



Integrating Safety Attitudes and Safety Stressors into Safety Climate and Safety Behavior Relations: The Case of Healthcare Professionals in Abu Dhabi

Fatima Al Faqeeh¹, Khalizani Khalid^{1*} and Abdullah Osman²

¹College of Business, Abu Dhabi University, Abu Dhabi, UAE

²College of Business, Abu Dhabi University, Al-Ain, UAE

ARTICLE INFO

Article history:

Received: 20 November 2018

Accepted: 11 February 2019

Online:

DOI 10.5001/omj.2019.93

Keywords:

Health Personnel;
Organizational Culture;
Attitude; Surveys and
Questionnaires; Hospitals,
Public; United Arab Emirates.

ABSTRACT

Objectives: How safety climates, safety attitudes, and safety behaviors are related remains unexplored in the literature, with no study so far investigating the moderating path of safety stressors between these variables. We sought to understand the path through which safety climates may affect safety-behavior-related outcomes, such as safety compliance and participation, through the integration of safety attitudes. Since this study is related to the safety-related perception-intention-behavior relationship, safety stressors are proposed as a moderator of this relationship. **Methods:** A total of 770 healthcare professionals working in public hospitals across Abu Dhabi were randomly selected for this study. We used questionnaires covering demographic details, safety behaviors, safety climates, safety attitudes, and safety stressors to obtain the data. **Results:** The results revealed the partial mediating role of safety attitudes in the relationship between safety climate and safety behavior. Additionally, safety stressors did not moderate the relationship between safety climates, safety attitudes, and safety behaviors, which has some interesting implications for healthcare professionals. **Conclusions:** The study suggests that safety attitudes may also regulate the impact of perceptions of management values regarding safety, policies, and procedures. It is highly likely that healthcare professionals who experience a positive workplace safety climate will form positive safety attitudes that encourage safety behavior. In addition, the homogeneous characteristics of healthcare professionals' in the UAE may also offer the positive coping strategy that caused the insignificant moderating effect of safety stressors on the relationship between safety climates, safety attitudes, and safety behaviors.

Safety behavior has received increased intention in recent research due to the link between safety behavior and patient safety. Studies show safety climate, safety attitudes, and safety stressors are the factors related to safety behavior.¹⁻³ The effect of these factors on safety behavior has been extensively studied in other high-risk sectors but is limited in the healthcare sector. One way that safety behavior can be better understood is to focus on safety attitudes and safety stressors. Existing research has focused mainly on safety attitudes and safety stressors as antecedents of safety behavior.^{2,3} However, the mediating role of safety attitudes and the moderating role of safety stressors in relation to safety behavior have remained unclear. Healthcare professionals' workplace psychological experiences have been found to play an important

role in patient safety.⁴ However, little is known about the psychological safety-related components, such as safety attitudes and safety stressors that may impact the safety behavior of healthcare professionals related to patient safety.

Therefore, a deep understanding of the factors beyond the safety climate and safety behavior relations could help healthcare professionals in their aim to improve workplace safety since occupational accidents and injuries can result in major patient safety concerns.⁵ This study contributes to the emerging body of literature on safety research by addressing two issues:

- The first objective of this study was to confirm the validity of the relationship between safety climate and safety behavior and a better understanding of the role of safety attitudes in this relation. This

proposal considers that safety attitudes partially mediates the relationship between safety climate and safety behavior of healthcare professionals. The inclusion of safety attitudes in this study is based on the important role that this variable plays in the healthcare safety context, which remains the most sensitive in evaluating patient safety.² This fact is especially relevant in this context of analysis due to the healthcare professionals' experience, or age.^{6,7}

- Secondly, the study addresses how safety stressors may interact with the antecedents of safety behavior to form this relationship. More specifically, the most prominent cited features of patient safety culture and healthcare safety culture is occupational stress, which results from the working conditions and influences action.^{5,8} Therefore, safety stressors are considered as moderators of the effect of safety climate and safety attitudes on safety behavior. The analysis of the moderating effect might be useful to implement strategies focused on limiting healthcare professionals' stressors, environmentally, and occupationally.

Safety climates are derived from organizational climates and describe workers' perceptions of the value of safety in their work environment.⁹ Safety climates are related to safety attitudes,¹⁰ occupational stress,¹¹ and predicting a patient safety culture.^{12,13} Safety behaviors are how individuals perform safety at work, which is classified as safety compliance and safety participation.^{9,14} Safety behaviors are negatively predicted by occupational stressors⁸ and are affected by healthcare professionals' attitudes.⁴ Safety attitudes are defined as personal attributes that relate to the tendency to respond to safety situations.¹⁴ Brown et al,¹⁵ posit that since little focus has been paid to measuring the safety behavior outcomes of safety participation and safety compliance, safety attitudes need to be carefully examined to ensure patient safety. Safety stressors are stress reactions when employees face safety obstacles and safety uncertainty in performing their tasks in the workplace.¹⁶ While there has been limited research on the effects of safety climates on occupational stressors, and occupational stressors on safety behavior, there has been more research on the relationships between safety climates and organizational constraints, and between occupational stressors and job performance in general.

