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Relationships among psychological safety, the principles of high reliability, and safety reporting intentions in pediatric nursing

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ABSTRACT

Purpose: The purpose of this study was to explore relationships among psychological safety, the principles of high reliability, and safety reporting intentions in pediatric nursing. Patient safety events are underreported and costly. To promote reporting, many healthcare organizations have adopted the high reliability framework with strategies to foster team psychological safety.

Design: A web-based survey was distributed through the Society of Pediatric Nurses and the National Pediatric Nurse Scientist Collaborative. Data were collected from 244 pediatric nurses using a demographic form, Safety Organizing Scale, Team Psychological Safety Scale, and Intention to Report Safety Events Scale. Data were analyzed using logistic and linear regression.

Results: Psychological safety and perception of working in a high reliability organization (HRO) showed positive statistically significant relationships with reporting intentions ($p = 0.034$). Odds of nurses achieving highest reporting intention scores increased by a factor of 0.3 with each practice year.

Conclusions: Psychological safety was found to be a predictor for intention to report safety events among pediatric nurses. Findings also demonstrated that nurses' perceptions of whether they worked in a high reliability setting also profoundly affect their attitude towards reporting.

Practice implications: Focusing organizational efforts on cultivating psychological safety and embedding the high reliability framework into professional practice may significantly affect attitudes towards safety event reporting.

Background

As the general public slowly adapts to a new "normal" in the wake of the COVID-19 pandemic, healthcare organizations are under significant strain to provide high quality and safe patient care. Faced by staffing and resource shortages, provider burnout, and higher acuity levels, organizations are challenged to improve the delivery and quality of patient care, mitigate safety risks and promote healthy work environments (American Hospital Association, 2021). To meet these goals, it is essential that staff feel empowered to lead the change management process. However, this is only achievable when staff feel comfortable, empowered and expected to share their perspectives, concerns, questions and ideas (Edmondson, 1999).

A key component for maintaining a culture of safety involves establishing supportive and trusting relationships among colleagues. All healthcare team members should feel psychologically safe, viewing the workplace as supportive and secure, where they are encouraged to share ideas, seek feedback, report mistakes and ask questions (Edmondson, 1999). In workplaces with high levels of psychological safety, staff see mistakes as opportunities to learn from and trust that organizational leaders want to know when a process is not working (Edmondson, 1999). Past research shows that many staff members work in environments where they are afraid to report safety events or speak up about concerns (Clark & Lake, 2020; Lake et al., 2021). Barriers to reporting include fear of retribution, concerns about litigation, time constraints, unsupportive colleagues, and a belief that no change will result from speaking up (Appelbaum et al., 2016; Vrbnjak et al., 2016). While several studies have explored the reporting of safety events in adult healthcare settings, there remains a dearth of literature on the reporting practices of pediatric nurses (Stratton et al., 2004; Yung et al., 2016).

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Previous research revealed that 46% of pediatric nurses feel that mistakes are held against them and only 67% of medication errors are reported in the acute care setting (Lake et al., 2021; Stratton et al., 2004).

In an attempt to mitigate safety risks and establish a culture of safety, many hospitals have adopted the high reliability model (Chassin & Loeb, 2013). High reliability organizations (HROs) are built upon five core principles: (1) preoccupation with failure; (2) reluctance to simplify observations; (3) sensitivity to operations; (4) commitment to resilience; and (5) deference to expertise (Weick & Sutcliffe, 2007). Despite the emphasis on non-punitive event reporting in HROs, no studies have explored the level of psychological safety felt by nurses working in self-declared HROs. Moreover, prior research has investigated nurses' actual reporting rates rather than their likelihood to report events in the future (Hung et al., 2015; Lee et al., 2016). By solely focusing on events formally submitted in the past, researchers overlook the critical fact that a large volume of safety events are underreported in healthcare (Kim et al., 2007; Vrbnjak et al., 2016). By exploring reporting intentions, greater insight on how a nurse may respond to a variety of challenging safety circumstances can be gleaned. Therefore, the purpose of this study was to explore the relationships among psychological safety, the principles of high reliability, and safety reporting intentions in the pediatric nursing workforce.

Methods

Design, sampling, and sample

This study used a cross-sectional and descriptive design. Upon University Institutional Review Board approval, study information was approved by the Society of Pediatric Nursing (SPN) and the National Pediatric Nurse Scientist Collaborative (NPNSC). Invitations to participate in the study were emailed to the pediatric nurse members in SPN and to nurse scientists in NPNSC. Nurse scientists then followed their internal research review policies before sending the survey link to pediatric nurses within their institution.

