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Research Article

Associations between transactional leadership and safety climate among 314 Pakistani nurses during COVID-19 pandemic: moderating roles of transformational leadership

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Aim: This study examines the effect of transactional leadership on safety climate via employee well-being and transformational leadership among nurses during COVID-19 pandemic.

Background: Exploration of the safety climate among nurses in COVID-19 pandemic has received little attention, but is of acute importance because of their potential effects on safety outcomes.

Methods: The data used for the study are obtained from self-reported surveys, originally collected by the 314 Pakistani nurses during COVID-19. Analysis of variance is used to identify the confounding variables of transactional leadership, transformational leadership and safety climate. Hierarchical linear regressions are used to explore moderating effects of transformational leadership on transactional leadership → employee well-being and effects of transformational leadership on employee well-being → safety climate. Based on social learning theory and social exchange theory, several hypotheses are established.

Results: 2-factor structures have been found among transformational leadership (motivational leadership, inspirational leadership), transactional leadership (active leadership, contingent leadership), and safety climate (compliance with safety rules, occasional deviations), respectively. Analysis of variance indicates socioeconomic factors are related with transformational leadership, transactional leadership, employee well-being, and safety climate. Hierarchical linear regression shows that motivational leadership significantly moderate the relationship between contingent leadership and employee well-being ($\beta=.161$; $p=0.19$) when controlling for a variety of individual characteristics. There are negative significant Inspirational leadership×employee well-being for compliance with safety rules ($\beta= -.299$, $p < .001$) and positive significant motivational leadership×employee well-being for occasional deviations ($\beta= .091$, $p = .047$) when controlling for a variety of individual characteristics. Significant relationships between contingent leadership and compliance with safety rules ($\beta=.152$, $p = .032$), between active leadership and occasional deviations ($\beta=.349$, $p < .001$), between contingent leadership and occasional deviations ($\beta=.422$, $p < .001$) are found.

Conclusions: This study identifies moderating mechanism of transformational leadership on the association between transactional leadership and employee well-being and between transactional leadership and safety climate. These findings highlight the importance of employee well-being in the relationship between transactional leadership and safety behaviors among nurses.

Implications for Nursing Management: To increase staff nurses' safety climate, we suggest that nurse managers contingent leadership styles and employee well-being could be improved. The nurse managers should consider their leadership style from the point of view of employee well-being. Nurse managers must address contingent leadership that affect employee well-being because this has an impact on safety climate.

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1. Introduction

Safety climate has an impact on both patient and nurse injuries (Taylor, et al., 2012) and can directly increase nurses' intent to stay (Liang, et al., 2016). However, nurse perceptions of safety climate varies between hospitals as well as across wards within each hospital (Soh, et al., 2018). Nurse leaders play an important role in

safety climate in hospitals (Ausserhofer, et al., 2012). Meanwhile, nurse managers are responsible for the nurse work environment which can contribute to improving nurses' perception of job satisfaction and safety climate (Dutra & Guirardello, 2021).

A large body of research reports support between leaders and followers can improve safety culture. As to nursing job, emotional labour plays an important role in promoting safety climate and reducing workplace risk (Smith, et al., 2009). Moreover, psychosocial hazards can moderate the safety climate-performance relationship (Manapragada, et al., 2019). Nurse managers' inclusive leadership helps nurses to improve psychological safety and

disclose nursing errors (Lee & Dahinten, 2021). Analogously, increased nurses' psychological capital and managerial support from and their managers will enhance nurses' satisfaction and in-role safety performance perceptions (Brunetto, et al., 2016).

Employee well-being like job satisfaction affects nurses' caring behaviours (De Los Santos & Labrague, 2021). Increasing nurses' job satisfaction and reducing organizational constraints may be areas to focus on to improve quality of care and patient safety (Stimpfel, et al., 2019). Improvement of working conditions could help prevent and minimize nursing medication errors and increase the job satisfaction of nurses (Intas, et al., 2021). Job dissatisfaction in nurse educators leads to destructive behaviors and turnover intentions; meanwhile, it is satisfied educators who can train competent nurses (Arian, et al., 2018). A cross-sectional study indicates leadership styles are major factors that impact nurse practitioners' job satisfaction in acute care practices (Lei, et al., 2022).

Empowering nurses and supervisors could improve the overall patient safety culture (Amiri, M., et al., 2018). Nurse work environment is found to influence the association between safety climate perception and patient mortality (Olds, et al., 2017). A cross-sectional study reports improvements in work environments may improve nurse practitioner job satisfaction and retention (Poghosyan, et al., 2022). Enhancing nurse work environments can be a potential strategy to foster interprofessional collaboration and improve job satisfaction and patient safety outcomes (Labrague, et al., 2022). Nurses who perceive decision authority and positive safety climate are less likely to miss nursing care (Labrague, 2021). A systematic review suggests that relational leadership traits contribute to greater nurse satisfaction whereas task-oriented styles may decrease nurse satisfaction (McCay, et al., 2018).

