

# One Climate or Many

## Examining the Structural Distinctiveness of Safety, Health, and Stress Prevention Climate Measures

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**Objective:** This study explores the structural distinctiveness of safety, health, and stress prevention climate scales and examines whether these measures predict safety, physical health, and mental health outcomes over time. **Methods:** We obtained samples of university students, Amazon Mechanical Turk workers, and firefighters to assess the dimensionality of the three climate foci, and provide content, construct, and criterion validity of the three measures. **Results:** Findings from our study suggest that the constructs of safety, health, and stress prevention climate are psychometrically distinct, as well as demonstrate content, construct, and criterion validity evidence. **Conclusion:** This study provides preliminary evidence for integrating the constructs of safety, health, and stress prevention climate in the Total Worker Health™ framework for predicting safety-, health-, and stress-related outcomes.

**Keywords:** health climate, safety climate, stress prevention climate, structural distinctiveness, validation

In both research and practice, the fields of occupational safety and health promotion have evolved independently, despite the potential overlap in organizational policies and practices pertaining to occupational safety and health.<sup>1</sup> However, for the better part of the last two decades, public health and safety organizations across the globe have strongly encouraged employers to adopt a more unified approach.<sup>2,3</sup> An emerging body of research has yielded evidence supporting the benefits of integrated approaches that simultaneously focus on promoting and protecting employee safety and health.<sup>4,5</sup>

In response to the need to encourage greater integration of health promotion and injury prevention efforts, the National Institute for Occupational Safety and Health (NIOSH) proposed a Total Worker Health™ (TWH, National Institute of Occupational Safety and Health, Morgantown, WV) program that integrates “occupational safety and health protection with health promotion to *prevent* worker injury and illness and to *advance* health and well-being.”<sup>(ppS8)</sup><sup>6</sup> Successful TWH interventions involve modifications to narrowly-focused occupational health policies and practices in favor of more integrated approaches that, among other effects, should influence organizational climate as it pertains to safety,

health promotion, and stress prevention. Although the TWH framework implies the benefits of programs focusing on multiple aspects of occupational health, relatively little research has simultaneously examined multiple health-related facets of organizational climate.<sup>7,8</sup> Such research is potentially important, however, both for researchers interested in building theoretical models that incorporate multiple climate constructs and for practitioners interested in implementing empirically-guided organizational climate interventions targeting safety and health outcomes. Our research compares the well-established concept of safety climate with two additional climate measures that are both understudied and represent two of the most important sources of occupational health concerns: (a) health climate, which focuses on organizational efforts at physical health promotion, and (b) stress prevention climate, which focuses on employees’ experience of psychosocial stressors.

Researchers’ interest in occupational safety research can be attributed to large numbers of accidents and injuries in the workplace. The International Labor Organization<sup>9</sup> estimated that occupational injuries and illnesses kill over 2.3 million workers each year with millions more experiencing non-fatal injuries and illnesses. These statistics are of concern to both employees and employers in part due to the high costs associated with them. For instance, the Liberty Mutual Research Institute for Safety<sup>10</sup> estimated that occupational injuries cost US companies over \$62 billion in worker compensation claims alone. In addition, indirect costs include hiring and training replacement workers, as well as the pain and suffering endured by injured workers and their families.<sup>11</sup>

Beyond safety, the occupational literature on physical health concerns has expanded in the last decade, partly due to increased recognition of soaring healthcare costs and unfavorable organizational outcomes associated with poor employee health.<sup>12</sup> In the United States, 154.7 million men and women aged 20 years or older are currently considered overweight or obese,<sup>13</sup> increasing their risk for several health conditions, such as Type 2 diabetes, high blood pressure, and several types of cancer.<sup>14</sup> At the same time, the odds of sustaining an injury at work are higher for employees who are obese,<sup>15</sup> which may partly explain the rise in average employer contribution to health insurance from \$3413 in 2005 to \$5179 in 2015.<sup>16</sup> More recently, occupational health research has increasingly focused on studying worksite health promotion programs.<sup>17</sup> Studies that examined the effectiveness of health promotion programs reported improvements in nutrition and exercise and reduction in body fat.<sup>18,19</sup> Meta-analytic evidence also suggests that workplace health promotion enhances mental well-being.<sup>20</sup> Although these reviews do not address climate per se, their findings emphasize the importance of work environmental factors for employee health.

Compared with safety climate, fewer studies have explored the constructs of health and stress prevention climate.<sup>21,22</sup> Moreover, the only measure that resembles stress prevention climate<sup>21</sup> also contains items pertaining to safety, raising construct validity-related questions about whether it distinctly focuses on policies and practices related to stress. Therefore, research is needed to establish the discriminant validity of safety, health, and stress prevention

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This research was generously funded by the National Institute for Occupational Safety and Health (NIOSH) Education and Research Center Pilot Project Grant Program.

This research was funded by a pilot project grant from the University of South Florida Sunshine Education and Research Center. Research Center Grant # 2015000093.

The authors certify that there is no conflicts of interest with any organization regarding the material discussed in the manuscript.

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DOI: 10.1097/JOM.0000000000001413

climate measures and determine the extent to which different types of climate measures predict different health and safety-related outcomes.

In light of the abovementioned gaps, the current study had three main goals: (a) to develop three parallel climate measures that incorporated items pertaining to safety, health, and stress prevention climate and explore the content validity of these measures; (b) to examine the structural distinctiveness of the three climate targets, and (c) to test the predictive validity of these climate constructs in predicting safety, physical health, and mental health behaviors over time.

### SAFETY, HEALTH, AND STRESS PREVENTION CLIMATE

The construct of safety climate has captured occupational health researchers' attention for over three decades, in part because of its associations with accident reduction and injury prevention.<sup>23</sup> Although safety climate is conceptualized as a group-level construct, researchers often study psychological safety climate, operationalized as individual perceptions of safety-related organizational policies, procedures, and practices.<sup>23</sup> Psychological safety climate can be aggregated to form unit or organizational safety climate when the perceptions regarding occupational safety held by individuals in a group become shared.<sup>24</sup> However, research suggests that compared with group-level safety climate, psychological safety climate predicts safety criteria equally well.<sup>23</sup>

While many studies have examined safety climate, health climate has received far less attention in the occupational health literature.<sup>8</sup> Prior research considered organizational health to be a characteristic of the organization with respect to its competitiveness, innovation, and adaptability, with no emphasis on the physical health of its employees.<sup>25</sup> For instance, The Performance Driver Model by Saunders and Barker<sup>26</sup> highlighted the role of effective strategy, people, systems to deliver the strategy, and leadership as core elements of a healthy organization.

