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Nurse safety: How is safety climate related to affect and attitude?

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ABSTRACT

Occupational accidents and injuries continue to be a critical concern for nurses, given the hazardous healthcare environment. This study advances the research on workplace safety by studying the process variables (i.e. job-related negative affect (JRNA) and job satisfaction) in explaining the relationship between safety climate and various safety criteria in nurses. Based on survey data from 326 nurses, our findings suggest that psychological safety climate is negatively related to JRNA, turnover intentions, safety workarounds, and workplace hazards. In addition, structural equation modelling indicated general support for a model in which psychological safety climate influences employee strain through job attitudes, including JRNA and job satisfaction. More specifically, job attitudes were found to mediate the relationship between psychological safety climate and turnover intentions, experience of hazards, and injuries. Safety workarounds did not significantly relate to injuries. The present study contributes to the ongoing improvement of interventions aimed at mitigating nurses' injuries by integrating job attitudes into the safety climate–safety outcome framework.

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Psychological safety climate; job attitudes; hazards; safety workarounds; injuries; nurses

Introduction

Due to both the human and financial costs, occupational injuries continue as an area of concern for many organizations. In 2011, private industry employers reported close to three million nonfatal workplace injuries and illnesses. Approximately 44,000 of these injuries were reported in the healthcare and social services industry (U.S. Department of Labor, Bureau of Labor Statistics [BLS], 2013). In 2011, 40% of nurses reported nonfatal on-the-job injuries (American Nurses Association), and it has been estimated that nurse back injuries alone cost 16 billion dollars annually in worker's compensation benefits, while additional costs are associated with absences, medical treatment, restricted workload due to injury, and employee turnover costs (White, 2010). Safety climate and psychological safety climate have received prevalent attention in this research area due to the strong associations between these constructs and safety criteria, such as engagement in safe workplace practices and reduced occupational injuries (Christian, Bradley, Wallace, & Burke, 2009; Nahrgang, Morgeson, & Hofmann, 2011). Indeed, meta-analytic evidence suggests

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that a high psychological safety climate is related to improved safety performance, as well as reduced accidents and injuries (Christian et al., 2009; Nahrgang et al., 2011). Conversely, a low psychological safety climate may operate as a job stressor, which can elicit a variety of strain responses from employees (Abbe, Harvey, Ikuma, & Aghazadeh, 2011) and encourage safety workaround behaviours.

Safety workarounds refer to a temporary fix or a bypass to perceived obstacles in a system (Halbesleben & Rathert, 2008). They have received increasing attention in healthcare research, particularly due to the negative consequences that have been cited resulting from these shortcuts (Halbesleben, 2010), which may in part be due to a growing concern and effort to better catalogue and address specific hazards experienced by nurses (Ramsay et al., 2006). Increased engagement in safe workplace practices associated with psychological safety climate is expected to reduce injuries and associated health problems through reducing safety workarounds and hazardous experiences. Yet, the process whereby antecedents, such as psychological safety climate, impact important safety practices and outcomes through employee attitudes needs further elaboration (see Clarke, 2010). Indeed, models of safety climate have shown that there is a mediating effect of attitudes on the relationship between safety climate and safety outcomes as attitudes are formed by work environment factors, such as the safety climate (see Siu, Phillips, & Leung, 2004). Further, research demonstrates that a high safety climate is associated with favourable work attitudes (Clarke, 2010; Kath, Magley, & Marmet, 2010; Morrow & Crum, 1998; Siu et al., 2004) and in one study, job attitudes mediated the relationship between safety climate and accidents and injuries (Siu et al., 2004).

Developing a framework that integrates job-related negative affect (JRNA) and job satisfaction into the process whereby psychological safety climate influences key safety criteria will better enable researchers and employers to implement effective interventions targeted at mitigating accidents, injuries, and unsafe work practices, as well as help address turnover in the healthcare industry. Thus, the purpose of this study was to examine how these job attitudes impact the effect of psychological safety climate on participation in safety workarounds, as well as nurses' hazardous experiences and injuries at work. In order to test these relationships, we examined an emotion-centred job stress model (e.g. Spector, 1998), whereby JRNA mediates the relationship between psychological safety climate with job satisfaction, safety workarounds, and hazards. Finally, we posit that a low psychological safety climate is an antecedent of injuries, via the intermediate determinants of JRNA, job satisfaction, participation in safety workarounds, and workplace hazards experiences.

Theoretical background

Organizational climate is a multidimensional, collective construct that reflects a shared understanding by employees of an organizational environment or organizational events (e.g. Ashforth, 1985). This construct can be distinguished from psychological climate, which refers specifically to an individual's understanding of an organizational environment or event (Rousseau, 1988). *Psychological safety climate* refers to employees' perceptions of the degree of safety within their organizational environment (Neal & Griffin, 2004). Specifically, psychological safety climate generally assesses employees' perceptions of safety policies, procedures, and practices (Schneider, 1990), as well as the competing

demands between these safety rules and procedures with other desired outcomes, such as productivity (Zohar, 2010). Thus, both stated aspects of the organizational environment and unstated behaviours or actions contribute to employees' perceptions of psychological safety climate.

