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Article

Foundational Effects of Organizational Climate on Perceived Safety Climate: A Multiple Mediation Model

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Abstract: Organizational climate is the ascribed psychological meaning and significance associated with the procedures, policies, and practices that are recognized and rewarded in the workplace and, hence, mediate the effects of environmental stimuli on individuals' responses. Safety climate is a specific organizational climate, i.e., organizational climate for safety. Previous research claimed that organizational climate provides a foundation for safety climate, but without elaboration on the foundational mechanisms. This paper attempts to fill this knowledge gap. As organizational climate is a multi-dimensional phenomenon, this paper chooses two dimensions: perceived organizational support (POS) and participative decision making (PaDM). Drawing on an interactive approach to forming climate perceptions, this paper introduces two interactive constructs—leader–member exchange (LMX) and team–member exchange (TMX)—and establishes a multiple mediation model depicting the foundational effect of organizational climate on safety climate. A random sample of 292 Hong Kong-based construction personnel is used to validate the model. The results show that both POS and PaDM are positively associated with perceived safety climate ($\beta_1 = 0.175$, $p < 0.01$; $\beta_2 = 0.502$, $p < 0.005$), both LMX and TMX fully mediate the effect of PaDM on safety climate (effect sizes are 0.146 and 0.076, respectively), and only LMX partially mediates the effect of POS on safety climate (effect size is 0.131). This study sheds light on the foundational effects of organizational climate on safety climate. POS can improve the quality of reciprocal exchange about safety matters between construction personnel and their supervisors and hence raise construction personnel's awareness of the priority of safety. PaDM can improve the quality of reciprocal exchange about safety matters vertically and horizontally and hence have construction personnel aware of the importance of safety. In practice, this paper suggests that project managers recognize and reward construction personnel's contributions in a timely manner, genuinely care about their well-being, and take their suggestions seriously in making decisions. In this way, the quality of both vertical and horizontal exchange about safety matters improves, and a sound and positive safety climate ensues.

Keywords: organizational climate; safety climate; multiple mediation; construction personnel; random sample



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1. Introduction

Safety cannot be compromised in construction projects. In the British Standards Institution's 'Guide to project management in the construction industry' BS 6079 Part 4: 2006, safety is placed at the center of the project management triangle. This indicates that

a project manager can change the priorities of performance, time, and cost according to the political climate, the client's commercial needs, or the life cycle of the project, but these project management goals cannot be achieved at the sacrifice of safety [1]. One way for the project manager to make safety a priority is to create a positive safety climate, which is a facet-specific organizational climate, on the construction site [2].

Organizational climate theory develops against the background of cognitive revolution in psychology. In the latter half of the twentieth century, psychology has seen a cognitive revolution, which features the perspective that "human cognition mediates the effects of environmental stimuli on human responses" [3] (p. 5). A prominent constituent of the mediating cognitions is psychological meanings and significance associated with the environment. In the organizational contexts, James and Jones [4] proposed the term "psychological climate" to denote such psychological meanings and significance that organizational members derive through interpreting (making sense of) sensory information from the organizational environment (e.g., jobs, co-workers, leaders, pay, performance expectations, opportunities for promotion, equity of treatment, etc.) based on previously stored mental representations (i.e., schemas). It is noteworthy that these schemas, in turn, are based on personal, work-related values. In operationalizing the climate concept, scholars have proposed numerous dimensions [5] and several taxonomies of these dimensions (e.g., [6,7]). After exploratory factor analyses of psychological climate variables, James and colleagues [8,9] found four factors: role stress and lack of harmony; job challenge and autonomy; leadership facilitation and support; and work-group cooperation, friendliness, and warmth. This four-factor psychological climate model is consistent with Locke's [10] four-factor model of work-related values. From the dimensions, it can be inferred that psychological climate reflects the extent to which the work environment is believed to be personally beneficial or detrimental to the individual and organizational stakeholders. When psychological climate perceptions of members in an organization converge, shared organizational climate perceptions emerge. Thus, organizational climate can be considered the outcome of aggregating individuals' psychological climates, reflecting the typical way members in an organization ascribe meanings and significance to that organization [3]. In this perspective, organizational climate can be viewed as an emergent property of organizations in that "it originates in the cognition, affect, behaviors, or other characteristics of individuals, is amplified by their interactions, and manifests as a higher-level, collective phenomenon" [11] (p. 55).

As the two constructs (i.e., psychological climate and organizational climate) have no specific referent, they are referred to as "global climate" (e.g., [12]), "molar climate" (e.g., [6]), "foundation(al) climate" (e.g., [13]), or "general climate" [14]. Although empirical studies before 1980 provided evidence that the organizational climate concept did mediate the effects of the environment on human actions, researchers (e.g., [15]) contended that the organizational climate is too general to be meaningful. To make up for this theoretical deficiency, they proposed that the organizational climate should have a specific referent (or facet). Consequently, numerous facet-specific climates (or strategic climates) emerge. Safety climate, i.e., organizational climate for safety, was proposed in the hope that it helps curb unsafe acts, which are believed to be the main culprit for seemingly inevitable industrial accidents. Kuenzi and Schminke [12] categorized safety climate as a climate that focuses on core operation since safety is an operational goal. Seemingly, the safety climate concept has not failed its advocates, as numerous empirical studies show that the safety climate concept is able to predict safety outcomes [16].

Since the climate research focus shifted from the global (or molar, general) climate to facet-specific (or strategic) climates, each facet-specific climate is studied in isolation. Climate research remains fragmented. In view of this deficiency, Kuenzi and Schminke [12] call for integrating the global climate with the facet-specific climate literature to have a more accurate understanding of how individuals conceptualize and react to their work environment. Further, extant research (e.g., [14,17]) claims that organizational climate provides a foundation for safety climate but fails to elaborate on how such a foundational

mechanism works. Concurring with this, Stackhouse and Turner [18] observe that relatively little is known about the work-related predictors of the safety climate concept itself. In responding to researchers' [12,18] calls, this paper attempts to explore how organizational climate impacts on safety climate in the construction sector.

Besides the above-mentioned theoretical contribution, this study also has practical implications for construction project management. Safety climate is a leading indicator for safety performance in construction projects, and a positive safety climate betokens a high safety performance level. However, improving safety climate necessitates efforts not only from the safety domain but also from other aspects (such as human resource management and team building). By revealing the foundational mechanism whereby organizational climate impacts safety climate, this study is expected to propose actionable, targeted, and effective measures from the wide organizational context.

