics felt by  
20 members.

21       Considering the inherent dangerousness of the construction industry (Idrees et al., 2017),  
22 construction worker safety is recognized as a major concern at construction sites, and their  
23 psychological safety is given special attention in the literature (Feng et al., 2015). Shen et al.  
24 (2015b) developed a conceptual framework for forming a desired psychological safety climate  
25 from structural, perceptual, interactive, and cultural perspectives. Shen et al. (2015a) also  
26 investigated the factors contributing to a favorable psychological safety climate on construction



1 sites from the individual perspective. They built a multi-perspective framework based on the  
2 responses to a construction project personnel questionnaire. Larsson et al. (2008) found reliable  
3 relationships between construction workers' perceptions of psychological climate, work outcomes,  
4 and safety behaviors.

### 5 *2.3 Safety performance*

6 Safety performance is an important indicator of the effectiveness of safety production management  
7 and has become a popular topic for researchers. It has several definitions due to different  
8 considerations and applications. For example, Borman and Motowidlo (1997) point out that the  
9 two main components of performance are task performance and relationship performance. Based  
10 on this, safety performance has been defined as safety *compliance* and *participation*,  
11 corresponding with task and relationship performance, respectively (Griffin and Neal, 2000). In  
12 contrast, Sawacha *et al.* (1999) define it as the degree of injury caused by safety accidents,  
13 including organization and individual aspects; Zohar (2000) defines it as the incidence of minor  
14 injuries requiring medical treatment and rest; while it is the accident rate and occupational injury  
15 for Siu et al. (2004). Christian *et al.* (2009) found the different definitions to be based on two  
16 completely different concepts, either referring to the safety *results* of organizations (such as the  
17 number of accidents per year) or individual safety *behavior*, arguing that both should be included  
18 in the definition of safety performance.

19 As with the PC, safety performance is often divided into a two-, three-, and multi-dimensional  
20 structure. For the *two-dimensional* version, as noted above, Griffin and Neal (2000) identify safety  
21 compliance and safety participation. The former denotes the key safety activities that individuals  
22 must perform to maintain workplace safety, while the latter concerns individual voluntary  
23 participation in safety improvement activities, such as safety activities or safety meetings.  
24 Christian *et al.* (2009) focus on safety behavior and safety results. Further dividing safety behavior  
25 into safety compliance and participation provides a *three-dimensional* structure of safety  
26 performance. Meanwhile, for the *multi-dimensional* structure, Wu (2005) has divided safety

1 performance into six dimensions: safety organization and management, safety facilities and  
2 measures, safety training, safety training evaluation, accident investigation, and accident data.

3 In recent years, studies have shifted their focus from concept definition to empirical research  
4 in different fields. In terms of PC and psychological safety, their impact on employees' work  
5 performance has become a research hotspot. However, most studies focus on teachers, knowledge  
6 workers, or white-collar workers in other professions, and fewer on front-line workers. Regarding  
7 safety performance, the psychological factors influencing safety performance have been explored,  
8 while only some studies include PC as a factor in the safety performance of construction workers.

### 9 3. Hypotheses

10 Examining the literature suggests two likely and fundamental hypotheses:

11 *H1: The employees' PC has a significant effect on safety performance as a whole.*

12 *H2: There is a significant positive correlation between different dimensions of PC and*  
13 *different dimensions of safety performance.*

14 The following sections are concerned with testing these hypotheses and considering the  
15 implications of the results.

### 16 4. Method

#### 17 4.1 Questionnaire development

18 A three-dimensional structure is used to divide both PC and safety performance constructs. The  
19 specific reasons are as follows:

20 (1) For a PC, the "team dimension" better reflects the characteristics of team-based organizations,  
21 especially in Chinese enterprises, which take measures to cultivate a traditional harmonious  
22 atmosphere and encourage cooperation between employees to achieve business goals.

1 (2) For safety performance, the "safety outcome" dimension is an important index for measuring  
2 the achievement of safety production management. It therefore reflects the whole connotation  
3 of safety performance more comprehensively than the two-dimensional structure.

4 A structured questionnaire is adopted here as a robust tool for a detailed academic inquiry  
5 involving a large population of construction personnel. Based on Maslow's (1943) Hierarchy of  
6 Needs and Social Exchange, an initial design was conditioned by a wide-ranging literature review  
7 identifying the items likely to be related to PCs and safety performance at construction sites. The  
8 questionnaire items developed this way were revised by interviews with six experts comprising an  
9 associate professor and five employees from different construction enterprises, four of whom were  
10 working on construction sites. All had sufficient industry experience and a good understanding of  
11 the situation of construction workers. The revisions included: (1) deleting items with a similar  
12 connotation and can be regarded as repetitive, (2) deleting items that do not conform to the actual  
13 situation of construction workers, and (3) using more straightforward item descriptions to enable  
14 construction workers to grasp their meaning easily. Table I summarises the final items included in  
15 the questionnaire, with 15 items from three dimensions of the PC (normative, interpersonal, and  
16 developmental) and 14 items from three dimensions of safety performance (safety result, safety  
17 compliance, and safety participation).