Generally, a distinction is made between formal policies and procedures and acted policies and procedures, as all formal policies and procedures may not be attended to in the work environment. Employees' perceptions of climate are impacted by their assessments of behavioural patterns and the signals sent to them by management about the relative priority of safety in comparison to other competing demands (Zohar, 2010). Employees may face competing organizational climates, such as competing climates for service, innovation, or productivity. Given these potentially competing demands, safety climate should be considered in comparison to other climates and priorities, as the relative priority of safety over organizational factors, such as innovation or productivity, is the key component of psychological safety climate (Zohar, 2010). For example, employees may engage in unsafe workplace practices despite formal policies and procedures when productivity is rewarded over safety (e.g. Clarke, 2010).

In response to a report by the Institute of Medicine on the prevalence of medical errors in the USA (Kohn, Corrigan, & Donaldson, 2000), there has been increased interest in reducing patient injuries and deaths in the healthcare industry. Consequentially, system-wide changes to healthcare strategies over the last 15 years have emphasized improving healthcare delivery, such as increasing safety practices, rather than mitigating errors (Donaldson, 2008). Safety climate is commonly studied in the nursing industry, as it is a predictor of medication errors, injuries, patient health, patient and nurse satisfaction, nurse turnover intentions, and even job stress (e.g. Hofmann & Mark, 2006). Given the importance of safety climate in reducing patient injuries and death, examining its impact on nurse emotions and subsequent health outcomes provides valuable information for both researchers and practitioners (Figure 1).

Emotion-centred model of job stress

A low psychological safety climate represents a job stressor in that it can be a perceived characteristic of the work environment that may elicit an adaptive response (Beehr & Newman, 1978). Such a response may be in the form of job dissatisfaction, job-related affect, or other strains. Indeed, many stressor-strain theoretical frameworks posit a stimulus-response process in which job stressors lead to employee strain (e.g. Kahn & Boysiere, 1992; Spector, 1998). According to the emotion-centred model of job stress, perceived

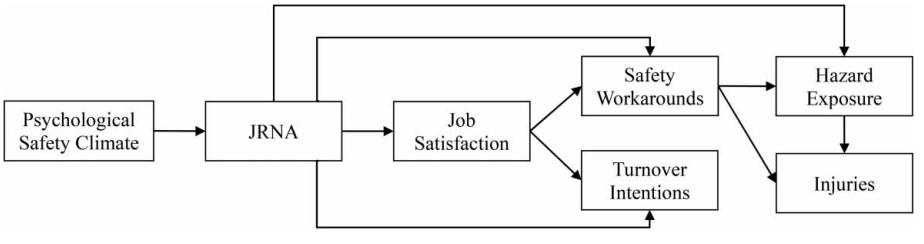

Figure 1. Hypothesized model.
Note: JRNA, job-related negative affect.

stressors elicit negative affective responses, such as anger or frustration, from nurses (e.g. Spector, 1998). These negative emotional states, in turn, lead to the experience of psychological, behavioural, and physical strains (Jex & Beehr, 1991). Psychological strains refer to affective (e.g. anxiety) and attitudinal (e.g. job dissatisfaction or turnover intentions) responses to stressors. Negative affect, as a precursor to strains, occurs more rapidly and operates as an antecedent to negative job attitudes. Behavioural strains are actions or instances of behaviour elicited in response to a job stressor, such as engaging in counterproductive work behaviours (CWBs). Physical strains include physiological responses, such as autonomic nervous system activation, that can impair cognitive function and lead to hazards and injuries (e.g. Mandler, 1975).

JRNA refers to employees' emotional responses and reactions to their jobs; it is an affective state response associated with temporary fluctuations in mood. This distinguishes JRNA from trait negative affectivity, which is a stable negative emotional disposition across situations and time (see Van Katwyk, Fox, Spector, & Kelloway, 2000). In prior research, trait negative affectivity has been unrelated to safety climate (Neal & Griffin, 2006); however, to date, the role of JRNA appears to be unexamined in relation to psychological safety climate. Psychological safety climate may have a relationship with state-based JRNA, even though it has not been related to trait-based negative affectivity. Particularly, if a low safety climate is perceived as stressful to an employee, negative state emotions such as JRNA are expected to occur, regardless of trait affectivity. JRNA may then mediate the relationship between psychological safety climate and less immediate strain.

Job satisfaction would be elicited by a low perceived psychological safety climate. This process may evolve over time, as job attitudes develop more slowly than JRNA. Indeed, high psychological safety climates have been positively related to job satisfaction (Kath et al., 2010; Morrow & Crum, 1998; Siu et al., 2004), while JRNA has been negatively related to job satisfaction (Van Katwyk et al., 2000). Furthermore, job attitudes may then impact more distal strains, such as turnover intentions or behavioural responses, including participation in safety workarounds (e.g. McGuire, 1976). Therefore, these relationships may be mediated by JRNA. However, to our knowledge, research to date has not evaluated if job satisfaction mediates the relationships between psychological safety climate, employee strain, and safety outcomes.

