




Extending the Association Between Leader-Member Exchange Differentiation and Safety Performance: A Moderated Mediation Model

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Purpose: This study examines and analyses the impact of leader-member exchange differentiation (LMXD) on employee safety performance.

Methods: A quantitative study was conducted on a sample of 357 Chinese construction industry employees through a structured questionnaire. The research hypothesis was tested by using the structural equation modelling (SEM) technique.

Results: The results showed that LMXD could directly and positively affect the negative emotions and indirectly affect the safety performance of employees through the mediating effect of negative emotions and work engagement. Interpersonal trust has a moderating impact on the relationship between LMXD and negative emotions.

Conclusion: This study contributes to the literature on organizational behavior. Employee workplace safety is a great challenge in the construction industry. Enterprises should pay attention to the negative impact of LMXD. A fair working environment has significant importance to the employee's safety.

Keywords: leader-member exchange differentiation, negative emotions, work engagement, interpersonal trust, safety performance

Introduction

Over the years, the foundation of work environment safety has remained the biggest challenge for industry experts and professionals. The incredible increase in injuries and accidents has made safety performance a distinct factor affecting occupational health and safety outcomes. Safety climate alludes to the organization that values the safety concerns while having the security policies embedded within the organization, thereby accomplishing successful safety outcomes.

Indeed, the organizational history emphasizes the significance of reinforcing the secure climate for ensuring environmental assurance by impeding unfavorable consequences.¹ Based on the research conducted on occupational safety, the findings illustrate that more than 100,000 production safety accidents in the Transportation and Warehouse sector (ie, truck and freight) were recorded in 2018. Hence, for governing the unsafe behavior, a safety performance mechanism needs to be embraced for curtailing the adversity in human lives while ensuring workers' well-being.

Finding illustrates that combating the difficulties concerning climate safety and reducing the number of catastrophic events is essential in understanding the high-risk behavior leading to massive calamity (ie, fatal injuries). Thus, creating a typology for identifying the organization's approaches and behaviors concerning

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leadership characteristics is vital for ensuring environmental safety. Given the explanation, leadership behaviors play a critical role in building the leader-employee relationship. Subsequently, for bolstering safety performance, Leader-Member Exchange differentiation, coined from the primes of LMX theory (ie, leader-subordinate relationship), contemplates the relationship by symbolizing the effect of leader's attitude influencing the employees' performance.

LMX differentiation is a novel configurable approach influencing task performance and organization outcome. It demonstrates that the difference between leader-subordinate relationships increases safety concerns while increasing the chances of injuries and accidents. Among all the imperative factors improving the organization's safety outcome, this multi-level dual-process (eg, LMXD) is a dominant factor affecting occupational health and safety.

Researchers have confirmed the importance of the relationship between leaders and followers in the workplace.² The leader-member exchange theory emphasizes that leaders should develop high-quality relationships with followers. Still, due to the limited energy of leaders, it is challenging to develop high-quality relationships with all followers, so employees will be treated differently by leaders, which is the leadership member exchange differentiation (LMXD).³ Due to the increasing prevalence of leader-member exchange differences in the workplace, the impact of leader-member exchange differences on employee safety performance needs more research.

Previous studies have not paid enough attention to the role of emotion in the explanation mechanism of LMXD and behaviour outcome. According to the affective events theory, an individual's experience of the work environment and work events will stimulate his emotional response and affect his attitude and behaviour.⁴ As leaders cannot develop high-quality exchange relationships with all employees, the unfair allocation of resources is widespread in organizations, and the dissatisfaction caused by the unfair treatment of employees often leads to behavioural disorders. Therefore, this paper believes that negative emotions play a mediating role between LMXD and safety performance.