18 --- insert Table I here ---

19 Two hundred fifty questionnaires were distributed to workers on four different construction  
20 sites in Foshan, Qingyuan, and Guangzhou, and 238 were returned. After eliminating invalid  
21 questionnaires (mainly because of unanswered questionnaires and the items for PC and safety  
22 performance all checked as "fully agreed"), 206 valid questionnaires remained – an effective  
23 response rate of 82.4%.

#### 24 *4.2 Statistical analysis*

25 SPSS 19.0 and AMOS 20.0 are used to test the reliability and validity of the questionnaire data  
26 and conduct linear regression and correlation analysis. Cronbach's alpha test is commonly used in

1 questionnaire validation studies (Bujang et al., 2018), and used here to assess the whole and the  
2 dimensions of the PC and safety performance constructs. The expert interviews used in designing  
3 the questionnaire ensure it has good content validity, and factor analysis is used to test its structural  
4 validity. The average score of each item for the three PC and safety performance dimensions are  
5 used to measure the levels of the respondents. Linear regression is a statistical analysis method to  
6 determine the quantitative relationships between two or more variables, and correlation analysis is  
7 used to study the correlation relationship between two variables (Eberly, 2007). Linear regression  
8 tests the effect of PC on safety performance and correlation analysis between different PC and  
9 safety performance dimensions.

## 10 5. Results

### 11 5.1 Reliability and validity assessment

12 Table II shows the results of the reliability and validity test, indicating that, with all Cronbach  
13 alpha values over 0.80, reliability is very good.

14 --- insert Table II here ---

15 Table III gives the results of the pre-analysis tests, indicating that, with KMO between 0.8 and  
16 0.9 and Bartlett's spherical test significance less than 0.05, the correlation between variables is  
17 strong enough for factor analysis.

18 --- insert Table III here ---

19 Tables IV and V show the results of the confirmatory factor analyses. With constituent  
20 reliability (CR) all higher than 0.6, the internal consistency of each item is good, while the average  
21 variances extracted (AVE) are all 0.500, also indicating good convergence validity. Therefore, the  
22 two constructs' reliability and convergence validity meet the requirements of factor analysis.

23 --- insert Table IV here ---

24 --- insert Table V here ---

1 5.2 PC state of construction workers

2 Table VI shows that the average score of each PC item is above 4.5, which indicates that the  
3 respondents perform well in the PC. The interpersonal PC has the highest average dimension score  
4 of 4.74, with "communication between superiors and subordinates is smooth and obtains a  
5 harmonious relationship", "treat each employee sincerely", and "have a harmonious colleague  
6 relationship" being its highest scoring items. This can be interpreted as showing that the  
7 organizations create a harmonious interpersonal atmosphere, the hierarchical boundaries between  
8 superiors and subordinates are not overly strict, workers and superiors can communicate equally,  
9 organizations have a sincere attitude to workers, and the relationship between workers is  
10 harmonious. Next is the developmental PC, with an average score of 4.68. Here, the *lowest* scoring  
11 item is "create career development and promotion space", which suggests that the workers are less  
12 career-minded or, more likely, the incentives provided by organizations in this respect are  
13 insufficient. The average score of normative PCs is the least; in particular, the lowest score is for  
14 the item "provide reasonable wages", again suggesting that monetary rewards and incentives are  
15 less than expected.

16 --- insert Table VI here ---

17 5.3 Safety performance state of construction workers

18 Table VII above shows that the average score of each safety performance item is also above 4.5,  
19 which indicates that the safety performance level of the respondents is also high. Safety  
20 compliance has the highest average dimension score of 4.78, indicating that the workers perform  
21 better in abiding by safety rules and regulations and carrying out safety operations according to  
22 regulations. A close second is the safety participation dimension (4.76), followed by the safety  
23 result (4.63). Here, the *lowest* score is 4.53 for the item "rate of safety accidents in construction  
24 sites is low", which may be due to some workers experiencing safety accidents and thus scoring  
25 this item lower.

26 --- insert Table VII here ---

#### 1 5.4 Regression analysis

2 The linear regression analysis of PC as the independent variable with safety performance as the  
3 dependent variable has a coefficient of determination, R, of 0.734, showing a strong relationship  
4 between variables. The R<sup>2</sup> of 0.539, between 0.5 and 0.8, denotes a general goodness of fit of the  
5 estimated model to the observed values. The variance analysis has an F value with 0.000  
6 significance, indicating the model has strong explanatory power. Residual plots and the Durban-  
7 Watson and VIF statistics indicate no significant non-linear or non-additive, autocorrelation,  
8 multicollinearity, or heteroskedasticity features of the data.

9 Finally, Table VIII gives the analysis results showing that, with a coefficient of 0.923  
10 (t=15.437, p=0), the strength of the PC has a massive effect on safety performance, and therefore  
11 H1 stands unrefuted.

12 --- insert Table VIII here ---

#### 13 5.5 Correlation analysis

14 Table IX indicates a highly positive correlation between PC and safety performance of 0.845,  
15 with the correlation between different PC dimensions and safety performance dimensions all  
16 significant at the 1% level. H2, therefore also stands unrefuted.