Eligibility of potential participants required that the following criteria were met: (1) they provided direct patient care as a pediatric registered nurse (RN); (2) worked in an acute care hospital within the United States; and (3) were employed on a per-diem, part-time, or full-time basis.

Instruments

The survey was compromised of four instruments:

Demographic questionnaire

A 23-item questionnaire collected demographic information regarding the participant's personal background, professional experience and organizational characteristics. Participants were also asked if their organization was a self-proclaimed HRO or had Magnet® designation.

Safety organizing scale (SOS)

The Safety Organizing Scale (SOS) is a unidimensional measure of safety-related behaviors in hospital settings (Vogus & Sutcliffe, 2016). The nine-item scale responses are scored from not at all (1) to a very great extent (7); with higher scores reflecting a greater perception of working in a culture incorporating the principles of high reliability into professional practice. Survey items were developed based on the theoretical literature on HROs (Weick & Sutcliffe, 2007). Content validity was established through survey item review by seven HRO experts (Vogus & Sutcliffe, 2007). Discriminant validity was established by conducting pair-wise tests of two other theoretically-related constructs: employee commitment and trust in management (Vogus & Sutcliffe, 2007). Past psychometric testing demonstrated sufficient internal reliability with a Cronbach's alpha of 0.88 (Alsalem et al., 2018; Ausserhofer et al., 2013; Vogus & Sutcliffe, 2007).

Team psychological safety scale (TPSS)

This Likert-style instrument was developed by Edmondson in 1999 to assess the social and organizational properties of hospital units and how willing staff members were to discuss concerns, ask for help and admit to mistakes. It consists of seven items each scored using a five-point scale from never (1) to always (5) that are averaged to calculate the final score. Psychometric testing of the TPSS has demonstrated sufficient reliability ($\alpha = 0.82$) and validity across a number of studies (Appelbaum et al., 2016; Carmeli & Gittell, 2009; Edmondson, 1999). Earlier studies also revealed a positive and statistically significant correlation between team psychological safety and the reporting of safety events in healthcare (Alingh et al., 2018; Appelbaum et al., 2016; Leroy et al., 2012).

Intention to report safety events scale (ITR)

Safety event reporting intentions were measured using a modified version of the Hospital Survey on Patient Safety (SOPS™) questionnaire, developed by the Agency for Healthcare Research and Quality (AHRQ). Its subscale, *Frequency of Events Reported*, consists of three items and asks about the frequency of reporting past mistakes with five response options including: (1) never; (2) rarely; (3) sometimes; (4) most of the time; and (5) always. The Cronbach's alpha for this subscale was.85 (Sorra & Dyer, 2010). For this study, modifications were made to the original three items to capture the participant's likelihood to report a future safety event rather than the participant's past reporting behaviors. Using the Theory of Planned Behavior as a guide (Fishbein & Ajzen, 2010), reporting intentions were measured using a 7-point bipolar scale; response options ranged from definitely will (1) through definitely won't (7). Behavioral intentions have been found to be a valid proxy measure for actual behavior among clinicians (Eccles et al., 2006; Kiesewetter et al., 2018). Similar instruments using the Theory of Planned Behavior as a conceptual guide to measure reporting intentions have been used in several international studies (De Angelis et al., 2017; Lapkin et al., 2015; Teng et al., 2009).

Data collection

The informed consent and the 42-item survey were administered electronically via Qualtrics®. Members of SPN and NPNSC institutions supporting this study were initially sent survey invitations followed by reminder emails two and three weeks later. Data was collected in June and July 2020.

Data analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS® V.27). A power analysis was calculated and power was set at 0.85 and all tests were performed at a 0.05 level of significance. Descriptive statistics were conducted to examine the characteristics of research participants, to identify general trends, to confirm normality, and identify outliers. A two-part statistical model using logistic regression and linear regression was built for subsequent analysis.

Results

Demographics

A total of 244 pediatric nurses from 28 states participated in the study; the majority were female, white/non-Hispanic, had a bachelor's degree in nursing, and had an average of 12.6 years (SD = 11.1) of nursing experience. A complete demographic profile of the sample can be found in Tables 1a and 1b. Gender, age, race and level of highest education were not correlated with any of the study variables.