As a kind of work attitude, work engagement plays a vital role in the workplace. Previous studies have confirmed the relationship between employee performance and work attitude,⁵ and a good work attitude is conducive to employee performance improvement. Maintaining a high-quality exchange relationship

between leaders and members will make employees expect the organization and arouse positive working attitudes.⁶ The more prominent the difference between leaders and followers in exchange, it indicates that it is difficult for employees to be treated equally by leaders, and the organization's resource allocation is more dependent on leaders' personal preferences, which will dampen employees' enthusiasm and commitment to work, and have a negative impact on performance. Therefore, this paper introduces two mediating variables, negative emotions and work engagement, to explore the mechanism of action between LMXD and safety performance. The study sheds light on the theory of LMX differentiation affecting safety performance. The weak leader-subordinate relationship breaks down the supportive safety atmosphere, thereby hampering the organization's safety climate. Hence, it is essential to study reliable predictive factors affecting environmental safety performance. As a result, uncommon consideration should be paid to the predictive model (ie, LMXD), leading to better implementation of safety programs within the field of occupational security.⁷

In addition, this study attempts to explore the moderating effect of interpersonal trust. The process of LMXD acting on negative emotions will also be affected by psychological factors. As one of the psychological factors, interpersonal trust reflects an individual's trust in the external environment and others.⁸ The external manifestation of LMXD is the differentiation of resource allocation.⁹ For employees with low interpersonal trust, this differentiated resource allocation will increase their perception of unfairness, thus increasing their feelings of jealousy and dissatisfaction.

On the contrary, employees with high interpersonal trust are more likely to have a sense of security for the organization¹⁰ and have a higher willingness to take risks¹¹ so that they can work with a positive attitude. Existing studies have shown that trust can regulate the influence of major determinants on outcomes by influencing an individual's assessment of future behaviour or interpreting the past behaviour of another party.¹² Therefore, the interpersonal trust of employees may regulate the impact of LMXD on negative emotions to some extent.

Based on the affective events theory, this study introduces negative emotions and work engagement as mediating variables and interpersonal trust as moderating variables to explore the impact of LMXD on safety

performance to provide a reference for enterprise management practices. Thus, this study sought to make several contributions to the existing body of knowledge. Firstly, this study is among the few studies that have attempted to investigate the role of LMXD in predicting safety performance.¹³ Secondly, this investigation has considered negative emotions a mediating mechanism between the LMXD and safety performance which is a unique contribution of the study. And adds essential links into the existing literature by anticipating the future call of Gooty, Thomas et al¹⁴ to develop more theoretical development concerning negative emotions. Thirdly, this study has identified a missing thread related to construction workers' LMX and safety performance. He¹³ conceptualized work engagement to enhance safety performance in the construction industry.

Literature Review and Research Hypothesis

LMXD and Safety Performance

LMXD refers to the difference between team members and the same leader in the quality of the exchange relationship between leader and employees.¹⁵ If a leader treats employees in different ways, individuals might develop stress, which can drive them into negative feelings and feel scared, ashamed, and depressed.¹⁶ Moreover, this leadership discrimination in differentiated behaviour might trigger them to be hostile at the workplace, resulting in drastic consequences for others. The safety performance of individuals is likely to be shattered in the construction industry. Safety performance refers to the degree of achievement of safety tasks, divided into safety compliance and participation.¹⁷ Existing studies have not discussed the relationship between LMXD and safety performance, but relevant studies show that there may be a negative relationship between LMXD and safety performance. According to the leader-member exchange theory, due to limited energy, leaders will only maintain high-quality exchange relationships with a few employees, who will therefore get more promotion opportunities and resource tilt.¹⁸ According to the conservation of resource theory, they will try their best to obtain, preserve and maintain their limited resources.¹⁹ Therefore, a high-quality leader-member exchange relationship is one of the resources that employees pursue. However, as people's energy and time are limited, when employees invest in developing high-quality exchange relationships with their leaders, they will ignore the improvement of their work ability and ultimately damage

their work quality and performance.²⁰ Based on this, hypothesis H1 is proposed:

H1: LMXD has a significant negative impact on safety performance.

