

The Effects of Safety Climate on Psychosocial Factors: An Empirical Study in Healthcare Workplaces

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Abstract: How to develop a better patient safety culture has been an important goal for healthcare organizations, but the effects of safety culture on psychosocial factors, such as emotional exhaustion and stress, have not been fully addressed. This study aimed to reconfigure important dimensions affecting safety culture and examine the associations between safety culture and psychosocial factors (emotional exhaustion and work-life balance). The partial least squaring technique was used to analyze the data, showing that job satisfaction ($\beta = 0.320, P < 0.001$), working conditions ($\beta = 0.307, P < 0.001$), and perception of management ($\beta = 0.282, P < 0.001$) positively affected the safety climate. The safety climate and work-life balance could reduce the occurrence of emotional exhaustion, whereas a high-stress environment would cause a higher level of emotional exhaustion. Given these findings, hospitals should endeavor to help employees feel safe and not threatened, reduce stress, and advise them to maintain a good work-life balance.

Key Words: safety attitude questionnaire, safety climate, emotional exhaustion, healthcare, stress

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The occurrence of adverse events and medical errors has been a huge challenge for healthcare providers and is one of the leading causes of death and disability globally.¹ In the previously mentioned report, 4 of every 10 patients were affected by accidents during healthcare procedures. These accidents could be prevented to reduce economic and social costs and improve healthcare quality for both organizations and patients, that is, the development of a better patient safety culture should be an important goal for healthcare providers. The Institute of Medicine identified safety as a key step to improve the quality of care and recommended that the improvement of internal factors, such as leadership, culture, and a patient safety program would enhance patient safety.²

Safety culture is defined in several ways but is ultimately viewed as the attitude, behavior, and ability of individuals and groups that commit themselves to sustain the importance of health and safety management in organizations.^{3–5} However, patient safety culture is difficult to measure quantitatively, so patient safety climate is often used as an alternative indicator.^{6,7} Most instruments to measure safety climate refer to the “surface features” of safety culture and consider the degree of staff’s safety

perceptions in an organization.⁸ Numerous studies have indicated that a better safety climate would lead to better safety outcomes, such as individual health performance indicators (absenteeism, presenteeism, and health care utilization) and hospital-level patient safety indicators (selected postoperative complications, nurse-sensitive technical adverse events, and technical difficulty with procedures).^{9–12}

Several articles have focused on safety climate measurement issues, including the identification of measurement scales and safety climate dimensions, when researchers started to study safety climate.¹³ The causal relationships between other variables and safety climate have been investigated in recent years for decision makers to better understand how to improve the safety outcomes of an organization. Alves and Guirardello¹⁴ examined the effects of job satisfaction and emotional exhaustion on the safety climate, showing that a unit increase in the job satisfaction score would lead to a 45% improvement in safety climate scores. However, a higher level of emotional exhaustion indicates a negative perception of safety climate. Trincherio et al¹⁵ suggested that hospitals should take active steps to increase the effectiveness of teamwork for enhancing safety behaviors, whereas Goh et al¹⁶ found that the support of an organization and teamwork are essential for organizational learning and positively affect patient safety culture. Huang et al¹⁷ investigated the effects of 7 dimensions on patient safety using multiple linear regression and found that teamwork climate, job satisfaction, and working conditions were strong indicators of the safety climate.

Healthcare is a distinct industry that relies on employees to pay extra attention and time, with healthcare workers having to sacrifice their schedules and work long hours in high-pressure environments and usually experience stress and emotional exhaustion. According to a survey conducted from Mental Health America, 82% of healthcare worker respondents were emotionally exhausted and half of them reported lacking quality time to parent their children during COVID-19.¹⁸ Emotional exhaustion is defined as the inability of an individual to meet job expectations due to the depletion of physical and mental conditions.^{19,20} Psychosocial factors, such as emotional exhaustion and stress, have gained less attention compared with physical injuries.²¹ Although improving patient safety outcomes is critical, promoting a healthy working environment is also an important issue. Sexton et al²² revealed that a higher work-life climate is correlated with better teamwork and patient safety, whereas Mansour and Tremblay²³ found that burnout (physical fatigue, cognitive weariness, and emotional exhaustion) mediated the relationship between psychosocial safety climate and safety behaviors. Furthermore, Vogus et al¹² showed a positive correlation between adverse events and nurse burnout, while a higher job identification and better safety climate would weaken this effect.