Turnover intentions have been conceptualized as an early part of the turnover process, which consists of a series of decision-making stages (Mobley, 1977). As such, turnover intentions, or the desire and intent to leave one's job, represent an early step in the withdrawal process that may ultimately result in turnover itself. The instability in nurse staffing has raised concerns from healthcare leaders about the impact of nurse turnover on the well-being of nurses, patients, and health organizations. Projected shortages are expected to produce a significant strain on the US healthcare system, requiring healthcare organizations to find ways to mitigate turnover (Juraschek, Zhang, Ranganathan, & Lin, 2012). Employees who perceive that safety is a low priority in their organization may conclude that its climate represents an inadequate fit for them and their career needs, and seek out an organizational culture that is a better fit for them, such as an organization with a high psychological safety climate (e.g. Edwards, 1991). Indeed, psychological safety climate (Kath et al., 2010), JRNA (Van Katwyk et al., 2000), and job satisfaction (Chen, Ployhart, Thomas, Anderson, & Bliese, 2011) are related to turnover intentions.

Safety workarounds are primarily studied in the context of circumventing intentionally designed limits or safeguards to employee or patient well-being in the healthcare setting, often to meet patient care needs while balancing other work protocols and demands (Halbesleben & Rathert, 2008). Safety workarounds represent behavioural strains and are a form of CWBs, as safety workarounds are in opposition to organizational safety goals. Safety workarounds can be productive, frequently used, and considered indispensable due to the complex nature of the tasks that occur in these settings (Eisenhauer, Hurley, & Dolan, 2007). However, safety workarounds increase the likelihood of accidents and injuries by rendering safety precautions ineffective (Halbesleben & Rathert, 2008). While safety workarounds have not yet received extensive attention in this area, they are likely to function similarly to other behavioural strains, with participation in safety workarounds increasing in response to job stressors, including low psychological safety climates, and in response to elevated JRNA and job dissatisfaction. Prior research indicates that psychological safety climate is related to safety performance and outcomes (Christian et al., 2009; Nahrgang et al., 2011), and JRNA is associated with CWBs (Bruk-Lee & Spector, 2006).

Nurses often experience *hazards*, including biological, chemical, and physical hazards (see Ramsay et al., 2006). Biological hazards include exposure to blood-borne pathogens or infections (e.g. bacteria, HIV, hepatitis C, and tuberculosis), which could occur while performing injections, suturing, or drawing blood (Perry, Parker, & Jagger, 2003). Chemical hazards might include contact with dangerous agents such as carcinogens, corrosives, and toxic or highly toxic materials. Physical hazards include a range of environmental conditions or demands that might contribute to falls, including hazardous experiences with equipment (e.g. cuts or electrical shocks; Ford & Wiggins, 2012). As with a "near miss", hazardous experiences may not always result in an injury; however, they are associated with increased injuries (Lagerström, Wenemark, Hagberg, & Hjelm, 1995).

The relationship of job stressors on *injuries* in the workplace has been frequently examined, especially for high-risk occupations such as healthcare workers (Ahlberg-Hultén, Theorell, & Sigala, 1995; Spector, Coulter, Stockwell, & Matz, 2007). Injuries associated with job stressors in the nursing profession occur frequently (U.S. Department of Labor, BLS, 2013) and entail serious costs in terms of nurse well-being, compromised patient care, and organizational expenditures (White, 2010). Theoretically, the experience of a job stressor elicits an autonomic and emotional response as well as a preoccupation with the event, which interferes with continuous conscious processing (Mandler, 1979). These processes reduce attention resources (Mandler, 1975), decrease memory for central tasks (Deffenbacher, 1983), and impair cognitive functioning (Van der Linden, Keijsers, Eling, & Van Schaijk, 2005). This disrupted cognition can lead to distraction and errors, increasing the likelihood of experiencing hazards and injuries (Wadsworth, Simpson, Moss, & Smith, 2003). With regard to the proposed model, increased hazards and injuries represent behavioural strains that may result from low psychological safety climates. In line with the emotion-centred job stress model, they may increase following low psychological safety climate and JRNA. According to the prior discussion and in accordance with Figure 1, we propose the following hypotheses:

Hypothesis 1: Psychological safety climate will be negatively related to JRNA, turnover intentions, participation in safety workarounds, hazards, and injuries, as well as positively related to job satisfaction.
Hypothesis 2: JRNA will mediate the relationship between psychological safety climate with job satisfaction, turnover intentions, safety workarounds, and hazards.
Hypothesis 3: Job satisfaction will partially mediate the relationship between JRNA with turnover intentions and participation in safety workarounds.
Hypothesis 4a: Participation in safety workarounds will mediate the relationships between JRNA with hazards and injuries.
Hypothesis 4b: Participation in safety workarounds will mediate the relationships between job satisfaction with hazards and injuries.
Hypothesis 5: Hazards will mediate the relationships between JRNA and injuries.

Method

Participants and procedure

Three hundred and twenty-six nurses in the USA participated in this study. The majority of participants were female (94%) and Caucasian (80%). Participants' ages ranged from 23 to 71 years, with an average age of 44.9 years ($SD = 12.9$). Tenure of nurses ranged from 1 month to 41 years, with an average of 6.3 years ($SD = 7.9$). A majority of participants reported working in direct patient or outpatient care (78%), with many working in a range of care areas, including general (15%), paediatric (13%), surgical (11%), critical (6%), emergency (6%), and psychiatric (4%). In addition, participants reported education and licensure; this sample consisted primarily of licensed practical nurses (7%), registered nurses (33%), and nurse practitioners (51%).