The Mediating Role of Negative Emotions

Negative emotions are a series of unpleasant emotional feelings and reactions such as indignation, tension, and fear produced by individuals psychologically and physically.²¹ The working atmosphere will affect employees' emotional feelings and expressions in daily work.²² Leaders have the right to control the organization's resources. LMXD means that the allocation of resources will be affected by the relationship between leaders and employees, thus creating an unfair organizational atmosphere.²³ Existing studies have shown that injustice in the workplace deviates from employees' expectations of the organization and will cause adverse emotional reactions and conflicts within the organization.²⁴ There is a positive relationship between paradoxical leader behaviors and organizational citizenship behaviors.²⁵ Work engagement has a mediating role between workplace loneliness and organizational citizenship behaviors.²⁶

At the same time, according to the affective events theory, individuals' perceived work experience will trigger their emotional reactions, affecting the individual's psychology and behaviour and further affecting the organization's performance.²⁷ As a signal that work events are inconsistent with personal goals, and employees often use negative emotions to alleviate the negative effects of emotions,²⁸ which ultimately leads to decreased performance. Empirical studies also show that when employees perceive the unfair atmosphere in the work environment, they will feel ostracized and alienated by leaders and are prone to negative emotions and work deviation behaviours, which will negatively impact employee performance.²⁹ Therefore, this study believes that negative emotions may mediate between LMXD and safety performance. Based on this, hypothesis H2 is proposed:

H2: Negative emotions play a mediating role between LMXD and safety performance.

The Mediating Role of Work Engagement

Work engagement refers to individuals' high psychological and physical involvement in activities, including vitality, dedication, and concentration.³⁰ Related studies show

that the availability of job resources³¹ and organizational equity³² are important factors affecting work engagement. Work resources contribute to realizing work-related goals³³ and are one of the main driving factors of work engagement.³⁴ In the workplace, high-quality leader-member exchange is an essential channel for employees to obtain organizational resources. Members who establish a low-quality exchange relationship with their leaders will get fewer resources than those with a high-quality leader-member exchange. Because employees will compare themselves with their colleagues around them, the sense of unfairness brought by the differentiated allocation of resources will reduce their work enthusiasm and effort.³⁵

Individual work attitudes influence work behaviour in an organization. As a positive work attitude, work engagement plays a vital role in improving work performance. Some scholars have found that work engagement positively affects satisfaction and job performance.³⁶ According to the affective events theory, certain organizational events will trigger employees' emotions and directly impact individual behaviours and attitudes.³⁷ Therefore, this study believes that LMXD will affect employees' work engagement and enthusiasm and ultimately decrease safety performance. Based on this, hypothesis H3 is proposed:

H3: Work engagement plays an intermediary role between LMXD and safety performance.

The Mediating Chain Effect of Negative Emotion and Work Engagement

This study believes that negative emotions can inhibit an individual's work engagement. As a positive force with motivation and perception, emotion significantly influences individuals' work enthusiasm and attitude.³⁸ On the one hand, positive emotions contribute to constructing individuals' lasting resources, including physical, intellectual, psychological, and social resources, which bring indirect and long-term benefits to individuals. On the contrary, negative emotions affect employees' work experience, dampen their work passion, and inhibit their commitment to work. On the other hand, negative emotions will interfere with employees' attention to the current task. The processing depth of the current task will weaken or even stop so that employees cannot put more energy into the work. According to the affective events theory, there is a specific connection between the emotional events and emotional reactions experienced by employees at work and their attitudes and

behaviours.³⁹ The unfairness caused by LMXD will lead to negative emotions such as employee dissatisfaction and anger. It will inhibit the enthusiasm of employees to contribute to the organization, make them unable to concentrate on their work, and even induce counterproductive work behaviours, which is not conducive to the improvement of safety performance. Therefore, this paper believes that while LMXD affects employee safety performance, negative emotions and work engagement play a chain mediation role.

Based on this, hypothesis H4 is proposed:

H4: Negative emotions and work engagement play a chain mediation role between LMXD and safety performance.

Moderating Role of Interpersonal Trust

Interpersonal trust refers to the tendency of an individual to believe that other members or organizations can be trusted⁴⁰ and is usually divided into cognitive trust and emotional trust.⁴¹ This study believes that interpersonal trust can weaken the relationship between LMXD and negative emotions. Studies have shown that trust can improve employees' tolerance of wrong behaviours.⁴² Employees with high interpersonal trust can get a sense of security from leaders and colleagues and have a positive attitude towards events at work, thus reducing the probability of generating negative emotions. However, employees with low interpersonal trust are more likely to have exclusive cognitive bias, and the differential management style of leaders is easy to be regarded as unjust behaviour driven by selfishness. In this case, employees are more likely to have negative emotions. Therefore, this study predicted that different levels of interpersonal trust would affect the relationship between LMXD and negative emotions. Accordingly, hypothesis H5 is proposed:

H5: Interpersonal trust plays a moderating role between LMXD and negative emotions.