Of the participants, 216 (88.5%) reported as working in a healthcare

Table 1a
Participant characteristics.

Variable	n	Percent
Gender		
Female	233	95.50%
Male	10	4.10%
Gender non-conforming, Gender Queer	1	0.40%
Age (M = 37.8)		
22–29	78	32%
30–39	79	32%
40–49	34	14%
50–59	44	18%
60+	10	4%
Race		
White	221	90.60%
Asian	6	2.50%
Black or African American	1	0.40%
Two or more races	12	4.90%
Other or No Answer	4	1.60%
Highest Degree		
Diploma in Nursing	5	2.00%
Associate's Degree	11	4.50%
Bachelor's Degree	158	64.80%
Master's Degree	57	23.40%
PhD	5	2.00%
DNP	6	2.50%
Not Reported	2	0.08%

organization with Magnet® designation for nursing excellence, 13 (5.3%) worked in a non-Magnet® setting, 10 (4.1%) in an organization working towards Magnet® designation and 5 (2.0%) were unsure. Regarding their organization's HRO status, 112 participants (45.9%) reported that their institution either declared itself as an HRO or was working to become an HRO; and 132 participants (54.1%) reported that their institution was not an HRO or that they were unsure. Hospital-type, Magnet® status, HRO status and union status were not correlated with any study variables. Additional organizational characteristics are summarized in Table 2.

HRO perception

The nine items in the SOS were totaled and averaged; providing a composite score for each participant. Scores ranged from 2.67 to 7.0, with a mean of 5.48 (SD = 0.90). Internal reliability was measured using Cronbach's alpha ($\alpha = 0.853$). All items were above 0.3 for the corrected item- total correlation supporting internal reliability for the scale.

A large majority of participants ($n = 195$, 79.9%) responded that during a patient crisis, the team rapidly pooled their collective expertise to manage the problem to "a great extent" (selecting "6" or "7" on item nine). While 77% of participants ($n = 189$) reflected that during patient reports, employees usually discussed what to look out for (selecting "6" or "7" on item one), only 52% ($n = 127$) spent time identifying activities that they did not want to go wrong (selecting "6" or "7" on item two). Less than half of all participants ($n = 112$, 46%) reported that their teams openly discussed past mistakes and how to learn from them (selecting "6" or "7" on item six) and 59% of participants ($n = 144$) reported that following a safety event, their teams did not discuss how to prevent similar events from happening again in the future. Response percentages for the SOS are presented in Table 3.

Psychological safety

The TPSS Scale item scores ranged from 2 to 5, with a mean composite score of 3.78 (SD = 0.50). The scale's Cronbach's alpha was 0.622. Of the 244 participants, 20% felt that mistakes were held against them "sometimes", "most of the time" or "always". When asked about their ability to bring up problems and tough issues, 25.4% reported they could "never" "rarely" or only "sometimes" do this in the workplace. Response percentages for the TPSS items are presented in Table 4.

Safety event reporting intentions

Scores on the ITR ranged from 1 to 7, with a mean of 5.94 (SD = 1.24) and a median of 6. Internal reliability was measured using Cronbach's alpha ($\alpha = 0.852$). The scores revealed that 79 (32.4%) of the 244 participants had a score of 7, the highest achievable score on the scale. Given the non-normal distribution, a two-part model was built. Binary logistic regression was used to estimate the probability of a pediatric nurse achieving the maximum possible ITR score. The six predictor variables (SOS Scores, TPSS Scores, years of nursing experience, unit type, Magnet® designation and HRO status) were individually removed from the model using backward selection in SPSS. The logistic regression analysis revealed that the log odds of achieving the maximum score of 7 on the ITR increased by a factor of 0.3 with each additional year of experience ($p < 0.05$; B = 0.028).

Linear regression then was used to further examine relationships among the variables. The final model revealed that nurses working on specialty units had lower ITR scores than nurses working on medical surgical units ($p < 0.05$; $\beta = -0.199$). In addition, a positive and significant relationship between psychological safety and safety event reporting intentions ($p < 0.01$; $\beta = 0.274$) was demonstrated. For every one-point increase in the TPSS scores, the ITR score increased by 0.703

Table 2
Organizational characteristics.