Moran and Volkwein [19] proposed four approaches to forming organizational climate: structural, perceptual, interactive, and cultural. The structural approach views organizational climate as organizational attributes that exist independent of the members' individual perceptions. On the contrary, the perceptual approach places the source of climate within individuals and considers climate a psychologically processed description of organizational conditions. Built on the above two approaches, the interactive approach maintains that the interaction of individuals in dealing with their situation engenders a shared agreement, which is the genesis of organizational climate. As an extension of the interaction approach, the cultural approach contends that it is the culture that conditions the interactions among individuals in responding to their situation and, hence, the formation of climate. To account for the foundational effect of organizational climate on safety climate, this paper adopts the interactive approach and proposes a general hypothesis that interactions among construction personnel and their supervisors play a mediating role in translating organizational climate to safety climate.

As organizational climate is a multi-dimensional phenomenon, this paper chooses two organizational climate dimensions—perceived organizational support (POS) and participative decision making (PaDM)—to exemplify the foundational impact of organizational climate on safety climate. POS reflects the extent to which employees feel supported by management, and PaDM refers to the extent to which management encourages and solicits employees' input in making decisions. Interactions between construction personnel and their supervisors are operationalized into two constructs: leader–member exchange (LMX) and team-member exchange (TMX). The former depicts the exchange quality between leaders and followers, and the latter refers to the exchange quality among team members. The relationships among POS, PaDM, LMX, TMX, and safety climate are to be elaborated on in the next section.

The objectives of this study, therefore, are to develop and validate a model to account for the foundational effect of organizational climate on safety climate. With these objectives, this study is structured as follows. First, a targeted literature review is conducted, and hence, hypotheses are proposed. Second, the methods, including sample, instruments, and data analysis techniques, are introduced. Third, results, especially psychometric properties of scales and hypothesis testing, are presented. Finally, both theoretical and practical implications of the findings are discussed, along with limitations and future research directions.

2. Model Development

2.1. An Interactive Approach to Forming Safety Climate

As an overwhelming majority of climate studies are empirical instead of theoretical, the formation of climate remains to be elucidated. In view of this shortcoming, Moran and Volkwein [19] grouped approaches to the formation of climate into four general categories: structural, perceptual, interactive, and cultural. The structural approach essentially views climate as a characteristic of the organization, which exists independently of individual members' perceptions. Assuming that individuals interpret and respond to situational

variables in a manner that is psychologically meaningful to them, the perceptual approach views climate as a psychologically processed description of organizational conditions. The interactive approach contends that the interaction of individuals in responding to their situation engenders shared climate perceptions. The cultural approach extends the interactive approach by maintaining that it is the shared culture that underlies the interaction of individuals. Among the four approaches, symbolic social interaction is identified as one primary antecedent of shared climate perceptions [20,21]. Moreover, organizational climate influences interactions among workers [22]. In particular, high-quality interactions between different organizational functions and hierarchical levels were identified as important constituents of safety standards in the construction sector [23]. Therefore, this paper adopts the interactive approach as a framework to organize relevant constructs, i.e., organizational climate→social interactions→perceived safety climate.

2.2. Dimensions of Organizational Climate

Organizational climate has multiple dimensions, and different authors propose different taxonomies to categorize those dimensions. For example, James et al. [3] designated organizational climate dimensions as role stress and lack of harmony; job challenge and autonomy; leadership facilitation and support; work-group cooperation, friendliness, and warmth; and organizational and subsystem attributes. Hart et al. [24] developed a school organizational climate scale that has 11 dimensions: appraisal and recognition, curriculum coordination, effective discipline policy, excessive work demands, goal congruence, participative decision making, professional growth, professional interaction, role clarity, student orientation, and supportive leadership. D'Amato [25] identified 13 compelling dimensions at the foundation of the organizational climate construct, namely, communication, supervision/leadership, team cohesion, autonomy/self-governance, psycho-physical environment, reward systems/structures, innovation, decision making, job description, role meaning and goals, coherence between strategy and operational implementation/fairness, integration and dynamism, and freedom of expression. Ostroff [26] identified 12 dimensions of organizational climate: participation, cooperation, warmth, social rewards, growth, innovation, autonomy, intrinsic rewards, achievement, hierarchy, structure, and extrinsic rewards. Further, she organized them into three facets, namely, affective, cognitive, and instrumental.

Nevertheless, this paper selected two dimensions: participative decision making (PaDM) and perceived organizational support (POS). This is not only because both participation and organizational support are necessary enacted values in ensuring safe production [27,28] but also because they are relevant in construction practices.

2.2.1. Perceived Organizational Support

Top management support is an essential attribute for project teamwork effectiveness, which contributes to successful project delivery [29]. Particularly, POS is a critical element of an effective construction safety program [30]. POS refers to employees' global beliefs concerning the extent to which the organization values their contributions and cares about their well-being [31]. POS can be either general or specific, and both general POS (POSg) and safety-specific POS (POSs) have been studied in the safety domain for a long time. Regarding POSg, Reader et al. [32] found that with more activities to support workforce health, offshore employees are more likely to gain higher POSg, which, in turn, stimulates their organizational commitment and hence induces more organizational and safety citizenship behaviors. Puah et al. [33] discovered that POSg is significantly related to employees' safety compliance behavior at chemical and petroleum process plants. Gyekye et al. [34] recognized that high levels of POSg lead to organizational citizenship behavior, safety compliance behavior, and a subsequent decrease in accident frequency. DeJoy et al. [35] verified that POSg partially mediates the relationship between enacted safety policies and procedures and perceived safety climate. Mearns and Reader [36] learned that general support from the organization (POSg) helps trigger offshore employees' safety citizenship behaviors. Gyekye and Salminen [22] confirmed that POSg has an impact on

Ghanaian industrial workers' safety climate perceptions. Given that the reciprocal causal relationship between POS and safety climate is unclear, Bunner et al. [37] carried out a cross-lagged panel study with a sample of 162 safety professionals over one year. They found that safety professionals' POS was positively related to their perceived safety climate over time, and their perceived safety climate, however, did not contribute to POS. Therefore, it is hypothesized that:

Hypothesis 1: *POS is positively associated with perceived safety climate.*

2.2.2. Participative Decision Making

Participative decision making refers to the extent to which leaders encourage and use team members' input when making decisions. It is relevant to construction projects. Construction projects are organized in a cross-functional way, i.e., project team members are from separate functional areas. Project team members' participation in goal formulation and decision-making processes enhances their performance and job satisfaction. Similarly, worker participation and involvement are critical for an effective construction safety program [30].