In summary, the author has five research focuses, ie, testing the negative impact of LMXD on safety performance. Examine the mediating role of negative emotions between LMXD and safety performance. Examine the mediating role of work engagement between LMXD and safety performance. Examine the intermediary effect of work engagement and negative emotions on the chain between LMXD and safety performance. Examine the moderating effect of interpersonal trust between LMXD and negative emotions. The hypothetical model is shown in [Figure 1](#).

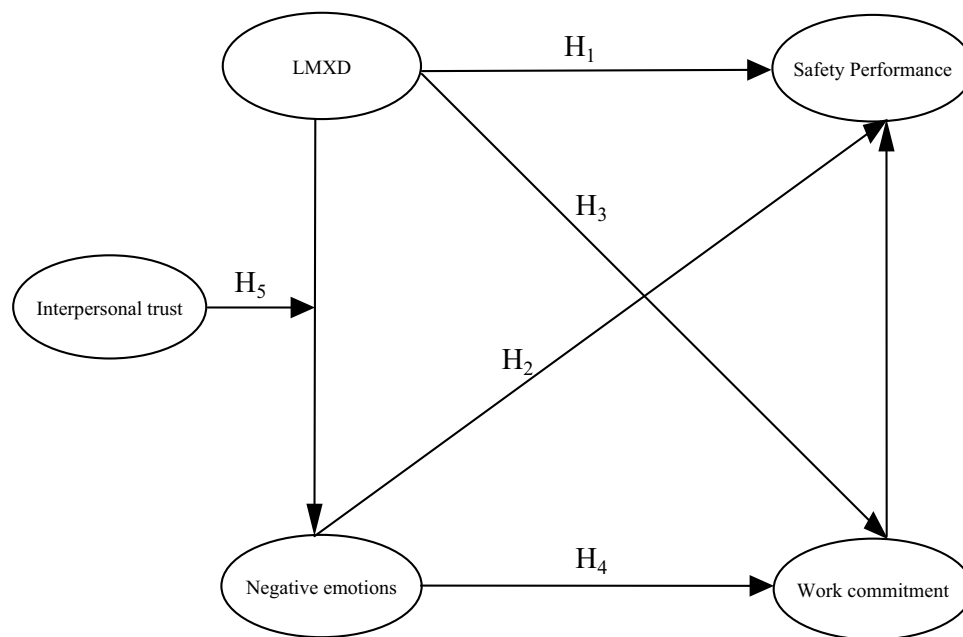


Figure 1 Theoretical framework.

Research Methods

Sample and Procedure

To verify the research hypothesis and clarify the relationship between LMXD, negative emotions, work engagement, and safety performance, SPSS and AMOS were used to test the mediating effect and the moderating effect. Based on stratified random sampling, five large construction companies in Liaoning Province were selected. We selected one large company based on the geographical distribution of the province and decided to distribute 80 questionnaires in each firm to achieve a sample size of 400. This sample size was considered according to the sample size recommendations of Krejcie & Morgan,² as 384 respondents are sufficient in case of a large population. So, 400 questionnaires were issued, out of which 357 were valid questionnaires, with a recovery rate of 89.25%. The data was collected from male gender; age is mainly 25 to 45 years, accounting for 86.2%, and the working experience is mainly 1 to 5 years, accounting for 72.6%. The education level of respondents is mainly junior college and below, accounting for 89.2%; the sample mainly involves masons, plumbers, welders, plumbers, shelf workers, and other types of work. From the characteristics of the sample, the sample is well represented.

Measures

The predecessor's questionnaire was partially modified according to actual needs, and the final questionnaire

structure validity and content validity were good. All questionnaires use Likert's five-level scoring 1~5 respectively, representing very non-conforming, non-conforming, general, and conforming.