The professional practice environment is related to nurse satisfaction and missed nursing care (Zeleníková, et al., 2020). Prior studies adopt social learning theory to develop nursing education (Bahn, 2001; Sanderson, et al., 2012). According to social learning theory, nurses observe and mimic the behaviors of nurse leaders. Early studies use social exchange theory to manage nursing job (Picot, 1994; McGregor, et al., 2010). According to social exchange theory, employee well-being and safety climate are the resultant outcomes of managers' leadership styles.

2. Literature review and hypotheses development

A cross-sectional study indicate multiple relationships between nurse managers' work activities, nurses' job satisfaction, and medication errors are identified (Nurmeksela, et al., 2021). A cross-sectional study in selected hospitals of Rwanda indicate that managerial leadership styles play a substantial role in enhancing job satisfaction, intention to stay and service provision (Ngabonzima, et al., 2020).

For front-line nurses, multiple studies confirms psychological empowerment (Li, et al., 2018; Lyden, et al., 2018), praise from nurse unit managers (Sveinsdóttir, et al., 2016), management relations (Price, et al., 2018) may improve patient safety. With respect to advanced nurse practitioners, efforts to improve the negotiating and leadership skills play an important role (O'Keeffe, et al., 2015). For nurse leaders, the combination of empowerment and perceptions of organizational support (Patrick & Laschinger, 2006), shared governance (Speroni, et al., 2021) are vital. A review suggests that job satisfaction of front line managers may be improved by addressing span of control and workload, increasing organizational support and empowerment to participate in decision-making (Lee & Cummings, 2008).

Combined with other leadership styles, TSL style has been confirmed to be useful to meet short-term goals, complete tasks, and maximise its effectiveness in healthcare settings (Richards, 2020). Through goal-setting, feedback, and reinforcement strategies, TSL style help team members maintain effective programs (Corrigan & Garman, 1999). For a structured 10-week exercise program, TSL style is able to explain unique variation in scheduling self-efficacy and barrier self-efficacy (Beauchamp, et al., 2007). The impact of TSL style on organizational-citizenship behavior between head nurse and staff nurses has been confirmed (Wang & Li, 2008), which varies across employee cultural-based individual differences (Nahum-Shani & Somech, 2011). Empirical studies in clinical practice indicate TSL style has positive relationship with residents' performance outcomes (Deng, et al., 2019) and moderates the relationship between employee-orientation culture and leader-member exchange (Deng, et al., 2020). TSL style exhibits supervisory coaching behavior and in turn mediates their relationships with job performance (Lee & Ding, 2020).

TFL style proves to be an effective way to engage and empower nurses and other members of the chronic pain team to enable them to achieve the project aims (Gousy & Green, 2015). The TFL style of First-line nurse managers has the strong direct effects on nurses' job satisfaction (Jankelová, & Joniaková, Z. 2021). Studies show TFL style is demonstrated as a positive contributor to safety climate (Merrill, 2015), promote medication safety in units (Lappalainen, et al., 2020), correlates with low levels of incivility (Kaiser, 2017), leading to increased perceptions of organizational support, quality care and decreased intent to leave (Spence Laschinger, et al., 2012). Staff nurses who perceives their nurse managers as demonstrating TFL style experience higher structural empowerment (Khan, et al., 2018). A Spain study demonstrate the influence that the supervisor's leadership exerts on the job satisfaction of the nurse (López-Ibort, et al., 2021). TFL leadership can improve patient safety outcomes (Labrague, & Obeidat, 2021) and nurses' job satisfaction during COVID-19 pandemic (Boamah, 2022).

TFL style often is implemented with TSL style in mental health service organizations (Aarons, 2006), applied psychology (Judge & Piccolo, 2004), graduate leadership training (Saravo, et al., 2017), and safety practices (Shi, 2021). The aim of this study is to investigate whether there are effects of TSL on safety climate among nurses in COVID-19 pandemic.

Thinking about TFL style is a driver of safety climate, we guess TSL style also lead to safety behavior. As a result, we also predict that nurse leaders can improve safety climate through employee well-being. More specifically, we guess that TSL style, TFL style, employee well-being and safety climate have various dimensions after factor analyses. Simultaneously, TFL style can mediate the relationship between TSL style and employee well-being and the relationship between employee well-being and safety climate. Hypothetical diagram can be seen in Figure 1. Thus, we have the following hypotheses:

- Hypothesis 1: There is a significant relationship between TSL style and employee well-being.
- Hypothesis 2: TFL style moderates the relationship between TSL style and employee well-being.
- Hypothesis 3: There is a significant relationship between employee well-being and safety climate.
- Hypothesis 4: TSL style moderate the relationship between employee well-being and safety climate.
- Hypothesis 5: TSL style is related to safety climate through employee well-being.

- Hypothesis 6: There is a significant relationship between TSL style and safety climate.