Table 1: Definitions for constructs used in our study.

Construct	Definition
Safety climate	Employees' perceptions of the value of safety in their work environment. ⁹
Safety attitudes	Employee relative beliefs, feelings, and behavioral tendencies towards safety at the workplace. ^{20,21}
Safety stressors	Organizational-related events or conditions that employees would consider demanding, challenging and/or threaten employees' safety. ^{22,23}
Safety behavior	Actual safety behavior that employees performed at work (classified into safety compliance and safety participation). ^{9,24}
Safety compliance	Safety-related behavior required by the organization to be carried out by employees to keep the workplace safe. ^{9,24}
Safety participation	Voluntary safety-related behaviors that may not directly work on personal safety but help to develop an organizational context to support safety. ^{9,24}

Therefore, the nature of how safety climates, safety attitudes, and safety behaviors are related remains unexplored in the literature, with no study so far investigating the moderating path of safety stressors between these variables. While some research supports the suggestions of the action theory¹⁷ (regarding the effect between occupational stressors and job performance), the results are inconsistent.¹⁸ Vinodkumar and Bhasi,¹⁴ highlighted the role of individual choices of actions and responses to safety circumstances in the workplace, including safety attitudes, in mediating the relationship between safety climates and safety behaviors. Differences in safety stressors are based on the level of control individuals perceive they have over them, moderating the relationships between safety climates, safety attitudes, and safety behaviors.¹⁹

Our study examined the effect of safety climates on safety behaviors through safety attitudes, mediated by the level of safety stressors. The strong relationship between safety climates and safety behaviors is widely acknowledged in the literature, although no study so far has looked at the workplace-safety-related psychological factors that may explain this relationship. Furthermore, safety attitudes that are a key element of patient safety cultures have not been studied much concerning safety climates and safety behaviors. Safety stressors, on the other hand,

have been widely studied. For example, there have been studies on organizational constraints in relation to safety climates and safety behaviors. Our study hypothesized that safety attitudes partially mediate the relationship between safety climates and safety behaviors, including their outcomes, which are safety compliance and safety participation (hypothesis 1). Furthermore, safety stressors are hypothesized to moderate these relationships (hypothesis 2). Table 1 presents the definition of the constructs used in this study.

METHODS

Of 1200 randomly distributed online questionnaires, only 770 individuals completed the survey and gave their informed consent to participate in the study. Over half (67.4%) were female, age ranged from 25 to 65 years (mean = 27.9 and standard deviation = 3.7), and worked in public hospitals run by public-private partnerships across Abu Dhabi, UAE. The response rate was sufficient and met the threshold suggested by Frohlich.²⁵ Most participants were nurses (n = 494, 64.2%); 195 (25.3%) participants were allied health, and 81 (10.5%) were physicians. Experience ranged from less than one year to 15 years, with a mean job tenure of 8.8 years. Most respondents were Filipinos (n = 350; 45.5%), followed by Indians (n = 342), and other nationals (n = 78).

This study was approved by Institutional Review Board of the authors' institution and Abu Dhabi Health Services Company (SEHA). The participants gave their consent to participate in the study by starting the survey after reading the cover letter explaining the confidentiality and anonymity of the respondents and indicating their informed consent to participate.

A set of questionnaires was developed to measure the four constructs: safety behaviors, safety climate, safety attitudes, and safety stressors. The self-reported survey was not translated into Arabic because English is the primary language in the healthcare sector in the UAE. Existing measurements of the multi-item constructs have been verified in the literature and were used in this study. A reliable and well-validated nine-item safety behaviors scale used in this study was adapted from Vinodkumar and Bhasi,¹⁰ by dividing it into two subscales, one measuring safety compliance with a four-item scale and the other safety participation

with a five-item scale. The safety behavior instrument measures the actual safety behaviors (regulated and voluntary) exhibited by healthcare professionals at the workplace. Participants rated how strongly they considered themselves to be performing safety behaviors at work. The Cronbach's reliability for the total score of the current sample was 0.822; the scores were 0.908 for safety compliance and 0.736 for safety participation. The safety climate questionnaire-short form is a three-item scale adapted from Neal et al.,⁹ which measures the perceptions of healthcare professionals on the attitudes and activities of top management regarding safety management. The Cronbach's reliability for the total score in the current sample was 0.887. Safety attitudes included a five-item scale adapted from Guldenmund²⁰ and Mearns et al.,²¹ to evaluate healthcare professionals' attitudes towards responding to safety situations in the workplace. The Cronbach's reliability in this sample for the total score was 0.885. For safety behavior, safety climate, and safety attitudes, Likert scales ranging from 1 = 'strongly disagree' to 7 = 'strongly agree' were used. Safety stressors included a 10-item scale adapted from Spector et al.,²² and Rizzo et al.,²³ to evaluate healthcare professionals' safety-related stressors in the workplace. The safety stressors used Likert scales ranging from 1 = 'strongly disagree' to 6 = 'strongly agree'. The face validity was tested for all instruments, in which experts qualify and validate each item in the instruments.²⁶ All items of the instruments were retained because a high level of agreement was observed across experts. Table 2 presents the factor names and items.