LMXD is based on the study of ERDOGAN and BAUER;¹⁵ it is measured by calculating the standard deviation of the leader-member exchange relationship scores evaluated by team members. It uses the leader-member exchange scale compiled by Graen and Uhl-Bien.⁴³ The overall Cronbach's α coefficient of the scale is 0.846, and all data can reach an acceptable level.

Interpersonal Trust

Rotter⁴⁴ Interpersonal Trust Scale was used to measure the moderating effect. The overall Cronbach's α coefficient of the scale is 0.825, and all data can reach an acceptable level.

Negative Emotions

Watson et al¹⁶ emotions scale was adopted in this research. The scale's overall Cronbach's α coefficient is 0.912, and all data can reach acceptable levels. Keeping this study's theoretical orientation and conceptualization, we have anticipated various dimensions of negative emotions such as being cared for, ashamed, hostile, and depressed at the workplace.

Work Engagement

Schaufeli et al³⁰ work engagement scale has been adopted in this study. The overall Cronbach's α coefficient of the scale is 0.936, and all data can reach an acceptable level.

Safety Performance

Griffin and Neal⁴⁵ safety performance scale is adopted to measure safety performance. The overall Cronbach's α coefficient of the scale is 0.853, and all data can reach an acceptable level.

Data Analysis and Discussion

Assessment of Validity and Common Method Bias Test

In this study, AMOS software was used to test the discriminative validity among variables for confirmatory factor analysis. As shown in Table 1, the five-factor model ($\chi^2/DF = 2.195$, RMSEA = 0.053, CFI = 0.956, NFI = 0.964, NNFI = 0.931) showed better fitting effect than other alternative models, indicating that the measurement tools of five constructs had good discriminative validity. In addition, we calculated the AVE and CR of each variable to test the convergence validity. The results are shown in Table 2. AVE of each variable is greater than 0.5, and the CR value is greater than 0.8, indicating that the convergence validity of each variable is good.

Since this study adopted the self-report method to collect questionnaire data, it is necessary to detect common method deviation. We use the Harman single factor method to test the severity of the common method bias, and the results show that the first factor accounts for 32.5% without rotation, which does not exceed 50% of the total account. Therefore, there is no serious common method bias in this study.

Means, Standard Deviations, and Correlation Matrices

All the variables of the mean, standard deviation, and coefficient of correlation matrix as shown in Table 3. The results showed that there was a significant negative correlation between LMXD and negative emotions. Work engagement, interpersonal trust, and safety performance are significantly positive correlations. The correlation

Table 2 Factor Analysis

Factor	AVE	CR
LMXD	0.648	0.927
Negative emotions	0.589	0.934
Work engagement	0.523	0.908
Interpersonal trust	0.596	0.967
Safety performance	0.581	0.892

Abbreviations: LMXD, Leader-Member Exchange Differentiation; NE, Negative Emotions; WE, Work Engagement; SP, Safety Performance.

between the variables is in line with the theoretical expectation and preliminarily supports the research hypothesis.

Mediation Testing

In this paper, the hierarchical regression method in software SPSS26.0 is used to test the hypothesis, and the results are shown in Table 4. According to model 2, there is a significant inverse correlation between LMXD and safety performance ($\beta = -0.241$, $P < 0.001$), and hypothesis H1 is valid. According to model 5 and model 8, LMXD has a significant positive correlation with negative emotions ($\beta = 0.228$, $P < 0.001$), and negative emotions have a significant negative correlation with safety performance ($\beta = -0.353$, $P < 0.001$). According to model 3, after adding negative emotions, the effect of LMXD on safety performance was decreased ($\beta = -0.170$, $P < 0.005$), but the mediating effect value was significant ($\beta = -0.314$, $P < 0.001$), indicating that negative emotions played a mediating role between LMXD and safety performance. Hypothesis H2 was established. According to model 6 and model 10, LMXD has a significant negative correlation with work engagement ($\beta = -0.246$, $P < 0.001$), and work engagement has a significant positive correlation with safety performance ($\beta = 0.401$, $P < 0.001$). According to model 4, after adding work engagement, the effect of LMXD on safety performance was decreased ($\beta = -0.152$, $P < 0.005$), but the mediating effect value was significant ($\beta = 0.361$, $P < 0.001$), indicating that

