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Responding to a major global crisis: The effects of hotel safety leadership on employee safety behavior during COVID-19

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ABSTRACT

Purpose - The main purpose of this research was to examine the effect of hotel safety leadership on employee safety behavior during the COVID-19 pandemic, and the mediation role of belief restoration and the moderation role of perceived risk between safety leadership and behavior were also investigated.

Design/methodology/approach - The COVID-19 outbreak served as the background for a questionnaire survey of 23 hotels in China with 1,594 valid responses being received. The statistical analysis techniques used were exploratory and confirmatory factor analysis, correlation analysis, structural equation modeling, and hierarchical regression.

Findings - The results showed that: (1) hotel safety leadership positively affected employee safety behavior (compliance, participation and adaptation); (2) belief restoration partially mediated the influence of safety leadership on safety behavior; and (3) perceived risk negatively moderated the direct effect as well as the mediation effect of "safety leadership - belief restoration - safety behavior".

Research limitations/implications - The main limitation was that the questionnaires were collected with the same measurement system within a certain period of time (cross-sectional design). And future research should test and expand this conceptual model in different crises, business fields, theoretical orientation, and cultural backgrounds.

Practical implications – Hotels should develop management strategies based on safety leadership and motivate and promote employee safety behavior from the four aspects of safety coaching, care, motivation, and control.

Originality/value – This investigation expanded the research on the effectiveness of safety leadership and especially with respect to safety in the hospitality industry during a major global crisis. Also, the research conceptual model and variables contained therein are original contributions to the hospitality research literature.

Keywords: Safety leadership; belief restoration; perceived risk; self-determination theory (SDT); substitutes for leadership concept; COVID-19 pandemic

Introduction

The COVID-19 outbreak is considered to be an impactful incident as well as a major health crisis in world history (Fong *et al*., 2020; Zenker and Kock, 2020). In December 2019, several cases of COVID-19 pneumonia were diagnosed in Wuhan, China, and then COVID-19 occurred in more than 200 countries and regions around the world. As of July 18, 2020, the cumulative number of confirmed cases exceeded 85,000 in China and more than 14,000,000 globally (World Health Organization, 2020). Hotels are public places that attract many people, and service is accomplished through interactions between employees and guests. Because COVID-19 can be spread through respiratory droplets, physical contact and aerosols, most hotels were fully or partially closed during the pandemic. Moreover, some hotels had clusters of COVID-19 outbreaks and cases. Therefore, the COVID-19 pandemic has greatly affected the sustainability of the hotel industry at the macro level and normal operations at the micro level (Zenker and Kock, 2020; Baum and Hai, 2020; Jiang and Wen, 2020). The crisis required hotels to adopt and maintain high-level safety leadership strategies and safety operational standards. Whether at an acute stage of intra-pandemic or resolution stage of post-pandemic, it is of great importance to promote hotel safety leadership and employee safety behavior to provide safe and satisfying service quality, as well as ensuring the health of guests and employees and hotel safety performance.

Hospitality is a comprehensive service industry and employee safety behaviors have a fundamental impact on workplace safety, product service quality, and corporate safety performance (Neal *et al*., 2000). However, behaviors such as service sabotage, rule-breaking, deviance, counterproductivity, bullying, and violence are common in hotel workplaces (Ghosh and Shum, 2019; Harris and Ogbonna, 2002; Lugosi, 2019). Hotel employee safety behavior particularly during crisis events (e.g., COVID-19) is a basic prerequisite for customers to feel safe and enjoy service experiences without fear as well as for workplace safety. Thus, it is critical to investigate and manage employee safety behaviors in hospitality and other service

sectors especially when threats to human lives and economic survival are at the highest levels. The influences on employee safety behavior have attracted considerable attention, which is not only extensively investigated on high-risk industries such as coal mining, construction, and firefighting (Newaz *et al*., 2019; Smith *et al*., 2019; Wang *et al*., 2019), but also is gradually receiving greater concern in service industries such as medical care, airlines, and hotel food and beverage departments (Avci and Yayli, 2014; Chen and Chen, 2014; Ji *et al*., 2019; Neal *et al*., 2000). Leadership is an important organizational resource, which can be influential in promoting employee leadership-oriented behavior, such as green transformational leadership and employee green creativity, shared leadership and employee knowledge sharing, safety leadership and safety behavior (Coun *et al*., 2019; Li *et al*., 2020; Lu and Yang, 2010). Hotel leaders during crisis events have the goal of ensuring service safety and normal business operations, as well as mitigating the negative impacts of market downturns so as to assure sustainability (Israeli *et al*., 2011). Safety leadership is a safety-goal oriented leadership style in service management, which is the ability to achieve the optimum safety benefits by effectively arranging organizational resources, as well as having a significant positive effect on employee safety behavior and workplace safety (Clarke, 2013; Wu, 2008), particularly during crises where the safety of corporations, employees, and customers is under major threat.

However, within this field of research, three key gaps exist. First, there is an absence of empirical research on how to promote hotel employee safety behavior in major crisis situations. An increasing array of crisis events are posing unique and difficult challenges for all corporations and, as with COVID-19, appear to be having disastrous negative impacts on service industries such as hotels. Employee safety behavior is a basic factor underlying safety performance (Neal *et al*., 2000) and it becomes even more crucial for hotels to promote employee safety behavior and safety performance during major crises. However, the relevant research about hotel employee safety behavior under abnormal circumstances is still limited. Second, the underlying psychological influences of safety leadership on safety behavior lack empirical investigation. Although safety leadership is considered to be effective for enhancing employee safety behavior (Lu and Yang, 2010), few researchers have explored the psychological mediation of safety leadership affecting safety behavior from an intrinsic motivation perspective. According to the theory of planned behavior (TPB), people's beliefs are the psychological basis that drives specific behaviors

(Ajzen, 1991). Belief restoration reflects individuals' intrinsic motivations and self-efficacy for organizational efforts and restoring the safety and stability of workplaces, which is a critical psychological premise driving employee behavior during the COVID-19 pandemic (Fong *et al*., 2020; Johnston and Johnson, 1989). Belief restoration via the influence of safety leadership on safety behavior has not been investigated and is an important research gap needing to be filled. Third, the moderation role of perceived risk in the influence of safety leadership has not been explored. Crisis events force people to make judgements and risk evaluations under pressure, and then serve as the foundation for behavioral decisions (Liu-Lastres *et al*., 2019; Xie *et al*., 2020). Safety behavior decisions during crises and high-risk situations involve perceptions and evaluations of the risk environment (Huang *et al*., 2020). Thus, employee perceived risk during crises is a significant factor as well as a critical boundary condition that determines the effectiveness of safety leadership. However, the moderation role of perceived risk in these relationships lacks clear and systematic investigation.

Therefore, the COVID-19 pandemic serves as the background for this research. The research purposes were to: (1) explore the effect of hotel safety leadership on employee safety behavior during the COVID-19 pandemic; (2) explore the mediation role of belief restoration between hotel safety leadership and employee safety behavior; and (3) investigate the moderation role of perceived risk in the "safety leadership - belief restoration - safety behavior" relationship. This research determined the formation of employee safety behavior during a crisis, which provides new insights for hotels in establishing safety leadership strategies, as well as helping to guide hotel crisis management during health crises such as COVID-19.