A common approach to obtain safety perceptions of staff in an organization is a questionnaire. The original safety attitude questionnaire (SAQ) was developed by Sexton et al²⁴ involving 6 dimensions: teamwork climate, safety climate, working conditions, job satisfaction, perceptions of management, and stress recognition. The questionnaire was revised based on the various conditions of

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the countries, for example, 2 more dimensions were included by the Taiwan Joint Commission on Hospital Accreditation (TJCHA) in 2014. The TJCHA considered the growing discussion of emotional exhaustion and fatigue on healthcare errors, thus incorporated an emotional exhaustion dimension from Maslach and Jackson's study²⁵ and work-life balance dimension into the questionnaire. The extended questionnaire has 46 questions and was validated and applied by many studies, such as Huang et al,¹⁷ Huang et al,²⁶ and Wu et al.²⁷ Previous studies usually focused on the investigation of the relationship between the original 6 dimensions and the safety climate; hence, the safety climate of organizations and psychosocial factors were not addressed. Furthermore, with our focus on the associations between safety culture and psychosocial factors, the "teamwork climate" dimension, mainly measuring the quality of collaborations among workers in the SAQ, was not discussed in our model. This study aimed to reconfigure important dimensions affecting safety culture and examine the associations between safety culture and psychosocial factors (emotional exhaustion and work-life balance). It was speculated that a better safety climate would affect the level of stress recognition and work-life balance, eventually reducing emotional exhaustion; hence, we examined whether a better safety climate could promote a healthy working environment and formulated the following hypotheses:

- H₁: Job satisfaction will positively affect safety climate.
- H₂: Working conditions will positively affect safety climate.
- H₃: Perception of management will positively affect safety climate.
- H₄: Safety climate will positively affect stress recognition.
- H₅: Safety climate will positively affect work-life balance.
- H₆: Safety climate will negatively affect emotional exhaustion.
- H₇: Stress recognition will positively affect emotional exhaustion.
- H₈: Stress recognition will negatively affect work-life balance.
- H₉: Work-life balance will negatively affect emotional exhaustion.

RESEARCH METHODOLOGY

Questionnaire and Data Collection

The hypotheses were tested and analyzed using the extended SAQ collected from a medical center hospital in Taiwan, which had approximately 1500 beds and 3500 employees. With the advocacy of the TJCHA, many hospitals in Taiwan participate annually in the SAQ survey. All hospital employees were invited to participate in this anonymous online survey. The survey data of the case hospital in 2016 were used for this study. The extended SAQ has 46 questions, with a 5-point Likert scale applied to the first 39 questions (1: strongly disagree; 5: strongly agree) and a 4-point scale for question 40 to 46 to describe the frequency of occurrence in their work environment (1: 1 d/wk; 4: 5–7 d/wk). After excluding questionnaires with missing data, 2364 questionnaires were analyzed. A total number of 40 measurement items in 7 constructs is summarized in Table 1.

Sample Characteristics

The characteristics of the respondents are shown in Table 2, and most employees were female (82.7%), doctors and nurses (78.7%), younger than 40 years (69.1%), had more than 3-year working experience at the hospital (73.5%), and hold bachelor's degrees (82.1%). Among the respondents, 29.3% of them reported at least 1 safety event in the past 12 months.