Table 1 Confirmatory Factor Analysis Results

Model	χ^2/df	RMSEA	CFI	NFI	TLI
Five factors: LMXD, NE, WE, SP, IT	2.195	0.052	0.956	0.964	0.931
Four factors: LMXD+NE, WE, SP, IT)	2.966	0.074	0.841	0.805	0.881
Three factors: LMXD+NE+WE, SP, IT)	3.514	0.081	0.732	0.718	0.785
Two factors: LMXD+NE+WE, SP+IT)	5.711	0.063	0.654	0.635	0.647
One factors: LMXD+NE+WE+SP+IT)	7.821	0.154	0.465	0.574	0.432

Abbreviations: LMXD, Leader-Member Exchange Differentiation; NE, Negative Emotions; WE, Work Engagement; SP, Safety Performance.

Table 3 Correlation Analysis

Variable	M	SD	1	2	3	4	5	6	7	8	9
Age	2.538	1.100	I								
Education	1.891	0.805	-0.079	I							
Length of service	2.062	0.832	0.136**	-0.074	I						
LMX mean	3.388	1.44	0.052	-0.004	0.023	I					
LMXD	0.473	0.128	0.047	0.019	-0.046	-0.016	I				
Interpersonal trust	3.055	1.624	0.032	0.025	0.021	0.116*	-0.365***	I			
Negative emotions	3.439	1.503	-0.059	-0.021	-0.061	-0.161**	0.229***	-0.391***	I		
Work engagement	3.423	1.445	0.018	-0.019	0.089	0.251***	-0.253***	0.307***	-0.223***	I	
Safety performance	3.281	1.516	0.028	-0.041	0.070	0.111*	-0.245***	0.325***	-0.363***	0.407***	I

Notes: Path Coefficients: ***p 0.001 level, **p, 0.01 level, *p, 0.05 level. M is the mean; SD is standard deviation.

Abbreviations: LMX, leader-member exchange; LMXD, leader-member exchange differentiation.

Table 4 Mediation Effect

Variable	Safety Performance						Negative Emotions		Work Engagement	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Age	0.011	0.025	0.006	0.022	-0.005	0.014	-0.046	-0.059	-0.007	0.007
Education	-0.035	-0.031	-0.041	-0.028	-0.046	-0.03	-0.029	-0.033	-0.013	-0.008
Length of service	0.063	0.051	0.038	0.025	0.045	0.03	-0.053	-0.041	0.083	0.07
LMX mean	0.109*	0.104*	0.056	0.016	0.053	0.008	-0.157**	-0.153**	0.250***	0.245***
LMXD		-0.241***	-0.170**	-0.152**				0.228***		-0.246***
Negative emotions			-0.314***		-0.353***					
Work engagement				0.361***		0.401***				
R2	0.018	0.076	0.166	0.190	0.139	0.168	0.032	0.083	0.070	0.131
ΔR2	0.018	0.058	0.090	0.114	0.121	0.150	0.032	0.051	0.070	0.060
F	1.638	5.780***	11.639***	13.648***	11.355***	14.183***	2.902*	6.389***	6.653***	10.542***

Notes: ***p 0.001 level, **p, 0.01 level, *p, 0.05 level.

Abbreviations: LMX, leader-member exchange; LMXD, leader-member exchange differentiation.

work engagement played a mediating role between LMXD and safety performance. Hypothesis H3 was established.

The Process macro program of the SPSS plug-in was used to verify further the mediating role of negative emotions and work engagement between LMXD and safety performance and to check the interplay between the two in the chain. The results are shown in Table 5. The 95% confidence interval of the mediation path of negative

emotions is [-1.222, -0.341], excluding 0, indicating that the mediation effect is significant, and hypothesis H2 is further supported. The 95% confidence interval of the mediation path of work engagement is [-1.316, -0.390], excluding 0, and the mediation effect is also significant. Hypothesis H3 has been verified again. The 95% confidence interval of the chain mediation path “LMXD → Negative emotions → Work engagement → Safety performance” is [-0.306, -0.047], excluding 0, indicating that

Table 5 Results of the Chain Mediation Test

Chained Mediation Path	Effect	95% CI
LMXD→Negative emotions→Safety performance	-0.725	[-1.222, -0.341]
LMXD→Work engagement→Safety performance	-0.810	[-1.316, -0.390]
LMXD→Negative emotions→Work engagement→Safety performance	-0.152	[-0.306, -0.047]

Abbreviations: LMX, leader-member exchange; LMXD, leader-member exchange differentiation.

negative emotions and work engagement play a chain mediation role between LMXD and safety performance. Hypothesis H4 has been verified.