The complicated characteristics of the healthcare sector provide complex conditions for the consideration of safety behavior and pose challenges to safety behavior research within this industry. Therefore, this study employed multilevel variables (i.e., safety climate, safety attitudes, safety stressors, and safety behaviors) to examine the psychosocial sequence of relationships among these safety responses with regression analysis. Compared to traditional regression analysis, the structural equation modeling (SEM) method analyzes data with consideration of their structural complexity and permission of study on relationships among each factor concurrently.²⁷ Multi-sample analysis serves to strengthen the support found for the meaningfulness and robustness of the proposed model.²⁸

Table 2: Factors names and items.

Names	Items
Safety compliance¹⁰	
SC1	I use all necessary safety equipment's to do my job.
SC2	I carry out my work in a safe manner.
SC3	I follow correct safety rules and procedures while carrying out my job.
SC4	I ensure the highest levels of safety when I carry out my job.
Safety participation¹⁰	
SP1	I help my coworkers when they are working under risky or hazardous conditions.
SP2	I always point out to the management if any safety-related matters are noticed in my hospital.
SP3	I put extra effort to improve the safety of the workplace.
SP4	I voluntarily carry out tasks or activities that help to improve workplace safety.
SP5	I encourage my coworkers to work safely.
Safety climate⁹	
SC1	Management places a strong emphasis on workplace health and safety.
SC2	Safety is given a high priority by management.
SC3	Management considers safety to be important.
Safety attitudes^{20,21}	
SA1	I feel that it is important to maintain safety at all times.
SA2	I carry out my work in a safe manner.
SA3	I feel that it is necessary to put efforts to reduce accidents and incidents at the workplace.
SA4	I feel that it is important to encourage others to use safe practices.
SA5	I feel that it is important to promote safety programs.
Safety stressors^{22,23}	
SS1	I get into arguments about safety with others at work.
SS2	Other people yell at me about safety at work.
SS3	People are rude to me about safety at work.
SS4	There are clear, planned safety goals and objectives for my job.
SS5	I know exactly what is expected of me about safety at work.
SS6	I know what my safety responsibilities are at work.
SS7	I must follow the rule or policy to carry out an assignment safely.
SS8	I work with two or more groups who operate quite differently regarding safety.
SS9	I receive incompatible safety requests from two or more people.
SS10	I receive an assignment without adequate resources and materials to execute it safely.

The data analyses were conducted using SPSS-AMOS V.18 (Chicago: IBM SPSS).²⁹ First,

confirmatory factor analyses were conducted using SEM to test the measurement model of safety behavior and the factors that affected safety behavior. Average variance extracted (AVE) and factor loadings ($\lambda > 0.50$)³⁰ demonstrated acceptable convergent validity. The composite reliability (CR) and Cronbach's alpha (CA) values of > 0.70 ³¹ demonstrated acceptable internal consistency. A relative χ^2 /degree of freedom (DF) value < 5.0 ,³⁰ and comparative fit index (CFI), normed fit index (NFI), and Tucker–Lewis index (TLI)³² values of ≥ 0.90 , and a root mean square error of approximation (RMSEA)²⁷ value of < 0.08 were considered to demonstrate satisfactory model fit. A causal modeling technique was conducted that simultaneously estimated a mediation model including only safety climates and safety behaviors, where safety attitudes were proposed to partially mediate this causal relationship (Model 1). In addition, configural invariance was conducted to measure how well the structural model of safety climates, safety attitudes, and safety behaviors fit the observed data. Configural, metric, and scalar invariance were tested by comparing the fit of two nested models, in which the difference in χ^2 values between nested models was evaluated (Model 2). A multi-sample analysis was performed to assess the moderating role of safety stressors in the relationship between safety behaviors and their direct antecedents—safety climates and safety attitudes. In the case of safety stressors, the total sample was divided into two groups according to the healthcare professionals' responses about their experiences with the level of workplace-safety-related constraint. The arithmetic mean of the moderating variable was used to divide the total sample.³³ Restriction method was used to eliminate variation in the confounding factors between safety climate, safety attitudes, and safety behaviors.³⁴ The first restriction formed of 551 cases representing healthcare professionals with a lower level of safety stressors. The second restriction formed of 219 cases representing healthcare professionals with a higher level of safety stressors. A multi-sample analysis generates an individual structural solution for each group that offers information about the significance of differences between the coefficients of the two models using measurement invariance analysis. This procedure was evaluated via multigroup SEM using a measurement invariance test that compared the sequences of CMIN (chi-square) and CMIN-difference tests.

Table 3: Convergent validity and model fit of the studied variables.