Method of Analysis

The partial least squaring (PLS) technique was used to analyze the data. Specifically, SmartPLS software was used to conduct confirmatory factor analysis and estimate the structural equation model. The confirmatory factor analysis validated our model

TABLE 1. The Chinese Version of Safety Attitude Questionnaire Items

Construct	Measure
SC	SC1: I would feel safe being treated here as a patient
	SC2: Medical errors are handled appropriately in this clinical area
	SC3: I know the proper channels to direct questions regarding patient safety in this clinical area.
	SC4: I receive appropriate feedback about my performance
	SC5: In this clinical area, it is difficult to discuss errors.
	SC6: I am encouraged by my colleagues to report any patient safety concerns I may have.
	SC7: The culture in this clinical area makes it easy to learn from the errors of others.
JS	JS1: I like my job
	JS2: Working here is like being part of a large family
	JS3: This is a good place to work
	JS4: I am proud to work in this clinical area
	JS5: Morale in this clinical area is high
SR	SR1: When my workload becomes excessive, my performance is impaired
	SR2: I am less effective at work when fatigued
	SR3: I am more likely to make errors in tense or hostile situations (e.g., emergency resuscitation, seizure)
	SR4: Fatigue impairs my performance during emergency situations
PM	PM1: Managers supports my daily efforts
	PM2: Managers do not knowingly compromise patient safety
	PM3: I am provided with adequate, timely information about events that might affect my work
	PM4: Staffing in this clinical area are sufficient to handle total patients
WC	WC1: Problem personnel are dealt with constructively
	WC2: This hospital does a good job of training new personnel
	WC3: All the necessary information for diagnostic and therapeutic decisions is routinely available to me
	WC4: Trainees in my discipline are adequately supervised
EE	EE1: I feel like I'm at the end of my rope
	EE2: I feel burned out from my work
	EE3: I feel frustrated by my job
	EE4: I feel I'm working too hard on my job
	EE5: I feel emotionally exhausted from my work
	EE6: I feel used up at the end of the workday
	EE7: I feel tired when I get up in the morning and have to face another day on the job
	EE8: Working with people all day is really a strain for me
	EE9: Working with people directly puts too much stress on me
WB	WB1: Missed meals
	WB2: A hasty meal
	WB3: All-day work without any rest
	WB4: Individual or family plan changes due to work factors
	WB5: Poor sleep
	WB6: Less than 5 h of sleep at night
	WB7: Working overtime

EE, emotional exhaustion; JS, job satisfaction; PM, perception of management; SC, safety climate; SR, stress recognition; WB, work-life balance; WC, working conditions.

TABLE 2. Characteristics of the Respondents in the Dataset

Category	n	%
Sex		
Male	410	17.3
Female	1954	82.7
Types of job		
Doctor	318	13.5
Nurse	1541	65.2
Medical technician	208	8.8
Pharmacy staff	58	2.5
Administrative staff	141	6.0
Rehabilitation staff	18	0.8
Others	80	3.4
Age		
<30 y	998	42.2
31–40 y	637	26.9
41–50 y	471	19.9
51–60 y	233	9.9
>60 y	25	1.1
Working experience at the hospital		
<1 y	269	11.4
1–2 y	358	15.1
3–4 y	352	14.9
5–10 y	534	22.6
11–20 y	440	18.6
>21 y	411	17.4
Education		
Junior high school diploma	6	0.3
High school diploma	40	1.7
Bachelor degree	1941	82.1
Master’s degree or above	377	15.9
Reporting of safety events in the past 12 mo		
None	1670	70.6
1–5 times	670	28.3
6–10 times	15	0.6
11–15 times	5	0.2
>16 times	4	0.2

based on internal consistency reliability, convergent validity, and discriminant validity.²⁸ According to Hair et al,²⁸ the internal consistency reliability is assessed by Cronbach α and composite reliability (CR) with the acceptable thresholds of 0.7 and 0.6, respectively. The convergent validity is measured by factor loading and average variance extracted (AVE) with the requirements of greater than 0.7 and 0.5, respectively. Lastly, the discriminant validity is determined by whether the square root of each construct’s AVE is larger than its correlations with any other constructs.