Literature review and theoretical basis

Self-determination theory (SDT) proposes that motivations, autonomous and controlled, are the determinants of behavior (Deci and Ryan, 1985a; 1985b), which represent people's self-determined and non-self-determined behaviors respectively. Autonomous motivation is taking action due to the challenge, meaningfulness, or attraction of the behavior itself. In contrast, controlled motivation refers to acting to get or avoid external results. In general, autonomous motivation is described as goal-oriented and value-loaded, belonging to the relationship-oriented motivation element. Controlled motivation is acting due to rewards or punishments, associated with task-

oriented motivation (Gagné and Deci, 2005). SDT proposes that behavior is based on a full understanding of self-intrinsic motivation and external environmental information. Environmental and contextual factors have a critical position in the formation of people's motivation and behavior.

To date, SDT has been widely employed to investigate the self-determination and psychological mediation processes of organizational leadership strategies that affect employee work behaviors, such as transformational and shared leadership and employee knowledge sharing (Coun *et al*., 2019); developmental leadership and employee organizational citizenship behavior (Zhang and Chen, 2013); and green transformational leadership and employee green creativity (Li *et al*., 2020). This theory has received some attention in the fields of safety and crises, and the self-determination process of people's safety-oriented behaviors has been examined. For example, based on SDT, and with the background of the Ya'an earthquake, Wang (2014) developed a theoretical model to examine the mechanisms through which different types of motivation (autonomous and controlled) contributed to various crisis participation behaviors in social network services; and Chan *et al*. (2014) examined the antecedents of safety-oriented behavior for reducing myopia risk based on SDT. Moreover, SDT has been applied in the hospitality and service industries, demonstrating strong predictive effectiveness and power in the relationships among hotel leadership, employee motivation and behavior (Kim *et al*., 2019; Ma *et al*., 2018). Therefore, this research used SDT as its theoretical basis.

Hypothesis development

Safety leadership

Leadership represents the interactions between leaders and followers through which leaders exert influence on organizations or followers to achieve goals. Leadership is closely related to safety performance, and it has been investigated in safety research (Gracia *et al*., 2020; Xue *et al*., 2020). The extant literature mainly reviews the impact of broad leadership styles on corporate safety performance and reveals the impact models of leadership and safety performance based on two leadership styles - transactional and transformational (Barling *et al*., 2002; Kelloway *et al*., 2006; Zohar, 2002). Transactional leadership refers to the transaction process between the leader and followers to satisfy each other, with a focus on achieving safety goals through rewards, benefits, and control, and it is also called task-oriented leadership (Clarke,

2013; Martínez-Córcoles and Stephanou, 2017; Wu, 2008). Transformational leadership focuses on achieving safety performance through coaching, inspiring visions and caring, and it is also called relationship-oriented leadership (Clarke, 2013; Coun *et al*., 2019; Wu, 2008). In short, transactional leadership is closely related to rewards and monitoring, which has a greater effect on safety compliance (Clarke, 2013), whereas transformational leadership is directed towards genuinely inspiring employees, which has a greater effect on safety participation (Christian *et al*., 2009).

Because most leadership styles contain broad ranges of behavioral elements, it is unclear what specific behavior leaders need to perform to promote safety performance among their followers (Griffin and Hu, 2013). Thus, some previous researchers have explored the effect of safety-specific leadership styles (safety leadership) on corporate safety performance (Clarke, 2013; Xu *et al*., 2020). Safety leadership is a sub-set and style of organizational leadership, which represents the process of the interactions between leaders and followers through which leaders exert influence on organizations and followers to achieve corporate safety performance, workplace safety, and organizational safety goals (Wu, 2005).

Wu (2008) proposed that safety leadership consisted of three factors: safety coaching, caring, and controlling. Lu and Yang (2010) argued that safety leadership included three dimensions: safety motivation, policy, and concern. Currently, safety leadership has not received enough attention in the tourism and hospitality field. Based on these findings, four safety leadership dimensions were incorporated, namely: safety coaching, caring, motivation, and control. Safety coaching and caring are aspects of transformational leadership. Safety coaching is when leaders encourage follower safety behaviors through role modeling, decision-making participation, emotional support, and opinion sharing. Safety caring refers to leaders respecting and trusting employees, caring about their needs, understanding their problems, and providing sufficient safety-related resources. Safety motivation and control are linked with transactional leadership. Safety motivation is when leaders establish motivation and reward systems to encourage employee safety behavior. Safety control refers to leaders ensuring corporate safety performance through setting safety regulations and behavioral norms, monitoring employee safety behavior, and using authority to correct deviant behavior (Lu and Yang, 2010; Wu, 2008).

Safety behavior

Safety behavior research originated from Heinrich's (1931) accident causation model,

which proposed that unsafe behaviors are the direct cause of accidents. Neal and Griffin proposed a two-factor model of safety behavior encompassing safety compliance and safety participation (Neal *et al*., 2000; Griffin and Neal, 2000). Safety compliance involves compliant behavior consistent with institutional norms, position responsibilities, and specific task requirements, and safety participation is proactive behavior that contributes to developing an environment that supports safety (Newaz *et al*., 2019; Smith *et al*., 2019). However, hospitality companies encounter diverse and complex safety issues due to the risks from multiple external and internal factors (e.g., terrorist attacks, crimes, diseases, colleague rule-breaking, and customer behavior) (Kubickova *et al*., 2019; Liu-Lastres *et al*., 2019; Lugosi, 2019). Therefore, hotel managers and staff must be increasingly adaptable, versatile, and creative in solving threats and issues to ensure safety. Consequently, safety adaptation is a valid addition to the two-factor model of safety behavior, which describes employee actions such as proposing new safety ideas, learning new safety techniques, and solving safety issues creatively (Chen and Chen, 2014; Leischnig and Kasper-Brauer, 2015). Therefore, this research proposed that hotel employee safety behavior includes three dimensions - compliance, participation, and adaptation.

Organizational leadership is a key influence source for employee safety behavior (Christian *et al.*, 2009; Clarke, 2013). According to social exchange theory, if one provides support, resources, and benefits to others, the beneficiaries need to repay to achieve mutual benefit. Supportive actions by leaders for employees may obligate those employees to reciprocate through positive work behaviors (Homans, 1985). Safety leadership tends to be supportive through coaching, caring, motivating, and controlling, and enhances positive emotional and psychological commitment to leaders. Additionally, it encourages staff to adopt safe practices to maintain workplace safety (Lu and Yang, 2010). Social learning theory proposes that people learn and grow by mirroring the attitudes, thoughts, and behaviors of role models (Bandura, 1977). Leaders are role models in organizations, and followers are keen to learn and imitate leader behaviors (Mayer *et al*., 2009; Wood and Bandura, 1989). Safety leaders attach importance to safety issues at work and improve corporate safety performance through instruction, caring, controlling and supporting (Wu, 2008). Their safety-oriented management strategies and practices inspire employee safety behavior (Lu and Yang, 2010). Thus, it was proposed that:

Hypothesis 1: Safety leadership has a positive impact on employee safety

compliance (H1a), participation (H1b), and adaptation (H1c)

Belief restoration

Self-belief refers to the estimation of one's attitudes, emotions, and capabilities of organizing and performing a set of recommended behaviors to manage potential situations (Pedrero and Manzi, 2020; Turner *et al*., 2006). Belief restoration is the staff estimation and judgement that their organizations are capable of organizing and performing the actions required to restore the safety and stability of workplaces during crisis events. During a specific period and in certain contexts, a person's self-belief related to behavioral expectations affects attitudes, subjective norms, and perceived behavioral control, as well as further determining behavioral goals related to specific situations (Ajzen, 1991). During a crisis, people with stronger restorative beliefs have greater intent to return to pre-crisis conditions (Liu-Lastres *et al*., 2019). Moreover, in crisis situations, individuals may follow "role extension" and adopt pro-social and adaptive behaviors (e.g., safety behaviors) to promote their organization's recovery from disasters (Johnston and Johnson, 1989). Thus, employees with strong restorative beliefs are more willing to adopt safety behavior during crises.