Variables	λ	AVE	CR	CA	χ^2/DF	CFI	NFI	TLI	RMSEA
Safety compliance		0.625	0.963	0.908	2.012	0.999	0.999	0.998	0.036
SC1	0.888								
SC2	0.924								
SC3	0.926								
SC4	0.892								
Safety participation		0.558	0.860	0.736	1.758	0.998	0.996	0.996	0.031
SP1	0.559								
SP2	0.606								
SP3	0.862								
SP4	0.828								
SP5	0.825								
Safety climate		0.786	0.917	0.887	0.000	0.000	0.000	0.000	0.000
SC1	0.857								
SC3	0.890								
SC3	0.911								
Safety attitude		0.786	0.948	0.885	4.010	0.997	0.996	0.992	0.063
SA1	0.843								
SA2	0.803								
SA3	0.896								
SA4	0.956								
SA5	0.927								

λ : factor loading; AVE: average variance extracted; CR: composite reliability; CA: Cronbach's alpha; χ^2 : chi-square; DF: degree of freedom; CFI: comparative fit index; NFI: normed fit index; TLI: Tucker–Lewis index; RMSEA: root mean square error of approximation.

Jiang et al,³⁵ argue that a measurement invariance test is a prerequisite for comparing measurements in different groups.

RESULTS

The convergent validity values for all studied variables were well above the cut-off values of more than 0.50 for the AVE and λ .³⁰ Also, the CR and CA values for all studied variables were well above the suggested cut-off values.³¹ The model fit for all constructs was satisfactory and met the cut-off values of less than 0.50 for χ^2/DF ;³⁰ more than 0.90 for CFI, NFI, and TLI;^{30,32} and less than 0.08 for RMSEA²⁷ [Table 3].

The study variables exhibited sufficient discriminatory validity in AVEs more than in r^2 ,³⁶ and the model fit was satisfactory ($\chi^2/DF = 4.250$, CFI = 0.970, NFI = 0.961, TLI = 0.964, and RMSEA = 0.065). All studied variables were positively intercorrelated (r between 0.484 and 0.738, $p < 0.010$). Safety compliance was positively related to safety participation ($r = 0.697$, $p < 0.010$), safety climate ($r = 0.519$, $p < 0.010$), and safety attitudes ($r = 0.738$, $p < 0.010$). Safety compliance

was positively related to safety climate ($r = 0.432$, $p < 0.010$) and safety attitudes ($r = 0.639$, $p < 0.010$). Moreover, safety climate was positively related to safety attitudes ($r = 0.484$, $p < 0.001$). The data were considered normal because skewness and kurtosis were between the acceptable limits of ± 2.0 and ± 7.0 , respectively [Table 4].²⁷ These

Table 4: Discriminant validity, model fit, and assessment of normality of the studied variables.

Variables	1	2	3	4
Safety compliance	1	-	-	-
Safety participation	0.697** (0.486)	1	-	-
Safety climate	0.519** (0.269)	0.432** (0.187)	1	-
Safety attitude	0.738** (0.545)	0.639** (0.408)	0.484** (0.234)	1
Skewness	-1.122	-0.515	-0.257	0.175
Kurtosis	2.576	-1.395	-1.562	-0.676
Mean	4.5	4.6	4.5	4.2
SD	0.5	0.4	0.4	0.4

**Correlation significant at the 0.010 level (r^2); SD: standard deviation.

Table 5: Results of the models.

	Model 1	Model 2	
		Low SS	High SS
n	770	551	219
χ^2/DF	4.237	2.556	-
CFI	0.970	0.972	-
NFI	0.961	0.955	-
TLI	0.964	0.967	-
RMSEA	0.065	0.045	-
$\Delta\chi^2$	-	4.935	-
ΔDF	-	4	-
p-value	-	0.294	-
Safety attitude \leftarrow safety climate	0.484	0.498 ^a	0.435 ^a
Safety behavior \leftarrow safety attitude	0.820	0.803 ^a	0.847 ^a
Safety behavior \leftarrow safety climate	0.149	0.153 ^a	0.141 ^a
Safety participation \leftarrow safety behavior	0.725	0.742 ^a	0.688 ^a
Safety compliance \leftarrow safety behavior	0.962	0.961 ^a	0.976 ^a
R ² – Safety attitude	0.234	0.248	0.190
R ² – Safety behavior	0.812	0.790	0.841
R ² – Safety compliance	0.925	0.924	0.953
R ² – Safety participation	0.525	0.551	0.474
Indirect effects – Safety behavior	0.397	0.400	0.369
Indirect effects – Safety compliance	0.525	0.531	0.497
Indirect effects – Safety participation	0.395	0.410	0.351

SS: safety stressor; n: sample; χ^2 : chi-square; DF: degree of freedom; CFI: comparative fit index; NFI: normed fit index; TLI: Tucker-Lewis index; RMSEA: root mean square error of approximation; \leftarrow : causality. All parameters are significant at $p < 0.010$; ^a is the moderated path.

findings provided preliminary support for the hypothesized models.