For the structural equation model, the value and significance of the path coefficients and the relationships between constructs were evaluated, with a bootstrapping of 5000 samples applied as suggested by Hair et al.²⁸

RESULTS

Reliability and Validity

The quality of our data was assessed through the criteria of internal consistency reliability, convergent validity, and discriminant validity, as the loadings of SC5, SC7, PM4, EE4, EE8, EE9, and

WB7 were all lower than 0.7, these measures were deleted from their constructs.

The final constructs and measures used are listed in Table 3, and the quality measurements of the survey data are presented in Table 4. Cronbach α values were all greater than 0.7, and the CR values were all greater than 0.6; hence, the internal consistency reliabilities of the constructs are acceptable. Furthermore, the factor loadings for measures were all greater than 0.715, and the AVE values were all greater than 0.5, indicating that the model meets the requirements of convergent validity. Lastly, the discriminant validity was examined in Table 4, and the square root of AVE for each construct was larger than the correlations with any

TABLE 3. Descriptive Statistics and the Results

Construct	Measure	Mean	Positive Responses* (%)	Negative Responses* (%)	Factor Loading
SC	SC1	4.04	1698 (72)	92 (4)	0.830
	SC2	4.02	1686 (71)	97 (4)	0.844
	SC3	4.14	1812 (77)	45 (2)	0.852
	SC4	3.75	1455 (62)	179 (8)	0.808
JS	SC6	3.94	1574 (67)	74 (3)	0.773
	JS1	3.73	1371 (57)	166 (7)	0.800
	JS2	3.87	1522 (64)	118 (5)	0.900
	JS3	3.77	1443 (61)	172 (7)	0.917
	JS4	3.86	1480 (63)	109 (5)	0.921
SR	JS5	3.61	1239 (52)	207 (9)	0.868
	SR1	4.04	1720 (73)	144 (6)	0.861
	SR2	4.01	1710 (72)	180 (8)	0.886
	SR3	3.66	1409 (60)	307 (13)	0.824
PM	SR4	3.91	1661 (70)	181 (8)	0.895
	PM1	3.63	1295 (55)	191 (8)	0.856
	PM2	4.11	1737 (73)	85 (4)	0.807
WC	PM3	3.81	1493 (63)	108 (5)	0.894
	WC1	3.66	1280 (54)	158 (7)	0.826
	WC2	3.84	1517 (64)	150 (6)	0.837
	WC3	3.84	1540 (65)	62 (3)	0.886
EE	WC4	3.92	1645 (70)	62 (3)	0.902
	EE1	3.03	737 (31)	708 (30)	0.768
	EE2	2.55	388 (16)	1187 (50)	0.860
	EE3	3.05	706 (30)	686 (29)	0.762
	EE5	2.67	422 (18)	1027 (43)	0.830
	EE6	2.27	228 (10)	1450 (61)	0.801
	EE7	2.79	555 (23)	949 (40)	0.815
WB	WB1	3.01	1824 (77)	540 (23)	0.715
	WB2	2.53	1315 (56)	1049 (44)	0.796
	WB3	2.79	1597 (68)	767 (32)	0.770
	WB4	2.87	1731 (73)	633 (27)	0.778
	WB5	2.72	1523 (64)	841 (36)	0.754
	WB6	3.00	1798 (76)	566 (24)	0.732

*For the construct of work-life balance, the responses of 3 and 4 were considered as positive responses, whereas 1 and 2 as negative responses. For the other 6 constructs, the responses of 4 and 5 were considered as positive responses, whereas 1 and 2 as negative responses.

EE, emotional exhaustion; JS, job satisfaction; PM, perception of management; SC, safety climate; SR, stress recognition; WB, work-life balance; WC, working conditions.

TABLE 4. Cronbach α , CR, AVE, and Construct Correlations

Construct	Cronbach α	CR*	AVE [†]	1	2	3	4	5	6	7
1. SC	0.879	0.912	0.675	0.822						
2. JS	0.928	0.946	0.779	0.744	0.822					
3. SR	0.890	0.924	0.752	0.091	0.005	0.867				
4. PM	0.812	0.889	0.727	0.753	0.711	0.128	0.853			
5. WC	0.886	0.921	0.746	0.764	0.729	0.087	0.795	0.864		
6. EE	0.892	0.918	0.650	-0.226	-0.358	0.496	-0.218	-0.221	0.806	
7. WB	0.853	0.890	0.575	0.244	0.304	-0.168	0.257	0.233	-0.450	0.758

*Composite reliability.