Variable	n	Percent
Hospital Type		
Free-standing	197	80.70%
Pediatric unit in adult hospital	32	13.10%
Combined pediatric and adult	10	4.10%
Other	5	2%
Unit Type		
Medical/Surgical	72	29.50%
Intensive Care	51	20.90%
PACU, OR, Recovery	17	7.00%
Emergency Department	18	7.40%
Specialty and Other	80	32.80%
Behavioral Health/Psych	6	2.50%
Magnet Status		
Yes	216	88.50%
No	13	5.30%
Working Towards Designation	10	4.10%
Unsure	5	2.00%
HRO Status		
Yes or Working Towards it	112	45.90%
No or Unsure	132	54.10%
Unionization Status		
Yes	73	29.90%
No	150	61.50%
Unsure	20	8.20%
No Response	1	0.40%

Table 1b
Participants' professional experience.

	Years of Nursing Experience	Years as Pediatric RN	Years at Current Hospital	Years on Current Unit
Mean	12.5615	11.36	9.20	6.73
Median	8.5000	8.00	5.50	4.00
Std. Deviation	11.11409	10.430	8.905	7.250

Table 3
Frequency of responses for safety organizing scale (SOS).

Statement	1	2	3	4	5	6	7
	Low HRO Perception					High HRO Perception	
	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)
When giving report to another employee, we usually discuss what to look out for	0.4 (1)	0.8 (2)	2.05 (5)	2.5 (6)	16.8 (41)	42.2 (103)	35.3 (86)
We spend time identifying activities we do not want to go wrong	1.6 (4)	1.6 (4)	6.97 (17)	12.7 (31)	25 (61)	28.3 (69)	23.8 (58)
We discuss alternatives as to how to go about our normal work activities	4.1 (10)	6.1 (15)	7.3 (18)	15.6 (38)	26.6 (65)	26.6 (65)	13.5 (33)
We have a good understanding of each other's talents and skills	0	1.2 (3)	2.5 (6)	9.0 (22)	22.1 (54)	37.7 (92)	27.5 (67)
We discuss our unique skills with each other so we know who on the unit has relevant specialized skills and knowledge	2.0 (5)	6.6 (16)	11.5 (28)	16.4 (40)	21.7 (53)	24.2 (59)	17.6 (43)
We talk about mistakes and ways to learn from them	0.8 (2)	4.1 (10)	6.9 (17)	13.1 (32)	28.3 (69)	28.7 (70)	18.0 (44)
When errors happen, we discuss how we could have prevented them	0.8 (2)	2.9 (7)	6.6 (16)	10.2 (25)	20.5 (50)	29.5 (72)	29.5 (72)
When attempting to resolve a problem, we take advantage of the unique skills of our colleagues	0.8 (2)	2.9 (7)	4.5 (11)	10.7 (26)	22.9 (56)	34.0 (83)	24.2 (59)
When a patient crisis occurs, we rapidly pool our collective expertise to attempt to resolve it	0	1.6 (4)	2.0 (5)	5.3 (13)	11.1 (27)	34.8 (85)	45.1 (110)

Table 4
Frequency of responses for team psychological safety survey (TPPS).

Statement	Never	Rarely	Sometimes	Most of the Time	Always
	% (n)	% (n)	% (n)	% (n)	% (n)
If you make a mistake on this team, it is often held against you (R)	20.9 (51)	59 (144)	17.2 (42)	2 (5)	0.8 (2)
Members of this team are able to bring up problems and tough issues:	0.4 (1)	3.7 (9)	21.3 (52)	52.9 (129)	21.7 (53)
People on this team sometimes reject others for being different (R)	20.5 (50)	43 (105)	34.8 (85)	1.6 (4)	0%
It is safe to take a risk on this team	5.3 (13)	14.8 (36)	45.5 (111)	30.3 (74)	4.1 (10)
It is difficult to ask other members of this team for help (R)	41.8 (102)	41.4 (101)	13.9 (34)	1.2 (3)	1.6 (4)
No one on this team would deliberately act in a way that undermines my efforts	14.3 (35)	20.1 (49)	12.7 (31)	25.8 (63)	27 (66)
Working with members of this team, my unique skills and talents are valued and utilized	0%	2.5 (6)	13.1(32)	57.8 (141)	26.6 (65)

Table 5
Linear regression model results.