Participative decision making contributes to employees' safety climate perceptions. Although both Sweden and Denmark are Scandinavian countries, considerable differences in construction accident rates exist between them. In order to explain such differences, Grill et al. [38] conducted a questionnaire survey among a random sample of construction workers in both countries and verified that participative leadership, with participative decision making as the primary component, is positively associated with safety climate. Therefore, we hypothesize that:

Hypothesis 2: *Participative decision making is positively associated with perceived safety climate.*

2.3. Interaction Perspective of Safety Climate

2.3.1. Leader–Member Exchange

Since the inception of the climate concept, leadership has been supposed to be able to create and shape employee climate perceptions [39]. As leaders have limited supplies of personal and organizational resources (e.g., time, power, rewards, etc.), they cannot distribute such resources among their followers evenly. This uneven distribution engenders discrepant relationships between different followers and the leader (i.e., leader–member exchange, or LMX). High-quality LMX is featured with high levels of attention, information exchange, support, informal influence, and trust from the leader [40]. LMX theory contends that with high-quality LMX, followers exhibit high job satisfaction, organizational citizenship, work engagement, and team performance [41,42]. As mentioned earlier, when members' psychological climate perceptions in an organization converge, shared organizational climate perceptions emerge. In contrast, when psychological climate perceptions of organizational members diverge, configural organizational climate perceptions ensue [11]. With low-quality LMX, configural organizational climate perceptions may emerge (e.g., [40]).

The supervisors' role in creating perceived safety climate on construction sites has been well acknowledged [2,43]. As first-line supervisors have contact with construction workers on a daily basis, they are supposed to exert more influence on workers' interpretation of enacted safety policies, procedures, and practices than senior managers. In other words, daily interaction with first-line supervisors contributes to workers' safety climate perceptions. Contextual variables usually predict LMX, and LMX frequently plays a mediating role in various relationships [42]. With POS, employees realize that they are valuable assets and reciprocate with continuous commitment to the organization. Among others, maintaining high-quality exchange relationships with supervisors in achieving organizational goals is one way to demonstrate such organizational commitment. In a longitudinal study, Cheung and Zhang [44] found that supervisory safety-specific transformational leadership medi-

ates the relationship between organizational support and group-level safety climate. By engaging in participative decision making, managers and supervisors demonstrate their interest in exchange with employees. Hence, participative decision making engenders social exchange relationships. Hence, we hypothesize that:

Hypothesis 3: *LMX mediates the relationship between POS and perceived safety climate.*

Hypothesis 4: *LMX mediates the relationship between participative decision making and perceived safety climate.*

2.3.2. Team-Member Exchange

Team-member exchange (TMX) refers to the quality of relationships between employees and their team members. TMX quality can be high or low in terms of content and process of exchange among individual team members [45]. For instance, low-quality TMX is restricted to exchanges based on task requirements, while high-quality TMX involves the exchange of resources and support, which is beyond task requirements. High-quality TMX is related to high individual and team performance since employees with high-quality TMX are more willing to help each other and to share information, ideas, and feedback within work teams. When parties behave in a way that benefits each other, the quality of exchange relationships improves.

Employees' perceptions of TMX may help employees develop shared perceptions of safety policies, procedures, and practices in the construction sector. Construction work is carried out by work crews, and daily interactions with crew members shape workers' interpretation of organizational safety policies and procedures. Like LMX, organizational climate exerts contextual influence on TMX as well. In particular, both POS and participative decision making would have employees realize that they are equally treated as valued members and hence improve lateral communications among employees. Therefore, we hypothesize that:

Hypothesis 5: *TMX mediates the relationship between POS and perceived safety climate.*

Hypothesis 6: *TMX mediates the relationship between participative decision making and perceived safety climate.*

The conceptual model featuring the above-mentioned six hypotheses is shown in Figure 1.

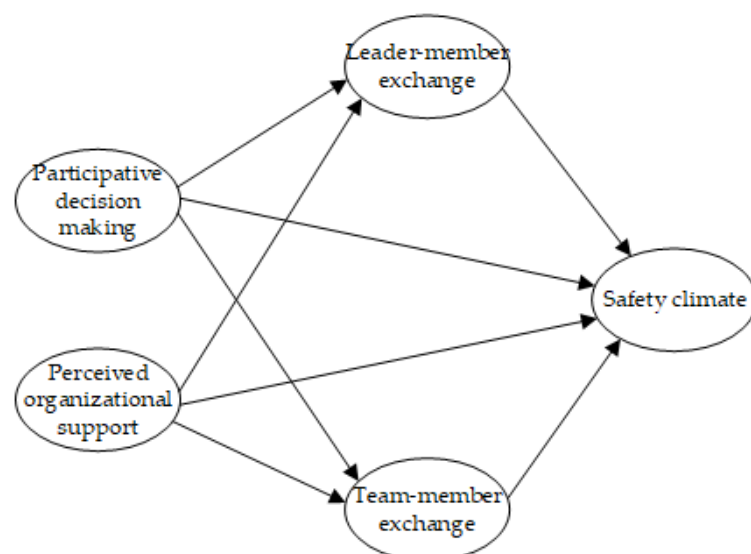


Figure 1. Conceptual framework.

3. Methods

3.1. Population and Sample

The target population was construction personnel based in Hong Kong. A sampling frame was composed of those members who were affiliated with local trade associations, professional institutions, governmental agencies, and property developers. In view of the low response rate with paper-and-pencil surveys, 2996 prospective respondents were drawn from the sampling frame and sent hardcopy questionnaires for completion. After five months and two rounds of reminder emails, 292 valid responses were finally secured. Of the respondents, 92.5% were male, 76% were above 40, and 87.7% had more than 10 years of industry experience. In terms of affiliation, 40.8% of them were from the contractor, 28.8% were from the client, and 30.5% were from the consultant. In terms of the project stage, 26.7% of the respondents were at the start-up stage (less than 30% of work has been completed), 40.0% of them were at the advanced stage (30–70% of work has been finished), and 33.3% of them were at the near close-out stage (more than 70% of work has been completed). Regarding the size of their employers, 15.2% of respondents were from companies employing less than 20 employees, 23.2% of them were from companies that have 21–99 employees, and 61.6% were from large employers with more than 100 employees. Regarding respondents' hierarchical positions, 54.5% of them were management, 39.4% were supervisors, and 6.2% were workers.

The effective response rate was 13.7%. As the effective response rate was expectedly low, the representativeness of the sample needed to be secured and non-response bias to be assessed. In this regard, respondents were categorized as either early or late respondents. The early category respondents were those who completed the survey before the first reminder email, and the late category were those who completed the survey after the first reminder email. Chi-square tests were conducted to compare these two categories of respondents in terms of gender, age, marital status, number of dependents to support, educational level, and industrial experience. The tests didn't find any significant difference between these two categories and hence ruled out nonresponse bias [2,46,47].

3.2. Measures

A questionnaire was used to collect data. Before sending it out, the hardcopy questionnaire was submitted to the Human Research Ethics Committee for Non-clinical Faculties, the University of Hong Kong, for approval. The approved questionnaire had four parts. The first part featured privacy and consent statements. The second part solicited prospective respondents' demographic information. The third part covered measures of relevant constructs, as described below. The fourth part sought respondents' advice.