17 --- insert Table IX here ---

### 18 6. Discussion

19 The findings show the employees' PC have a significant positive effect on and safety performance  
20 in the construction industry. This was also found in the study of Wang et al. (2021), which  
21 attributed this to the mediating mechanisms of PC making employees feel safety responsibility and  
22 safety-specific trust in supervisors at construction sites. PC was recognized as one of the  
23 determinants of employees' safety perception, which then affected their safety performance  
24 behaviors (Newaz et al., 2019c). The indirect impact of PC on safety performance was found to be  
25 more significant than that on accident-coping behaviors (Liang et al., 2022). Furthermore, Newaz

1 et al. (2021a) found a positive association between the fulfillment level of PC mutual obligations  
2 for employees and employers and safety performance, suggesting that the PC's fulfillment level  
3 also mattered in decreasing accidents in construction settings. Newaz et al. (2016b) held that  
4 construction workers' safety behavior could be shaped by PC and verified the mediated relationship  
5 between safety climate and safety performance by PC.

6 Due to the particularity of the construction industry in China, the country's construction  
7 workers face greater work pressure, and their operating processes involve higher safety risks.  
8 Therefore, the workers' unsafe behavior will cause serious consequences for themselves and their  
9 organizations, which makes the management of construction workers' safety behavior of great  
10 importance. The PC perspective can provide new ideas for standardizing workers' unsafe behavior.  
11 Accordingly, three suggestions for improving safety production management and enhancing safety  
12 performance in the construction industry are proposed.

13 (1) Sufficient material and economic conditions need to be provided for workers to maintain the  
14 balance of normative PC, which mainly involves providing employees with a reasonable  
15 salary, welfare, stable job security, and other related material and economic benefits. These  
16 basic needs of individuals need to be satisfied for workers to be motivated to improve safety  
17 performance. In practice, this includes providing sufficient wages to meet the needs of the  
18 workers' lives; paying wages on time; creating opportunities for promotion and salary  
19 increases; providing bonuses according to the workers' performance; not dismissing workers  
20 at will; and providing stable living and work security. Having a balanced normative PC helps  
21 workers work safely and be motivated to improve their safety performance.

22 (2) Workers need to be helped to establish good interpersonal relationships and create a  
23 harmonious interpersonal atmosphere. Introducing measures to meet the workers' emotional  
24 and belonging needs helps maintain the interpersonal PC at a high level. Chinese construction  
25 workers usually work in groups and live together; therefore, building good interpersonal  
26 relationships can help improve safety performance. To do this in practice includes: breaking

1 down the communication barriers between superiors and subordinates, creating smooth  
2 communication channels between superiors and subordinates; carrying out various types of  
3 off-the-job leisure activities; building a platform for workers' leisure; creating a harmonious  
4 living atmosphere and improving the relationship between colleagues; strengthening the  
5 workers' sense of emotional belonging; providing sincere concern and help to workers; and  
6 actively paying attention to the workers' work and life problems and preventing psychological  
7 dissatisfaction caused by these problems.

8 (3) Various ways need to be adopted to help workers realize their personal values and prevent the  
9 developmental PC from breaking down. Specific practical measures include: providing  
10 professional and technical training for workers so that their technical operation level can be  
11 improved; providing timely guidance to workers to help them accomplish their tasks better;  
12 providing a variety of challenging jobs that can enable workers to fully develop their potential;  
13 creating opportunities and channels for workers to be promoted; and enabling workers to have  
14 the opportunity to rise to high-level positions. Attending to the developmental PC of  
15 construction workers indicates the organization values them, encourages professional training  
16 to continuously improve their skills, obtain external support and help from the organization to  
17 achieve individual goals, and provides a stronger incentive to improve safety performance.

## 18 **7. Conclusion**

19 This study investigates how the PC influences the safety performance of construction workers  
20 through a questionnaire survey of workers from 4 different construction sites in China's Foshan,  
21 Qingyuan, and Guangzhou. The questionnaire comprises a set of questions (items) for each  
22 construct (the PC and safety performance), identified in an extensive literature review and  
23 validated by a group of five construction experts. The analysis of the 206 valid responses indicates  
24 the PC to be intact and generally well-performed, and their safety performance is maintained at a



1 high level. Cronbach's alpha, KMO, Bartlett's test, and an exploratory factor analysis indicate that  
2 the questionnaire items have good empirical reliability and validity.

3 The regression analysis confirms a highly significant relationship between the two constructs.  
4 In contrast, the correlation analysis shows that the three dimensions of safety performance (safety  
5 result, safety compliance, and safety participation) are positively correlated with PC dimensions  
6 (normative, interpersonal, and developmental). Therefore, when the workers' PC is good and the  
7 state is relatively balanced, their safety performance will be maintained at a high level. Hypothesis  
8 H1, that *the employees' PC has a significant effect on safety performance as a whole*, is therefore  
9 supported. Hypothesis H2, that *there is a significant positive correlation between different*  
10 *dimensions of PC, and different dimensions of safety performance*, is also very much supported.