The measures described in the following were distributed via an online survey using Qualtrics Online Survey Software. State and national professional nursing listservs in the USA were contacted, with nine listservs agreeing to disseminate an email with the electronic invitation to the survey. Of these listservs, there was a membership count approaching 4400. However, an accurate response rate cannot be determined given the difficulty in identifying members of an online population, identifying how many individuals received the invitation, tracking nonresponses, and accounting for the potential of duplicate members on numerous listservs (e.g. Andrews, Nonnecke, & Preece, 2003). Of those who opened the link, 84% completed the survey. The first 200 participants to complete the survey received an $8 gift card.

Measures

To examine the construct validity of the measures used in the hypothesized model, all items were evaluated simultaneously using a confirmatory factor analysis (CFA). A one-factor model failed to converge; convergence and adequate fit was reached with a seven-factor CFA, $\chi^2(df = 968) = 2131.41$, $p = .00$; comparative fit index (CFI) = .84; root mean square error approximation (RMSEA) = .06; standardized root mean square residual (SRMR) = .06. While the χ^2 score was significant, it may be affected by the large sample size (e.g. Tabachnick & Fidell, 2007). Likewise, the CFI was lower than preferred, but this measure of fit is determined via correlations in the data, which is not necessarily expected when assessing multiple formative scales, including the JRNA, hazards, and injuries scales. Further, all

factor loadings loaded significantly onto their respective construct ($p < .05$) except for the negatively worded safety workaround item ($p = .53$). Further examination of this scale is included in the following and in the limitations section.

Psychological safety climate

Psychological safety climate was measured using a 6-item version of the National Institute of Occupational Safety and Health (NIOSH) Safety Climate Survey by Hahn and Murphy (2008; $\alpha = .84$). The scale assesses the importance of safety procedures and compliance in an organization. For example, one item states "employees are told when they do not follow good safety practices". Participants are asked to rate each statement on 5-point Likert-type scale, with responses ranging from "strongly disagree" to "strongly agree". A higher score indicates a higher psychological safety climate. CFA results indicated reasonably acceptable fit based on common criteria: $\chi^2(df = 9) = 78.41$, $p = .01$; CFI = .93; RMSEA = .16; SRMR = .04. No modification indices met the minimum criteria.

Job-related negative affect

The 15-item displeasurable (negative) affect subscale of the Job-related Affective Well-being Scale (Van Katwyk et al., 2000) was used to measure nurses' affective mood at work ($\alpha = .94$). Participants were asked how often their job made them experience emotional states such as "annoyed", "disgusted", or "angry" over the past month. Participants were asked to respond on a 5-point frequency scale, ranging from "never" to "extremely often or always". Higher scores indicate greater JRNA. CFA results indicated acceptable fit: $\chi^2(df = 90) = 598.78$, $p = .01$; CFI = .83; RMSEA = .14; SRMR = .07. No modification indices met the minimum criteria.

Job satisfaction

A three-item subscale of the Michigan Organizational Assessment Questionnaire (MOAQ; Cammann, Fichman, Jenkins, & Klesh, 1983) was used to measure job satisfaction ($\alpha = .89$). Items such as "in general, I like working here", were used to assess employees' contentment with their job. Participants were asked to rate each statement on a 5-point Likert-type scale, ranging from "strongly disagree" to "strongly agree". Higher scores indicate greater job satisfaction. CFA results indicated acceptable fit: $\chi^2(df = 3) = 698.39$, $p = .01$; CFI = 1.00; RMSEA = .00; SRMR = .00. No modification indices met the minimum criteria.

Turnover intentions

A three-item subscale of the MOAQ was used to measure turnover intentions ($\alpha = .92$). Participants were asked the degree to which they agreed with statements such as "it is very possible that I will look for a new job next year". Each statement was rated on a 5-point Likert-type scale, ranging from "strongly disagree" to "strongly agree". Higher scores indicate greater turnover intentions. CFA results indicated acceptable fit: $\chi^2(df = 3) = 526.90$, $p = .01$; CFI = 1.00; RMSEA = .00; SRMR = .00. No modification indices met the minimum criteria.

Safety workarounds

Safety workarounds were measured using a three-item scale developed by Halbesleben (2010) to measure workarounds committed by nurses ($\alpha = .56$). Further analysis revealed

that the negatively worded item loaded on a separate factor; removing this item improved the reliability of the remaining 2-item scale ($\alpha = .90$). Subsequent structural equation modeling analyses were examined with both the 2-item and 3-item versions of the scale and due to the lack of impact on the model fit and relationships, we chose to retain the third item and keep the scale intact. Participants were asked to rate items such as "I bypass safety rules in order to get my work done", on a 5-point frequency scale, ranging from "never" to "every day". Higher scores indicate more safety workarounds.

Hazards

A 7-item hazardous work outcomes scale ($\alpha = .78$), based on Ramsay et al.'s (2006) identification of nursing hazards, was used to measure participants' frequency of experiencing hazards on the job (e.g. exposure to hazardous chemicals or infections, falls, or equipment hazards). Participants were asked to indicate how often they experienced such hazards on a 5-point frequency scale, ranging from "not at all" to "several times per day". Higher scores indicate more hazardous experiences.

Injuries

Physical injuries were measured using the 9-item Standardized Nordic Questionnaire ($\alpha = .69$), developed by Kuorinka et al. (1987). Nurses were shown a picture of nine locations on the body (such as the neck and lower back) and were asked to indicate, with a "yes" or "no", whether they had experienced any work-related injuries in these areas within the past 30 days. If participants did not suffer an injury in any of the specified areas, they were given the option of selecting "none". Higher scores indicate more physical injuries.