When combined with SDT, belief restoration reflects intrinsic motivation when experiencing crisis events. Safety leadership serves as an inducer of intrinsic motivation (Deci and Ryan, 1985a; 1985b). Safety coaching and caring serve as relationship-oriented leadership strategies, which involve motivational elements such as embedding values and inspiring vision, thereby resulting in autonomous motivation. Safety motivation and control are task-oriented leadership strategies, involving rewards, punishments, and organizational norms, that result in control motivation. Thus, safety leadership strengthens autonomous and controlled motivations related to employee belief restoration. The conservation of resources theory proposes that individuals endeavor to conserve resources they deem valuable from real or potential threats in stressful situations (Hobfoll, 1989). Crisis situations may deplete employees' valuable resources (Guo *et al*., 2019). As an important intrinsic psychological resource of employees, belief restoration can prevent employees from falling into a spiral of resource loss, as well as ensuring that they have the ability to cope with pressures and generate resource increments (Hobfoll, 1989). Therefore, belief restoration is an important motivational and psychological variable supporting the impact of safety leadership on employee safety behavior. The psychological mediation process of employee belief in organizational leadership and

leadership effectiveness has drawn research attention. For example, Kim *et al.* (2019) found that employee environmental beliefs partially mediated the influence of hotel environmental-transformational leadership on employee organizational citizenship behavior (OCB). Therefore, it was proposed that:

Hypothesis 2: Belief restoration mediates the effect of safety leadership on employee safety behavior (compliance, participation and adaptation)

Perceived risk

Risk is defined as the possibility and uncertainty of danger, injury or loss, and perceived risk refers to people's subjective evaluation of the probability of personal harm from risk events and the assessment of the magnitude and effects of risk events (Reisinger, 2005; Rimal and Real, 2003). Accordingly, a consensus has developed to evaluate perceive risk from the perspectives of susceptibility and severity (Huang *et al*., 2020; Liu-Lastres *et al*., 2019; Witte, 1996). For example, Liu-Lastres *et al*. (2019) measured cruise line customer perceived risk to health-related incidents (Norovirus) in terms of susceptibility and severity. In hospitality, perceived risk reflects employee judgement of internal and external risks and the risk status of the hotel at which they work, as well as subjective assessments of the objective risk environment and risk information (Xie *et al*., 2020).

Perceived risk is an environmental variable and perceptual factor that is objectively discernable within crises. It plays a critical role in the relationship between organizational leadership, employee beliefs, and safety behavior (Oah *et al*., 2018; Rimal and Real, 2003). The substitutes for leadership concept proposes that individual, task and organizational variables influence and substitute for the effectiveness of leadership (Kerr and Jermier, 1978). Substitute variables serve as enhancers and strengthen the effect of leadership; or serve as substitutes and reduce the effect of leadership; or serve as neutralizers that eliminate but do not replace the impact of leadership (Ling *et al*., 2016; Podsakoff and MacKenzie, 1997). The uncertain environments faced by organizations represent an important substitute variable that influences the effectiveness of leadership. In this research, perceived risk was the employees' perception of the risk environment and uncertainty of organizational survival in a crisis situation. This perceived risk serves as a substitute and reduces the effectiveness of safety leadership on safety behavior. In summary, perceived risk negatively moderates the effect of safety leadership on employee safety behavior. Therefore, it was proposed that:

Hypothesis 3: Perceived susceptibility (H3a) and severity (H3b) negatively moderate the relationship between safety leadership and safety behavior

Based on that, this research posits that perceived risk moderates the relationship of "safety leadership - belief restoration - safety behavior", that is, this mediation effect is moderated by employees' perceived risk. Compared with a low-risk perceptual situation, safety leadership that improves employee belief restoration as well as safety behavior is much more difficult in high-risk perceptual situations. Thus, it was proposed that:

Hypothesis 4: Perceived susceptibility (H4a) and severity (H4b) negatively moderate the mediation effect of "safety leadership - belief restoration - safety behavior."

The conceptual model is presented in Figure 1.

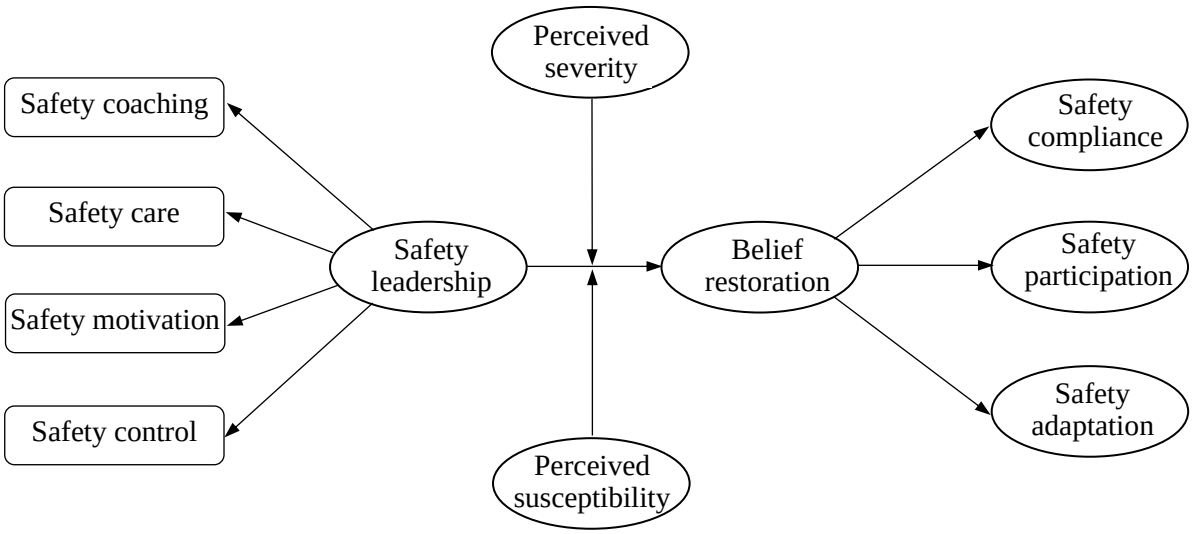

Figure 1 Research conceptual model

Methodology

Questionnaire design

The questionnaire was comprised of two sections. The first section included four scales for safety leadership, belief restoration, perceived risk, and safety behavior. Eighteen items based on Wu (2008) and Lu and Yang (2010) were adapted to measure

safety leadership, which was a second-order factor composed of safety coaching, caring, motivation, and control. Four items based on the measurement of efficiency belief and self-belief were used to measure belief restoration (Rimal and Real, 2003; Turner *et al.*, 2006; Witte, 1996). Nine items proposed by Witte (1996) measured perceived risk, including the two dimensions of perceived susceptibility and severity. Safety behavior had the three dimensions of safety compliance, participation, and adaptation. Safety compliance and participation were measured by using the instrument proposed by Neal and Griffin (2006), with each being measured by three items. Three items based on the employee adaptive behavior scale (Leischnig and Kasper-Brauer, 2015) and the innovative behavior scale developed by Scott and Bruce (1994) were adapted to measure safety adaptation. Some items were slightly revised according to the COVID-19 and hospitality contexts, and the English scales were translated and checked by an expert committee, consisting of two hospitality professors and four Ph.D. students. Each item was measured from 'strongly disagree (1)' to 'strongly agree (7)'.