11 Moreover, it is found that a subtle change in any PC item will influence safety performance,  
12 meaning that, in safety production management practice, all three PC dimensions need to be  
13 closely attended to at the same time. Based on exploring the relationship between PC and safety  
14 performance, the present study proposes targeted suggestions to help improve the safety  
15 production management and safety performance of the construction industry from the perspective  
16 of PC. This not only enriches the research fields of PC, psychological safety, and safety  
17 performance but also has practical significance for safety performance management of the  
18 construction industry.

19 The study is limited by sample size, location, and the lack of a long-term follow-up survey of  
20 construction workers. Moreover, PC may change significantly due to the dynamic characteristics  
21 of the surrounding environment. Being restricted to four different construction sites in China's  
22 Foshan, Qingyuan, and Guangzhou, the number and regional distribution of selected samples  
23 should also be appropriately expanded for further studies as a check on the heterogenous capacity  
24 of the results. Likewise, while the expectation is that the results will also apply to other similar  
25 regions of the world, further studies would reveal how much this is the case. Finally, an further  
26 elaboration could involve distinguishing the working years, types of work, and other

1 characteristics of the respondents, together with a long-term follow-up survey focusing on the  
2 dynamic changes and the factors impacting on workers' PC.

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### 11 **References**

- 12 Argyris, C., and Ditz, G.W. (1960), “Understanding organizational behavior”, *American Journal of*  
13 *Sociology*, Vol. 26 No. 1, pp. 457–458.
- 14 Bird, F.E. (1974), *Management guide to loss control*. Atlanta: Intl Loss Control Inst.
- 15 Borman, W.C., and Motowidlo, S.J. (1997), “Task performance and contextual performance: the meaning  
16 for personnel selection research”, *Human Performance*, Vol. 10 No. 2, pp. 99–109.  
17 [https://doi.org/10.1207/s15327043hup1002\\_3](https://doi.org/10.1207/s15327043hup1002_3)
- 18 Brown, S. P., and Leigh, T. W. (1996), "A new look at psychological climate and its relationship to job  
19 involvement, effort, and performance", *Journal of Applied Psychology*, Vol. 81 No. 4, pp. 358–  
20 368. <https://doi.org/10.1037/0021-9010.81.4.358>
- 21 Bujang, M. A., Omar, E. D., and Baharum, N. A. (2018). "A review on sample size determination for  
22 Cronbach’s alpha test: a simple guide for researchers". *The Malaysian Journal of Medical*  
23 *Sciences*, Vol. 25 No. 6, pp. 85-99. <https://doi.org/10.21315/mjms2018.25.6.9>
- 24 Chan, A.P., Wong, F.K., Hon, C.K., Javed, A.A., and Lyu, S. (2017), “Construction safety and health  
25 problems of ethnic minority workers in Hong Kong”, *Engineering, Construction and*

- 1            *Architectural Management*, Vol. 24 No. 6, pp. 901–919. [https://doi.org/10.1108/ECAM-09-2015-](https://doi.org/10.1108/ECAM-09-2015-0143)  
2            [0143](https://doi.org/10.1108/ECAM-09-2015-0143)
- 3            Chen, J.Z., Ling, W.Q., and Fang, L.L. (2004), “Exploration and verification of employee psychological  
4            contract structure dimension”, *Science and Management of Science and Technology*, Vol. 25 No.  
5            3, pp. 94–97.
- 6            Christian, M.S., Bradley, J.C., Wallace, J.C., and Burke, M.J. (2009), “Workplace safety: a meta-analysis  
7            of the roles of person and situation factors”, *Journal of Applied Psychology*, Vol. 94 No. 5, pp.  
8            1103–1127. <https://doi.org/10.1037/a0016172>
- 9            Dainty, A.R., Bagilhole, B.M., and Neale, R.H. (2000), “The compatibility of construction companies’  
10            human resource development policies with employee career expectations”, *Engineering*  
11            *Construction and Architectural Management*, Vol. 7 No. 2, pp. 169-178.  
12            <https://doi.org/10.1046/j.1365-232x.2000.00150.x>
- 13            Dainty, A.R., Raiden, A.B., and Neale, R.H. (2004), “Psychological contract expectations of construction  
14            project managers”, *Engineering, Construction and Architectural Management*, Vol. 11 No. 1, pp.  
15            33-44. <https://doi.org/10.1108/09699980410512647>
- 16            Eberly, L. E. (2007). "Correlation and simple linear regression". *Methods in Molecular Biology (Clifton,*  
17            *N.J.)*, Vol. 404, pp. 143–164. [https://doi.org/10.1007/978-1-59745-530-5\\_8](https://doi.org/10.1007/978-1-59745-530-5_8)
- 18            Edmondson, A. (1999), “Psychological safety and learning behavior in work teams”, *Administrative*  
19            *Science Quarterly*, Vol. 44 No. 2, pp. 350–383. <https://doi.org/10.2307/2666999>
- 20            Edmondson, A. C., and Lei, Z. (2014), “Psychological safety: the history, renaissance, and future of an  
21            interpersonal construct”, *Annual Review of Organizational Psychology and Organizational*  
22            *Behavior*, Vol. 1, pp. 23–43.
- 23            Egbu, C.O. (2004), “Managing knowledge and intellectual capital for improved organizational  
24            innovations in the construction industry: an examination of critical success factors”, *Engineering,*  
25            *Construction and Architectural Management*, Vol. 11 No. 5, pp. 301-315.  
26            <https://doi.org/10.1108/09699980410558494>
- 27            Feng, X.-D., Cao, B.-L., Li, N.-B., Chen, H.-S., and Yu, W. (2015), "Influence factors and construction  
28            strategy of R & D team psychological safety", Paper presented at the *International Conference on*  
29            *Management Science and Management Innovation (MSMI)*.