Results

Means, standard deviations, and correlations between all study variables are presented in Table 1. There was a strong negative correlation between job satisfaction and turnover intentions ($r = -.72$), indicating evidence of multicollinearity (Morrow, 1983). However, linear regressions examining variance inflation factors identified that all values were below 2.51 (e.g. Myers, 1990). Further, these constructs did not suffer from low reliability, small sample sizes, and low explanatory power (Grewal, Cote, & Baumgartner, 2004). Taken together, these findings indicated that multicollinearity was not problematic. Higher psychological safety climate was negatively related to JRNA, turnover intentions, participation in safety workarounds, and hazards, as well as positively related to job

Table 1. Means, standard deviations, and correlations among study variables.

	M	*SD*	1	2	3	4	5	6	7
1. Psychological safety climate	3.76	0.75	(.84)						
2. JRNA	2.37	0.80	−.36*	(.94)					
3. Job satisfaction	3.94	0.96	.42*	−.64*	(.89)				
4. Turnover intentions	2.78	1.32	−.41*	.60*	−.72*	(.92)			
5. Safety workarounds	1.46	0.68	−.13*	.17*	−.20*	.17*	(.56)		
6. Hazards	1.63	0.65	−.17*	.24*	−.05	.11	.12*	(.78)	
7. Injuries	1.15	1.56	−.11	.21*	−.07	.11	−.04	.18*	(.69)

Note: Alpha coefficients are provided on the diagonal.
*$p < .05$.

Table 2. Competing structural equation models for predicting turnover intentions and injuries.

Model	χ^2 (*df*)	$\Delta\chi^2$, Δdf	CFI	TLI	RMSEA	SRMR
1	44.55 (10)	–	.93	.85	.11	.06
2	24.69 (9)	19.86, 1*	.97	.92	.07	.04

Note: TLI, Tucker Lewis Index.
*$p < .05$.

satisfaction. However, psychological safety climate was not significantly related to reported injuries on the job. Overall, Hypothesis 1 was partially supported by these data. Interestingly, safety workarounds were not significantly related to injuries, although both safety workarounds and injuries were positively associated with hazards.

Mplus Version 5.1 software was used to test the path analysis model using a full maximum-likelihood estimator with missing data estimated. Of the 326 participants, 13 individuals (4% of cases) were missing some scales at random. Path analysis of the covariance matrix was performed on the data to examine the hypothesized relationships among the study variables (Figure 1).

The initial model (Model 1 in Table 2) showed inadequate fit based on common criteria (see Hu & Bentler, 1999; Kline, 2005), $\chi^2(df = 10) = 44.55$, $p < .01$. Tests between competing models are detailed in Table 2. Modification indices suggested a direct path of psychological safety climate predicting job satisfaction (Model 2 in Table 2), a modification that theoretically aligns with prior research examining these constructs (e.g. Kath et al., 2010; Morrow & Crum, 1998; Siu et al., 2004). The modified model yielded satisfactory fit to the data, $\chi^2(df = 9) = 24.69$, $p < .01$, and had a better fit than the baseline model, $\chi^2(21) = 502.51$, $p < .01$. Based on R^2 values of Model 2, the variables in the model explained 13% of the variance in JRNA, 45% of the variance in job satisfaction, 55% of the variance in turnover intentions, 4% of the variance in safety workarounds, 6% of the variance in hazards, and 5% of the variance in injuries.

Most of the paths in Model 2 were significant (Table 3), except for the paths from JRNA to safety workarounds, and safety workarounds to injuries and hazards. As illustrated in Figure 2, the relationships between psychological safety climate and employee strains, including turnover intentions, participation in safety workarounds, and hazards, were mediated by JRNA. The relationship between psychological safety climate and job satisfaction was partially mediated by JRNA; the indirect effect was also significant. These finding provide partial support for Hypothesis 2. Job satisfaction partially mediated the relationships between JRNA with turnover intentions and participation in safety workarounds, supporting Hypothesis 3. Participation in safety workarounds did not mediate the relationship between JRNA and injuries; thus, Hypothesis 4 was not supported. Safety workarounds were significantly correlated to hazards, but not supported in the proposed model as an antecedent of safety outcomes. Hazards mediated the relationship between JRNA with injuries, providing support for Hypothesis 5.

Discussion

The current study applied an emotion-centred job stress framework (see Spector, 1998) to the study of psychological safety climate and its impact on psychological, behavioural, and physical strains among nurses. Support was found for a model in which psychological safety climate generally impacts employee strain and injuries through JRNA and job

Table 3. Direct and indirect effects predicting nurse outcomes in Model 2.