Model 1 suggested that safety attitudes partially mediate safety climates ($\beta = 0.484$, $p < 0.010$) and safety behaviors ($\beta = 0.820$, $p < 0.010$). The relationship between safety climates and safety behaviors was significant ($\beta = 0.149$, $p < 0.010$). The indirect effects (IEs) of safety climates on safety behavior (IE = 0.397, $p < 0.010$), safety compliance (IE = 0.525, $p < 0.010$), and safety participation (IE = 0.395, $p < 0.010$), and the IE of safety attitudes on safety compliance (IE = 0.79, $p < 0.010$) and safety participation (IE = 0.59, $p < 0.010$), were also significant. It was also found that safety climates predicted 25.0% of the variance in safety attitudes, while safety climates and safety attitudes predicted 80.0% of the variance in safety behaviors, 94.0% of the variance in safety compliance, and 52.0% of the variance in safety participation. The causal structure of Model 1 was satisfactory ($\chi^2/DF = 4.237$, CFI = 0.970, NFI = 0.961, TLI = 0.964, and RMSEA = 0.065) [Table 5].

In addition, Model 2 proposed that safety stressors moderate the relationship among safety climates, safety attitudes, and safety behaviors. The nested model comparison showed that the difference in χ^2 values between the nested models was small ($\Delta\chi^2 = 4.935$, $\Delta DF = 4$, $p > 0.010$). Thus, it was proven that the measurement models for both low safety stressors and high safety stressors were not significantly different from the studied data. The causal model of low safety stressors ($n = 551$) showed that safety attitude \leftarrow safety climate ($\beta = 0.498$, $p < 0.010$, $R^2 = 25.0\%$), safety behavior \leftarrow safety attitude ($\beta = 0.803$, $p < 0.010$, $R^2 = 79.0\%$), and safety behavior \leftarrow safety climate ($\beta = 0.153$, $p < 0.010$, $R^2 = 79.0\%$) were significantly related. These relationships were also significant for safety compliance \leftarrow safety behavior ($\beta = 0.96$, $p < 0.010$, $R^2 = 92.0\%$) and safety participation \leftarrow safety behavior ($\beta = 0.742$, $p < 0.010$, $R^2 = 55.0\%$). On the other hand, the causal model of high safety stressors ($n = 219$) showed that safety attitude \leftarrow safety climate ($\beta = 0.435$, $p < 0.010$, $R^2 = 19.0\%$), safety behavior \leftarrow safety attitude

($\beta = 0.847, p < 0.010, R^2 = 84.0\%$), and safety behavior \leftarrow safety climate ($\beta = 0.141, p < 0.010, R^2 = 84.0\%$) were significantly related. These relationships were also significant for safety compliance \leftarrow safety behavior ($\beta = 0.976, p < 0.010, R^2 = 95.0\%$) and safety participant \leftarrow safety behavior ($\beta = 0.688, p < 0.010, R^2 = 47.0\%$). The results of the proposed model and configural model based on the differences between healthcare professionals' experience with a low level and high level of safety stressors are shown in Table 5.

DISCUSSION

We sought to examine the partially mediating role of safety attitudes on the relationship between safety climates and safety behaviors and to test the mediating role of safety stressors in the causal relationships between safety climates, safety attitudes, and safety behavior. This study supported the partial mediating role of safety attitudes, but not the moderating role of safety stressors.

Safety attitudes acted as a mediator of the relationship between safety climates and safety behaviors. Indeed, positive perceptions of the safety climate in the workplace led to positive safety attitudes, which in turn had a positive impact on safety behaviors. These results suggest that top management's safety commitment and safety practices may mobilize the organizational safety response, supervisors' safety response, and coworkers' safety response, which in turn increases the effect of safety participation and compliance, which form safety behavior in the healthcare sector. Safety attitudes were shown to be the mediator of the relationship between safety climates and safety behaviors.^{24,37} This study also indicated that safety attitudes might regulate the impact of perceptions of management values regarding safety, policies, and procedures relating to safety (particularly in multicultural environments) on safety behavior. Indeed, when including safety attitudes as a mediator, safety climates had less of an effect on safety behaviors—particularly safety compliance. However, safety attitudes had more of an effect on safety participation. Healthcare professionals' national cultures (e.g., a high power-distance, long-term orientation, uncertainty avoidance, and masculinity) have a great effect on organizational climates and influence safety

perceptions that, in turn, impacts the relationship with safety attitudes and safety behaviors.^{38,39} Shared safety experiences and opinions affect workplace safety perceptions and play a role in determining the positive effect of safety behaviors. In this context, it is highly likely that healthcare professionals who experience a positive workplace safety climate will form positive safety attitudes that encourage safety behaviors. This finding is similar to research that explained how workers' interactions with safety behaviors are defined by cultural compatibility and level of experience.^{40–42}

The healthcare regulators at both the federal and emirate levels shaped a homogeneous characteristic of the healthcare professionals through accreditation standards. This result is consistent with previous studies that suggest healthcare accreditation standards are generally considered an important benchmark for the attributes of healthcare professionals to improve clinical safety practice.⁴³ However, the evidence about whether accreditation standards significantly change healthcare professional's safety behaviors with the effect of safety climate and safety attitudes is equivocal and determined by circumstances such as psychosocial working conditions,⁴⁴ national culture,⁴⁵ and government health and safety policies.⁴⁶