- 1 Franz, B., Wang, T., and Issa, R.R. (2021), “Exploration of burnout in early-career construction  
2 management professionals in the USA”, *Engineering, Construction and Architectural  
3 Management*, Vol. ahead-of-print No. ahead-of-print. [https://doi.org/10.1108/ECAM-08-2021-  
4 0761](https://doi.org/10.1108/ECAM-08-2021-0761)
- 5 Griffin, M.A., and Neal, A. (2000), “Perceptions of safety at work: a framework for linking safety climate  
6 to safety performance, knowledge, and motivation”, *Journal of Occupational Health Psychology*,  
7 Vol. 5 No. 3, pp. 347–358. <https://doi.org/10.1037/1076-8998.5.3.347>
- 8 Heinrich, H.W. (1959), “Industrial accident prevention: a scientific approach”, *Industrial and Labor  
9 Relations Review*, Vol. 4 No. 4, pp. 609–609.
- 10 Idrees, M. D., Hafeez, M., and Kim, J.-Y. (2017), "Workers' age and the impact of psychological factors  
11 on the perception of safety at construction sites", *Sustainability*, Vol.9 No.5.  
12 <https://doi.org/10.3390/su9050745>
- 13 Khan, W. (1990), "Psychological conditions of personal engagement and disengagement at work", *The  
14 Academy of Management Journal*, No. 33, pp. 692–724.
- 15 Larsson, S., Pousette, A., and Torner, M. (2008), "Psychological climate and safety in the construction  
16 industry-mediated influence on safety behaviour", *Safety Science*, Vol. 46 No. 3, pp. 405–412.  
17 <https://doi.org/10.1016/j.ssci.2007.05.012>
- 18 Lee, C., and Tinsley, C.H. (1999), “Psychological normative contracts of work group member in the U. S.  
19 and Hong Kong”, Working Paper.
- 20 Levinson, H., Price, C.R., Munden, K.J., Mandl, H.J., and Solley, C.M. (2013), “Men, management, and  
21 mental health”, In *Men, Management, and Mental Health*. Harvard University Press.
- 22 Li, Y. (2002), “Research on the structure and related factors of employee psychological contract”, Capital  
23 Normal University.
- 24 Liang, H., Shi, X., Yang, D., and Liu, K. (2022). "Impact of mindfulness on construction workers' safety  
25 performance: The mediating roles of psychological contract and coping behaviors". *Safety  
26 Science*, Vol. 146. <https://doi.org/10.1016/j.ssci.2021.105534>
- 27 Liu, A.M., Chiu, W.M., and Fellows, R. (2007), “Enhancing commitment through work empowerment”,  
28 *Engineering, Construction and Architectural Management*, Vol. 14 No. 6, pp. 568-580.  
29 <https://doi.org/10.1108/09699980710829021>

- 1 Marques, S.C., Pais-Ribeiro, J.L., and Lopez, S.J. (2011), “The role of positive psychology constructs in  
2 predicting mental health and academic achievement in children and adolescents: a two-year  
3 longitudinal study”, *Journal of Happiness Studies*, Vol. 12 No. 6, pp. 1049–1062.  
4 <https://doi.org/10.1007/s10902-010-9244-4>
- 5 Maslow, A.H. (1943), “A theory of human motivation. *Psychological Review*, Vol. 50 No. 4, 370–396.
- 6 Morrison, E.W., and Robinson, S.L. (1997), “When employees feel betrayed: a model of how  
7 psychological contract violation develops”, *The Academy of Management Review*, Vol. 22 No. 1,  
8 pp. 226–256. <https://doi.org/10.5465/amr.1997.9707180265>
- 9 National Bureau of Statistics of China. (2018), *China Statistical Yearbook*. China Statistics Press, Beijing.
- 10 Newaz, M.T. (2018), *The psychological contract to measure safety outcomes on construction sites*. PhD  
11 thesis, School of Architecture and Built Environment, The University of Newcastle, Australia
- 12 Newaz, M.T., Jefferies, M., Davis, P., and Pillay, M. (2016a), “Using the psychological contract to  
13 measure safety outcomes on construction sites”, in *Proc.*, 32nd Annual ARCOM Conf., PW Chan  
14 and CJ Neilson, eds., Association of Researchers in Construction Management, Manchester, UK.  
15 pp. 487-496.
- 16 Newaz, M.T., Davis, P., Jefferies, M., and Pillay, M. (2016b), “The psychological contract of safety: The  
17 missing link between safety climate and safety behaviour in construction sites”, in *Advances in*  
18 *Safety Management and Human Factors* (pp. 199-210). Springer, Cham.
- 19 Newaz, M.T., Davis, P., Jefferies, M., and Pillay, M. (2018), “Role of psychological contract to influence  
20 safety behaviour at construction sites”, in *International Conference on Applied Human Factors*  
21 *and Ergonomics* (pp. 545–555). Springer, Cham.
- 22 Newaz, M.T., Davis, P.R., Jefferies, M., and Pillay, M. (2019a), “Validation of an agent-specific safety  
23 climate model for construction”, *Engineering, Construction and Architectural Management*, Vol.  
24 26 No. 3, pp. 462–478. <https://doi.org/10.1108/ECAM-01-2018-0003>
- 25 Newaz, M.T., Davis, P., Jefferies, M., and Pillay, M. (2019b), “The psychological contract: A missing  
26 link between safety climate and safety behaviour on construction sites”, *Safety Science*, Vol. 112,  
27 pp. 9–17. <https://doi.org/10.1016/j.ssci.2018.10.002>