[†]Average variance extracted; the square root of the AVE is in the diagonal (in bold). Off-diagonal elements are the correlations between different constructs.

EE, emotional exhaustion; JS, job satisfaction; PM, perception of management; SC, safety climate; SR, stress recognition; WB, work-life balance; WC, working conditions.

other constructs. Taken together, these results indicate that our data satisfy the requirements to run a PLS analysis.

Path Analysis

The results of our PLS model show that all 9 hypotheses are supported, as illustrated in Table 5 and Figure 1. Firstly, the safety climate in a hospital is positively and significantly affected by job satisfaction, working conditions, and perception of management. These 3 factors have similar intensities to influence safety climate, with path coefficients of 0.320, 0.307, and 0.282, respectively. Secondly, safety climate has positive effects on stress recognition ($\beta = 0.091$) and work-life balance ($\beta = 0.262$) but negatively affects emotional exhaustion ($\beta = -0.189$). Notably, that means that a better organizational safety climate helps employees maintain greater work-life balances and reduce their feelings of emotional exhaustion at work. Thirdly, emotional exhaustion is positively affected by stress recognition ($\beta = 0.459$) but negatively affected by safety climate and work-life balance ($\beta = -0.327$). Among these 3 factors, stress recognition is the most dominant, and the work-life balance is negatively affected by stress recognition ($\beta = -0.192$).

DISCUSSION AND CONCLUSIONS

First, our results reveal the importance of providing high job satisfaction, pleasant working conditions, and supportive management to the development of a hospital safety climate. Second, emotional exhaustion is positively affected by stress recognition while negatively affected by safety climate and work-life balance. Finally, a better safety climate can increase the stress recognition and work-life balance of their employees and reduce the extent of emotional exhaustion.

Healthcare employees work in a complex, multitasking, and high-pressure environment, which is worsened during public health emergencies, such as the COVID-19 pandemic. If employees experience long-term accumulated pressure and anxiety, it not only harms the safety culture of a hospital but also negatively impacts the workers' mental health as well as their abilities to provide the best possible care. The formation of safety climate is not only made from superficial regulations and procedures but also, more importantly, blending them with the interactional behaviors in the organization.^{13,26} Only when healthcare workers perceive that their safety attitudes are appreciated and supported by managers and coworkers, the climate of safety in an organization can be attained.

Emotional exhaustion has been long discussed regarding its impacts on patients, individual workers, and their families, as well as the causations to safety culture, medical errors, and quality of healthcare.²⁹⁻³¹ Zadow et al²¹ also pointed out that emotional exhaustion was the main factor that caused healthcare worker injuries, the more stress employees face, the more easily they will feel exhausted. If employees always work under stress, their exhaustion might lead to medical errors and jeopardize their work-life balance, whereas promoting a safe climate and helping employees maintain their work-life balance can diminish emotional exhaustion.