Further, the majority of the respondents of this study fall into a younger age group (75% was aged between 25 and 65), which may also contribute to the significant mediating relationship in this study. This result is consistent with earlier research that shows younger healthcare professionals were more positive towards safety than their older counterparts.⁴ The differences in work experience are affected by the level of trust in the management team's safety climate. For example, research suggests that more experienced healthcare professionals may witness or be victims of more safety-related incidents than younger healthcare professionals.⁴⁷ These past experiences can influence their perceptions of the safety attitudes, which in turn affect the relationship between safety climate and safety behaviors. This finding is consistent with the theory of reasoned action⁴⁸ and theory of planned behavior,⁴⁹ which specify that subjective norms (safety climates)⁵⁰ and attitudes (safety attitudes)^{10,51} influence the performance of behaviors. The mediating role of safety attitudes in the relationship between safety climates and safety behaviors in the healthcare

sector is interesting and consistent with the Swiss cheese model,⁵² because safety is related to perception-intention-behavior relationship. This is crucial as the regulatory role of safety attitudes will provide a better understanding of the multifaceted aspects of healthcare-based safety—particularly patient safety management.

This study further investigated the moderating effect of safety stressors on the relationship between safety climates, safety attitudes, and safety behaviors. Model 2 indicated that safety stressors did not have a moderating effect; the effects of safety climates and safety attitudes on safety behaviors in both groups were insignificantly different ($p = 0.294$). This result contradicts an earlier study that found that safety stressors moderated the causality between safety climates, safety attitudes, and safety behaviors,¹⁹ but is consistent with earlier research that reported inconsistent results regarding safety stressors.¹⁸ Action theory does not explain the importance of perceived behavioral control—in particular, coping with safety stressors as a control factor. However, it can be extended based on the fundamental assumption of the theory of planned behavior,⁴⁹ which is consistent with the findings of this study. The theory of planned behavior explains the degree to which healthcare professionals perceived barriers to safety attitudes and safety behaviors as affecting their intention to seek coping strategies to deal with stress. Positive coping strategies may come from looking for support from family or friends, or from utilizing others' ways of dealing with similar problems.⁵³ Specifically, this study suggests that the homogeneous characteristics of healthcare professionals' categories in the UAE (the majority are Filipino and Indian) may also offer a positive coping strategy for dealing with safety stressors because psychological well-being is shared among them.^{54,55} Thus, these may be the reasons for the insignificant impacts of safety stressors' moderating the role of the relationship between safety climates, safety attitudes, and safety behaviors.

Despite these contributions, this study has some limitations, which provide opportunities for future research. First, this study was restricted to UAE healthcare professionals' perspectives, and the target respondents all came from Abu Dhabi public hospitals. Since Abu Dhabi has its own health authority that is separate from the other emirates, the results of this study may not be generalizable

to the UAE healthcare professional population as a whole. It would be interesting to test this framework by extending the sample of healthcare professionals to other geographical areas and comparing the results with this study. Similarities and differences in cross-cultural perceptions of boundaries would allow researchers to have a better understanding of and greater insight into the factors that affect safety behaviors in healthcare settings. Second, health management and safety studies are still a relatively new and emerging trend in the UAE context. Future studies could consider including a dimension of group-level safety climate measures and examine whether these variables modify healthcare professionals' safety behaviors. Third, future studies should use a longitudinal analytical study to predict changes in safety behaviors over time since this study was a cross-sectional study that measured healthcare-safety-related behavior results from one-time point. Additionally, further research is needed to explore whether the effect of safety climates on safety behaviors through safety attitudes can be mediated by the level of safety stressors and the type of safety stressors. Fourth, the study could be complemented by an evaluation of the impact of the factors leading to safety behaviors including organizational safety climate, supervisory safety climate, coworkers' safety climate, safety motivation, and safety knowledge, with the inclusion of job experience and stress coping strategies as additions to the current moderating variables.

CONCLUSION

We constructed a comprehensive model to explore the effect of safety attitudes and safety stressors in the relationship between safety climate and safety behavior. We found safety attitudes partially mediate the relationship between safety climate and safety behavior. We also found that safety stressors do not moderate the relationship between safety climate, safety attitudes, and safety behavior. This research contributes to the safety research, especially to safety attitudes and safety stressors notions by demonstrating its validity and resonance with recent research. It also contributes to the study on the mechanism of safety compliance and safety participation by considering the combined effects of safety attitudes and safety stressors in demonstrating differential influences on these safety behavior

dimensions. Based on the present findings, measures should be taken to investigate the reason behind the positive coping strategy of safety stressors among healthcare professionals to further understand the variation of effect between safety compliance and safety participation.

Disclosure

The authors declared no conflicts of interest. No funding was received for this study.