Other researchers argued that employee health must be considered an essential component of organizational health. Lim and Murphy<sup>27</sup> described a healthy organization as one "whose culture, climate and practices create an environment that promotes both employee health and safety as well as organizational effectiveness."<sup>(pp64)</sup> More recently, Mearns et al<sup>8</sup> conceptualized health climate in line with safety climate, as "shared perceptions of an organization's priorities and practices regarding employee health."<sup>(pp1447)</sup> Health climate differs from safety climate in that safety climate typically has a primary focus on preventing injuries through reducing accidents, whereas health climate encompasses broader health promotion efforts through wellness programs.

Studies on health climate have treated the construct as a correlate of employee health and organizational effectiveness.<sup>27,28</sup> For example, Wilson et al,<sup>29</sup> proposed a number of job and organizational characteristics, such as job design and organizational climate that promote employee health. Despite increased efforts to enhance theory and research on health climate, a few gaps persist in this literature. Ambiguity exists with regards to the conceptualization of health climate, as researchers have argued that the construct encompasses not just perceptions of health, but also safety and stress.<sup>27,30</sup> A recent study reported that health climate explained an additional 1.8% variance above and beyond safety climate in predicting health-related outcomes.<sup>22</sup> However, research assessing whether safety and health climate are psychometrically distinct constructs is currently lacking.

Stress prevention climate has also received relatively little research attention. Dollard and Bakker<sup>21</sup> introduced the construct of psychosocial safety climate (PSC), which was defined as shared perceptions with regards to "policies, practices, and procedures for the protection of worker psychological health and safety."<sup>(pp580)</sup>

They found that higher levels of PSC are associated with reduced demands and increased resources, which are further related to decreased psychological health problems and increased workplace engagement. Subsequent studies have also shown that PSC buffers the impact of occupational stressors on employee health and performance.<sup>31,32</sup>

PSC emphasizes the involvement of all layers of the organization in stress prevention.<sup>21</sup> Although primarily concerned with support by management and supervisors for stress prevention, PSC has an additional focus on employee safety.<sup>33</sup> More recently, Kozusznik et al,<sup>34</sup> represented climate of stress prevention as an emergent property, which is formed when individuals' appraisal of distress and eustress becomes shared. Unlike PSC, this conceptualization of stress prevention climate focuses on the shared experience of stress and makes no reference to the organization's priorities and practices for reducing employee stress.

Research examining the discriminant validity of stress prevention climate from similar climates is largely non-existent. Much of the research on PSC has conflated safety and stress prevention climate (ie, including both in the same measure) without any attention to health promotion. Although one study examined the structural distinctiveness of the PSC and safety climate scales,<sup>35</sup> no research has examined whether stress prevention climate is distinct from health climate. Therefore, questions remain regarding the distinctiveness of measures of safety, health, and stress prevention climate. If the three constructs are in fact distinct, then studies that fail to include each of them as predictors may provide an incomplete view of employee health and well-being. On the other hand, if the three constructs are empirically redundant, then there are important theoretical questions for the broader climate research with respect to whether employees actually distinguish among the various safety, health, and stress prevention facets of climate.

### MEASUREMENT OF SAFETY, HEALTH, AND STRESS PREVENTION CLIMATE

Due to the popularity of safety climate research, a number of measures have been developed to assess the construct. The initial measure of safety climate by Zohar included eight subscales with facets such as training programs, management attitudes, levels of risk, work pace, status of safety officer, and safe conduct on social status.<sup>36</sup> Since then, several multidimensional measures of general<sup>37,38</sup> and industry-specific<sup>39,40</sup> safety climate measures have been developed.

Comparatively, only a handful of measures of health and stress prevention climate exist in the literature. The health climate measure by Ribisl and Reischl<sup>41</sup> comprised of several subscales, including job flexibility to exercise, healthy nutrition norms, and exercise norms. However, this measure also assesses psychosocial factors, such as general supervisor support and tension norms. Similarly, Sonnentag and Pundt<sup>42</sup> developed a 24-item measure of health behavior, which incorporated values and expectations, organizational practices, and communication pertaining to healthy eating and physical exercise. While some studies have presented additional measures of health climate,<sup>22,43</sup> research relating health climate to safety or health climate is scant. Only one study has examined the factor structure of a safety and health climate measure and found that items tapping the two climate dimensions loaded on their respective factors.<sup>8</sup> Additional research is needed to replicate the distinctiveness of safety and health climate measures.

To our knowledge, only the PSC measure comprises items that relate to stress prevention climate.<sup>44</sup> While the majority of items in this measure pertain to occupational stress, a handful of items refer to safety and health (eg, "My contributions to resolving occupational health and safety are listened to"). Another study alluded to examining stress prevention climate in a sample of social

services professionals, but the researchers relied solely on items pertaining to job demands, such as workload and work-life balance, which were aggregated to the team level.<sup>34</sup> The operationalization of stress prevention climate in the study by Kozuszniak et al. is inconsistent with the definition of psychological climate which emphasizes employees' perceptions regarding policies, procedures, and practices with regards to the organizational facet, in this case, stress prevention.<sup>45</sup>

Although climate researchers have focused on issues related to safety, health, and stress prevention, studies have not directly compared measures of these three constructs. Moreover, existing measures may not be able to adequately diagnose concerns specifically pertaining to safety, health, or stress, and hence, may not be as useful for intervention research. Considering the dearth of empirical literature on stress prevention climate, as well as the deficiency of studies on measure validation for both health and stress prevention climate, additional work on scale development is warranted for the two climates.

Cooper and Richardson<sup>46</sup> pointed out that fair comparisons are possible only when equivalence is demonstrated between measures of different constructs. Equivalence can be maximized by operationalizing the three climate constructs similarly, and creating identical measures of the safety, health, and stress prevention climate. Since the existing measures of safety, health, and stress prevention climate are not "operationalized, manipulated, or measured with equal care and fidelity,"<sup>(pp71),46</sup> comparisons made using existing measures preclude us from making definitive conclusions regarding the distinctiveness of the three climate measures. Therefore, to assess the distinctiveness of the three forms of climate, we sought to develop parallel measures that (a) captured the most important aspects of climate, (b) reflected similar content across the measures, and (c) were short enough that multiple climate measures could be administered in the same study while being sufficiently broad in content to ensure that the constructs were being effectively assessed.