The second section of this questionnaire was the demographic variables, including gender, marital status, age, education, position, work experience, monthly income, and hotel department.

Data collection

A pilot survey was conducted in four Chinese star-rated hotels in early February 2020 and 139 valid responses were received. The reliability and validity of each construct were tested. The results showed that the Cronbach's α for each constructs were all above 0.8, suggesting good internal consistency for these scales. In addition, the KMO indexes of each construct were all above 0.7, indicating good validity structure of the questionnaire.

To ensure the representativeness, 23 star-rated hotels, still in operation during COVID-19, from 13 regions of China were surveyed from February 20 to March 5, 2020. Hotels in east China (Fujian, Zhejiang), north China (Shanxi, Beijing), central China (Hunan, Hubei), south China (Guangdong, Guangxi), southwest China (Sichuan, Guizhou), northwest China (Shanxi, Xinjiang), and Northeast China (Jilin) were selected. To avoid the health risks caused by pandemic infection, the survey was conducted through convenience sampling and distributed online. The hyperlink to the questionnaire, completion requirements, and research purposes were sent to each hotel's HR managers for checking, and then were forwarded to employees at various

positions and departments with their assistance. In total, 1,896 questionnaires were returned with 1,594 valid ones, yielding an 84.1% effective response rate.

Results

Characteristics of respondents

The profile of the respondents is shown in Table 1.

Table 1. Respondent profile (n =1,594)

Category		Frequency	Rate (%)	Category		Frequency	Rate (%)
Gender	Male	609	38.2	Monthly income (CNY)	≤ 2,500	530	33.2
	Female	985	61.8		2,501-5,000	740	46.4
Marital	Married	1182	74.2		5,001-10,000	252	15.8
	Unmarried	412	25.8		10,001-20,000	48	3.0
Age	20 or below	33	2.1		≥ 20,001	24	1.5
	20-29	386	24.2	Work experience (years)	Less than one	226	14.2
	30-39	445	27.9		1-3	367	23.0
	40-49	514	32.2		3-5	234	14.7
	50-59	201	12.6		5-10	338	21.2
	60 or above	15	0.9		More than 10	429	26.9
Education	Junior high college or below	519	32.6	Department	Front office	286	17.9
	Senior high school	525	32.9		Food and beverage	257	16.1
	Junior college	326	20.5		Housekeeping	360	22.6
	Bachelor’s degree	210	13.2		Entertainment	51	3.2
	Master’s degree or above	14	0.9		Security	46	2.9
Position	Trainee	47	2.9		Kitchen	113	7.1

	Junior staff	759	47.6		Finance	97	6.1
	Foreman	140	8.8		Sales	59	3.7
	Supervisor	313	19.6		Engineering	72	4.5
	Manager	239	15.0		Human resources	61	3.8
	Director	96	6.0		Others	192	12.0

Common method variance (CMV)

The order of items was varied in the questionnaires, a few items were set in the reverse direction, and the assurance of anonymity were steps taken to avoid CMV in the data collection. Then, the Harman's single-factor test was performed by including all items for the principal component analysis (PCA) without rotation. The results presented that the KMO index was 0.953 (> 0.7) and the first component explained 37.8% (< 40%) of CMV (Podsakoff *et al*., 2003). In addition, the variance inflation factor (VIF) of each regression was tested to avoid collinearity. The results showed that the VIF of each variable was lower than the threshold of three (Kim *et al*., 2012). Thus, CMV was not a major concern in this research.

Reliability and validity tests

Exploratory factor analysis (EFA) with PCA through SPSS 22.0 was conducted to examine the reliability and validity of questionnaire data (Table 2). The EFA results showed that Cronbach's alpha for belief restoration (0.880), perceived susceptibility (0.917), perceived severity (0.842), safety compliance (0.832), safety participation (0.868), safety adaptation (0.871), safety coaching (0.919), safety control (0.918), safety motivation (0.875), and safety care (0.947) were all over 0.8, indicating that the questionnaire items had reasonably good internal consistency. The KMO index of these constructs ranged from 0.706 to 0.897, and the factor loading coefficients of each item were above 0.5, suggesting a sound validity structure of the questionnaire.

Confirmatory factor analysis (CFA) through Amos 21.0 was conducted to examine the convergent and discriminant validities of each construct (Table 2). The

CFA results were above the suggested levels (Hooper *et al*., 2008): χ^2/df = 3.516 (1 <, < 5), RMSEA = 0.040 (< 0.05), SRMR = 0.046 (< 0.05), AGFI = 0.910 (> 0.9), GFI = 0.922 (> 0.9), NFI = 0.951 (> 0.9), RFI = 0.946 (> 0.9), ILI = 0.965 (> 0.9), TLI = 0.961(> 0.9), CFI = 0.965 (> 0.9), PGFI = 0.798 (> 0.5), suggesting that the model fitted well with the actual data. Moreover, the standard factor loadings and average variances extracted (AVEs) of each construct were over 0.5, and the composite reliabilities (CRs) were more than 0.8, indicating good convergent validity.

Table 2.1. Second-order factor structure validation of safety leadership (n = 1,594)

Constructs		Items	Explanatory factor analysis				Confirmatory factor analysis				
			Mean	Factor loadings	KMO	Cronbach's α	Factor loadings	T value	Coefficient	AVE	CR
Safety leadership	Safety coaching	SL01	6.47	0.875	0.849	0.919	0.836	42.315	0.956	0.8897	0.9699
		SL02	6.40	0.904			0.869	45.270			
		SL03	6.34	0.922			0.899	48.148			
		SL04	6.30	0.891			0.847	-			
	Safety control	SL05	6.34	0.873	0.874	0.918	0.863	39.506	0.914		
		SL06	6.47	0.902			0.904	42.109			
		SL07	6.43	0.862			0.813	36.412			
		SL08	6.21	0.853			0.778	40.437			
		SL09	6.34	0.867			0.793	-			
	Safety motivation	SL10	6.26	0.806	0.808	0.875	0.831	26.444	0.934		
		SL11	5.82	0.874			0.704	32.594			
		SL12	6.06	0.878			0.788	31.918			
		SL13	5.68	0.859			0.634	-			
	Safety care	SL14	6.31	0.909	0.897	0.947	0.869	-	0.968		
		SL15	6.26	0.909			0.862	57.308			
		SL16	6.47	0.918			0.901	51.840			
		SL17	6.40	0.930			0.916	53.827			

		SL18	6.46	0.886			0.870	48.267			

Table 2.2. EFA and CFA of belief restoration, perceived risk and safety behavior (n = 1,594)