Perceived organizational support

This construct reflects the extent to which construction personnel believe that the project management team values their contributions and cares about their well-being. It was measured by an adapted version of the supportive leadership subscale from Hart et al.'s [24] School Organizational Health Questionnaire. A sample item was "There is always support from the leadership".

Participative decision making

This construct reflects leaders' encouragement and use of team members' input in making decisions. It was measured by an adapted version of the participative decision-making subscale from Hart et al.'s [24] School Organizational Health Questionnaire. A sample item was "There is opportunity for staff to participate in making decision and policy".

Leader–member exchange

This construct captures interactions between leaders and their subordinates. It was measured by an adapted version of the Leader–Member Exchange 7 questionnaire (LMX-7), which was developed to measure the quality of working relationships between leaders and followers [48]. A sample item was "My immediate supervisor understands my job problems and need".

Team-member exchange

This construct captures the exchange relationship between employees and their colleagues. It was measured by an adapted scale used by Tuuli [49]. A sample item was “My peers are willing to finish work assigned to me”.

Safety climate

This construct reflects employees’ individual perceptions of safety policies, procedures, and practices. It was measured by a short scale developed by Fang and colleagues [50–52]. A sample item was “Accidents and incidents which happen here are always reported”.

Control variables

In addition to the main constructs mentioned earlier, several control variables were introduced due to their possible confounding effects on the hypothesized relationships. Considering that this study deals with individuals’ perceived organizational and safety climate, both organization-level and individual-level control variables were examined. For instance, the types and sizes of organizations may determine the organizational climate and ultimately affect individuals’ organizational and safety climate perceptions. Individuals’ interactions with peers and their climate perceptions may also be influenced by their hierarchical positions and the project stage they are involved in. Thus, this study incorporates organization type, organization size, hierarchical position, and project stage as control variables.

3.3. Data Analysis

The data were processed in two steps. In the first step, the measurement model was validated by adopting partial least square structural equation modeling (PLS-SEM). PLS-SEM is suitable for confirmatory factor analysis, as it is flexible for data distribution and sample size [53] and efficient in automating many analytical functions [54]. The second step used regression analysis and a bootstrap approach for hypothesis testing. The size of a representative sample, calculated by the ratio of observation to independent variables, affects the generalizability of the regression analysis results. According to Hair et al. [55], the desired ratio is between 15 to 20 observations for each independent variable. Since the maximum number of independent variables in the regression model is eight (affiliation of respondents; respondent’s hierarchical position; project stage; number of employees; participative decision making; perceived organizational support; team-member exchange; and leader-member exchange), the sample size of this study, 292, was sufficient for regression analysis. In terms of mediation effect analysis, the improved Baron and Kenny’s [56] causal steps approach with the bootstrap test [57] was employed because this approach garners higher statistical power in assessing mediating effects [58]. The bootstrap test was achieved by a PROCESS macro (Model 4) developed by Hayes [59].

The next section presents measurement model evaluation results, followed by hypothesis testing results. The former is to ensure the reliability and validity of the involved constructs, and the latter is to quantify the interrelationship among them and confirm whether the hypotheses are accepted.

4. Results

4.1. Measurement Model Evaluation

To evaluate individual item reliability, loadings were assessed using SmartPLS 3.0, which is a leading software for PLS-SEM. As suggested by Hair et al. [60], indicators with low loadings (below 0.4) should always be eliminated from the construct. After removing an inconsistent item, the remaining items and their outer loadings are shown in Table 1. All the loadings are above 0.7, showing that the indicators are reliable [61]. Furthermore, as shown in Table 1, all values of calculated composite reliability and Cronbach’s alpha are between 0.7 and 0.9, suggesting a satisfactory level of internal consistency for each construct [60].

Table 1. Measurement model evaluation.

Construct	Items	Outer Loadings	Cronbach's Alpha	Composite Reliability	AVE
PaDM	PaDM1: I am happy with the decision-making processes.	0.811	0.797	0.867	0.620
	PaDM2: There is opportunity for staff to participate in making decision and policy.	0.774			
	PaDM3: Others take an active interest in my professional growth and career development.	0.779			
	PaDM4: I am encouraged to seek further professional development.	0.785			
POS	POS1: I receive support from my colleagues.	0.842	0.757	0.860	0.672
	POS2: I am clear about my professional responsibilities.	0.800			
	POS3: There is always support from the leadership.	0.817			
LMX	LMX1: My immediate supervisor understands my job problems and need.	0.761	0.843	0.888	0.613
	LMX2: My immediate supervisor recognizes my potential.	0.813			
	LMX3: My immediate supervisor uses his/her power to help me solve problems regardless of how much formal authority he/she has.	0.709			
	LMX4: I have enough confidence in my immediate supervisor that I would defend and justify his/her decision if he/she were not present to do so.	0.782			
	LMX5: My working relationship with my immediate supervisor is very good.	0.843			
TMX	TMX1: My peers understand my problems and needs.	0.833	0.803	0.871	0.628
	TMX2: My peers are willing to finish work assigned to me.	0.739			
	TMX3: My peers recognize my potential.	0.804			
	TMX4: My peers let me know when I affect their work.	0.791			
SaCl	SaCl1: Accidents and incidents which happen here are always reported.	0.775	0.794	0.866	0.619
	SaCl2: The project encourages people to make some suggestions to improve safety.	0.798			
	SaCl3: The project really cares about the safety of the people who work here.	0.727			
	SaCl4: All the people who work in my team are fully committed to safety.	0.842			

Note: PaDM = participative decision making; POS = perceived organizational support; TMX = team-member exchange; LMX = leader-member exchange; SaCl = safety climate; and AVE = average variance extracted.

The convergent validity is evaluated using average variance extracted (AVE). All AVE values in Table 1 are higher than 0.5, indicating that each construct can explain more than half of the variance sum of its indicators. Hence, each construct secures convergent validity [62].

The discriminant validity of constructs is evaluated using cross-loadings and the Fornell–Larcker criterion. As Table 2 shows, each indicator's outer loading on the associated construct is greater than any of its cross-loadings on other constructs, demonstrating the discriminant validity of the constructs [60]. Additionally, as shown in Table 3, the square root of the AVE of each construct is higher than its highest correlation with any other construct. All these results indicate that discriminant validity is satisfactory, and the constructs are different from each other.

Table 2. Cross-loadings.