In Study 1, we developed parallel measures focusing on four core elements of climate: management commitment, supervisor support, communication, and policies and procedures. Next, we examined the content validity of the three measures using procedures outlined by Hinkin and Tracey.<sup>47</sup> The new measures of safety, health, and stress prevention climate were then subjected to extensive tests of content, construct, and criterion-related validity. We expected our measure of safety and health climate to be positively associated with existing measures of the same constructs. Since the stress prevention climate measure developed in the current study is the first scale assessing stress climate, we were unable to examine its convergent validity with existing measures.

With respect to discriminant validity, we expected to find a stronger association between our measure of safety climate and the scale developed by Zohar and Luria,<sup>45</sup> but weaker associations with the health climate measure by Zweber et al.<sup>22</sup> Similarly, we anticipated that our health climate measure would demonstrate a stronger correlation with the existing health climate measure<sup>22</sup> than the safety climate measure by Zohar and Luria.<sup>45</sup> In line with prior studies,<sup>48,49</sup> we expected that our three climate scales will exhibit weak to negligible correlations with participant demographics.

In Study 2, we explored whether the measures of safety, health, and stress prevention climate from Study 1 can be structurally distinguished. Specifically, this study evaluated whether parallel items of safety, health, and stress prevention climate load on distinct factors. Based on the findings from Mearns et al.,<sup>8</sup> we expected that items for safety, health, and stress prevention climate would load on three distinct factors.

In Study 3, we replicated the factor structure obtained in Study 2 and examined criterion validity evidence for the three climate scales using a prospective design. Specifically, we tested

whether safety, health, and stress prevention climate predicted safety performance, physical outcomes, and engagement, respectively. Past literature demonstrates that workplace climate measures exhibit stronger relationships to outcomes that are both relevant and specific to the climate construct of interest.<sup>50</sup> Consistent with meta-analytic evidence,<sup>23</sup> we expected safety climate at Time 1 to be positively related to safety compliance and safety participation at Time 2. We also expected health climate at Time 1 to be positively related to physical activity and nutrition, and negatively related to physical fatigue at Time 2, in line with prior research.<sup>51-53</sup> Lastly, in accordance with prior studies,<sup>54,55</sup> we expected stress prevention climate at Time 1 to be positively related to engagement, and negatively related to mental and emotional fatigue at Time 2.

## STUDY 1

### Method

#### Participants and Procedure

Participants for this study comprised of undergraduate students ( $N=207$ ) from a Southeastern university. On average, participants were 18.50 years of age ( $SD=1.01$ ) and 25% were employed. The majority of the participants were women (69%) and Caucasian (86%). The announcement for the study was posted on an online Psychology Research System. Students who signed up for the study completed a 30-minute survey in a proctored setting.

Participants were provided with the climate items (described below) and definitions of safety, health, and stress prevention climate; they were then asked to rate the extent to which each item corresponded to the three definitions using a 7-point Likert scale (1 = "Not at all representative" to 7 = "Completely representative"). To prevent order effects, we randomized the ordering of the items. Evidence for content validity is inferred if the mean ratings of the items are significantly higher for the intended construct. In addition, participants who were employed ( $N=53$ ) completed existing measures of safety climate and health climate to examine whether our measures correlated with these scales (ie, convergent validity), and work-family climate, to determine whether the safety, health, and stress prevention climate measures could be distinguished from these measures (ie, discriminant validity).

### Measures

#### Climate Scale Development

Because we wanted parallel and equivalent measures to assess the distinctiveness of the multiple climate scales, we developed new safety, health, and stress prevention climate measures for this study. The most commonly-used safety climate scales focus exclusively on organization's commitment to safety at the top-management, supervisor, or coworker level, and safety communication.<sup>45,56-58</sup> Moreover, supervisor and coworker support and social norms supportive of safety and health behaviors have been shown to improve health and safety behaviors.<sup>59-61</sup> Therefore, we developed a measure of safety climate to reflect four elements of organizational climate in the workplace: management commitment, supervisor support, communication, and policies and procedures. The health and stress prevention climate scales were modeled after the safety climate measure with respect to their structure and content. Specifically, the wording of items from the safety climate measure was applied to health and stress prevention climate scales such that the word "safety" from the safety climate items was replaced with "health" or "stress." Each measure consisted of 13 items (see Table 1) which respondents answered using a 7-point Likert scale (1 = "Strongly disagree" to 7 = "Strongly agree").