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.752	0.679		5.524	0.000
Magnet Status	−0.150	0.304	−0.032	−0.494	0.621
HRO Status	0.111	0.159	0.044	0.698	0.486
ICU Unit	−0.253	0.226	−0.083	−1.122	0.263
OR Unit	−0.086	0.332	−0.018	−0.258	0.797
ER Unit	0.057	0.322	0.012	0.178	0.859
Specialty Unit	−0.496	0.198	−0.187	−2.503	0.013**
Psych Unit	−0.317	0.517	−0.039	−0.612	0.541
SOS Score	0.176	0.101	0.128	1.743	0.083
Years RN Experience	0.002	0.007	0.020	0.304	0.761
TPSS Mean Score	0.399	0.181	0.161	2.209	0.028**

points.

Participants who perceived themselves as working in an organization that embodied the principles of high reliability also had higher safety event reporting intentions than pediatric nurses who did not perceive themselves to be working in an HRO. However, this was only statistically significant when TPSS scores were excluded from the model. (See Table 5).

Discussion

This study highlighted the positive influence that safety culture has in the safety reporting process. Psychological safety and perception of working in an HRO were positively associated with safety reporting intentions. Results demonstrated that with each one-unit increase in TPSS scores, ITR scores increased by 0.27 units which align with similar studies conducted among medical residents and nurses working in non-pediatric healthcare settings and outside the United States (Appelbaum et al., 2016, Lee & Dahinten, 2021).

The findings from this study revealed that when all other variables were excluded from the statistical model, a positive and statistically significant relationship between HRO perception and safety event reporting intentions ($p = 0.034$) existed. These results supported the 2016 study conducted by Vogus and Iacobucci—demonstrating positive and statistically significant relationships between SOS scores and fewer medication errors ($p < 0.05$) and patient falls ($p < 0.01$). Results further revealed that only 52% of participants spent time identifying activities that they did not want to go wrong and 25.4% experienced difficulty bringing up problems, issues and concerns in the workplace. Over half of the participants ($n = 130$, 53.3%) were unsure of their organization's

self-declared HRO status, suggesting that they were unfamiliar with the concept or had little involvement in the planning and implementation process. This finding was not surprising as tremendous variability continues to exist in how healthcare organizations implement the principles in practice (Veazie et al., 2019).

The principles of high reliability are only achievable if all staff members feel psychologically safe and empowered to raise questions, concerns and be resilient when facing adversity. This was not demonstrated in this study. Despite the majority of pediatric nurses feeling that their unique skills and contributions were valued in the workplace (n = 206, 84.4%), they remained uncomfortable raising concerns or bringing up challenging issues; a full 20% of participants were concerned that reported events might be used against them. These findings are slightly lower than a 2016 study reporting that 28% of pediatric nurses do not feel safe questioning authority over unsafe practices and 46% of pediatric nurses felt that reported mistakes were held against them (Lake et al., 2021). One potential explanation for the differences between the studies, is that >60% of participants in this study were under the age of 39 (n = 157). Generational studies have shown that 'millennials', representing individuals between 25 and 40 years of age, are increasingly risk averse with a preference for teamwork and frequent leadership feedback (Erlam et al., 2018; Keith et al., 2021). However, it is important to note that when age was included in the linear regression model, no statistically significant relationship was revealed. In fact, gender, age, race and level of highest education were not correlated with any of the study variables.

Years of experience and unit type may have also influenced reporting intentions in this study. These findings are consistent with results from previous studies exploring relationships among tenure status, psychological safety and willingness to speak up (Alingh et al., 2018). These results support that a nurse's reporting intentions increase with time and professional experience, but at a certain point a ceiling effect likely occurs.

The findings support the continued use of the Theory of Planned Behavior to measure behavioral intentions in healthcare. The negative distribution of ITR scores indicate that overall, pediatric nurses have strong safety reporting intentions but are not reporting near-misses as often as events reaching the patient.

Limitations

It is important to note that there are limitations to this study. The first is that in order to ensure that data were collected from a large, diverse and representative sample, snowball sampling was ultimately required. Details about the study were distributed by several nurse scientists working in inpatient pediatric organizations across the country and there is a chance that participants from these settings may have had an advanced appreciation for nursing research and responses may not be representative of the larger workforce. Another study limitation is that nurses working in Magnet® organizations may have been overrepresented when compared to all nurses working in pediatric facilities. According to the Children's Hospital Association (2022), there are currently 220 pediatric healthcare organizations in the United States and 96 of these (43%) have achieved Magnet® designation through the American Nurses Credentialing Center (ANCC). A large majority of participants in this study reported working in a pediatric Magnet® organization (88.5%) and there is a chance that given the Magnet® model's emphasis on patient safety and nursing excellence, study participants may have demonstrated higher scores than what would be found among the complete nursing population.