Moderating Effect Test

In SPSS 26.0, the hierarchical linear regression model is used to test the regulating effect, and the results are shown in Table 6. According to model 14, the product interaction term of LMXD and interpersonal trust has a significant negative prediction effect on negative emotions ($\beta = -0.136, P < 0.005$), indicating that interpersonal trust negatively regulates the relationship between LMXD and negative emotions. In addition, this paper draws a regulatory effect diagram to show the regulatory effect more clearly, as shown in Figure 2. As shown in Figure 2, LMXD has different slopes to negative emotions under different levels of interpersonal trust. When the employee has high interpersonal trust, the slope of the line is smaller than that of the employee with low interpersonal trust, which indicates that the negative impact of LMXD on employee safety performance is weaker, and H5 has been verified. Table 7 shows study hypothesis results.

Study Limitations

The limitations of this study are mainly reflected in the following aspects. First of all, the investigations in this study all come from a one-time point, and the future investigation of variables can be carried out from multiple periods. In particular, the relationship between leaders and employees may change with the change of time so that further research can be conducted from a dynamic perspective in the future. Secondly, this study only

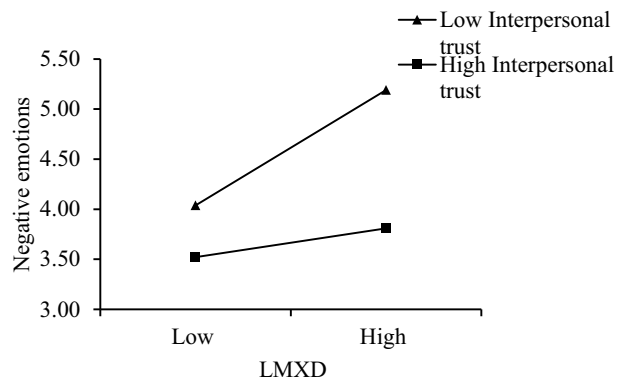


Figure 2 Interpersonal trust regulating "LMXD - Negative Emotions".

investigated Liaoning Province in China, and it remains to be verified whether the research conclusions are applicable to other regions. In addition, there is a significant cultural difference between enterprises. This study did not include the factors that potentially affect the relationship between superiors and subordinates in the corporate culture into the control variables, affecting the significant degree of the coefficients between relevant variables. Therefore, it is possible to consider including the variables related to corporate culture in the research on the relationship between superiors and subordinates in the future.

Conclusion

This study uses affective events theory, leader-member exchange theory, and conservation of resource theory to explore the internal mechanism and boundary conditions of LMXD on safety performance and examines the mediating effect of negative emotions and work engagement and the moderating effect of interpersonal trust. The main

Table 6 Moderating Effect Regression Analysis Results

Variable	Negative Emotions			
	Model 11	Model 12	Model 13	Model 14
Age	-0.046	-0.062	-0.046	-0.055
Education	-0.029	-0.036	-0.023	-0.021
Length of service	-0.053	-0.030	-0.036	-0.033
LMX Mean	-0.157**	-0.127*	-0.106*	-0.113
LMXD		0.273***	0.140**	0.159**
Interpersonal trust			-0.317***	-0.317***
Interpersonal trust LMXD*				-0.136**
R2	0.032	0.105	0.186	0.204
ΔR2	0.032	0.073	0.081	0.018
F	2.902*	8.218***	13.342***	12.781***

Notes: ***p 0.001 level, **p, 0.01 level, *p, 0.05 level.

Abbreviations: LMX, leader-member exchange; LMXD, leader-member exchange differentiation.