	LMX	POS	SaCl	PaDM	TMX
POS1	0.509	0.842	0.416	0.421	0.434
POS2	0.406	0.800	0.397	0.303	0.327
POS3	0.514	0.817	0.402	0.524	0.400
PaDM1	0.453	0.455	0.354	0.811	0.356
PaDM2	0.291	0.358	0.279	0.774	0.297
PaDM3	0.369	0.393	0.190	0.779	0.410
PaDM4	0.379	0.399	0.333	0.785	0.318
LMX1	0.761	0.350	0.316	0.424	0.367
LMX2	0.813	0.455	0.344	0.435	0.353
LMX3	0.709	0.342	0.204	0.298	0.335
LMX4	0.782	0.467	0.369	0.333	0.344
LMX5	0.843	0.612	0.430	0.385	0.419
TMX1	0.424	0.382	0.346	0.367	0.833
TMX2	0.254	0.302	0.192	0.306	0.739
TMX3	0.461	0.405	0.311	0.400	0.804
TMX4	0.304	0.404	0.277	0.310	0.791
SaCl1	0.367	0.381	0.775	0.295	0.240
SaCl2	0.346	0.375	0.798	0.334	0.286
SaCl3	0.316	0.360	0.727	0.271	0.263
SaCl4	0.347	0.434	0.842	0.270	0.347

Note: PaDM = participative decision making; POS = perceived organizational support; TMX = team-member exchange; LMX = leader-member exchange; and SaCl = safety climate.

Table 3. Fornell–Larcker criterion.

	LMX	POS	SaCl	PaDM	TMX
LMX	0.783				
POS	0.585	0.820			
SaCl	0.437	0.494	0.787		
PaDM	0.480	0.514	0.371	0.788	
TMX	0.466	0.476	0.363	0.440	0.792

Note: (1) PaDM = participative decision making; POS = perceived organizational support; TMX = team-member exchange; LMX = leader-member exchange; and SaCl = safety climate. (2) AVE values of constructs are shown in bold.

4.2. Hypothesis Testing

Regression analysis results are reported in Table 4. Both PaDM and POS are positively related to SaCl (path c_1 , $B_1 = 0.175$, $p < 0.01$; path c_2 , $B_2 = 0.502$, $p < 0.005$ in Model 2), supporting Hypotheses 1 and 2. The R^2 values for LMX, TMX, and SaCl are 0.348, 0.260 and 0.281, all higher than 0.25, suggesting that the effect size is large and the explanatory power of the structural model is strong [63]. Control variables are not significantly associated with SaCl, except for NoEpyee. NoEpyee has a significant effect on SaCl, implying that respondents from large-scale organizations tend to perceive a strong safety climate. Nevertheless, in other models, all coefficients are assessed, controlling for the potential confounding effects by control variables.

In terms of mediation effects, Table 4 shows that coefficients of PaDM→LMX (path $a_{1,1}$), PaDM→TMX (path $a_{1,2}$), POS→LMX (path $a_{2,1}$), POS→TMX (path $a_{2,2}$), and LMX→SaCl (path b_1) are significant, whereas the coefficient of TMX→SaCl (path b_2) is not significant. Following Wen and Ye's [58] suggestion, a bootstrap approach is needed to further test the mediation effects. The results in Table 5 show that the 95% confidence intervals for indirect paths do not include zero, except for path POS→TMX→SaCl. It indicates that both LMX and TMX positively mediate the effects of PaDM on SaCl, whereas only LMX positively mediates the relationship between POS and SaCl. Thus, the results support Hypotheses 3, 4, and 5, but Hypothesis 6 is not tenable. Furthermore, since the coefficient of PaDM→SaCl in Model 5 (path $c_{1'}$) is not significant, LMX and TMX jointly play full mediation roles in the relationship between PaDM and SaCl. The coefficient of

path POS→SaCl in Model 5 (path c_2') is significant and positive (coefficients of path a_{2_1} and b_1 are also positive), showing a partial mediation effect of LMX in the relationship between POS and SaCl.

Table 4. Regression analysis results.

	Model 1	Model 2	Model 3	Model 4	Model 5
	SaCl	SaCl	LMX	TMX	SaCl
AffRes	0.033	0.038	−0.022	0.002	0.041
RespHier	0.041	0.089	0.049	0.086	0.071
StgProj	0.022	−0.002	−0.017	0.013	−0.001
NoEpyee	0.229 **	0.184 **	0.020	−0.004	0.181 **
PaDM		0.175 ** (c_1)	0.209 *** (a_{1_1})	0.250 *** (a_{1_2})	0.110 (c_1')
POS		0.502 *** (c_2)	0.444 *** (a_{2_1})	0.371 *** (a_{2_2})	0.383 *** (c_2')
LMX					0.177 ** (b_1)
TMX					0.110 (b_2)
R ²	0.032	0.258	0.348	0.260	0.281
Adjusted R ²	0.018	0.242	0.334	0.244	0.260
p-value	0.058	0.000	0.000	0.000	0.000

Note: (1) ** $p < 0.01$, *** $p < 0.001$; (2) AffRes = affiliation of respondents; RespHier = respondent's hierarchical position; StgProj = project stage in which the respondent is involved; NoEpyee = number of employees in respondent's organization; PaDM = participative decision making; POS = perceived organizational support; TMX = team-member exchange; LMX = leader-member exchange; and SaCl = safety climate.

Table 5. Bootstrapping results for indirect effects.

Indirect Path	Effect	SE	95% CI	Mediation Type
PaDM→LMX→SaCl	0.146	0.041	[0.073, 0.234]	Full mediation
PaDM→TMX→SaCl	0.076	0.031	[0.017, 0.139]	Full mediation
POS→LMX→SaCl	0.131	0.053	[0.030, 0.242]	Partial mediation
POS→TMX→SaCl	0.067	0.038	[−0.008, 0.140]	No mediation

Note: (1) Bootstrap sample size = 5000; SE = standard error; and CI = confidence interval; (2) PaDM = participative decision making; POS = perceived organizational support; TMX = team-member exchange; LMX = leader-member exchange; and SaCl = safety climate.

5. Discussion

There are two categories of climate in the climate literature: molar and specific climate. The former is also referred to as global, general, or foundation(al) climate and the latter as strategic or facet-specific climate. Organizational climate belongs to the former, and safety climate is one specific climate. Organizational climate provides a foundation for safety climate, but the literature rarely dwells on such a foundational mechanism. This paper aims to fill this knowledge gap. As there are many dimensions of organizational climate, this paper chooses two dimensions—POS and PaDM—for illustrative purposes. Using the interactive approach to forming climate perceptions, this study further introduces two interactive constructs—leader-member exchange and team-member exchange—to explain the foundational mechanism.