- 1 Newaz, M.T., Davis, P., Jefferies, M., and Pillay, M. (2019c), “Using a psychological contract of safety to  
2 predict safety climate on construction sites”, *Journal of Safety Research*, Vol. 68, pp. 9-19.  
3 <https://doi.org/10.1016/j.jsr.2018.10.012>
- 4 Newaz, M.T., Jefferies, M., Davis, P.R., and Pillay, M. (2020a), “Managerial implications for  
5 construction practices as a consequence of using a psychological contract of safety”, *Engineering,  
6 Construction and Architectural Management*, Vol. 28 No. 4, pp. 1134–1155.  
7 <https://doi.org/10.1108/ECAM-02-2020-0119>
- 8 Newaz, M.T., Davis, P., Jefferies, M., and Pillay, M. (2020b), “Examining the psychological contract as  
9 mediator between the safety behavior of supervisors and workers on construction sites”, *Journal  
10 of Construction Engineering and Management*, Vol. 146 No. 1, 04019094.  
11 [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0001722](https://doi.org/10.1061/(ASCE)CO.1943-7862.0001722)
- 12 Newaz, M.T., Wang, D., Davis, P., Wang, X., Jefferies, M., and Sheng, Z. (2021a), “A cross-cultural  
13 validation of the psychological contract of safety on construction sites”, *Safety Science*, Vol. 141,  
14 105360. <https://doi.org/10.1016/j.ssci.2021.105360>
- 15 Newaz, M.T., Ershadi, M., Jefferies, M., and Davis, P. (2021b), “Assessing safety management factors to  
16 develop a research agenda for the construction industry”, *Safety Science*, Vol. 142, 105396.  
17 <https://doi.org/10.1016/j.ssci.2021.105396>
- 18 Novieto, D.T. (2021), “Safety climate and occupational safety behaviours: the mediating role of  
19 psychological ownership among construction professionals”, *Engineering, Construction and  
20 Architectural Management*, Vol. ahead-of-print No. ahead-of-print.  
21 <https://doi.org/10.1108/ECAM-06-2021-0539>
- 22 Rousseau, D.M. (1990), “New hire perceptions of their own and their employer's obligations: a study of  
23 psychological contracts”, *Journal of Organizational Behavior* Vol. 11 No. 5, pp. 389-400  
24 <https://doi.org/10.1002/job.4030110506>
- 25 Rousseau, D.M., and Tijoriwala, S. (1996), “Perceived legitimacy and unilateral contract changes: it takes  
26 a good reason to change a psychological contract”, San Diago: Symposium at the SIOPM  
27 Meetings.
- 28 Rousseau, D.M. (2002), Psychological contract inventory technical report.  
29 [http://www.andrew.cmu.edu/user/rousseau/0\\_reports/reports.html](http://www.andrew.cmu.edu/user/rousseau/0_reports/reports.html)