Constructs	Items	Explanatory factor analysis (EFA)				Confirmatory factor analysis (CFA)			
		Mean	Factor loadings	KMO	Cronbach's α	Factor loadings	T value	AVE	CR
Belief restoration	BR01	5.84	0.786	0.819	0.880	0.688	-	0.6582	0.8843
	BR02	5.90	0.888			0.850	30.240		
	BR03	5.50	0.901			0.880	30.973		
	BR04	5.40	0.858			0.814	29.173		
Perceived susceptibility	RP01	5.94	0.874	0.839	0.917	0.809	-	0.7344	0.9169
	RP02	5.90	0.885			0.826	37.882		
	RP03	5.69	0.921			0.914	43.371		
	RP04	5.71	0.898			0.875	41.012		
Perceived severity	RS01	6.19	0.688	0.819	0.842	0.602	-	0.5190	0.8419
	RS02	6.58	0.737			0.666	20.706		
	RS03	6.11	0.845			0.753	22.283		
	RS04	6.27	0.851			0.843	23.538		
	RS05	6.19	0.82			0.715	21.499		
Safety compliance	SC01	6.20	0.84	0.717	0.832	0.734	-	0.6477	0.8461
	SC02	6.55	0.886			0.838	31.480		
	SC03	6.39	0.891			0.838	31.484		
Safety participation	SP01	6.17	0.863	0.706	0.868	0.758	-	0.7129	0.8808
	SP02	6.35	0.931			0.939	36.951		
	SP03	6.28	0.891			0.826	34.264		
Safety adaptation	SA01	5.94	0.887	0.739	0.871	0.822	-	0.6973	0.8735
	SA02	6.18	0.905			0.869	38.591		
	SA03	5.87	0.887			0.813	35.948		

Correlation analysis

As presented in Table 3, there were strong correlations among pairs of the main constructs. The square root of the AVEs for each factor were larger than the correlations of specific factors with any of the other factors, confirming the discriminant validity of each construct.

Table 3. Correlation analysis between constructs (n = 1594)

Constructs	1	2	3	4	5	6	7	VIF
Safety leadership	(0.943)							1.553
Belief restoration	0.351**	(0.811)						1.255
Perceived susceptibility	0.108**	-0.084**	(0.857)					1.085
Perceived severity	0.221**	0.092**	0.216**	(0.720)				1.108
Safety compliance	0.556**	0.399**	0.126**	0.224**	(0.844)			1.824
Safety participation	0.396**	0.221**	0.108**	0.134**	0.506**	(0.805)		1.382
Safety adaptation	0.562**	0.302**	0.131**	0.210**	0.583**	0.460**	(0.835)	-
Mean	6.28	5.66	5.81	6.27	6.38	6.27	6.00	
S.E.	0.91	1.30	1.43	1.02	0.86	1.03	1.07	

Notes: The diagonal element is the square root of the extracted mean variance.

Mediation effect of belief restoration

To test the direct and indirect hypotheses, structural equation modelling provided by AMOS 21.0 was conducted, which provides indirect effect estimates for serial multiple mediators, and confidence intervals (CIs) derived from the bootstrap distribution with 2,000 bootstrap estimates. Among these 1,594 respondents, there was good fit with the data (χ^2/df = 5.389, RMSEA = 0.052, SRMR = 0.0488, AGFI = 0.891, GFI = 0.908, NFI = 0.947, RFI = 0.941, IFI = 0.956, TLI = 0.951, CFI = 0.956, PGFI = 0.765). Although χ^2/df was slightly greater than five, this is acceptable if the sample size is large (> 1,500) and could be used for further hypothesis testing

(Hooper *et al*., 2008).

Regarding direct effects, safety leadership had a positive and significant impact on safety compliance (β = 0.548, p = 0.001), safety participation (β = 0.419, p = 0.001), and safety adaptation (β = 0.579, p = 0.001), supporting H1a, H1b, and H1c. In addition, safety leadership had a positive and significant impact on belief restoration (β = 0.365, p = 0.001), and belief restoration had a positive and significant impact on safety compliance (β = 0.254, p = 0.001), safety participation (β = 0.104, p = 0.001), and safety adaptation (β = 0.133, p = 0.001) (Table 4). Regarding indirect effects, belief restoration partially mediated the effect of safety leadership on compliance (SL → BR → SCOM; 0.093, p = 0.001, CI: 0.070-0.120); participation (SL → BR → SPAR; 0.038, p = 0.001, CI: 0.019-0.062); and adaptation (SL → BR → SADA; 0.049, p = 0.001, CI: 0.027-0.076), supporting H2.

Table 4. Structural equation modeling

Path		Estimate	S.E.	Bias-corrected 95% CI		p-value
				Lower	Higher	
Direct effect	BR→SCOM	0.254	0.031	0.195	0.315	0.001
	BR→SPAR	0.104	0.030	0.051	0.168	0.001
	BR→SADA	0.133	0.032	0.071	0.196	0.001
	SL→BR	0.365	0.029	0.309	0.422	0.001
	SL→SCOM	0.548	0.035	0.474	0.611	0.001
	SL→SPAR	0.419	0.035	0.352	0.486	0.001
	SL→SADA	0.579	0.032	0.515	0.641	0.001
Indirect effect	SL→BR→SCOM	0.093	0.013	0.070	0.120	0.001
	SL→BR→SPAR	0.038	0.011	0.019	0.062	0.001
	SL→BR→SADA	0.049	0.012	0.027	0.076	0.001
Total effect	SL→SCOM	0.640	0.030	0.577	0.693	0.001
	SL→SPAR	0.457	0.031	0.393	0.516	0.001
	SL→SADA	0.627	0.027	0.572	0.679	0.001

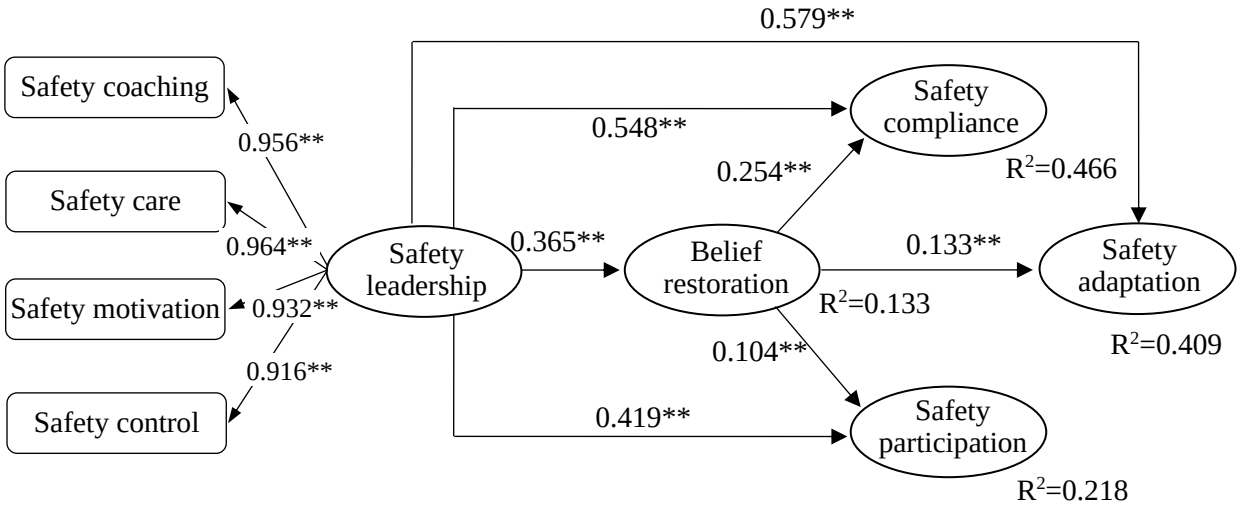

Figure 2. Structural equation modelling

Moderation effect of perceived susceptibility

According to Hayes' (2013) and Wen and Ye's (2014) suggestions, the moderated mediation effect is confirmed if the results satisfy any of the following conditions. First, the perceived risk moderated the relationship between safety leadership and belief restoration, and belief restoration had a significant impact on the safety behavior. Second, perceived risk moderated the relationship between belief restoration and safety behavior, and safety leadership had a significant impact on belief restoration. Third, perceived risk both moderated the relationship between safety leadership and belief restoration, and the relationship between belief restoration and safety behavior.