The results show that both POS and PaDM are positively associated with an individual's perceived safety climate. Previous studies [22,37] support the positive relationship between POS and perceived safety climate. Specifically, in a longitudinal study with safety professionals, Bunner et al. [37] confirmed that POS causes perceived safety climate instead of perceived safety climate causing POS. Concurring with these studies, this study also supports the positive relationship between POS and perceived safety climate. Although previous studies [22,37] have proposed and confirmed many mechanisms to explain how POS affects safety climate, still more mechanisms need to be uncovered so that more targeted measures can be developed. Similarly, there is also a positive association between PaDM and perceived safety climate. Management style has implications for safety climate at the worksite. Compared with directive-styled managers, those managers with a participative style are more likely to perceive employees' safety attitudes and be more confident in their ability to develop and maintain a positive safety climate across the workplace [64]. In healthcare organizations, it is essential for staff to perceive that senior and supervisory

leadership support patient safety because such perceptions (i.e., patient safety climate) can help reduce medical errors. In order to foster a patient safety climate, Zaheer et al. [65] called on senior and supervisory leadership to transform their traditional bureaucratic decision-making approach to a participative approach. Also, more mechanisms explaining the effect of PaDM on perceived safety climate need to be explored.

This paper finds that the effect of PaDM on safety climate perceptions is fully mediated by LMX and TMX. PaDM is a defining feature of organizations with lower rates of lost time injuries. The PaDM approach reduces the power distance between leaders and their followers and hence improves the exchange quality. PaDM promotes equality perceptions among peers and, therefore, facilitates lateral communications. Consequently, with high-quality LMX and TMX, construction personnel are able to freely voice safety concerns without fear of reprimand or ridicule.

The effect of POS on safety climate is partially mediated by LMX but not by TMX. Those construction personnel who secure more support from the project management team (i.e., high-level POS) are more likely to enhance their skills and abilities. With such skills and abilities, they may bring more benefits to their immediate supervisors and hence develop high-quality exchanges with their immediate supervisors (i.e., high-quality LMX). In this way, they are more likely to identify with the immediate supervisors and realize the importance of safety (i.e., positive safety climate perceptions). This phenomenon once again reflects the important mediating role played by supervisory staff. It is through supervisors that construction personnel receive favorable treatment from the project management team. However, contrary to the hypothesis, TMX doesn't mediate the effect of POS on safety climate. This may be due to the TMX scale failing to capture all aspects of team-member exchange that have implications for perceived safety climate. Therefore, the impact of team-member exchange in creating a positive safety climate needs further examination in the future.

Respondents from large-scale organizations tend to develop positive safety climate perceptions. This is probably because their affiliated organizations have ample resources to improve their safety awareness.

This paper has both theoretical and practical implications. In theory, this paper explains the foundational effects of organizational climate on safety climate through the lens of the interactive approach to forming safety climate. Other approaches (i.e., structural, perceptual, and cultural) are also worthy of exploring so that diversified theories can be established. In practice, this paper acknowledges the positive effect of POS and PaDM on safety climate and highlights the mediation effect played by LMX and TMX. On construction sites, project managers shall demonstrate genuine concern for first-line workers' welfare and involve them in making decisions. However, such goodwill cannot translate into first-line workers' safety climate perceptions on its own. In this regard, this paper advocates encouraging open and egalitarian communications between superiors and subordinates and among peers. For example, management (including managers and supervisors) shall visibly demonstrate and communicate their safety commitment with a clear and written safety policy and by various means such as meetings, toolbox talks, posters, and digital media. Management is expected to find and fix discrepancies in implementing safety policies and procedures in a timely manner among direct and indirect laborers so that all workers have the same protection and rights.

These findings should be interpreted with some limitations in mind. First, this study adopts a cross-sectional design, which cannot make cause-effect inferences. Second, the sample was from Hong Kong, and whether the findings apply to other cultural backgrounds needs further investigation. Third, this paper focuses on project-level phenomena. For example, POS refers to the perceived support from the project management team. However, at the same time, construction personnel may also perceive support from their affiliated organizations. So, whether POS from their affiliated organizations has an impact on their safety climate perceptions in the project is worth investigating in the future. Fourth, due to time and resource constraints, this study has not considered other dimensions of

organizational climate. Future research is needed to explore more explanations of the foundational mechanism and contribute to the existing body of knowledge.

6. Conclusions

Previous research claimed that organizational climate provides a foundation for safety climate but without elaboration on the foundational mechanisms. This paper attempts to explain the foundational effect through the lens of an interactive approach to forming climate perceptions. This paper chooses two dimensions of organizational climate: perceived organizational support (POS) and participative decision making (PaDM). Based on the interactive approach, this paper introduces two constructs—leader–member exchange (LMX) and team–member exchange (TMX)—and establishes a multiple mediation model. With a random sample of Hong Kong-based construction personnel, this paper finds that both POS and PaDM are positively associated with perceived safety climate, both LMX and TMX fully mediate the effect of PaDM on safety climate, and only LMX partially mediates the effect of POS on safety climate. In practice, this study highlights the role of high-quality reciprocal exchange among construction personnel and their supervisors in enacting the espoused commitment to employees from the project management team.

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References

1. Lester, A. *Project Management, Planning and Control: Managing Engineering, Construction and Manufacturing Projects to PMI, APM and BSI Standards*, 7th ed.; Elsevier: Cambridge, MA, USA, 2017.
2. Shen, Y.Z.; Koh, T.Y.; Rowlinson, S.; Bridge, A.J. Empirical Investigation of Factors Contributing to the Psychological Safety Climate on Construction Sites. *J. Constr. Eng. Manag.* **2015**, *141*, 04015038. [[CrossRef](#)]
3. James, L.R.; Choi, C.C.; Ko, C.-H.E.; McNeil, P.K.; Minton, M.K.; Wright, M.A.; Kim, K. Organizational and psychological climate: A review of theory and research. *Eur. J. Work Organ. Psychol.* **2008**, *17*, 5–32. [[CrossRef](#)]
4. James, L.R.; Jones, A.P. Organizational climate: A review of theory and research. *Psychol. Bull.* **1974**, *81*, 1096–1112. [[CrossRef](#)]
5. Benzer, J.; Horner, M. A Meta-analytic Integration and Test of Psychological Climate Dimensionality. *Hum. Resour. Manag.* **2015**, *54*, 457–482. [[CrossRef](#)]
6. Carr, J.Z.; Schmidt, A.M.; Ford, J.K.; DeShon, R.P. Climate perceptions matter: A meta-analytic path analysis relating molar climate, cognitive and affective states, and individual level work outcomes. *J. Appl. Psychol.* **2003**, *88*, 605–619. [[CrossRef](#)]
7. Parker, C.P.; Baltes, B.B.; Young, S.; Huff, J.W.; Altmann, R.A.; Lacost, H.A. Relationships between psychological climate perceptions and work outcomes: A meta-analytic review. *J. Organ. Behav.* **2003**, *24*, 389–416. [[CrossRef](#)]
8. James, L.A.; James, L.R. Integrating work environment perceptions: Explorations into the measurement of meaning. *J. Appl. Psychol.* **1989**, *74*, 739–751. [[CrossRef](#)]
9. James, L.R.; Sells, S.B. Psychological climate: Theoretical perspectives and empirical research. In *Toward a Psychology of Situations: An Interactional Perspective*; Magnusson, D., Ed.; Lawrence Erlbaum Associates, Inc.: Hillsdale, NJ, USA, 1981; pp. 275–295.