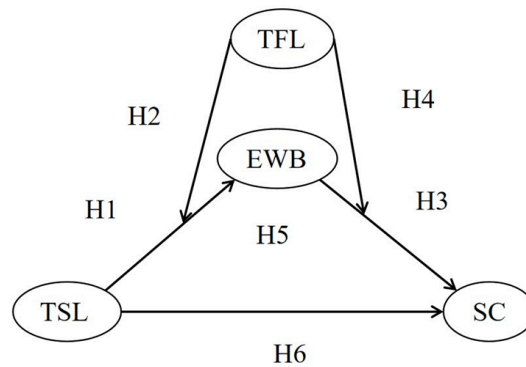


Figure 1. Hypothetical diagram.

TSL: transactional leadership.
 EWB: employee well-being.
 TFL: transformational leadership.
 SC: safety climate.

3. Methods

3.1. Ethics Statement

The data adopted is from a publicly available survey dataset whose ethical approval is obtained from the institutional review board at Universiti Utara Malaysia. All methods are carried out in accordance with relevant guidelines and regulations. Written informed consent is obtained from all participants before they agreed to participate in the study. Participants are informed that they could leave the study at any time without penalty, and all personal information is kept confidential. Thus, it is not necessary to obtain ethical approval from the institutional review board at the author's institution.

3.2. Data source

This study employs a publicly available survey data (Awais-E-Yazdan, et al., 2022). With convenience sampling, Data is collected with the help of self-administered questionnaire from Services Hospital Lahore, Sir Ganga Ram Hospital Lahore, Government General Hospital Faisalabad, DHQ Hospital Chiniot, Municipal General Hospital Sargodha, DHQ Hospital Jhang, and DHQ Hospital Multan and Sulehri Children & General Hospital Sialkot in Punjab, Pakistan. The dataset includes the particulars of 314 nurse on safety climate during COVID-19.

3.3. Main variables

Control variables

The socioeconomic variables included in dataset are age, gender, and marital status. Marital status is comprised of unmarried (single, divorced, and widowed) status and married status. Originally, age categories are under 25 years, 25 to 35 years, 36 to 45 years, 46 to 55 years, and above 56 years. Due to uneven distribution, the age group is recoded by three groups: under 25 years, 25 to 35 years, and above 36 years. Several studies indicates demographic factors including age (Herman, et al., 2017; Moon, et al., 2019), gender (Apore &

Asamoah, 2019), and marital status (Theucksuban, et al., 2022) possible influence nursing leadership styles.

Main measures

The psychological variables are TSL style (Burns,1998; Ismail, et al., 2010) reflecting information exchange between leaders and followers, TFL style (Adamshick, 2007; Ismail, et al., 2010) reflecting morally and ethically support between leaders and followers, employee well-being (Sharma, et al., 2016; Su & Swanson, 2019) reflecting physical and mental well-being of the individuals, and safety climate (Neal & Griffin, 2002; Vinodkumar & Bhasi, 2010) reflecting safe working standard. Each scale's items are rated on a 5-point, Likert-type scale (1=strongly disagree to 5=strongly agree). Their Cronbach's alpha coefficients are .7830, .8507, .7632, and .7832, respectively.

3.4. Statistical strategies

Factorial structures of TSL style, TFL style, and safety climate are explored by rotated principle component factor analyses. Pearson correlation analysis is performed to calculate means, standard deviations, and correlations between all study variables. For analysis of variance (ANOVA) tests, effect sizes are assessed with Cohen's d statistic (.20 for small effects, .50 for medium, and .80 for large effect sizes) and partial-eta squared (η_p^2) statistic (.01 as a small effect, .06 as medium, and .14 as large effect size) (Cohen, 1988).

Using stepwise hierarchical regressions, the control variables (age, gender, marital status), independent variables (TSLa, TSLb), moderating variables (TFLa, TFLb), interactions (TSLa×TFLa, TSLa×TFLb, TSLb×TFLa, TSLb×TFLb) on employee well-being are examined. Then, stepwise hierarchical regressions with control variables (age, gender, marital status), independent variables (TSLa, TSLb), moderating variables (TFLa, TFLb), interactions (TFLa×employee well-being, TFLb×employee well-being) on safety climate are examined. The data are analyzed using SPSS 25.0.

All the statistical calculations are conducted by Statistical Package for the Social Sciences (SPSS; IBM Corporation, Armonk, NY, USA).

4. Results

4.1. Factor analyses

Regarding TSL style, PCA extracted 2 factors with an eigenvalue greater than one accounted for 74.167% of total variance. Each rotated factor is considered to be composed of subtests with loadings bigger than .50. KMO measure of sampling adequacy is .717, which indicates adequate sample size for the factor analysis. Bartlett's test of sphericity is significant ($\chi^2 = 491.506$, $df = 10$, $p < .001$). Accordingly, factor 1 with 2 items (active leadership abbreviated by TSLa: TSL1, TSL2; Cronbach's alpha= .714; composite reliability=.885) and factor 2 with 3 items (contingent leadership abbreviated by TSLb: TSL3, TSL4, TSL5; Cronbach's alpha= .733; composite reliability=.871) are obtained in Table 1 (Left).