REFERENCES

- Lyu S, Hon CK, Chan AP, Wong FK, Javed AA. Relationships among safety climate, safety behavior, and safety outcomes for ethnic minority construction workers. *Int J Environ Res Public Health* 2018 Mar;15(3):484.
- Elsous A, Akbarisari A, Rashidian A, Aljeesh Y, Radwan M, Abu Zaydeh H. Psychometric properties of an Arabic safety attitude questionnaire (Short Form 2006). *Oman Med J* 2017 Mar;32(2):115-123.
- Geuens N, Braspenninga M, Bogaert PV, Franck E. Individual vulnerability to burnout in nurses: The role of type D personality within different nursing specialty areas. *Burn Res* 2015;2:80-86.
- Kim SE, Kim CW, Lee SJ, Oh JH, Lee DH, Lim TH, et al. A questionnaire survey exploring healthcare professionals' attitudes towards teamwork and safety in acute care areas in South Korea. *BMJ Open* 2015 Jul;5(7):e007881.
- Al Harthy SN, Tuppal CP, Sta Ana AE, Reynecke J, Al Husami I, Al Rubaiey A. Interprofessional competency framework for health service managers in Oman: An e-Delphi Study. *Oman Med J* 2018 Nov;33(6):486-496.
- Paguio JT, Pajarillo EJ. Safety culture and safety attitudes of nurses in the National University Hospital. *Philipp J Nurs* 2016;86(1):10-16.
- Robb G, Seddon M. Measuring the safety culture in a hospital setting: a concept whose time has come? *N Z Med J* 2010 May;123(1314):68-78.
- Sampson JM, DeArmond S, Chen PY. Role of safety stressors and social support on safety performance. *Saf Sci* 2014;64:137-145.
- Neal A, Griffin MA, Hart PM. The impact of organizational climate on safety climate and individual behavior. *Saf Sci* 2000;34(1):99-109.
- Vinodkumar MN, Bhasi M. Safety climate factors and its relationship with accidents and personal attributes in the chemical industry. *Saf Sci* 2009;47(5):659-667.
- Kim KW, Park SJ, Lim HS, Cho HH. Safety climate and occupational stress according to occupational accidents experience and employment type in shipbuilding industry of Korea. *Saf Health Work* 2017 Sep;8(3):290-295.
- Colla JB, Bracken AC, Kinney LM, Weeks WB. Measuring patient safety climate: a review of surveys. *Qual Saf Health Care* 2005 Oct;14(5):364-366.
- El-Jardali F, Dimassi H, Jamal D, Jaafar M, Hemadeh N. Predictors and outcomes of patient safety culture in hospitals. *BMC Health Serv Res* 2011 Feb;11:45.
- Vinodkumar MN, Bhasi M. Safety management practices and safety behaviour: assessing the mediating role of safety knowledge and motivation. *Accid Anal Prev* 2010 Nov;42(6):2082-2093.
- Brown KA, Willis PG, Prussia GE. Predicting safe employee behavior in the steel industry: development and test of a sociotechnical model. *J Oper Manage* 2000;18(4):445-465.
- Zapf D, Vogt C, Seifert C, et al. Emotion work as a source of stress: the concept and development of an instrument. *Eur J Work Organ Psychol* 1999;8(3):371-400.
- Parsons T. *Action theory and the human condition*. New York, NY: Free Press; 1978.
- Park ES, Hinsz VB, Nickell GS. Regulatory fit theory at work: prevention focus' primacy in safe food production. *J Appl Soc Psychol* 2015;45(7):363-373.
- Wang D, Wang X, Xia N. How safety-related stress affects workers' safety behavior: the moderating role of psychological capital. *Saf Sci* 2018;103:247-259.
- Guldenmund FW. The use of questionnaires in safety culture research—an evaluation. *Saf Sci* 2007;45(6):723-743.
- Mearns K, Whitaker SM, Flin R. Safety climate, safety management practice and safety performance in offshore environments. *Saf Sci* 2003;41(8):641-680.
- Spector PE, Dwyer DJ, Jex SM. Relation of job stressors to affective, health, and performance outcomes: a comparison of multiple data sources. *J Appl Psychol* 1988 Feb;73(1):11-19.
- Rizzo JR, House RJ, Lirtzman SI. Role conflict and ambiguity in complex organization. *Adm Sci Q* 1970;15:150-163.
- Griffin MA, Neal A. Perceptions of safety at work: a framework for linking safety climate to safety performance, knowledge, and motivation. *J Occup Health Psychol* 2000 Jul;5(3):347-358.
- Frohlich MT. Techniques for improving response rates in OM survey research. *J Oper Manage* 2002;20:53-62.
- Lynn MR. Determination and quantification of content validity. *Nurs Res* 1986 Nov-Dec;35(6):382-385.
- Byrne BM. *Structural Equation Modeling with AMOS: basic concepts, applications, and programming*. 2nd edition. Mahwah, NJ: Erlbaum; 2010.
- Roustaie N, Jamali H, Jamali MR, Nourshargh P, Jamali J. The association between quality of sleep and health-related quality of life in military and non-military women in Tehran, Iran. *Oman Med J* 2017 Mar;32(2):134-130.
- Arbuckle JL. *AMOS. (Version 23.0) [Computer Program]*. Chicago, IL: International Business Machines Corporation SPSS 2014 [cited 2018 December 12]. Available from: ftp://public.dhe.ibm.com/software/analytics/spss/documentation/amos/23.0/en/Manuals/IBM_SPSS_Amos_User_Guide.pdf.
- Hair JF, Black WC, Babin BJ. *Multivariate data analysis: a global perspective*. Upper Saddle River, NJ: Pearson 2010 [cited 2018 December 13]. Available from: https://is.muni.cz/el/1423/podzim2017/PSY028/um/_Hair_-_Multivariate_data_analysis_7th_revised.pdf.
- Raykov T. Coefficient alpha and composite reliability with interrelated nonhomogeneous items. *Appl Psychol Meas* 1998;22(4):375-385.
- Bentler PM, Satorra A. Testing model nesting and equivalence. *Psychol Methods* 2010 Jun;15(2):111-123.
- Rodríguez NG, Pérez MJ, Gutiérrez JA. Can a good organizational climate compensate for a lack of top management commitment to new product development? *J Bus Res* 2008;61(2):118-131.
- Brookhart MA, Stürmer T, Glynn RJ, Rassen J, Schneeweiss S. Confounding control in healthcare database research: challenges and potential approaches. *Med Care* 2010;48(6 Suppl):S114-S120. doi: 10.1097/MLR.0b013e3181d8bebe3.
- Jiang G, Mai Y, Yuan KH. Advances in measurement invariance and mean comparison of latent variables: equivalence testing and a projection-based approach. *Front Psychol* 2017 Oct;8:1823.
- Kline RB. *Principles and practice of structural equation modeling*. New York, NY: Guilford Press; 2010.
- Ancarani A, Di Mauro C, Giammanco MD. Hospital safety climate and safety behavior: A social exchange perspective. *Health Care Manage Rev* 2017 Oct/Dec;42(4):341-351.
- Alshahrani AS. *The role of national culture on safety behavior among petrochemical employees in Saudi Arabia [unpublished doctoral thesis]*. Brisbane: Griffith University; 2016.