**TABLE 1.** Means and Item Loadings for Safety, Health, and Stress Prevention Climate Scales

Items	Item Means in the Student Sample			Loadings in the MTurk Sample	
	SC	HC	SP		
Management commitment to safety					
1	Safety is given a high priority by top management.	<b>6.48</b>	3.63	3.11	0.90
2	Top management continually tries to improve the safety of our workplace.	<b>6.39</b>	3.60	3.15	0.96
3	Top management displays a high level of commitment to workplace safety.	<b>6.41</b>	3.63	3.10	0.97
Supervisor support for safety					
4	My supervisor places a strong emphasis on workplace safety.	<b>6.49</b>	3.84	3.25	0.92
5	My supervisor often encourages subordinates to work safely.	<b>6.42</b>	3.77	3.19	0.96
6	My supervisor is committed to ensuring that subordinates work safely.	<b>6.35</b>	3.73	3.37	0.96
Safety communication					
7	My organization takes the safety ideas of employees seriously.	<b>6.31</b>	3.70	3.28	0.91
8	There is open communication about safety issues at my workplace.	<b>6.29</b>	3.57	3.05	0.89
9	My organization is open to ideas about improving safety in the workplace.	<b>6.35</b>	3.69	3.14	0.83
Policies and procedures for safety					
10	Employees receive comprehensive training in workplace safety issues.	<b>6.36</b>	3.51	3.06	0.78
11	My workplace offers incentives for employees to follow safety procedures and guidelines.	<b>5.95</b>	3.57	3.13	0.87
12	My organization has clear policies in place around safety in my workplace.	<b>6.58</b>	3.84	3.14	0.64
13	My organization provides the resources employees need to perform the job safely.	<b>6.57</b>	3.73	3.31	0.85
Management commitment to health					
14	Top leadership is committed to health promotion as an important investment.	4.05	<b>6.02</b>	4.01	0.90
15	Top management continually tries to improve employee health.	4.85	<b>6.00</b>	4.14	0.97
16	Top management displays a high-level of commitment to employee health.	4.98	<b>5.97</b>	4.37	0.97
Supervisor support for health					
17	My supervisor encourages me to make changes to improve my health.	3.43	<b>5.92</b>	3.95	0.92
18	My supervisor displays a high level of commitment to his/her subordinates' health.	4.95	<b>5.92</b>	4.50	0.95
19	My supervisor often encourages subordinates to improve their health.	3.82	<b>5.98</b>	4.12	0.95
Health communication					
20	My organization takes employee suggestions about how to improve employee health seriously.	4.09	<b>6.08</b>	4.06	0.85
21	Within my workplace, there is open communication about improving employee health.	3.71	<b>6.00</b>	3.98	0.91
22	My organization is open to suggestions about how to improve employees' physical health.	3.80	<b>6.02</b>	3.66	0.88
Policies and procedures for health					
23	My organization provides health education programs.	3.41	<b>5.88</b>	4.04	0.91
24	My workplace offers incentives for employees to engage in healthy behaviors (eg, diet and exercise).	3.58	<b>6.03</b>	3.55	0.82
25	My organization has policies in place that support healthy lifestyle choices for employees (eg, diet and exercise).	3.44	<b>6.00</b>	3.65	0.87
26	My organization provides the resources employees need in order to support a healthy lifestyle (eg, information or classes).	3.62	<b>6.06</b>	3.98	0.89
Management commitment to stress prevention					
27	Employee psychological health is given a high priority by top management.	3.74	5.00	<b>5.57</b>	0.90
28	Top management continually tries to improve employee stress levels.	3.59	4.03	<b>6.14</b>	0.97
29	Top management displays a high-level of commitment to reducing employee stress levels.	3.48	4.06	<b>6.28</b>	0.97
Supervisor support for stress prevention					
30	My supervisor shows an interest in my stress level.	3.58	4.09	<b>6.15</b>	0.85
31	My supervisor often helps employees manage their stress levels at work.	3.63	4.08	<b>6.17</b>	0.97
32	My supervisor displays a high-level of commitment to his/her subordinates' stress levels.	3.57	4.03	<b>6.22</b>	0.93
Stress prevention communication					
33	My organization listens to the stress reduction contributions of workers.	3.50	4.00	<b>6.13</b>	0.94
34	There is open communication in my workplace regarding stress reduction.	3.47	4.12	<b>6.22</b>	0.92
35	My organization is open to suggestions about how to improve the stress of its employees.	3.75	4.17	<b>6.19</b>	0.90
Policies and procedures for stress prevention					
36	Employees receive information and/or training to help reduce the amount of stress experienced on the job.	3.59	4.02	<b>6.24</b>	0.93
37	My workplace offers incentives for employees to participate in activities to reduce stress.	3.41	4.08	<b>6.14</b>	0.89
38	My organization has policies in place that aim to reduce the levels of stress experienced by employees.	3.72	4.02	<b>6.15</b>	0.82
39	My organization provides the necessary resources in order to reduce the level of stress experienced by its employees (eg, information or classes).	3.59	4.10	<b>6.22</b>	0.90

Means in bold are significantly higher ( $P < 0.05$ ) than the other two means for that item.  
 HC, health climate; SC, safety climate; SP, stress prevention climate.

**TABLE 2.** Descriptive Statistics, Correlations, and Reliabilities for Study 1 Variables

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Safety climate	5.35	1.23	(0.95)														
2. Health climate	4.11	1.48	0.55**	(0.96)													
3. Stress prevention climate	4.12	1.55	0.48**	0.90**	(0.96)												
4. Organization-level safety climate	4.98	1.47	0.90**	0.62**	0.62**	(0.97)											
5. Group-level safety climate	5.13	1.46	0.80**	0.54**	0.50**	0.89**	(0.98)										
6. Workgroup health climate	5.18	1.27	0.27	0.42**	0.49**	0.32*	0.29*	(0.76)									
7. Supervisor health climate	4.36	1.25	0.20	0.57**	0.45**	0.22	0.14	0.39**	(0.70)								
8. Organization health climate	5.00	1.40	0.58**	0.72**	0.74**	0.69**	0.68**	0.57**	0.50**	(0.87)							
9. Managerial support (WF)	5.43	1.01	0.22	0.48*	0.55**	0.27	0.26	0.47**	0.18	0.49**	(0.91)						
10. Career consequences (WF)	4.84	1.47	0.04	-0.13	-0.01	0.02	0.10	0.20	-0.19	0.14	0.21	(0.94)					
11. Organizational time demands (WF)	5.18	1.46	0.23	0.21	0.24	0.22	0.27*	0.12	-0.08	0.27	0.48**	0.41**	(0.90)				
12. Age	18.50	1.01	0.06	-0.05	0.08	0.10	0.04	-0.02	-0.13	-0.03	-0.09	-0.09	-0.22	-			
13. Gender	1.70	0.46	-0.08	0.04	0.04	-0.12	-0.17	-0.09	0.07	0.16	0.04	-0.06	-0.29*	-0.15*	-		
14. Ethnicity	2.24	1.03	0.06	-0.12	-0.13	-0.01	-0.03	-0.16	-0.27	-0.20	-0.22	-0.04	-0.01	0.16*	-0.04	-	
15. Work hours	16.92	9.83	-0.16	-0.17	-0.14	-0.15	-0.16	-0.14	0.04	-0.22	-0.20	-0.34*	-0.26	0.20	-0.22	-0.09	-

M, mean; SD, standard deviation; WF, work-family.

\* $P < 0.05$ .

\*\* $P < 0.01$ .

### Safety Climate

In order to examine the convergent validity of our safety climate measure with existing measures, we examined organization- and group-level safety climate using scales by Zohar and Luria,<sup>45</sup> scales, which comprise 16 items for each of the two dimensions. A sample item for organization-level safety climate was “Top management in my company reacts quickly to solve the problem when told about safety hazards.” A sample item for group-level safety climate included “My direct supervisor makes sure we receive all the equipment needed to do the job safely.” Items for both dimensions were rated on a 7-point Likert scale (1 = “Strongly disagree” to 7 = “Strongly agree”). Cronbach  $\alpha$  reliabilities for the organization- and group-level safety climate were 0.97 and 0.98, respectively.

### Health Climate

In order to examine the convergent validity of our health climate scale with an existing measure, we used the scale by Zwebber et al,<sup>22</sup> which assesses three facets of health climate, namely, workgroup, supervisor, and organization, and comprise of three, three, and four items, respectively. A sample item for the workgroup facet included “If my health were to decline, my coworkers would take steps to support my recovery.” A sample item for the supervisor facet was “My supervisor encourages healthy eating behaviors in my workgroup.” A sample item for the organization facet was “My organization is committed to employee health and well-being.” All items were assessed using a 7-point Likert scale (1 = “Strongly disagree” to 7 = “Strongly agree”). Cronbach  $\alpha$  reliabilities for the workgroup, supervisor, and organization facets were 0.76, 0.70, and 0.87, respectively.