Regarding TFL style, PCA extracts 2 factors with an eigenvalue greater than one which accounts for 78.369% of total variance. Each rotated factor is considered to be composed of subtests with loadings bigger than .50. KMO measure of sampling adequacy is .809, which indicates adequate sample size for the factor analysis. Bartlett's test of sphericity is statistically significant ($\chi^2 = 1008.464$,

$df = 15$, $p < .001$). Factor loading after the rotation of each item is shown in Table 1 (Left). Accordingly, factor 1 with 3 items (motivational leadership abbreviated by TFLa: TFL1, TFL2, TFL3; Cronbach's alpha= .809; composite reliability=.887) and factor 2 with 3 items (inspirational leadership abbreviated by TFLb: TFL4, TFL5, TFL6; Cronbach's alpha= .871; composite reliability=.922) are obtained in Table 1 (Middle).

Regarding safety climate, PCA extracts 2 factors with an eigenvalue greater than one which accounts for 63.453% of total variance. Each rotated factor is considered to be composed of subtests with loadings bigger than .50. KMO measure of sampling adequacy is .805, which indicates adequate sample size for the factor analysis. Bartlett's test of sphericity is statistically significant ($\chi^2 = 645.405$, $df = 21$, $p < .001$). Factor loading after the rotation of each item is shown in Table 1. Accordingly, factor 1 with 4 items (compliance with safety rules abbreviated by SCa: SC1, SC2, SC3, and SC4 ; Cronbach's alpha= .784; composite reliability=.860), factor 2 with 3 items (occasional deviations abbreviated by SCb: SC5, SC6, and SC7; Cronbach's alpha= .668; composite reliability=.818) are obtained. Varimax rotated items loadings for factor analyses of safety climate can be seen in Table 1 (Right).

TSL			TFL			SC		
Factor			Factor			Factor		
Item	TSLa	TSLb	Item	TFLa	TFLb	Item	SCa	SCb
TSL1	.888		TFL1	.877		SC1	.775	
TSL2	.842		TFL2	.741		SC2	.791	
TSL3		.699	TFL3	.773		SC3	.672	
TSL4		.858	TFL4		.858	SC4	.719	
TSL5		.837	TFL5		.850	SC5		.627
			TFL6		.889	SC6		.796
						SC7		.791

Table 1. Varimax rotated matrices from principal axis factor analyses of TSL, TFL, and SC.

TSL: transactional leadership.
TFL: transformational leadership.
SC: safety climate.
TSLa: active leadership.
TSLb: contingent leadership.
TFLa: motivational leadership.
TFLb: inspirational leadership.
SCa: compliance with safety rules.
SCb: occasional deviations.

Regarding employee well-being, PCA extracted 1 factor with an eigenvalue greater than one which accounts for 66.141% of total variance. Each rotated factor is considered to be composed of subtests with loadings bigger than .50. KMO measure of sampling adequacy is .661, which indicates adequate sample size for the factor

analysis. Bartlett's test of sphericity is statistically significant ($\chi^2 = 363.822$, $df = 3$, $p < .001$; Cronbach's $\alpha = .763$; composite reliability = .867).

4.2. Descriptive analyses

The sample is predominantly married status (89.17%) and males (84.39%). Most participants (70.38%) are within the age group 25-35 years. Table 2 shows that there are statistically significant correlations among all the variables. Among them, correlation coefficients between SCb and TSLa (.559***), SCb and TSLb (.545***), TSLb and TFLa (.757***), SCa and TFLb (.503***), TFLa and TFLb (.512***) are higher than .500. All AVE square root values are higher than the correlation coefficients, which indicates an acceptable level of discriminant validity.

	Means	SD	1	2	3	4	5	6	7
1.SCa	3.502	1.020	.608						
2.SCb	3.406	1.058	.431***	.601					
3.EWB	3.291	1.127	.459***	.145**	.686				
4.TSLa	3.198	1.166	.317***	.559***	.206***	.740			
5.TSLb	2.952	1.135	.377***	.545***	.193***	.448***	.692		
6.TFLa	2.811	1.242	.491***	.395***	.370***	.381***	.757***	.725	
7.TFLb	3.043	1.221	.503***	.434***	.429***	.385***	.337***	.512***	.797

Table 2. Means, standard deviations, and correlations (n = 314).

Note: *, **, *** denote significance at 10%, 5%, and 1% levels, respectively. SD=Standard deviations. Diagonal values indicates the square root of average variance extracted (AVE).

SCa: compliance with safety rules.

SCb: occasional deviations.

EWB: employee well-being.

TSLa: active leadership.

TSLb: contingent leadership.

TFLa: motivational leadership.

TFLb: inspirational leadership.

4.3. ANOVA analyses

There are statistically significant interaction between gender and marital status on SCa, $F(1,303)=3.63$, $p=0.058$, $\eta^2=.012$, and $\omega^2=.009$. There are statistically significant effect of age on SCa, $F(2,303)=10.72$, $p < 0.001$, $\eta^2=.066$, and $\omega^2=.060$.