Therefore, hierarchical regression provided by SPSS 21.0 was applied to examine the moderation effect of perceived risk (susceptibility and severity) on the direct and mediated effects of safety leadership and safety behavior. To avoid the causal error by respondent characteristics and the influence of multiple collinear relationships among variables, this research controlled for the demographic variables during the analysis of moderation effects and centralized the independent (mediating) and moderating variables to obtain interaction terms.

Table 5 and Figure 3 presents the moderation effect of perceived susceptibility

between safety leadership and behavior. In equation 1 (E1), safety leadership positively affected employee safety compliance (β = 0.553, t = 26.153) and the interaction term (SL × PSU) negatively affected employee safety compliance (β = -0.122, t = -5.912). In equation 7 (E7), safety leadership positively affected employee belief restoration (β = 0.390， t = 16.669) and the interaction term (SL × PSU) negatively affected employee belief restoration (β = -0.057, t = -2.505). In equation 2 (E2), belief restoration positively affect employee safety compliance (β = 0.447, t = 19.588) and the interaction term (BR × PSU) negatively affected employee safety compliance (β = -0.163, t = -7.169). This result showed that perceived susceptibility moderated the direct and indirect effects (before and after) of "safety leadership - belief restoration - safety compliance".

In equation 3 (E3), safety leadership positively affected employee safety participation (β = 0.382, t = 16.289) and the interaction term (SL × PSU) had no impact on safety participation (β = -0.040, t = -1.774). In equation 4 (E4), belief restoration positively affected employee safety participation (β = 0.266, t = 10.907) and the interaction term (BR × PSU) negatively affected employee safety participation (β = -0.099, t = -4.072). This result showed that perceived susceptibility moderated the indirect effect (before and after) of "safety leadership - belief restoration - safety participation".

In equation 5 (E5), safety leadership positively affected employee safety adaptation (β = 0.536, t = 25.263) and the interaction term (SL × PSU) had no impact on safety adaptation (β = -0.008, t = -0.380). In equation 6 (E6), belief restoration positively affected employee safety adaptation (β = 0.346, t = 14.742) and the interaction term (BR × PSU) negatively affected employee safety adaptation (β = -0.107, t = -4.563). This result showed that perceived susceptibility moderated the indirect effect (before and after) of "safety leadership - belief restoration - safety adaptation". Therefore, these results provided support for H3a and H4a.

Table 5. Moderation effect of perceived susceptibility

Variables		Safety compliance		Safety participation		Safety adaptation		Belief restoration
		E1	E2	E3	E4	E5	E6	E7
		β	β	β	β	β	β	β
Control variables	Gender	0.000	0.046	-0.007	0.021	-0.038	-0.002	-0.050*
	Marital status	0.008	-0.035	-0.005	-0.035	-0.017	-0.061*	0.056
	Age	-0.067*	-0.035	-0.086**	-0.063	0.017	0.05	0.010
	Education	-0.038	0.004	0.035	0.060*	-0.005	0.027	-0.089**
	Department	-0.056*	-0.002	-0.057*	-0.025	-0.040	0.002	-0.126***
	Position	0.017	0.126***	0.116***	0.186***	0.100***	0.197***	-0.154***
	Monthly income	0.009	0.034	-0.029	-0.009	-0.021	0.006	0.050
	Work experience	0.007	-0.038	0.027	-0.003	0.020	-0.022	0.076*
Independent variables	Safety leadership (SL)	0.553***		0.382***		0.536***		0.390***
	Perceived susceptibility (PSU)	0.079***	0.192***	0.069*	0.145***	0.072**	0.172***	-0.104***
	Belief restoration (BR)		0.447***		0.266***		0.346***	
Interaction terms	SL ×PSU	-0.122***		-0.040		-0.008		-0.057*
	BR×PSU		-0.163***		-0.099***		-0.107***	
R2		0.338	0.228	0.186	0.117	0.334	0.180	0.192
Adj-R2		0.333	0.223	0.180	0.111	0.329	0.175	0.186
F		73.267	42.446	32.893	19.019	72.108	31.668	34.091

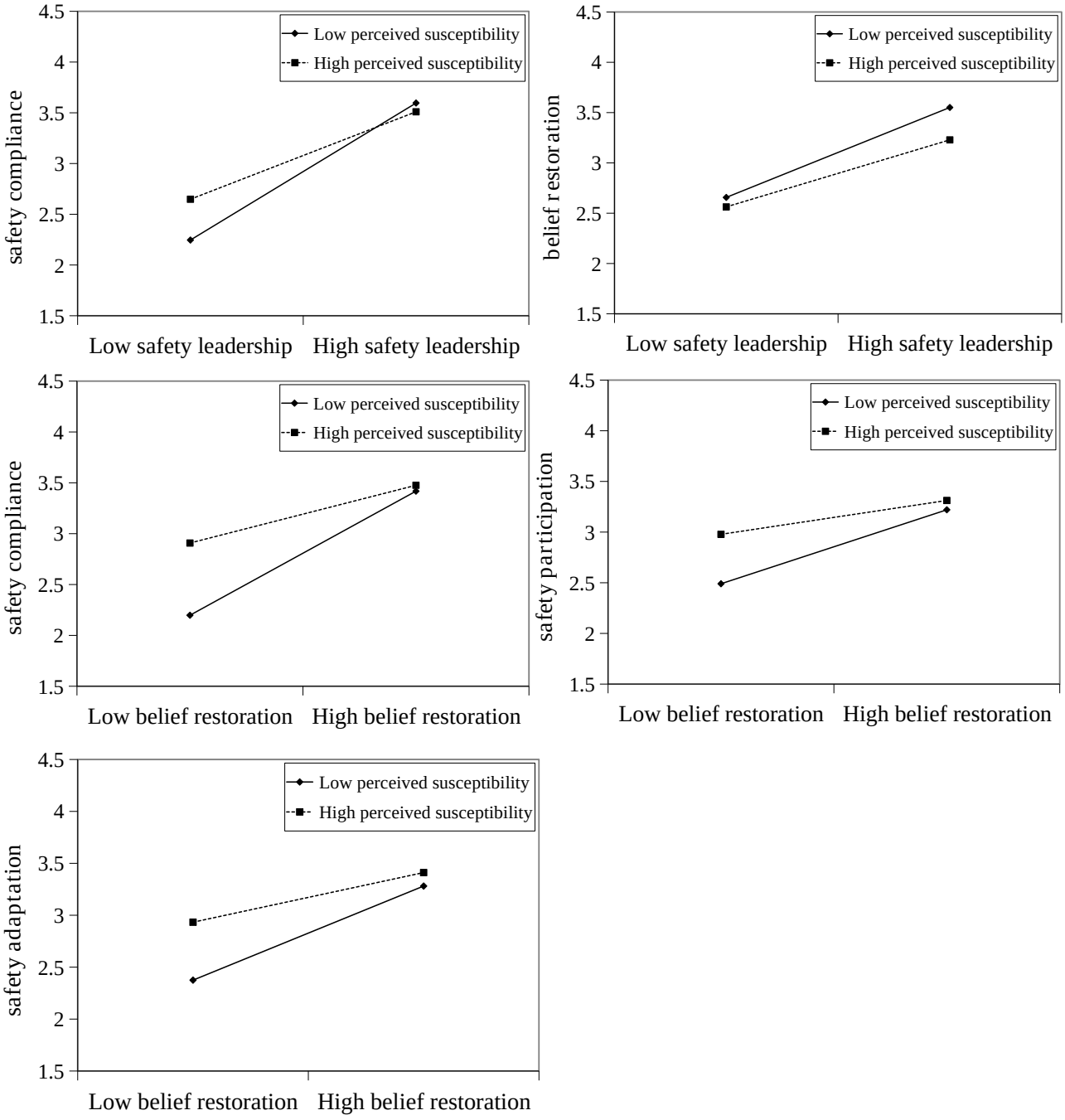

Figure 3. Moderation effect of perceived susceptibility

Moderation effect of perceived severity

Table 6 and Figure 4 presents the moderation effect of perceived severity between safety leadership and behavior. In equation 1 (E1), safety leadership positively affected employee safety compliance (β = 0.531, t = 24.339) and the interaction term (SL × PSE) negatively affected employee safety compliance (β = -0.080, t = -3.775). In equation 7 (E7), safety leadership positively affected employee belief restoration (β