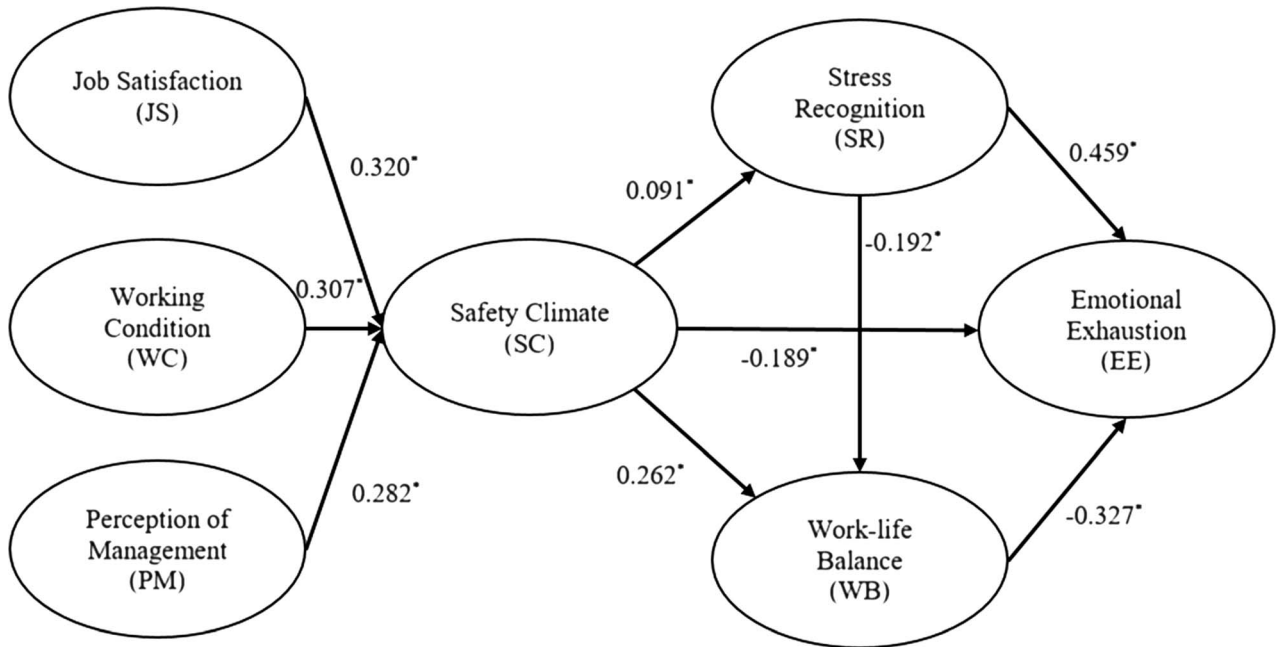
Equally important as the formation of a safe climate, maintaining the psychosocial and physical wellness of employees is also critical for a hospital. Employees must deal with their psychosocial stress and physical exhaustion during their work as well as take care of their family and personal lives. That is, when employees know that safety is their priority, they will understand better about their limits and not overstress themselves. In addition, they will know the necessity of taking good care of themselves and their families so as not to endanger their work because of fatigue, which is consistent with the findings of Mansour and Tremblay.²³

Given the previous findings, hospitals should ensure that employees feel safe and not threatened, help them reduce stress, and advise them to maintain a good work-life balance. To enhance the climate of safety, it is important to build a supportive and reactive working atmosphere in which colleagues can give feedback

TABLE 5. The Main Effects of Our Structural Model

	Path Coefficients	t	Outcome
H ₁ : JS → SC	0.320	14.804	Supported
H ₂ : WC → SC	0.307	12.905	Supported
H ₃ : PM → SC	0.282	11.586	Supported
H ₄ : SC → SR	0.091	3.916	Supported
H ₅ : SC → WB	0.262	13.035	Supported
H ₆ : SC → EE	-0.189	11.786	Supported
H ₇ : SR → EE	0.459	25.794	Supported
H ₈ : SR → WB	-0.192	9.978	Supported
H ₉ : WB → EE	-0.327	20.438	Supported

EE, emotional exhaustion; JS, job satisfaction; PM, perception of management; SC, safety climate; SR, stress recognition; WB, work-life balance; WC, working conditions.



*: P value <0.001

FIGURE 1. Structural model results.

and encourage each other. Hospitals should also coach unit leaders to be respectful and considerate, instead of applying pressure and being dominating. Regarding the psychosocial and physical wellness of employees, in addition to showing concern about their jobs, hospitals can arrange team leisure activities and guide them on how to relax under stressful situations. These actions will benefit not only hospitals but also their employees and patients.

In conclusion, this study reveals the mediation role of a safety climate, whereby employees can maintain their wellness both psychosocially and physically and thus prevent medical errors and injuries.

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