### Work-Family Climate

We assessed three dimensions of work-family climate in this study using a measure developed by Thompson et al.<sup>62</sup> Specifically, managerial support for work-family balance was measured using 11 items. A sample item included “In general, managers in this organization are quite accommodating of family-related needs.

Career consequences for using work-family benefits were assessed using five items (eg, “Many employees are resentful when men in this organization take extended leaves to care for newborn or adopted children.”). Organizational time demands comprised of four items (eg, “Employees are often expected to take work home at night and/or on weekends.”). All items were measured using a 7-point Likert scale (1 = “Strongly disagree” to 7 = “Strongly agree”). Cronbach  $\alpha$  reliabilities for managerial support, career consequences, and organizational time demands were 0.91, 0.94, and 0.90, respectively.

## RESULTS AND DISCUSSION

### Content Validity

The first goal of this study was to examine the content validity of our three measures. In order to achieve this goal, we conducted within-subjects ANOVAs to determine whether each item was captured by the construct definition. As indicated in Table 1, all items were rated significantly higher on the intended construct than the other two constructs. Specifically, participants rated all safety climate items as most consistent with the definition of safety climate, the health climate items as most consistent with the definition of health climate, and the stress prevention items as most consistent with the definition of stress prevention climate. These findings suggest that the items for safety, health, and stress prevention climate possess adequate content validity.

The second goal of the study was to establish convergent validity of our measures using bivariate correlations. Results (Table 2) indicated that our measure of safety climate exhibited strong correlations with existing measures of organization-level and group-level safety climate. While health climate also demonstrated strong associations with existing measures of safety climate, these correlations were significantly lower with both organization-level climate (Fisher  $r$  to  $z = -3.74$ ,  $P < 0.01$ ) and group-level safety climate ( $z = -2.47$ ,  $P < 0.01$ ) compared with those exhibited by our safety climate measure. Likewise, stress prevention climate exhibited significantly lower correlations with both organization-level

climate ( $z = -3.74$ ,  $P < 0.01$ ) and group-level safety climate ( $z = -2.75$ ,  $P < 0.01$ ).

As expected, our measure of health climate correlated significantly with the workgroup, supervisor, and organization facets of the existing health climate measure.<sup>22</sup> In comparison, safety climate demonstrated a weaker, but not significantly different, relationship with organization health climate. Safety climate was not related to either workgroup or supervisor health climate. Stress prevention climate exhibited correlations with all facets of health climate that were similar in magnitude to those obtained with health climate. These findings offer convergent validity evidence for our safety and health climate measures in relation to existing instruments. However, the high correlation between our health and stress prevention climate measures raises questions about their distinctiveness. This finding could be attributable to the small sample consisting of employed students. Therefore, we sought to replicate this finding in a larger and more diverse sample in Study 2.

Lastly, we examined the discriminant validity of our measures by assessing their associations with work–family climate and demographic variables. We expected the correlations between our measures and work–family climate to be smaller in magnitude compared with those with their respective convergent measures. Our measure of safety climate was not related to any facet of work–family conflict. While both health and stress prevention climate were related to managerial support for work family, these correlations were small enough to support the distinctiveness of the climate measures. No relationships were found between the climate measures and the career consequences or organizational time demands measures. Lastly, no demographic variables were related to any of the three measures of climate. These findings provide evidence of discriminant validity.

## STUDY 2

### Method

#### Participants and Procedure

The final sample for Study 2 consisted of 1032 participants from Amazon Mechanical Turk (MTurk) who were participating in a larger study of workers' job-related attitudes, behaviors, and health outcomes (our data have not been used in any prior published research). MTurk has become a popular tool for psychological research<sup>63</sup> as it provides easy and inexpensive access to samples from a diverse set of occupations and organizations.<sup>64,65</sup> This diversity ensures that samples include workers with a broad mix of climate-related perceptions. Because members of MTurk belong to a many different organizations, the data in this study are not nested and therefore appropriate for individual-level analyses.

For the present study, members of MTurk in the United States were encouraged to participate if they were employed for 20 hours or more. In addition to the climate items, four attention check items were included. A total of 1124 participants responded to the survey. Of these, 92 (8%) participants failed one or more attention checks, and were removed from further analyses. Members received \$3.00 for their participation in the study. On average, participants were 32.61 (SD = 10.71) years old and worked 43.42 (SD = 8.18) h/wk. Approximately 50% were men and most were Caucasian (80%). Regarding marital status, 46.90% were married or cohabiting with a partner, 42.20% were single, 7.40% were divorced, 2.30% were widowed, and 1.10% were separated. In addition, participants held a wide range of jobs, such as security officer, bartender, and customer service representative.

#### Analytic Strategy

To test the structural distinctiveness of the measures, we conducted confirmatory factor analyses (CFA) with robust maximum

likelihood estimation (MLR) using Mplus 7.4 (Muthén & Muthén, Los Angeles, CA) to replicate the dimensionality of the 39 items from Study 1. We assessed a series of five competing second-order factor CFA models to explore the dimensionality of the three climate scales. The first second-order CFA specified three higher order factors, with each factor representing safety, health, or stress prevention climate. The first-order factors for each of the three second-order factors included management commitment, supervisor support, communication, and policies and procedures for safety, health, and stress prevention, respectively (see Fig. 1). The second-order three-factor model was compared with three second-order two-factor models where first-order factors for two of the three climate measures loaded on one second-order factor, while the first-order factors pertaining to the third climate measure loaded on the second higher-order factor (ie, safety and health climate vs stress prevention climate, safety and stress prevention climate vs health climate, and health and stress prevention climate vs safety climate). Lastly, we tested a second-order one-factor model in which all first-order factors loaded on one second-order factor.

We assessed model fit using the Comparative Fit Index (CFI<sup>66</sup>), Root Mean Square Error of Approximation (RMSEA<sup>67</sup>), and Standardized Root Mean Square Residual (SRMR<sup>68</sup>). Although the chi-square test has been traditionally used as an indicator of model fit,<sup>69</sup> it “provides a highly sensitive statistical test, but not a practical test, of model fit.”<sup>(pp234),70</sup> Hence, the chi-square statistic was used for the purposes of comparing the fit across the models, but not for assessing model fit.