There are statistically significant effect of age on SCb, $F(2,303)=7.85$, $p < 0.001$, $\eta^2=.049$, and $\omega^2=.043$. There are statistically significant interaction between age and gender on SCb, $F(2,303)=2.68$, $p=0.070$, $\eta^2=.017$, and $\omega^2=.011$. There are statistically significant interaction between gender and marital status on SCb, $F(1,303)=2.73$, $p=0.099$, $\eta^2=.009$, and $\omega^2=.006$.

There are statistically significant effect of marital status on employee well-being, $F(1,303)=4.40$, $p=0.037$, $\eta^2=.014$, and $\omega^2=.011$. There are statistically significant interaction between age and gender on employee well-being, $F(2,303)=4.08$, $p=0.018$, $\eta^2=.0262123$, and $\omega^2=.020$. There are statistically significant interaction between and between age and marital status on employee well-being, $F(2,303)=3.38$, $p=0.035$, $\eta^2=.022$, and $\omega^2=.015$. There are statistically significant interaction among age, gender, and marital status on employee well-being, $F(1,303)=3.85$, $p=0.051$, $\eta^2=.0125462$, and $\omega^2=.009$.

There are statistically significant effect of age on TSLa, $F(2,303)=4.39$, $p=0.013$, $\eta^2=.028$, and $\omega^2=.022$. There are statistically significant effect of age on TSLb, $F(2,303)=15.03$, $p < 0.001$, $\eta^2=.090$, and $\omega^2=.084$. There are statistically significant interaction between age and gender on TSLb, $F(2,303)=5.43$, $p=0.005$, $\eta^2=.035$, and $\omega^2=.028$. There are statistically significant interaction among age,

gender, and marital status on TSLb, $F(2,303)=8.52$, $p=0.004$, $\eta^2=.027$, and $\omega^2=.024$.

There are statistically significant effect of age on TFLa, $F(2,303)=16.01$, $p < 0.001$, $\eta^2=.096$, and $\omega^2=.090$. There are statistically significant interaction between age and gender on TFLa, $F(2,303)=3.94$, $p < 0.020$, $\eta^2=.025$, and $\omega^2=.019$. There are statistically significant interaction among age, gender, and marital status on TFLa, $F(1,303)=5.96$, $p=0.015$, $\eta^2=.019$, and $\omega^2=.016$. There are statistically significant effect of age on TFLb, $F(2,303)=8.27$, $p < 0.001$, $\eta^2=.052$, and $\omega^2=.046$. There are statistically significant interaction among age, gender, and marital status and on TFLb, $F(1,303)=2.72$, $p=0.099$, $\eta^2=.009$, and $\omega^2=.006$.

4.4. Moderating analyses

Hypothesis 1 predicts there is a statistically significant relationship between TSL style and employee well-being. In Table 3, TSLa and TSLb do not significantly predict employee well-being. Thus, Hypothesis 1 is rejected. Hypothesis 2 predicted TFL style moderates the relationship between TSL style and employee well-being. Significant coefficients of TSLb×TFLa indicate that motivational leadership significantly moderate the relationship between contingent leadership and employee well-being ($\beta=.161$; $p=0.19$). Thus, Hypothesis 2 is partially accepted. Hypothesis 3 predicts there is a statistically significant relationship between employee well-being and safety climate. The coefficient of employee well-being with SCa is statistically significant ($\beta=.228$, $p < .001$). Thus, Hypothesis 3 is partially accepted. Hypothesis 4 predicts TSL moderates the relationship between employee well-being and safety climate. A negative significant TFLb×employee well-being for SCa ($\beta=-.299$, $p < .001$) and positive significant TFLa×employee well-being for SCb ($\beta=.091$, $p=.047$) can be seen. Thus, Hypothesis 4 is completely accepted. Hypothesis 5 predicts TSL style is related to safety climate through employee well-being. The coefficients between TSLa and employee well-being, between TSLb and employee well-being, between employee well-being and SCa, between employee well-being and SCb are not zeros. Thus, Hypothesis 5 is completely accepted. Hypothesis 6 predicts there is a statistically significant relationship between TSL style and safety climate. Statistically significant relationships between TSLb and SCa ($\beta=.152$, $p=.032$), between TSLa and SCb ($\beta=.349$, $p < .001$), between TSLb and SCb ($\beta=.422$, $p < .001$) are found. Thus, Hypothesis 6 is partially accepted.