= 0.376, t = 15.522) and the interaction term (SL × PSE) had no significant impact on belief restoration (β = -0.008, t = -0.352). In equation 2 (E2), belief restoration positively affected employee safety compliance (β = 0.403, t = 17.643) and the interaction term (BR × PSE) negatively affected employee safety compliance (β = -0.087, t = -3.887). This result showed that perceived severity moderated the direct and indirect effects (after) of "safety leadership - belief restoration - safety compliance".

In equation 3 (E3), safety leadership positively affected employee safety participation (β = 0.377, t = 15.609) and the interaction term (SL × PSE) had no impact on safety participation (β = -0.016, t = -0.671). In equation 4 (E4), belief restoration positively affected employee safety participation (β = 0.237, t = 9.683) and the interaction term (BR × PSE) had no impact on safety participation (β = -0.038, t = -1.581). This result showed that the perceived severity had no moderation effect on the direct and indirect effect (before and after) of "safety leadership - belief restoration - safety participation".

In equation 5 (E5), safety leadership positively affected employee safety adaptation (β = 0.527, t = 24.228) and the interaction term (SL × PSE) had no impact on safety adaptation (β = 0.022, t = 1.058). In equation 6 (E6), belief restoration positively affected employee safety adaptation (β = 0.311, t = 13.324) and the interaction term (BR × PSE) negatively affected employee safety adaptation (β = -0.080, t = -3.485). This result showed that perceived severity moderated the indirect effect (after) of "safety leadership - belief restoration - safety adaptation". Therefore, these results provided partial support for H3b and H4b.

Table 6. Moderation effect of perceived severity

Variables		Safety compliance		Safety participation		Safety adaptation		Belief restoration
		E1	E2	E3	E4	E5	E6	E7
		β	β	β	β	β	β	β
Control variables	Gender	0.006	0.044	-0.005	0.019	-0.036	-0.003	-0.045
	Marital status	0.016	-0.030	-0.004	-0.035	-0.014	-0.057	0.067*
	Age	-0.061*	-0.031	-0.084**	-0.060	0.020	0.054	0.013
	Education	-0.031	0.009	0.040	0.065*	0.002	0.033	-0.096**

	Department	-0.056*	0.001	-0.055*	-0.022	-0.036	0.005	-0.130***
	Position	0.023	0.137***	0.120***	0.195***	0.105***	0.206***	-0.159***
	Monthly income	-0.001	0.004	-0.037	-0.029	-0.029	-0.019	0.062*
	Work experience	0.005	-0.043	0.024	-0.008	0.017	-0.027	0.086**
Independent variables	Safety leadership (SL)	0.531***		0.377***		0.527***		0.376***
	Perceived severity (PSE)	0.095***	0.181***	0.049*	0.109***	0.094***	0.170***	0.011
	Belief restoration (BR)		0.403***		0.237***		0.311***	
Interaction terms	SL×PSE	-0.080***		-0.016		0.022		-0.008
	BR×PSE		-0.087***		-0.038		-0.080**	
R2		0.335	0.219	0.183	0.106	0.337	0.184	0.177
Adj-R2		0.330	0.214	0.177	0.100	0.333	0.178	0.172
F		72.332	40.409	32.205	17.041	73.166	32.337	31.003

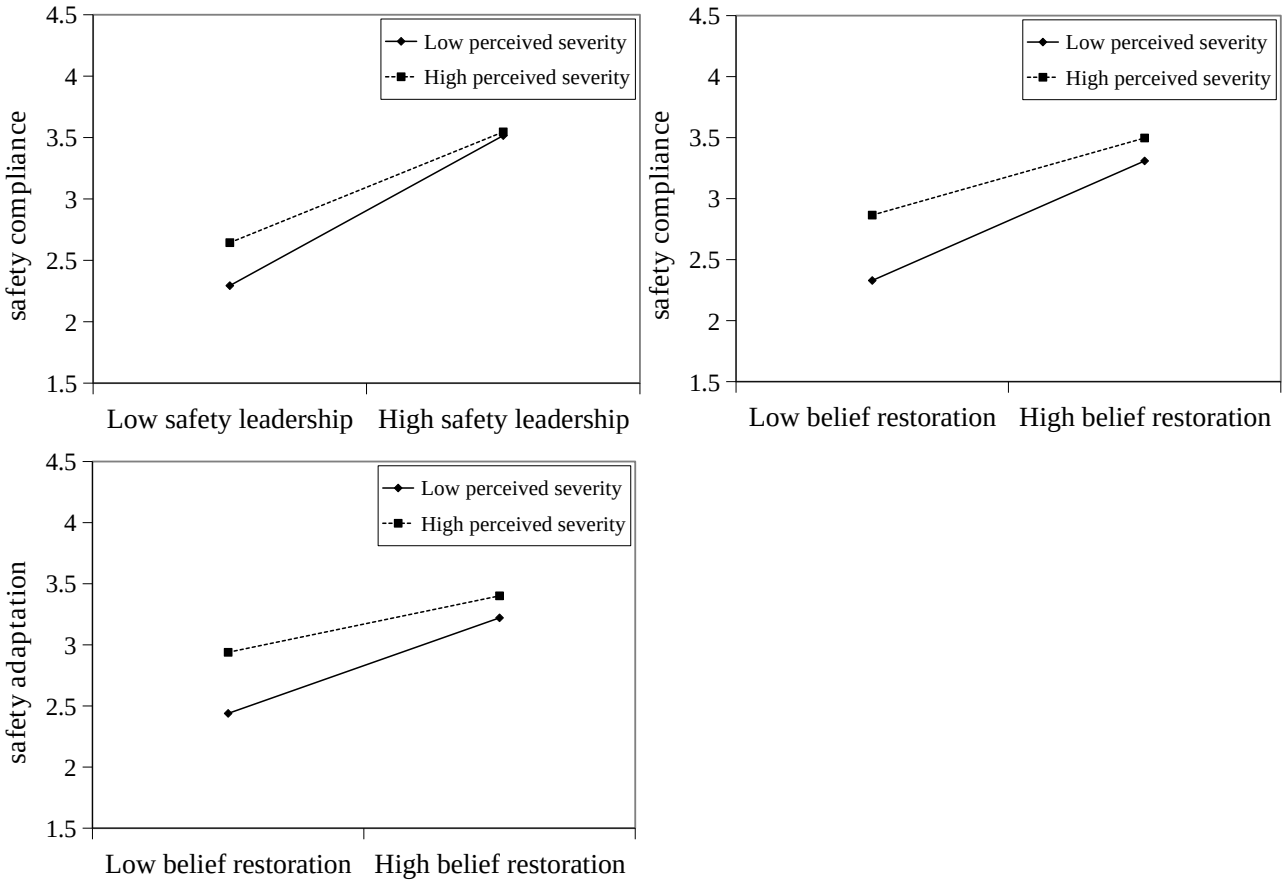

Figure 4. Moderation effect of perceived severity

Conclusions and implications

Conclusions

Based on SDT, and with the background of the COVID-19 pandemic, this research explored the impact of hotel safety leadership on employee belief restoration and safety behavior. The moderation effect of perceived risk was investigated based on the substitutes for leadership concept. The main conclusions are as follows.