10. Locke, E.A. The nature and causes of job satisfaction. In *Handbook of Industrial and Organizational Psychology*; Dunnette, M.D., Ed.; Rand McNally: Skokie, IL, USA, 1976; pp. 1297–1350.
11. Kozlowski, S.W.J.; Klein, K.J. A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In *Multilevel Theory, Research and Methods in Organizations: Foundations, Extensions, and New Directions*; Klein, K.J., Kozlowski, S.W.J., Eds.; Jossey-Bass: San Francisco, CA, USA, 2000.
12. Kuenzi, M.; Schminke, M. Assembling fragments into a lens: A review, critique, and proposed research agenda for the organizational work climate literature. *J. Manag.* **2009**, *35*, 634–717. [[CrossRef](#)]
13. Ostroff, C.; Kinicki, A.J.; Muhammad, R.S. Organizational culture and climate. In *Handbook of Psychology*, 2nd ed.; Weiner, I.B., Ed.; John Wiley & Sons, Inc.: Hoboken, NJ, USA, 2013; Volume 12, pp. 643–676.
14. Wallace, J.C.; Popp, E.; Mondore, S. Safety climate as a mediator between foundation climates and occupational accidents: A group-level investigation. *J. Appl. Psychol.* **2006**, *91*, 681–688. [[CrossRef](#)]
15. Schneider, B.; Reichers, A.E. On the etiology of climates. *Pers. Psychol.* **1983**, *36*, 19–39. [[CrossRef](#)]
16. Christian, M.S.; Bradley, J.C.; Wallace, J.C.; Burke, M.J. Workplace safety: A meta-analysis of the roles of person and situation factors. *J. Appl. Psychol.* **2009**, *94*, 1103–1127. [[CrossRef](#)]
17. Neal, A.; Griffin, M.A.; Hart, P.M. The impact of organizational climate on safety climate and individual behavior. *Saf. Sci.* **2000**, *34*, 99–109. [[CrossRef](#)]
18. Stackhouse, M.; Turner, N. How do organizational practices relate to perceived system safety effectiveness? Perceptions of safety climate and co-worker commitment to safety as workplace safety signals. *J. Saf. Res.* **2019**, *70*, 59–69. [[CrossRef](#)]
19. Moran, E.T.; Volkwein, J.F. The cultural approach to the formation of organizational climate. *Hum. Relat.* **1992**, *45*, 19–47. [[CrossRef](#)]
20. Zohar, D. Thirty years of safety climate research: Reflections and future directions. *Accid. Anal. Prev.* **2010**, *42*, 1517–1522. [[CrossRef](#)]
21. Klein, K.J.; Conn, A.B.; Smith, D.B.; Sorra, J.S. Is everyone in agreement? An exploration of within-group agreement in employee perceptions of the work environment. *J. Appl. Psychol.* **2001**, *86*, 3–16. [[CrossRef](#)] [[PubMed](#)]
22. Gyekye, S.A.; Salminen, S. Workplace safety perceptions and perceived organizational support: Do supportive perceptions influence safety perceptions? *Int. J. Occup. Saf. Ergon.* **2007**, *13*, 189–200. [[CrossRef](#)] [[PubMed](#)]
23. Törner, M.; Pousette, A. Safety in construction—A comprehensive description of the characteristics of high safety standards in construction work, from the combined perspective of supervisors and experienced workers. *J. Saf. Res.* **2009**, *40*, 399–409. [[CrossRef](#)]
24. Hart, P.M.; Wearing, A.J.; Conn, M.; Carter, N.L.; Dingle, R.K. Development of the School Organisational Health Questionnaire: A measure for assessing teacher morale and school organisational climate. *Br. J. Educ. Psychol.* **2000**, *70*, 211–228. [[CrossRef](#)] [[PubMed](#)]
25. D’Amato, A. From research to action and back again: The long journey of organizational climate—A review of the literature and a summative framework. *J. Gen. Manag.* **2023**, 03063070231152010. [[CrossRef](#)]
26. Ostroff, C. The Effects of Climate and Personal Influences on Individual Behavior and Attitudes in Organizations. *Organ. Behav. Hum. Decis. Process.* **1993**, *56*, 56–90. [[CrossRef](#)]
27. Johnston, D.; Pagell, M.; Veltri, A.; Klassen, R. Values-in-action that support safe production. *J. Saf. Res.* **2020**, *72*, 75–91. [[CrossRef](#)] [[PubMed](#)]
28. Pagell, M.; Johnston, D.; Veltri, A.; Klassen, R.; Biehl, M. Is safe production an oxymoron? *Prod. Oper. Manag.* **2014**, *23*, 1161–1175. [[CrossRef](#)]
29. Yap, J.; Leong, W.J.; Skitmore, M. Capitalising teamwork for enhancing project delivery and management in construction: Empirical study in Malaysia. *Eng. Constr. Archit. Manag.* **2020**, *27*, 1479–1503. [[CrossRef](#)]
30. Winge, S.; Albrechtsen, E.; Arnesen, J. A comparative analysis of safety management and safety performance in twelve construction projects. *J. Saf. Res.* **2019**, *71*, 139–152. [[CrossRef](#)]
31. Eisenberger, R.; Huntington, R.; Hutchison, S.; Sowa, D. Perceived organizational support. *J. Appl. Psychol.* **1986**, *71*, 500–507. [[CrossRef](#)]
32. Reader, T.W.; Mearns, K.; Lopes, C.; Kuha, J. Organizational support for the workforce and employee safety citizenship behaviors: A social exchange relationship. *Hum. Relat.* **2017**, *70*, 362–385. [[CrossRef](#)]
33. Puah, L.N.; Ong, L.D.; Chong, W.Y. The effects of perceived organizational support, perceived supervisor support and perceived co-worker support on safety and health compliance. *Int. J. Occup. Saf. Ergon.* **2016**, *22*, 333–339. [[CrossRef](#)]
34. Gyekye, S.A.; Salminen, S.; Ojajarvi, A. A theoretical model to ascertain determinates of occupational accidents among Ghanaian industrial workers. *Int. J. Ind. Ergon.* **2012**, *42*, 233–240. [[CrossRef](#)]
35. DeJoy, D.M.; Della, L.J.; Vandenberg, R.J.; Wilson, M.G. Making work safer: Testing a model of social exchange and safety management. *J. Saf. Res.* **2010**, *41*, 163–171. [[CrossRef](#)]
36. Mearns, K.J.; Reader, T. Organizational support and safety outcomes: An un-investigated relationship? *Saf. Sci.* **2008**, *46*, 388–397. [[CrossRef](#)]
37. Bunner, J.; Prem, R.; Korunka, C. Perceived organizational support and perceived safety climate from the perspective of safety professionals: Testing reciprocal causality using a cross-lagged panel design. *J. Saf. Res.* **2021**, *78*, 1–8. [[CrossRef](#)] [[PubMed](#)]