	EWB				SCa				SCb			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Age	.174***	.138**	.084	.076	.064	.011	-.017	.028	.059	.062	.050	.039
Gender	.062	.086	.039	.035	-.078	-.111**	-.141***	-.136***	-.039	-.037	-.053	-.053
Marital status	.155***	.151***	.087*	.095*	.119**	.060	.028	.021	.061	.065	.059	.062
TSLa		.151**	.054	.048	.196***	.138**	.069	.074	.401***	.404***	.342***	.349***
TSLb		.103	-.177**	-.048	.257***	.217***	.037	.152**	.344***	.346***	.456***	.422***
TFLa			.314***	.292***			.196**	.099			-.221***	-.212***
TFLb			.274***	.212***			.265***	.203***			.276***	.284***
TSLb×TFLa				.161**								
EWB						.388***	.264***	.228**		-.023	-.063	-.038
TFLa×EWB												.091**
TFLb×EWB								-.299***				
R ²	.063	.109	.244	.258	.191	.325	.404	.477	.429	.429	.480	.487
ΔR ²	.063	.046	.135	.014	.191	.134	.078	.074	.429	.000	.051	.007
F	6.958***	7.909***	27.356***	5.572**	14.569***	60.920***	20.054***	42.953***	46.226***	.261	14.906***	3.995**
ΔF	6.958	7.524	14.110	13.227	14.569***	24.656***	25.801***	30.862***	46.226***	38.472***	35.195***	32.035***

Table 3. Moderated hierarchical robust linear regression on SC

Note: *, **, *** denote significance at 10%, 5%, and 1% levels, respectively. TSLa: active leadership. TSLb: contingent leadership. TFLa: motivational leadership. TFLb: inspirational leadership. SCa: compliance with safety rules. SCb: occasional deviations. EWB: employee well-being.

4.5. Post-hoc analysis

The interactions between TSLb and TFLa add 1.4% to the explanation rate, and in total, the model explained 25.8% of the

variation in employee well-being. Regarding interaction effects with post-hoc tests, the significance of relationships TSLb×TFLa on employee well-being can be plotted in Figure 2. The simple slope analyses show that in the nurse group with low TFLa, there is a statistically significant positive relationship between TSLb and employee well-being ($\beta = -0.204$, $p = 0.050$), whereas in the nurse group with high TFLa, the relationship is not statistically significant ($\beta = 0.108$, $p = 0.499$).

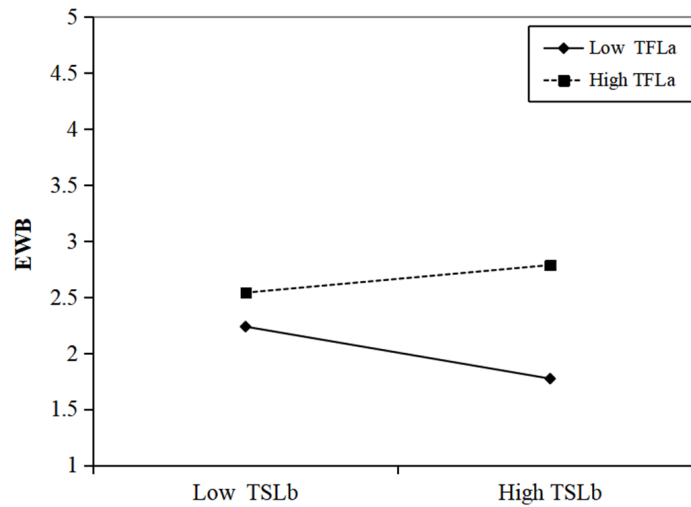


Figure 2. Moderating effects of TSLb on EWB through TFLa.

EWB: employee well-being.
 TSLb: contingent leadership.
 TFLa: motivational leadership.

Similarly, the interactions between TFLb and employee well-being add 7.4% to the explanation rate, and in total, the model explained 47.7% of the variation in SCa. Regarding interaction effects with post-hoc tests, the significance of relationships TFLb×employee well-being on SCa can be plotted in Figure 3. The simple slope

analyses show that in the nurse group with low TFLb, there is a significant positive relationship between employee well-being and SCa ($\beta=0.471, p<0.01$), whereas in the nurse group with high TFLb, the relationship is not statistically significant ($\beta=-0.059, p=0.404$).

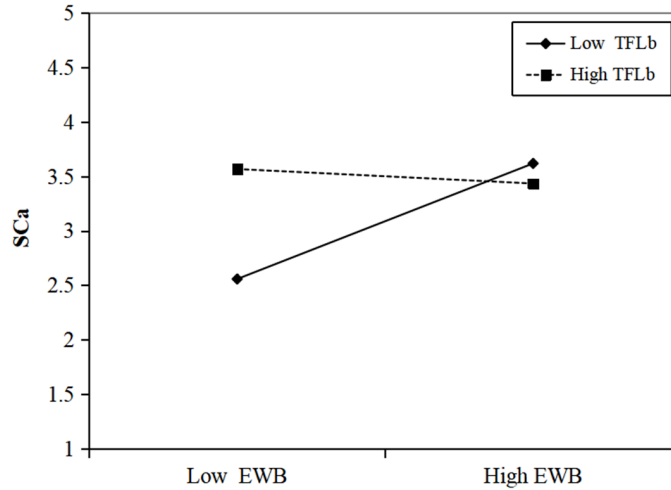


Figure 3. Moderating effects of EWB on Sca through

TFLb.EWB: employee well-being.
 Sca: compliance with safety rules.
 TFLb: inspirational leadership.