39. Ourfali E. Comparison between Western and Middle Eastern cultures: research on why American expatriates struggle in the Middle East. *Otago Management Graduate Review* 2015;13:33-43.
40. Håvold JL. National cultures and safety orientation: a study of seafarers working for Norwegian shipping companies. *Work & Stress: An International Journal of Work, Health & Organization* 2007;21(2):173-195.
41. Keiser NL. National culture and safety: a meta-analysis of the relationship between Hofstede's cultural value dimensions and workplace safety constructs [unpublished doctoral thesis]. Texas: Texas A&M University; 2017.
42. Noort MC, Reader TW, Shorrock S, Kirwan B. The relationship between national culture and safety culture: Implications for international safety culture assessments. *J Occup Organ Psychol* 2016 Sep;89(3):515-538.
43. Greenfield D, Pawsey M, Hinchcliff R, Moldovan M, Braithwaite J. The standard of healthcare accreditation standards: a review of empirical research underpinning their development and impact. *BMC Health Serv Res* 2012 Sep;12:329.
44. Wagner A, Rieger MA, Manser T, Sturm H, Hardt J, Martus P, et al; WorkSafeMed Consortium. Healthcare professionals' perspectives on working conditions, leadership, and safety climate: a cross-sectional study. *BMC Health Serv Res* 2019 Jan;19(1):53.
45. McLinton SS, Loh MY, Dollard MF, Tuckey MM, Idris MA, Morton S. Benchmarking working conditions for health and safety in the frontline healthcare industry: Perspectives from Australia and Malaysia. *J Adv Nurs* 2018 Apr;74(8):1851-1862.
46. Al Malki A, Endacott R, Innes K. Health professional perspectives of patient safety issues in intensive care units in Saudi Arabia. *J Nurs Manag* 2018 Mar;26(2):209-218.
47. Pousette A, Larsman P, Eklöf M, Törner M. The relationship between patient safety climate and occupational safety climate in healthcare - A multi-level investigation. *J Safety Res* 2017 Jun;61:187-198.
48. Ajzen I, Fishbein M. Attitude-behavior relations: a theoretical analysis and review of empirical research. *Psychol Bull* 1977;84(5):888-918.
49. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process* 1991;50(2):179-211.
50. Zohar D. Safety climate in industrial organizations: theoretical and applied implications. *J Appl Psychol* 1980 Feb;65(1):96-102.
51. Guo BH, Yiu TW, Gonzalez VA. Predicting safety behavior in the construction industry: development and test of an integrative model. *Saf Sci* 2016;84:1-11.
52. Reason J. Human error: models and management. *BMJ* 2000 Mar;320(7237):768-770.
53. Li L, Ai H, Gao L, Zhou H, Liu X, Zhang Z, et al. Moderating effects of coping on work stress and job performance for nurses in tertiary hospitals: a cross-sectional survey in China. *BMC Health Serv Res* 2017 Jun;17(1):401.
54. Freire C, Ferradás MD, Valle A, Núñez JC, Vallejo G. Profiles of psychological well-being and coping strategies among university students. *Front Psychol* 2016 Oct;7:1554.
55. Harzer C, Ruch W. The relationships of character strengths with coping, work-related stress, and job satisfaction. *Front Psychol* 2015 Feb;6:165.