- 1 Sawacha, E., Naoum, S., and Fong, D. (1999), "Factors affecting safety performance on construction  
2 sites", *International Journal of Project Management*, Vol. 17 No. 5, pp. 309–315.  
3 [https://doi.org/10.1016/S0263-7863\(98\)00042-8](https://doi.org/10.1016/S0263-7863(98)00042-8)
- 4 Schein, E. H., and Bennis, W., (1966), "Personal and organizational change through group methods".
- 5 Shen, Y., Koh, T. Y., Rowlinson, S., and Bridge, A. J. (2015a), "Empirical investigation of factors  
6 contributing to the psychological safety climate on construction sites". *Journal of Construction*  
7 *Engineering and Management*, Vol. 141 No. 11. [https://doi.org/10.1061/\(asce\)co.1943-  
8 7862.0001021](https://doi.org/10.1061/(asce)co.1943-7862.0001021)
- 9 Shen, Y., Tuuli, M. M., Xia, B., Koh, T. Y., and Rowlinson, S. (2015b), "Toward a model for forming  
10 psychological safety climate in construction project management", *International Journal of*  
11 *Project Management*, Vol. 33 No. 1, pp. 223–235.  
12 <https://doi.org/10.1016/j.ijproman.2014.04.009>.
- 13 Song, Z.G. (2017), "On reasons for accidents in architectural construction in China and their strategies",  
14 *Shanxi Architecture*, Vol. 23, pp. 259–260.
- 15 Tong, R., Wang, L., Cao, L., Zhang, B. and Yang, X. (2021), "Psychosocial factors for safety  
16 performance of construction workers: taking stock and looking forward", *Engineering,*  
17 *Construction and Architectural Management*, Vol. ahead-of-print No. ahead-of-print.  
18 <https://doi.org/10.1108/ECAM-09-2021-0786>.
- 19 Wang, D., Fu, H., and Fang, S. (2019), "The efficacy of trust for the governance of uncertainty and  
20 opportunism in megaprojects: The moderating role of contractual control", *Engineering,*  
21 *Construction and Architectural Management*, Vol. 27 No. 1, pp. 150–167.  
22 <https://doi.org/10.1108/ECAM-09-2018-0409>
- 23 Wang, Q., and Shi, Q. (2019), "The incentive mechanism of knowledge sharing in the industrial  
24 construction supply chain based on a supervisory mechanism", *Engineering, Construction and*  
25 *Architectural Management*, Vol. 26 No. 6, pp. 989–1003. [https://doi.org/10.1108/ECAM-05-  
26 2018-0218](https://doi.org/10.1108/ECAM-05-2018-0218)
- 27 Wang, X., Qiao, Y., Wang, D., Sheng, Z., and Newaz, M. T. (2021). "Psychological contract of safety and  
28 construction worker behavior: felt safety responsibility and safety-specific trust as mediators".

- 1            *Journal of Construction Engineering and Management*, Vol. 147 No. 11.  
2            [https://doi.org/10.1061/\(asce\)co.1943-7862.0002185](https://doi.org/10.1061/(asce)co.1943-7862.0002185)
- 3        Wu, T.C. (2005), “Surveying safety performance in laboratories in universities and colleges”, *Chinese*  
4            *Journal of Science Education*, Vol. 13 No. 4, pp. 465–482.
- 5        Wu, Y.F., Yuan, M.H., and Meng, T. (2017), “Research on accident-causing theory model of construction  
6            engineering”, *Technology Innovation and Productivity*, Vol. 11, pp. 58–61.
- 7        Xu, S., Zhang, M., Xia, B., and Liu, J. (2021), “Exploring construction workers' attitudinal ambivalence:  
8            a system dynamics approach”, *Engineering, Construction and Architectural Management*, Vol.  
9            ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/ECAM-01-2021-0097>
- 10        Zohar, D. (2000), “A group-level model of safety climate: Testing the effect of group climate on  
11            microaccidents in manufacturing jobs”, *Journal of Applied Psychology*, Vol. 85 No. 4, pp. 587–  
12            596. <https://doi.org/10.1037/0021-9010.85.4.587>
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## Tables

2 **Table I**

3 Final items

Construct	Dimension	No.	Item
Psychological contract	Normative	P1	Provide reasonable wages
		P2	Provide social welfare (vacation, medical insurance, labor insurance)
		P3	Provide stable job security
		P4	Provide adequate resources
	Interpersonal	P5	Communicate smoothly between superiors and subordinates and obtain a harmonious relationship
		P6	Fully respect and trust employees and support them
		P7	Concern about employees' life and ideological problems
		P8	Care for the personal growth and development of employees
		P9	Obtain a harmonious colleague relationship
		P10	Treat each employee sincerely
	Developmental	P11	Provide training opportunities
		P12	Provide timely job guidance
		P13	Able to show skills in the work
		P14	Create career development and promotion space
		P15	Variety of challenging jobs
Safety performance	Safety result	S1	The rate of safety accidents in construction site is low
		S2	There are basically no safety accidents on site
		S3	Economic loss from safety accidents is low
		S4	Generally, site safety conditions are good
	Safety compliance	S5	I always follow the correct safety rules when I work
		S6	I abide by the safety rules and regulations of the enterprise
		S7	I work in the safest possible state
		S8	I always use all the necessary safety facilities when I work
		S9	I work safely even if the foreman does not supervise
	Safety participation	S10	I will participate in the safety risk assessment of the company
		S11	I will take the initiative to correct my colleagues' wrong actions or ideas
		S12	I will take the initiative to demonstrate to my colleagues the correct method of operation
		S13	I will make suggestions for improving safety in production
		S14	I volunteer to take part in activities to improve workplace safety

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**Table II**  
Reliability analysis results

Dimension	Cronbach's alpha	N
Normative	0.806	4
Interpersonal	0.817	7
Developmental	0.802	4
Psychological contract	0.910	15
Safety result	0.838	4
Safety compliance	0.811	5
Safety participation	0.808	5
Safety performance	0.899	14

**Table III**  
KMO and Bartlett's spherical test results of the psychological contract and safety performance items

Test	Psychological contract	Safety performance
KMO	0.886	0.886
Bartlett's spherical test	Approximate chi-square	1579.143
	df	105
	Sig.	.000
		1297.058
		91
		.000