Table 7 Hypothesis Results

Hypothesis	Statement	Supported/Not Supported
H1:	LMXD has a significant negative impact on safety performance.	Supported
H2:	Negative emotions play a mediating role between LMXD and safety performance.	Supported
H3:	Work engagement plays an intermediary role between LMXD and safety performance.	Supported
H4:	Negative emotions and work engagement play a chain mediation role between LMXD and safety performance	Supported
H5:	Interpersonal trust plays a moderating role between LMXD and negative emotions.	Supported

conclusions are as follows: LMXD has a significant negative impact on safety performance; Negative emotions and work engagement played a mediating role in the influence of LMXD on safety performance alone and played a mediating chain role together. Interpersonal trust negatively regulates the relationship between LMXD and negative emotions.

Theoretical Contribution

This study is the very first of its kind to explore the impact of LMXD on safety performance in the construction industry through the mediating role of work engagement and negative emotions. In recent years, the research on LMXD has gradually attracted the wide attention of scholars. However, the mechanism of LMXD on safety performance is still in the exploratory stage. Unlike previous studies, which mainly discussed the influence mechanism of leadership or employee factors on safety performance, this study first linked LMXD with safety performance from the perspective of the exchange relationship between leaders and employees and found that LMXD had a vital role impact on safety performance. The conclusion of this study not only verifies the effectiveness of LMXD, but also inspires more research on LMXD as an antecedent in the future.

In view of the lack of research on the mechanism of LMXD on safety performance, this study, based on the affective events theory, verifies the mediating effect and chain mediating effect between negative emotions and work engagement on LMXD and safety performance and opens the black box that LMXD has a negative impact on safety performance. Previous studies on LMXD rarely focus on the field of safety production, and the mechanism of LMXD's influence on safety performance is still unclear. This study selects two mediating variables, negative emotions, and work engagement, to explore the internal mechanism of LMXD's influence on safety performance through negative emotions and work engagement. The results show that LMXD can enhance employees' negative emotions and reduce work engagement,

thus having a negative impact on safety performance. The discovery of the chain mediation mechanism is helpful to reveal further the process of LMXD affecting safety performance.

This study demonstrates that interpersonal trust is an important boundary condition of LMXD affecting safety performance. In the research on the effect of LMXD on performance, few scholars attach importance to the moderating role of psychological variables in the relationship between LMXD and performance. Based on interpersonal trust as a psychological variable, this study explored the moderating effect of interpersonal trust. It investigated the changing degree of LMXD's influence on safety performance under different levels of interpersonal trust. Therefore, this study enriches the research on boundary conditions of LMXD affecting safety performance.

Practical Inspiration

Leaders should pay attention to the negative impact of LMXD on safety performance. On the one hand, leaders should strengthen communication with employees, coordinate the relationship between team members, and avoid the potential harm of LMXD. On the other hand, leaders should set fair and reasonable standards to reduce employees' perception of differential treatment and reduce the negative impact of employee dissatisfaction on performance.

Leaders should pay attention to employees' negative emotions and work engagement. According to the research results, LMXD affects safety performance through negative emotions and work engagement. Therefore, leaders should monitor and evaluate employees' negative emotions and provide timely psychological counselling to employees with poor emotions to help them with their negative emotions. At the same time, leaders need to show more emotional care to employees and strengthen the interaction and emotional communication with employees to improve employees' work engagement more effectively.

Leaders should create a working atmosphere of mutual trust. The findings suggest that low levels of interpersonal trust can make employees suspicious of each other, with negative consequences. Therefore, according to its situation, the organization should regularly hold team-building activities to promote the communication and communication of internal members to enhance the feelings of members. In addition, leaders should timely disclose relevant work information and make reasonable explanations to reduce misunderstanding and trust crises caused by information asymmetry and lag.

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval

All participants gave their informed consent for inclusion before they participated in the study. All procedures performed were by the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standard. All the procedures were approved by the ethical committee of School of Business Management, Liaoning Technical University, Huludao, China.

Author Contributions

All authors contributed to data analysis, drafting or revising the article, have agreed on the journal to which the article will be submitted, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

Funding

This research was supported by discipline innovation team of Liaoning Technical University(LNTU20TD-04) and Humanities and Social Science Fund of MOE (Ministry of Education of China)(19YJA630038).

Disclosure

The authors declare no conflicts of interest in this work.

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