First, hotel safety leadership positively predicted employee safety behavior. The results showed that safety leadership had a significant and positive impact on employee safety compliance, participation, and adaptation, which was consistent with the results of Clarke (2013) and Xue *et al*. (2020). Safety leadership had the largest upward effect on safety compliance, followed by safety adaptation and participation. These results suggested that safety leadership encourages employees to comply with safety systems, maintain workplace safety, and learn new safety skills to improve hotel safety performance.

Second, belief restoration partially mediated the impact of safety leadership on behavior. Specifically, belief restoration partially mediated the impact of safety leadership on compliance, participation and adaptation, implying that it is an important mediation variable for predicting employee safety behavior. These results demonstrated the cognitive and mediation processes of safety leadership effects on safety behavior during a major crisis.

Third, perceived risk negatively moderated the direct as well as the mediation effect of "safety leadership - belief restoration - safety behavior." The results showed that perceived susceptibility and severity negatively moderated the impact of safety leadership on safety compliance, suggesting that perceived risk partially substituted for the task-oriented elements of safety leadership, and weakened the direct effect of safety leadership on compliance. The results for the moderated mediation model showed that the higher the perceived risk and/or the lower the belief restoration, the weaker was the effect of hotel safety leadership on employee safety behavior during COVID-19, which is a significant conclusion not found in previous research.

Theoretical implications

First, this investigation expanded the research on the effectiveness of safety leadership and especially with respect to safety in the hospitality industry during a major global crisis. Employee safety behavior is a critical indicator of workplace safety and performance, and its influencing factors are widely researched (Chen and Chen, 2014; Neal *et al*., 2000; Wang *et al*., 2019; Wu, 2005). Importantly, organizational leadership is closely related to employee safety behavior and corporate safety performance. The impact of different leadership styles on employee safety behavior has been investigated in normal operating conditions, and the effectiveness of safety leadership has been confirmed in diverse high-risk occupations as well such as construction, nuclear power plants, container terminal operations, and university and college laboratories (Gracia *et al*., 2020; Lu and Yang, 2010; Stiles *et al*., 2018; Wu, 2005; Wu, 2008). This research explored and confirmed the effect of safety leadership on behavior in the context of a pandemic that affected hotel services. This not only broadens the research on safety leadership, but also provides new insights on influential factors of hotel employee safety behavior. In addition, this research provides a theoretical basis for motivating and fostering hotel employee safety behaviors during crises.

Second, based on SDT, this research elaborated on the effect of organizational safety leadership on employee safety behavior and provides a theoretical basis for analyzing the psychological mediation processes in promoting employee safety behavior in crisis situations. The psychological mediation process of employee belief and motivation between organization leadership and employee behavior has become an important topic (Kim *et al*., 2019; Li *et al*., 2020; Ma *et al*., 2018). Combined with SDT, relationship-oriented leadership strategies (e.g., safety coaching, safety care) are inducements for autonomous motivation, and task-oriented leadership strategies (e.g., safety motivation, safety control) are inducers of controlled motivation, and belief restoration reflects the intrinsic motivation of employees in crisis contexts. This research revealed the mediation effect of belief restoration between safety leadership and safety behavior. The theoretical contribution of this research is in the integration of the safety performance model and SDT, which helps to develop motivation theory in safety research, as well as explaining the psychological mediation process that promotes employee safety behavior. Also, this research extends the application of SDT in crisis situations and in hospitality occupational safety.

Third, based on the substitutes for leadership concept, this research uncovered the effectiveness of safety leadership during a major crisis. The substitutes for leadership concept has been very widely explored (Hussain *et al*., 2016). The concept proposes that certain individual, task, and organizational variables can provide guidance and positive feelings for employees and act as "substitutes for leadership" (Kerr and Jermier, 1978). In this research, perceived risk represented an external risk environment variable as well as individual perception variable and revealed its moderation role in the direct and mediated effects of "safety leadership - belief restoration - safety behavior". This research indicates that perceived risk is an important substitute variable that influences the effectiveness of safety leadership in the context of an epidemic in China, which provides new evidence and a theoretical basis for analyzing the impact and boundary conditions of safety leadership.

Practical implications

First, hotels should develop management strategies based on safety leadership, and motivate and promote employee safety behavior from four aspects - safety coaching, care, motivation, and control. Regarding safety coaching, hotel managers should become role models for the safety behavior of staff and provide employees with sufficient safety knowledge and safety guidance. Regarding safety care, hotel

managers should meet the safety needs of employees and develop a safe workplace, as well as providing enough resources to support employee safety behavior. For safety motivation, hotel managers should establish safety motivation systems and reward employees for behaviors that are conducive to improving safety performance, such as adhering to safety systems, participating in safety training, and proposing new safety ideas. Regarding safety control, hotel managers should establish safety management systems and safety behavioral norms and improve hotel safety performance through monitoring employee safety performance and correcting unsafe behaviors.

Second, hotels should pay attention to belief restoration during crises and provide psychological motivation for employees to adopt safety behaviors. Hotel managers should care about employee needs and psychological status during the crisis, provide employees with positive and sufficient safety information, as well as demonstrating the hotel's crisis response capabilities. To enhance employee positive expectations and confidence of crisis intervention, hotel managers should provide positive feedback on employees' safety concerns. In the context of events such as COVID-19, hotel managers should develop an organizational atmosphere that supports safety, conduct systematic safety skills training, and provides sufficient protective equipment. This will assist with improving employee safety performance and could be instrumental in enhancing employee belief restoration.

Third, hotels should strengthen the management of employees' perceived risk during a crisis and implement appropriate risk information intervention measures. Specifically, hotel managers should provide employees with real and objective crisis information. Most importantly, hotel managers should help employees to objectively understand the risk factors and enhance their knowledge and ability to respond to a crisis. In addition, hotel managers should avoid spreading rumors and promote positive information, such as about hotel safety response strategies and safety management effectiveness, thereby reducing employee perceived risk.

Limitations and future research directions

This research has several limitations. First, the data were collected with the same measurement system within a certain period of time. Future research should apply a longitudinal and paired sample design to confirm these conclusions. Second, based on the COVID-19 crisis context, this research investigated the effect of safety leadership on safety behavior in Chinese hotels. To improve the validity and generalizability of

this conceptual model, future research should test and expand it in different crises, business fields and other cultural backgrounds. Third, this research confirmed the impact of safety leadership on employee safety behavior based on SDT. Future research should confirm and expand this conceptual model based on different theories in relation to crisis management (e.g., signal theory, information integration theory). Also, future research can explore the antecedents of employee safety behavior from organizational (e.g., safety climate, corporate social responsibility) and individual levels (e.g., safety motivation, safety knowledge), which will further advance the knowledge about the formation of employee safety behaviors.

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