38. Grill, M.; Pousette, A.; Nielsen, K.; Grytnes, R.; Torner, M. Safety leadership at construction sites: The importance of rule-oriented and participative leadership. *Scand. J. Work Environ. Health* **2017**, *43*, 375–384. [[CrossRef](#)] [[PubMed](#)]
39. Zohar, D. A group-level model of safety climate: Testing the effect of group climate on microaccidents in manufacturing jobs. *J. Appl. Psychol.* **2000**, *85*, 587–596. [[CrossRef](#)] [[PubMed](#)]
40. Roberson, Q.M.; Colquitt, J.A. Shared and configural justice: A social network model of justice in teams. *Acad. Manag. Rev.* **2005**, *30*, 595–607. [[CrossRef](#)]
41. Graen, G.B.; Schiemann, W.A. Leadership-motivated excellence theory: An extension of LMX. *J. Manag. Psychol.* **2013**, *28*, 452–469. [[CrossRef](#)]
42. Dulebohn, J.H.; Bommer, W.H.; Liden, R.C.; Brouer, R.L.; Ferris, G.R. A meta-analysis of antecedents and consequences of leader-member exchange: Integrating the past with an eye toward the future. *J. Manag.* **2012**, *38*, 1715–1759. [[CrossRef](#)]
43. Newaz, M.T.; Davis, P.; Jefferies, M.; Pillay, M. Using a psychological contract of safety to predict safety climate on construction sites. *J. Saf. Res.* **2019**, *68*, 9–19. [[CrossRef](#)]
44. Cheung, C.M.; Zhang, R.P. How Organizational Support Can Cultivate a Multilevel Safety Climate in the Construction Industry. *J. Manag. Eng.* **2020**, *36*, 04020014. [[CrossRef](#)]
45. Tse, H.H.M.; Dasborough, M.T. A study of exchange and emotions in team member relationships. *Group Organ. Manag.* **2008**, *33*, 194–215. [[CrossRef](#)]
46. Shen, Y.; Ju, C.; Koh, T.Y.; Rowlinson, S.; Bridge, A.J. The impact of transformational leadership on safety climate and individual safety behavior on construction sites. *Int. J. Environ. Res. Public Health* **2017**, *14*, 45. [[CrossRef](#)] [[PubMed](#)]
47. Shen, Y.Z.; Tuuli, M.M.; Xia, B.; Koh, T.Y.; Rowlinson, S. Toward a model for forming psychological safety climate in construction project management. *Int. J. Proj. Manag.* **2015**, *33*, 223–235. [[CrossRef](#)]
48. Gerstner, C.R.; Day, D.V. Meta-analytic review of leader-member exchange theory: Correlates and construct issues. *J. Appl. Psychol.* **1997**, *82*, 827–844. [[CrossRef](#)]
49. Tuuli, M.M. Empowerment and Control Dynamics in Project Teams: A Multilevel Examination of the Antecedents and Job Performance Consequences. Ph.D. Thesis, The University of Hong Kong, Hong Kong, 2009.
50. Fang, D.; Chen, Y.; Wong, L. Safety climate in construction industry: A case study in Hong Kong. *J. Constr. Eng. Manag.* **2006**, *132*, 573–584. [[CrossRef](#)]
51. Choudhry, R.M.; Fang, D. Why operatives engage in unsafe work behavior: Investigating factors on construction sites. *Saf. Sci.* **2008**, *46*, 566–584. [[CrossRef](#)]
52. Choudhry, R.M.; Fang, D.; Ahmed, S.M. Safety management in construction: Best practices in Hong Kong. *J. Prof. Issues Eng. Educ. Pract.* **2008**, *134*, 20–32. [[CrossRef](#)]
53. Hair, J.F.; Risher, J.J.; Sarstedt, M.; Ringle, C.M. When to use and how to report the results of PLS-SEM. *Eur. Bus. Rev.* **2019**, *31*, 2–24. [[CrossRef](#)]
54. Hair, J.F.; Ringle, C.M.; Sarstedt, M. PLS-SEM: Indeed a silver bullet. *J. Mark. Theory Pract.* **2011**, *19*, 139–152. [[CrossRef](#)]
55. Hair, J.; Black, W.; Babin, B.; Anderson, R. *Multivariate Data Analysis*, 8th ed.; Cengage Learning: Hampshire, UK, 2019.
56. Baron, R.M.; Kenny, D.A. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *J. Personal. Soc. Psychol.* **1986**, *51*, 1173–1182. [[CrossRef](#)]
57. Preacher, K.J.; Hayes, A.F. SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behav. Res. Methods Instrum. Comput.* **2004**, *36*, 717–731. [[CrossRef](#)]
58. Wen, Z.; Ye, B. Analyses of mediating effects: The development of methods and models. *Adv. Psychol. Sci.* **2014**, *22*, 731–745. [[CrossRef](#)]
59. Hayes, A.F. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*; Guilford Publications: New York, NY, USA, 2017.
60. Hair, J.F.; Hult, G.T.M.; Ringle, C.M.; Sarstedt, M. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 2nd ed.; SAGE Publications, Inc.: Los Angeles, CA, USA, 2017.
61. Chin, W.W. The partial least squares approach to structural equation modeling. *Mod. Methods Bus. Res.* **1998**, *295*, 295–336.
62. Fornell, C.; Larcker, D.F. Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics. *J. Mark. Res.* **1981**, *18*, 382–388. [[CrossRef](#)]
63. Cohen, J. *Statistical Power Analysis for the Behavioral Sciences*; Lawrence Erlbaum Associates: Hillsdale, NJ, USA, 1988.
64. O’Dea, A.; Flin, R. Site managers and safety leadership in the offshore oil and gas industry. *Saf. Sci.* **2001**, *37*, 39–57. [[CrossRef](#)]
65. Zaheer, S.; Ginsburg, L.; Chuang, Y.T.; Grace, S.L. Patient safety climate (PSC) perceptions of frontline staff in acute care hospitals: Examining the role of ease of reporting, unit norms of openness, and participative leadership. *Health Care Manag. Rev.* **2015**, *40*, 13–23. [[CrossRef](#)] [[PubMed](#)]

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