	PSC			JRNA			Job satisfaction			Safety workarounds			Hazards		
Endogenous variables	Unst.	*SE*	St.	Unst.	*SE*	St.	Unst.	*SE*	St.	Unst.	*SE*	St.	Unst.	*SE*	St.
JRNA															
Direct	−.38*	.06	−.36												
Total indirect	–	–	–												
Total	–	–	–												
Job satisfaction															
Direct	.27*	.06	.21	−.67*	.06	−.56									
Total indirect	.26*	.05	.20	–	–	–									
Total	.53*	.07	.41	–	–	–									
Safety workarounds															
Direct	–	–	–	.06	.06	.07	−.11*	.05	−.16						
Total indirect	−.08*	.03	−.09	.07*	.04	.09	–	–	–						
Total	−.08*	.03	−.09	.13*	.05	.16	–	–	–						
Turnover intentions															
Direct	–	–	–	.38*	.09	.23	−.79*	.07	−.57						
Total indirect	−.56*	.08	−.32	.53*	.07	.32	–	–	–						
Total	−.56*	.08	−.32	.91*	.08	.55	–	–	–						
Hazards															
Direct	–	–	–	.18*	.05	.22	–	–	–	.08	.06	.08			
Total indirect	−.08*	.02	−.09	.01	.01	.01	−.01	.01	−.01	–	–	–			
Total	−.08*	.02	−.09	.19*	.05	.24	−.01	.01	−.01	–	–	–			
Injuries															
Direct	–	–	–	–	–	–	–	–	–	−.14	.14	−.06	.44*	.14	.18
Total indirect	–	–	–	.08*	.04	.04	.01	.02	.01	.04	.03	.02	–	–	–
Total	–	–	–	.08*	.04	.04	.01	.02	.01	−.11	.14	−.05	–	–	–

Note: Unst., unstandardized; St., standardized; PSC, psychological safety climate; JRNA, job-related negative affect.
*$p < .05$.

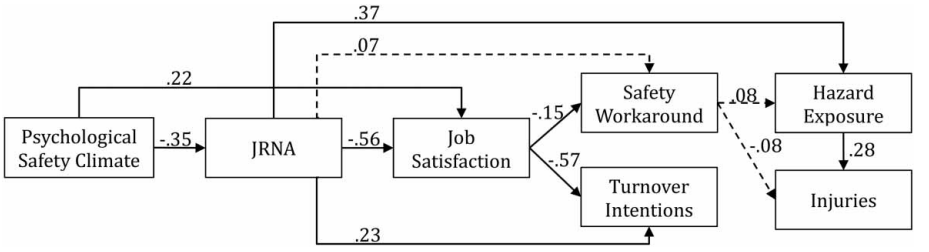

Figure 2. Path analysis model with standardized path coefficients.
Note: Solid line indicates significant path ($p < .05$).

satisfaction, providing partial support for the study's hypotheses. Beyond proposing and testing this model, several relevant but understudied constructs were examined in relation to psychological safety climate. This study contributed to the current literature primarily by (1) establishing the negative relationships between psychological safety climate with JRNA, participation in safety workarounds, and hazards, and (2) examining the mediating role of job attitudes, including JRNA and job satisfaction in psychological safety climate–strain relationships. These findings are important given the critical nature of the constructs examined and are aimed at increasing nurse safety and well-being, as well as providing an early examination of both nurse safety workarounds and hazards.

Consistent with prior research, psychological safety climate has been shown to be an important variable when explaining employee strain, safe workplace practices, and safety outcomes in the workplace. Psychological safety climate had moderately strong relationships with psychological strain, including JRNA, job satisfaction, and turnover intentions. State level negative affective response was a significant correlate in the initial examination of these variables. Future research can further elucidate the nature of the relationships between these variables, as JRNA and negative affectivity are often related to one another (Uncu, Bayram, & Bilgel, 2007; Van Katwyk et al., 2000), yet trait negative affectivity has not been related to safety climate in recent research (e.g. Neal & Griffin, 2006). However, these preliminary findings suggest that at the state level, negative affect does play a meaningful role in understanding the impact of safety climate. The relationships between psychological safety climate and work attitudes provide further support for the far-reaching positive effects of safety climate in the work environment (Clarke, 2010).

Psychological safety climate also demonstrated relationships with novel behavioural strains, as it was related to both safety workaround engagement and hazards. Importantly, this is an early study of the impact of psychological safety climate on both of these constructs, indicating that psychological safety climate may be important in reducing potentially unsafe workplace practices as well as hazardous experiences in hospital settings. This may indicate that when employees perceive that policies and procedures are designed to support their safe workplace practices, safety workarounds that might result in accidents, injuries, or hazards are more likely to be avoided or perceived as unnecessary. Likewise, the relative priority of safety in comparison to other competing demands by management could reduce the likelihood of nurses engaging in workarounds and experiencing

hazards, potentially through impaired or distracted cognitive functioning. These alternative explanations require further investigation.

Unexpectedly, psychological safety climate was not significantly related to injuries in this study. One explanation for this finding could be the short time period in which data were collected and the restricted range for the injury variable in this sample (M = 1.15, SD = 1.56). Fifty-one per cent of the nurses in this sample reported that they had not experienced an injury in the prior 30 days, with an additional 30% reporting only 1 to 2 injuries in the prior 30 days. Similarly, as the injury variable was significantly related to nurse JRNA and hazards, the theoretically distal relationship between psychological safety climate and injuries may also contribute to the lack of significant relationship in this study. It is possible that examining injury rates over a longer time frame may better illuminate the relationship between psychological safety climate and injuries.