## RESULTS AND DISCUSSION

Findings in Table 3 suggest that the fit of the second-order three-factor model demonstrated satisfactory fit that was significantly better than the second-order one- and two-factor models. Therefore, we concluded that we had strong evidence to support a three-factor view of the climate scales with distinct safety, health, and stress prevention climate dimensions. The factor loadings for the three-factor model appear in Table 1.

Despite demonstrating the structural distinctiveness of the three climate scales, we once again noted high correlations between safety and health ( $r = 0.69$ ,  $P < 0.01$ ), safety and stress prevention ( $r = 0.69$ ,  $P < 0.01$ ), and health and stress prevention ( $r = 0.85$ ,  $P < 0.01$ ) climates. Therefore, to further investigate the distinctiveness of the measures, we examined whether the three constructs predicted different outcomes in Study 3 using a sample of employees in a job with significant safety, health, and stress concerns.

## STUDY 3

### Method

#### Participants and Procedure

The participants for Study 3 were 268 firefighters from around the United States who completed two waves of survey data assessing climate and health-related measures. On average, the firefighters were 32.81 years of age (SD = 6.57) with 7.30 years of tenure (SD = 7.12). The firefighters were mostly men (93%) and Caucasian (53%).

Participants were recruited in several different ways. In a previous study by the fifth author,<sup>71</sup> a large group of firefighters had agreed to participate in future research and had provided their email addresses. These firefighters were recruited for the current study. Study recruitment notices also were posted on several firefighter webpages and forums, urging firefighters from around the country to participate. Because firefighters belonged to various fire stations across the country, the data were not nested. All paid firefighters who work in Suppression (ie, 24 hour shifts) were eligible to participate.

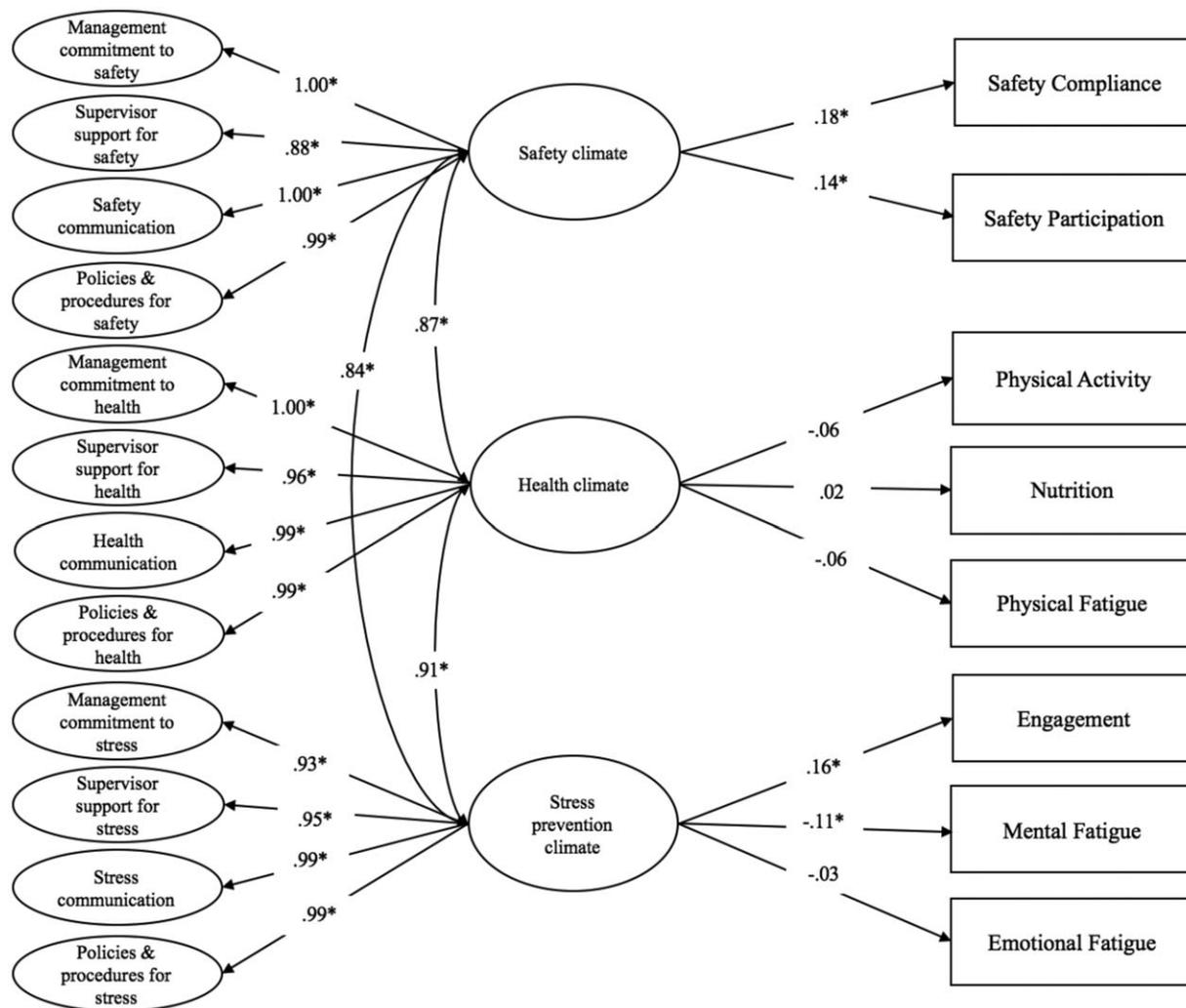


FIGURE 1. Standardized path coefficients for the hypothesized model. \* $P < 0.05$ .

Firefighters who agreed to participate were sent a link to a Time 1 survey which included measures of safety, health, and stress prevention climate. One month later, the Time 1 respondents were invited to participate in a second online survey, where they completed measures of safety performance,

physical outcomes, engagement, and mental and emotional fatigue. Participants received \$10 and \$14 for participating at Time 1 and Time 2, respectively. A total of 440 firefighters completed the Time 1 survey, 268 of whom (61%) responded at Time 2.

TABLE 3. Goodness-of-Fit Statistics for Confirmatory Factor Analyses

Model	$\chi^2$	df	CFI	SRMR	RMSEA	90% CI of RMSEA
Second-order 1-factor model	5742.45*	690	0.85	0.10	0.08	[0.08,0.09]
Second-order 2-factor model <sup>a</sup>	5286.64*	689	0.86	0.09	0.08	[0.07,0.08]
Second-order 2-factor model <sup>b</sup>	5316.36*	689	0.86	0.09	0.08	[0.07,0.08]
Second-order 2-factor model <sup>c</sup>	4507.72*	689	0.88	0.06	0.07	[0.07,0.08]
Second-order 3-factor model	4026.77*	687	0.91	0.06	0.07	[0.07,0.08]

CFI, comparative fit index; CI, confidence interval; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual.