Similarly, the interactions between TFLa and employee well-being add 0.7% to the explanation rate, and in total, the model explained 4.7% of the variation in Sca. Regarding interaction effects with post-hoc tests, the significance of relationships TFLa×employee well-being on SCb can be plotted in Figure 4. The simple slope

analyses show that in the nurse group with low TFLa, there is not a significant positive relationship between employee well-being and SCb ($\beta=-0.115$, $p=0.264$), whereas in the nurse group with high TFLa, the relationship is not statistically significant ($\beta=0.043$, $p=0.565$).

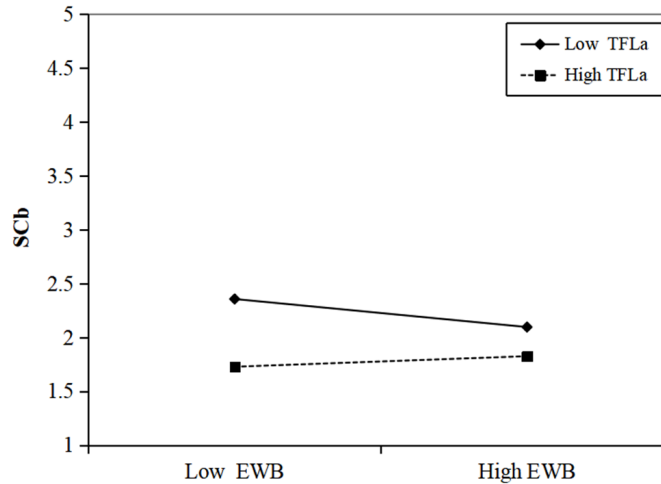


Figure 4. Moderating effects of EWB on SCb through TFLa.

EWB: employee well-being.
 SCb: occasional deviations.
 TFLa: motivational leadership.

5. Discussions

5.1. Summary findings

There are statistically significant correlations among motivational leadership, inspirational leadership, active leadership, contingent leadership, compliance with safety rules, occasional deviations, and employee well-being. Analysis of variance shows there are statistically significant interaction of socioeconomic factors with TSL style, TFL style, and safety climate. Analyses from hierarchical robust linear regression show motivational leadership significantly moderates the relationship between contingent leadership and employee well-being. The coefficient of employee well-being with compliance with safety rules is statistically significant. There are negative significant inspirational leadership×employee well-being for compliance with safety rules and positive significant motivational leadership×employee well-being for occasional deviations. TSL style is related to safety climate through employee well-being. Statistically significant relationships between contingent leadership and compliance with safety rules, between active leadership and occasional deviations, between contingent leadership and occasional deviations are found. The findings in this study can be used to compare with related studies in other geographic regions.

The 2-factor structures of TSL style, TFL style, and safety climate are identified in this sample. The factors defined in this study are in line with the relevant studies. For example, nurses' occasional deviation from guidelines often causes medication-related errors (Karttunen, et al., 2020). With respect to inspirational leadership, emotional intelligence plays an important role in nurse manager TFL effectiveness (Spano-Szekely, et al., 2016). But, the factorial structures are not consistent with the general knowledge. For instance, a meta-analysis indicates 3 dimensions (idealized influence–inspirational motivation/charisma, intellectual stimulation, and individualized consideration) of TFL style and 3 dimensions (contingent reward, management by exception–active,

and passive leadership) of TSL style (Bono & Judge, 2004). This is because factor structures and dimensions originated from various scales and items.

Statistically significant correlations among factors of the main scales are in line with some prior studies. For example, an early study confirms the relationship of TFL style → psychological empowerment → job satisfaction (Larrabee, et al., 2003). Another study demonstrates agreement on the frequency of TSL behaviors between nurse managers and staff nurses (Kleinman, 2004). TFL and TSL styles of nurse managers are positively related to staff nurse overall job satisfaction (Bormann & Abrahamson, 2014). The relationship between a creative work climate and job satisfaction is confirmed to be strong (Sellgren, et al., 2008). Consequently, the empirical outcomes from Pakistani healthcare workers are similar to other countries.

There are several possible explanations for these moderator findings. First, motivational leadership may play a role in contingent leadership. Modifying head nurse messages is confirmed to improve safety climate in healthcare organisations (Zohar, et al., 2017). Nurse managers' perceptions of the quality of the relationship with their supervisors are associated with greater job satisfaction (Laschinger, et al., 2007). The leadership style employed by nurse managers has a major impact on nurses' satisfaction, turnover, and the quality of patient care they deliver (Saleh, et al., 2018). Research indicates that positive and relational leadership styles can improve nurses' job satisfaction, organizational commitment, and retention while concurrently reducing emotional exhaustion and burnout (Hall, et al., 2022). A study in Finland demonstrate nurse managers' abilities to reflect, understand, and change their leadership style influence the work unit's success and employees' job satisfaction (Vesterinen, et al., 2013). A systematic review shows nurse leaders' leadership styles affect nurses' work-related well-being which is mainly assessed in terms of burnout (Niinihuhta & Häggman-Laitila, 2022).