A primary contribution of this study was that it responded to calls aimed at understanding how safety climate and job attitudes affect one another (see Clarke, 2010). The emotion-centred job stress model examined proved to be a viable model for understanding and examining these relationships. Partial support was found for the role of JRNA as a mediator between psychological safety climate and nurse strain. Specifically, JRNA served to mediate the relationships between psychological safety climate with turnover intentions and hazards, as well as partially mediate the relationship between psychological safety climate and job satisfaction. During the analysis process, the proposed model was adapted to include a direct path from psychological safety climate to job satisfaction, indicating that JRNA partially, rather than fully, mediates this relationship. This relationship is consistent with theoretical perspectives wherein the work environment operates as the determinant of job satisfaction (e.g. Kopelman, Brief, & Guzzo, 1990) and may be explained through a variety of mechanisms, including a "positive spillover" effect (Morrow & Crum, 1998, p. 130), whereby employees perceive a high psychological safety climate due to commitment from the organization and managers to prioritize employee safety, thus leading to improved employee work attitudes, including job satisfaction. Further, a high psychological safety climate could impact job satisfaction directly through a psychological contract, wherein the commitment to employee safety on behalf of the organization and management would fulfill a psychological contract, leading an employee to reciprocate with positive work attitudes (Coyle-Shapiro & Kessler, 2000).

JRNA failed to mediate the relationship between psychological safety climate and safety workarounds. A potential explanation for this finding might be that nurses participate in safety workarounds as a strategy to circumvent a dysfunctional system (e.g. Morath & Turnbull, 2005). If participation in safety workarounds were a conscious decision made as a matter of practicality, JRNA would be unlikely to impact this relationship. Conversely, this relationship may also be attenuated due to a restricted range in the safety workarounds variable (M = 1.46, SD = 0.68). Fifty-three percent of the sample reported never engaging in safety workarounds, and approximately 44% of the sample engaged in safety workarounds once to twice a month. Better clarity and understanding of how these variables interact could be useful in future research.

While safety workarounds were significantly related to hazards, it was not supported in the proposed model as an antecedent of injuries. This may also be impacted by the range restriction in these variables as previously discussed. However, other possibilities must also

be considered. Previous research into safety workarounds has focused on employee exhaustion (Halbesleben, 2010) and human resource management effectiveness (Wheeler, Halbesleben, & Harris, 2012) as antecedents to safety workarounds. In this study, safety workarounds were not impacted by nurses' affective reactions to the workplace, which could suggest that safety workarounds are less likely to be used due to psychological strain rather than physical limitations or organizational constraints and system problems (e.g. Pennsylvania Patient Safety Authority, 2005). For instance, nurses may override safety procedures, such as the use of patient lifts, in order to provide rapid or high-quality patient care, rather than the experience of JRNA. Conversely, nurses in this sample may have used safety workarounds, but these safety workarounds might not have led to injuries in the time frame examined. Finally, sample differences between this and prior studies, particularly given the focus on solely registered nurses in prior research, may have influenced these results.

Further clarity around how psychological safety and workplace attitudes relate to one another, as well as support for the emotion-centred job stress model, can be drawn from the mediating effects of job satisfaction. In the final model, job satisfaction mediates the relationships between psychological safety climate and JRNA with turnover intentions and safety workarounds. These findings provide support for models wherein job attitudes impact more distal strain (e.g. McGuire, 1976). Additionally, these results provide some initial evidence that safety workarounds function as a behavioural strain similar to CWBs, in that they increase in response to job stressors.

Finally, as predicted, nurses' reported hazards was related to injuries, and served to mediate the relationship between JRNA and injuries. These results support the theoretical process underlying emotion-centred job stress model, such that a low psychological safety climate elicits JRNA, which interferes with continuous conscious processing via a reduction of attentional resources and impaired cognitive functioning (Mandler, 1979; Van der Linden et al., 2005). Thus, when employees experience a negative affective response associated with a low psychological safety climate, they become distracted as emotions and cognitive ruminations occupy needed cognitive resources. In this way, the negative affective response to a low psychological safety climate distracts employees' attention when hazardous work must be conducted, increasing the likelihood of hazards due to inattention. Hazards increase as a consequence of JRNA's interference with cognitive functioning, and increase the likelihood of injuries.

Practical applications

Going beyond correlational relationships to examine a process model, researchers and practitioners can begin to illuminate the role of affect and attitudes in a field that has traditionally concentrated on cognitive and motivational processes (e.g. Griffin & Neal, 2000; Neal & Griffin, 2006). Within an applied setting, these findings call for a renewed focus on measuring and implementing interventions to improve nurses' affect and attitudes concerning their work conditions. Given the relationships identified, as well as prior research in this area, it is evident that positive job affect and attitudes can provide a wide breadth of benefits both for organizations and employees. For example, JRNA tends to be associated with increased CWB (Bruk-Lee & Spector, 2006) as well as reduced performance (Kiefer & Barclay, 2012). High employee JRNA or low satisfaction can be addressed through various

interventions, including improving perceived organizational support (e.g. Rhoades & Eisenberger, 2002). For example, given that less experienced nurses report greater frustration, anger, burnout, and turnover intentions when compared to more experienced nurses (Erickson & Grove, 2007), health leaders could highlight the importance of having experienced nurses provide emotional mentorship for newer nurses (e.g. Buerhaus, Donelan, Ulrich, Norman, & Dittus, 2006).