<sup>a</sup>Safety and health climate load on the first second-order factor, while stress prevention climate loads on the second second-order factor.

<sup>b</sup>Safety and stress prevention climate load on the first second-order factor, while health climate loads on the second second-order factor.

<sup>c</sup>Health and stress prevention climate load on the first second-order factor, while safety climate loads on the second second-order factor.

\* $P < 0.001$ .

**TABLE 4.** Descriptive Statistics, Correlations, and Reliabilities for Study 2 Variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1. Safety climate	4.87	1.13	(0.95)										
2. Health climate	4.84	1.14	0.82**	(0.95)									
3. Stress prevention climate	4.73	1.25	0.78**	0.86**	(0.96)								
4. Safety compliance	3.64	0.78	0.26**	0.25**	0.18**	(0.85)							
5. Safety participation	3.64	0.75	0.23**	0.17**	0.08	0.72**	(0.84)						
6. Physical activity	2.75	0.83	-0.02	-0.02	-0.08	-0.04	-0.11	(0.75)					
7. Nutrition	3.87	1.35	-0.06	0.04	0.06	-0.36**	-0.38**	0.49**	(0.96)				
8. Physical fatigue	2.76	0.78	-0.15*	-0.17**	-0.11	-0.33**	-0.32**	-0.17**	-0.16**	(0.88)			
9. Engagement	3.69	0.68	0.20**	0.25**	0.18**	0.28**	0.20**	0.35**	0.38**	-0.53**	(0.87)		
10. Mental fatigue	2.60	0.75	-0.19*	-0.22**	-0.15*	-0.33**	-0.27**	-0.18**	-0.18**	0.76**	-0.55**	(0.89)	
11. Emotional fatigue	2.64	0.73	-0.16*	-0.16**	-0.06	-0.26**	-0.29**	-0.12	-0.14*	0.76**	-0.51**	0.74**	(0.86)

*M*, mean; *SD*, standard deviation.  
 \**P* < 0.05.  
 \*\**P* < 0.01.

**Measures**

The safety, health, and stress prevention climate measures from Study 1 were administered at Time 1. In addition, the following measures were administered at Time 2.

**Safety Performance**

Two dimensions of safety performance, that is, safety compliance and safety participation were assessed using a measure by Neal and Griffin.<sup>58</sup> Four items were used to assess safety compliance. A sample item for safety compliance included “I use the correct safety procedures for carrying out my job.” Safety participation was measured using four items. A sample item for this subscale included “I put in extra effort to improve the safety of the workplace.” All items were rated on a 5-point Likert scale (1 = “Strongly disagree” to 5 = “Strongly agree”). Cronbach α reliabilities for safety compliance and safety participation scales were 0.85 and 0.84, respectively.

**Physical Outcomes**

We used measures of physical activity and nutrition as outcomes of health climate. Physical activity was measured using a four-item Concise Physical Activity Questionnaire.<sup>72</sup> Participants indicated the number of times they engaged in different physical activities. A sample item included “Moderate aerobic activity (eg, brisk walking, bicycling, tennis).” Participants endorsed these items using a 6-point Likert scale (1 = “Unable/not medically allowed to do this” to 6 = “6 to 7 days per week”). Cronbach α reliability for this measure was 0.75. Nutrition was measured the 12-item Diet Quality Scale.<sup>43</sup> Participants indicated the frequency with which they consumed different types of food. A sample item was “Leafy green vegetables (eg, broccoli, spinach, romaine lettuce).” All items were rated on an 8-point Likert scale (1 = “Did not or could not eat due to dietary or religious/ethical restrictions” to 8 = “5+ times per day”). Cronbach α reliability for this scale was 0.96.

**Fatigue**

We used Frone and Tidwell<sup>73</sup> measure of fatigue. Specifically, we assessed physical, mental, and emotional fatigue using six items each. A sample item for physical fatigue included “I feel physically exhausted at the end of the workday.” A sample item for mental fatigue was “I feel mentally worn out at the end of the workday.” Lastly, a sample item for emotional fatigue included “I feel emotionally drained at the end of the workday.” All items were measured using a 5-point Likert scale (1 = “Never” to 5 = “Everyday”).

Cronbach α reliability for physical, mental, and emotional fatigue was 0.88, 0.89, and 0.86, respectively.

**Engagement**

Work engagement was assessed using the 9-item Utrecht Work Engagement Scale.<sup>74</sup> A sample item included “At my work, I feel bursting with energy.” All items were measured on a 5-point Likert scale (1 = “Never” to 5 = “Almost Always”). Cronbach α reliability for this measure was 0.87.

**RESULTS AND DISCUSSION**

**Criterion-Related Validity**

Table 4 presents the means, standard deviations, correlations, and reliabilities for all study variables. As expected, safety climate was positively related to safety compliance and safety participation. Similarly, health climate was negatively related to physical fatigue, but not physical activity or nutrition. Lastly, stress prevention climate exhibited a positive relationship with engagement and a negative relationship with mental fatigue, but no relationship with emotional fatigue.

Next, we tested a path model presented in Fig. 1. The structural model provided acceptable fit to the data,  $\chi^2(991) = 1621.47$ ,  $P < 0.001$ , CFI = 0.91, RMSEA = 0.05, SRMR = 0.05. Safety climate was positively related to safety performance and accounted for 3.2% and 1.8% of the variance in safety compliance and safety participation, respectively. Health climate did not demonstrate a significant relationship with physical activity, nutrition, or physical fatigue. Lastly, stress prevention climate was positively related to engagement and mental fatigue, but not emotional fatigue. Stress prevention climate accounted for 2.5% of the variance in engagement and 1.3% of the variance in mental health. The Lagrange Multiplier test revealed that adding the remaining unspecified paths to the model would not substantially enhance model fit, thereby further supporting our hypothesized model.

The results from Study 3 confirm that safety, health, and stress prevention climate are distinct constructs that are differentially related to occupational health outcomes. The results for safety climate and stress prevention climate were consistent with the proposal that climate measures exhibit stronger relationships with outcomes that are conceptually aligned. We elaborate on these findings in our general discussion below.