**Table IV**  
Validity analysis results of the psychological contract items

Dimension	Item	R	C.R.	CR	AVE
Normative	P1	0.798	10.487		
	P2	0.557	7.432		
	P3	0.678	9.002	0.798	0.500
	P4	0.717	/		
Interpersonal	P5	0.612	8.089		
	P6	0.619	8.173		
	P7	0.696	9.113		
	P8	0.691	9.057	0.875	0.500
	P9	0.646	8.510		
	P10	0.685	8.982		
	P11	0.685	/		
Developmental	P12	0.689	6.868		
	P13	0.63	6.529		
	P14	0.601	6.348	0.799	0.500
	P15	0.524	/		

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**Table V**  
Validity analysis results of the safety performance items

Dimension	Item	R	C.R.	CR	AVE
Safety Result	S1	0.883	9.769		
	S2	0.702	8.393	0.797	0.500
	S3	0.799	9.240		
	S4	0.635	/		
Safety Compliance	S5	0.508	6.601		
	S6	0.541	7.000		
	S7	0.667	8.415	0.831	0.500
	S8	0.731	9.901		
	S9	0.658	/		
Safety Participation	S10	0.651	6.827		
	S11	0.704	7.128		
	S12	0.671	6.943	0.832	0.500
	S13	0.566	6.275		
	S14	0.515	/		

**Table VI**  
Psychological contract state

Dimension	No.	Item	AVG	SD	N
Normative	P1	Provide reasonable wages	4.50	0.58	206
	P2	Provide social welfare (vacation, medical insurance, labor insurance)	4.71	0.63	206
	P3	Provide stable job security	4.62	0.54	206
	P4	Provide adequate resources	4.67	0.52	206
Interpersonal	P5	Communication between superiors and subordinates is smooth and obtains a harmonious relationship	4.78	0.45	206
	P6	Fully respect and trust employees and support them	4.66	0.51	206
	P7	Concern about employees' life and ideological problems	4.72	0.51	206
	P8	Care for personal growth and development of employees	4.71	0.50	206
	P9	Have a harmonious colleague relationship	4.76	0.50	206
	P10	Treat each employee sincerely	4.78	0.45	206
Developmental	P11	Provide training opportunities	4.71	0.56	206
	P12	Provide job guidance in time	4.76	0.48	206
	P13	Able to show skills in the work	4.73	0.49	206
	P14	Create career development and promotion space	4.55	0.64	206
	P15	Various and challenging job	4.65	0.63	206

1 **Table VII**  
 2 Safety performance state

Dimension	No. Item	AVG	SD	N
Safety Result	S1 The rate of safety accidents on site is low	4.53	0.60	206
	S2 There are basically no safety accidents on site	4.67	0.55	206
	S3 Economic loss resulting from safety accidents is low	4.60	0.60	206
	S4 Generally, the safety condition of the site is good	4.73	0.48	206
Safety Compliance	S5 I always follow the correct safety rules when I work	4.80	0.43	206
	S6 I abide by the safety rules and regulations of the enterprise	4.81	0.45	206
	S7 I will work in the safest possible state	4.77	0.46	206
	S8 I always use all the necessary safety facilities when I work	4.74	0.51	206
	S9 I will work safely even if the foreman does not supervise	4.79	0.43	206
Safety Participation	S10 I will participate in the safety risk assessment of the company	4.74	0.48	206
	S11 I will take the initiative to correct my colleagues' wrong actions or ideas	4.74	0.51	206
	S12 I will take the initiative to demonstrate to my colleagues the correct method of operation	4.80	0.43	206
	S13 I will make suggestions for improving safety in production	4.77	0.46	206
	S14 I volunteer to take part in activities to improve workplace safety	4.76	0.47	206

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5 **Table VIII**  
 6 Regression analysis

	Nonstandardized Coefficient		Standardized Coefficient	t	Sig.	95.0% Confidence Interval of B	
	B	Standard Error	Trial Version			Lower Limit	Upper Limit
(Constant)	0.314	0.28		1.119	0.264	-0.239	0.867
Psychological Contract	0.923	0.06	0.734	15.437	0	0.805	1.041

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**Table IX**  
Correlation analysis results

Construct/dimension	AVG	SD	Normative	Interpersonal	Developmental	<i>Psychological Contract</i>	Safety Result	Safety Compliance	Safety Participation	<i>Safety Performance</i>
Normative	4.63	0.44	1							
Interpersonal	4.73	0.36	.771**	1						
Developmental	4.67	0.42	.653**	.700**	1					
<i>Psychological Contract</i>	4.68	0.36	.906**	.907**	.878**	1				
Safety Result	4.63	0.46	.686**	.650**	.635**	.734**	1			
Safety Compliance	4.78	0.33	.689**	.787**	.512**	.732**	.561**	1		
Safety Participation	4.76	0.34	.709**	.768**	.608**	.771**	.667**	.789**	1	
<i>Safety Performance</i>	4.72	0.33	.788**	.823**	.671**	.845**	.876**	.859**	.910**	1