Alternatively, these findings indicate that future interventions aimed at improving perceptions of justice (e.g. Loi, Yang, & Diefendorff, 2009) may be useful. Perceptions of justice, such as fairness in managers' decisions and practices, have been related to employees' behavioural, attitudinal, and performance outcomes (Dirks & Ferrin, 2002). Developing policies and systems for equitable resource dissemination, as well as providing managers training opportunities that highlight the importance of equitable treatment, as well as practical skills, such as how to communicate decision-making criteria, should positively impact perceptions of justice and trust. Likewise, having upward communication systems to address polices that are perceived as unfair could be a powerful tool. Efforts from health organizations and administrators should continue to develop systems of care delivery that are considerate of patient and nurses' needs in order to improve the quality of overall care.

Limitations

Although this study makes several contributions to the nursing safety literature, several limitations must be noted. First, this study used a cross-sectional design, restricting causal assumptions. Second, due to the single source data used, bivariate relationships may be affected by shared biases (i.e. common method variance). However, using subjective measures may be most appropriate due to the subjective nature of some of the variables examined (Spector, 1999). Future research should utilize a variety of different research designs, including longitudinal studies to allow for temporal and causal assumptions of this model to be evaluated. The use of multiple data sources, such as archival data and co-workers or supervisors' reports, would also allow for a more objective and conclusive assessment of less subjective constructs, such as safety workarounds, hazards, and injuries. Additionally, several of the variables in this study suffered from some range restriction. Given the low base rate of both safety workarounds and injuries, the relationships presented in this paper should be considered a conservative evaluation of these variables, particularly nonsignificant paths associated with these variables.

The Standardized Nordic Questionnaire, which is one of the most common scales in the epidemiological literature, was used to measure physical injuries. Although the original scale assessed injuries within the past 12 months, we utilized a 30-day time frame to stay consistent with other measures used in this study. Using a shorter time frame to measure physical injuries gives a more accurate representation of injuries experienced at work, since individuals are likely to remember recent and more severe injuries better than those who are older and less severe (Kuorinka et al., 1987). In forthcoming research, it would be valuable to assess injuries over a longer time frame, as well as safety workarounds and hazards, which were also rare experiences. Finally, further research efforts in this area could measure severity of injuries in addition to frequency, as these factors may both impact the relationships described here.

Finally, the alpha coefficient for the 3-item safety workarounds measure was low (α = .56). The negatively worded item loaded onto a separate factor and its removal increased Cronbach's alpha to .90. For this reason, we reran Models 1 and 2 with the 2-item version of the safety workarounds scale. However, these analyses produced no significant changes to the fit indices or the path coefficients. Prior studies have reported both a low alpha (α = .56; Dakhlaoui & Neveu, 2013) and acceptable coefficient alphas (α = .90; Halbesleben, 2010; Halbesleben & Rathert, 2008). One noted difference is the sample in these studies, with Halbesleben's research drawing from registered nurses, while this sample included many nurse practitioners. Dakhlaoui and Neveu's (2013) study drew on a large range of employees from the healthcare industry. It could be that diverse job requirements and responsibilities differentially impact (1) response patterns to negatively and positively worded items, and (2) the diminished relationships between safety workarounds and injures, potentially through limitations on workarounds available to nurse practitioners compared to registered nurses. Further research is needed to clarify these distinctions, as well as to further examine the internal consistency and underlying structure of this scale (e.g. Van Schuur & Kiers, 1994).

Concluding comments and future directions

This study represents an initial step in addressing a key gap in the psychological safety climate literature, in that it illuminates the important mediational role of job attitudes, including JRNA and job satisfaction, in the relationship between psychological safety climate with safety-related workplace practices and outcomes. Importantly, the emotion–centred job stress model demonstrated satisfactory theoretical and analytical fit, providing an appropriate framework to examine the psychological safety climate–job attitudes–safe workplace practices and outcome process. This framework provides a foundation for future research in the area to continue to identify the critical role that job attitudes play in improving safe workplace practices and outcomes.

Future research will be needed to continue progress in reducing costly accidents and injuries, particularly in the healthcare sector where the consequences have far-reaching societal implications. While these initial findings should be replicated, this model could be expanded in the future to include additional job attitudes, such as employee commitment, involvement, or engagement. In line with Clarke's (2010) original suggestion, future research should investigate the role that safety specific job attitudes play in an expanded process model, including variables such as safety commitment. The inclusion of these variables could add considerably to the current model examined. Researchers could also examine the role safety workarounds play in the job stressor–injury process with a larger sample in order to best assess the effects of these behaviours. An examination of the impact of safety workarounds on patient safety and outcomes, rather than just nurses' safety, may better illuminate how this construct operates in healthcare settings. Furthermore, an in-depth evaluation of the types of safety workarounds in which nurses engage regularly may illuminate why safety workarounds and injuries were unrelated in the current study.

Finally, these findings indicate that safety climate perceptions may be important in the reduction of unsafe workplace practices as well as hazardous experiences in hospital settings. This area is ripe for future research, including examining the variety of alternative explanations posited here, or exploring questions such as whether these relationships exist

at the organizational level, or if they vary across organization units or functional tasks. It will be critical to examine these variables and relationships in the context of molar safety climate, to distinguish between the impact of individual perceptions and a shared understanding of an organizational environment. Future research can also take into account a wider range of individual safe workplace practices, such as safety participation and safety compliance. These future efforts will be critical, particularly given the severity of the outcomes associated with injuries and hazards in healthcare settings.

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