We also found that health climate did not exhibit a significant relationship with physical activity, nutrition, or physical fatigue. A possible explanation for this inconsistent finding may be that due to

the physically demanding nature of the work, firefighters may be intrinsically motivated to stay physically active. Hence, health climate may have little influence on physical activity or nutrition among firefighters. In essence, for employees who are not intrinsically motivated to maintain their health, health climate may act as an extrinsic motivator. Future research should examine the influence of health climate on physical activity in such samples.

## GENERAL DISCUSSION

In recent years, NIOSH has encouraged integration of worker safety and health approaches through its Total Worker Health™ (TWH) program. The TWH program not only incorporates employee safety and health promotion as determinants of employee well-being, but also addresses employee stressors.<sup>75</sup> Climate research offers a way to study the relationship between safety-focused and health/well-being focused aspects of the work environment as expressed through employees' perceptions about the organization's relative priorities. Although previous studies have demonstrated strong correlations between safety and health climate<sup>22</sup> and safety and psychosocial safety climate (PSC),<sup>35</sup> no research to date has examined whether the constructs of safety, health, and stress prevention climate can be psychometrically distinguished. The goal of the current research was to develop measures of safety, health, and stress prevention climate and determine whether the items pertaining to the three climates provided evidence of structural distinctiveness.

Using independent samples from undergraduate students, MTurk workers, and firefighters, this study provided content validity evidence for the newly developed safety, health, and stress prevention climate measures, and demonstrated that the three measures reflect structurally distinct constructs. Additionally, we provided criterion-related validity evidence for safety and stress prevention climate scales by demonstrating relationships with safety performance and engagement/fatigue, respectively, 1 month later. The safety climate findings largely replicate prior safety climate literature. Our findings supporting the distinctiveness of stress-prevention climate indicate the potential importance of stress-prevention climate as an understudied construct requiring further research attention.

Although we found that health climate was structurally distinct from safety and stress-prevention climate, health climate did not significantly predict physical activity, nutrition, or physical fatigue. Thus, this study provides evidence that health climate is a distinct construct, but no evidence that it uniquely contributes to health-related outcomes. We noted above that this finding may reflect the fact that firefighters are required to stay physically fit to perform their jobs and may eat a healthy diet regardless of whether their organizational climate supports such healthy behavior. Health climate may be more strongly related to health behavior for employees who work in sedentary jobs, or jobs that require little physical effort.

Research on health and stress prevention climate suffers from construct contamination, as conceptualizations of health and stress prevention climate often encompass policies and procedures pertaining to occupational safety.<sup>27,44</sup> Despite the high correlations reported between safety, health, and stress prevention climate,<sup>22,35</sup> our findings suggest that employees can distinguish the three climate constructs. Future research should simultaneously assess safety, health, and stress prevention climate to gain a holistic view of employee well-being, and develop interventions targeting specific climate dimensions.

Our study demonstrated that safety climate predicted safety performance, which was expected based on prior research.<sup>23</sup> However, safety climate did not predict physical health outcomes, engagement, or fatigue. Similarly, while stress prevention climate predicted engagement and mental fatigue, it did not predict safety

performance, physical outcomes, or physical fatigue. Some climate research has included outcomes that do not necessarily align with the climate content of interest. For instance, Zveber et al,<sup>76</sup> examined the relationship between health climate and mental health outcomes but did not include physical health outcomes. Similarly, Mearns et al<sup>8</sup> found that while safety climate predicted safety compliance, health climate was not related to compliance. These studies, as well as our findings, lend further support to the view that specific forms of climate predict outcomes that are conceptually aligned with those climate dimensions.

Another contribution of our study was that we developed instruments with uniform facets for assessing safety, health, and stress prevention climate which should facilitate comprehensive evaluation of occupational health-related aspects of organizational climate with parallel items that enable direct comparisons across the climate dimensions. Because these measures are general in nature, they can be utilized in a wide range of industries and organizations. The climate scales were validated using undergraduate students in Study 1, a diverse sample from numerous industries and organizations in Study 2, and a firefighter sample from across the United States in Study 3, supporting their generalizability and enabling continued examination of safety, health, and stress prevention climate across industries and organizations. While the measures developed in the study have the potential to contribute to furthering research in occupational health and safety, we recognize that the length of the measure (ie, 13 items per scale) may limit its use in some organizational settings. Future research may consider developing shorter versions of these measures that maintain their psychometric properties.

## Limitations and Directions for Future Research

Since participants represented a wide range of organizations in Study 2 and 3, employees were not nested and multilevel analyses were not possible. However, the findings of the current study are useful considering that previous researchers,<sup>22</sup> have argued for assessment of climate at multiple levels to enhance understanding of the differential roles that multiple climate facets have in shaping the health, safety, and psychological health outcomes. Future studies may consider utilizing a multi-level approach to explore whether the distinctiveness of safety, health, and stress prevention climate persists in group-level data.

The Study 2 participants belonged to a wide range of occupations and industries, including healthcare, construction, manufacturing, finance, and hospitality, among others. Therefore, it is plausible that the three climates assessed in this study may differ in salience across occupations. For instance, safety climate may be particularly important in industries where employees are exposed to safety hazards on a regular basis such as healthcare and construction. On the other hand, safety climate may be less salient in industries such as information technology and finance due to the absence of physical hazards. In such industries, health and stress prevention climate may be more applicable given the health hazards commonly faced by such workers (eg, sedentary work, interpersonal conflict, shiftwork). Future studies could assess the equivalence of climate perceptions in high versus low risk industries to determine whether the nature of a job's hazards influences the validity of the climate measure. Research also could examine hazard exposure as a moderator of the relationship between each of the climate dimensions and conceptually aligned outcomes.

This study exclusively relied on self-report outcomes as opposed to objective criteria, such as accidents and injuries, physical activity, and blood pressure. According to Zapf et al,<sup>77</sup> correlates between self-report measures are especially susceptible to common method variance (CMV) effects. To overcome the limitation of CMV, this study utilized a time-lagged design where measures of safety, health, and stress prevention climate measures were

administered at Time 1, and safety performance, physical activities, and engagement were assessed one month later, at Time 2. Future research should attempt to replicate our findings using objective outcome measures.

## CONCLUSIONS

This study sought to examine the distinctiveness of safety, health, and stress prevention climate measures. Results from two samples indicated that the three climate constructs can be psychometrically distinguished. In addition, measures of safety and stress prevention climate (but not health climate) demonstrated criterion-related validity by exhibiting relationships with safety performance and engagement/fatigue, respectively. By demonstrating that safety, health, and stress prevention climate are three distinct constructs, the current study augments support for assessment of the three constructs simultaneously to gain a better understanding of employee well-being.

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