5.2. Theoretical implications

The results of this study contribute to the nursing management literature in the following ways. First, despite that only partial components are extracted from classical components of TFL and TSL styles, this study underscores the importance of integrating components of TFL and TSL styles. In addition, the components of TFL and TSL styles can be split into segments further, which provides a more detailed perspective on theoretical development of nursing management. To some degree, this study answers the mechanism of TFL and TSL styles in the field of nursing management. Especially, how components of TFL and TSL styles interact with each other and in turn improve organizational climate. Thus, the concurrent effects of components of TFL and TSL styles in nursing management provide a new sight for theoretical framework.

5.3. Limitations

There are some limitations to this study. First, a cross-sectional nature with a small sample size can not exhibit causal relationship between TSL style and safety climate. Second, the findings in this study are possibly not worth being generalized because healthcare systems and their operations vary across countries. Especially, males dominate the sample. Third, without occupational variables like working years and hospital department, only three socioeconomic factors with categorical values are included in this study. Consequently, some comparative analyses can not be performed. Lastly, the starting and ending time of 3 months for data collection is not reported. Thus, health needs shock from the COVID-19 worldwide pandemic can not be considered in this study.

5.4. Ideas for future research

Nurse-patient interaction in nursing psychology also need to be studied further. Further research is needed to find possible explanations for the association between nurse-patient interaction and occupational psychology in this field. A cross-sectional study demonstrates the positive correlation between nurses' care nurse-patient interaction competence and their work environment satisfaction (Chung et al. 2021). Thus, the issue leadership→ nurse-patient interaction→nurses' employee well-being should be studied further. Other issues such as nurse-family relationship and nurse-family communication also deserve further investigation.

6. Conclusions

The results of this study suggest that inspirational leadership is one of important driving factors of safety climate among nurses during COVID-19 pandemic. Motivational leadership moderates the

relationships between contingent leadership and employee well-being and between employee well-being and compliance with safety rules. Employee well-being mediates the relationship between TSL style and safety climate.

7. Implications for Nursing Management

Findings from this study show that safety climate of nursing staff is impacted by transactional leadership, transformational leadership, and employee well-being during the current pandemic crisis, while employee well-being of nursing staff is influenced by motivational leadership and contingent leadership. In terms of practical implications, the results of this study suggest that transactional leadership instead of transformational leadership play a role in nursing management. Existing studies demonstrate that transformational leadership plays a more important role than transactional leadership in nursing management. The findings of this study indicates transactional leadership could be utilized to design employee well-being interventions addressing safety climate. An organizational study suggests that positive work engagement and work conditions contribute to enhanced safety climate and can reduce nurse injuries (Mark, et al., 2007). In addition, organizational design targeted at specific patient groups, like patients in the intensive care unit, would be useful during COVID-19 pandemic.

8. Contribution of the Paper

What is already known

Transformational leadership often is linked to safety climate, while transactional leadership is not in the field of nursing management.

Transformational leadership and transactional leadership are documented to improve employee well-being and safety climate among the medical staff.

Nurse managers play a pivotal role in well-being and safety climate in the nurses.

What this paper adds

Contingent leadership is confirmed to be related to employee well-being which is moderated by motivational leadership.

Transactional leadership also plays the same role in the well-being and safety climate just like transformational leadership.

Appendix

Factors	Items	Descriptions
		Transactional leadership (TSL)
Active leadership	TSL1	Makes clear expectation
	TSL2	Will take action before problems are chronic
Contingent leadership	TSL3	Tells us standards to carry out work
	TSL4	Works out agreements with me
	TSL5	Monitors my performance and keeps track of mistake
		Transformational leadership (TFL)
Motivational leadership	TFL1	Listens to my concerns
	TFL2	Encourages me to perform
	TFL3	Increases my motivation
Inspirational leadership	TFL4	Encourages me to think more creatively
	TFL5	Sets challenging standards
	TFL6	Gets me to rethink never-questioned ideas
		Employee well-being (EWB)
Employee well-being	EWB1	How would you rate your quality of life?
	EWB2	How satisfied are you with yourself?
	EWB3	How satisfied are you with your capacity for work?
		Safety climate (SC)
Compliance with safety rules	SC1	I use all necessary safety equipments to do my job
	SC2	I carry out my work in a safe manner
	SC3	I follow correct safety rules and procedures while carrying out my job
	SC4	I ensure the highest levels of safety when I carry out my job
Occasional deviations	SC5	Occasionally due to Lack of Time, I deviate from correct and safe work procedure
	SC6	Occasionally due to over familiarity with the job, I deviate from correct and safe work procedures
	SC7	It is not always practical to follow all safety rules and procedures while doing

Table 1. Factors, items, and descriptions of the main scales.

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