In comparison to the national health workforce analysis data collected by the Health Resources and Services Administration (HRSA) and the National Council of State Boards of Nursing (NCSBN), at the time of this study, the average age of the nurse was between 47.9 and 51 years old (National Center for Health Workforce Analysis, 2019; Smiley et al., 2018). The average age of the nurse in this study was 37.78 years old, being a decade younger than the benchmark reports. According to the HRSA and NCSBN workforce analyses, the following estimates represented the racial and ethnic makeup of the nursing workforce: 1.) 81% of nurses identify as White/Caucasian; 2.) 5%–10.2% identify as Hispanic or Latino; 3.) 5.2%–7.5% identify as Asian; 4.) 6.2%–7.8% identify as Black/African American; 5.) 2.9% identity as other; and 6.) 1.7% identify with two or more races. The demographic findings from this study suggested that those who identify as male, Black/African American or Asian may have been underrepresented. However, it is important to note that estimates regarding the demographic makeup of the nursing workforce do not provide specific details for those working in pediatrics. Thus, it is unknown how the sample from this study compares to the larger pediatric nursing workforce.

While this study was conducted with rigor, the generalizability of results was limited as this research area is still in its infancy and rapidly evolving. One possible limitation to this study was the sub-optimal internal reliability results (α = 0.622) for the TPSS. However, concerns regarding the interpretability of results were assuaged given the instrument's extensive psychometric testing across a variety of settings and populations.

Practice implications

The information gleaned from this study addressed a critical knowledge gap which will hopefully serve as a catalyst for practice changes and research. The findings from the literature review and this study highlighted the important role that pediatric nurses play in the prevention and reporting of safety events. To promote reporting, it is essential that pediatric nurses feel their unique knowledge base and expertise are recognized and that their input is wanted and valued. Like other clinical skills, pediatric nurses may benefit from participating in courses focusing on effective communication techniques. With advanced training, nurses may feel more confident in speaking up even when a conversation is challenging or power differentials exist (Browning et al., 2007; Clark, 2015).

To cultivate psychological safety, it is recommended that organizational leaders recognize the inherent power gradients and hierarchies that exist in healthcare (Appelbaum et al., 2016; Lee et al., 2022). To promote shared learning and communication, reducing the power distance between organizational leaders and staff is highly recommended. By dismantling the hierarchy and embracing a culture of continuous learning, staff members will perceive constructive feedback and the reporting process not as something to be ashamed of but as an opportunity for improvement (Lee et al., 2022). By asking exploratory questions, openly discussing their own challenges and mistakes and seeking staff feedback, nurse leaders model the behaviors they hope to observe themselves. Nurse leaders should closely track retention rates, conduct exit interviews and support the collection, analysis and follow-up of cultural assessment surveys. Information regarding safety event trends (including near misses) should be shared to promote benchmarking and highlight opportunities for improvement. In this spirit, organizations may find it useful to appoint an HRO Executive Director to foster the engagement of frontline staff across the organization and follow-up with teams with lower cultural assessment survey scores, high turnover or concerning safety event trends.

As more pediatric hospitals adopt the high reliability framework, it will become increasingly important to gather data regarding how organizations define, operationalize and measure the principles in practice. Given the potential conceptual overlap that could exist between a nurse's perception of high reliability and level of psychological safety, additional refinement and testing of the scales should be considered. Future investigators may want to consider pooling items from the SOS and TPSS to better understand the dimensionality of items. The relationships among HRO status, psychological safety and safety event reporting warrants continued investigation.

Conclusions

The findings from this study demonstrate that a nurse's intention to report a safety event is affected by their level of psychological safety and perception of working in an HRO. The results identify important antecedents to promote improved reporting behaviors in healthcare. Multimodal interventions to cultivate psychological safety and embed the principles of high reliability are likely necessary to influence staff attitudes and behaviors.

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CRediT authorship contribution statement

Lauren Pfeifer: Conceptualization, Writing – original draft, Writing – review & editing, Investigation, Formal analysis. **Judith Vessey:** Conceptualization, Writing – review & editing, Investigation, Formal analysis, Supervision. **Mary Cazzell:** Conceptualization, Writing – review & editing, Investigation, Formal analysis, Supervision. **Pat Reid Ponte:** Conceptualization, Writing – review & editing. **David Geyer:** Writing – review & editing.

Declaration of Competing Interest

The authors declare that there are no conflicts of interest.

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