Membrane Technology
ISSN (online): 1873-4049

How Does Empathic Leadership Link To Safety Behaviors: The Mediating Role of Belongingness

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Abstract:

In contemporary healthcare, particularly among nursing staff, there is a notable incidence of occupational accidents linked to safety participation. This research investigated the relationship between empathetic leadership and two key aspects of employee safety behavior—safety involvement and adherence—considering a sense of belonging as an intermediary factor. Data was gathered from 372 nurses across various hospitals over a two-week period. The findings strongly upheld our hypotheses. Empathetic leadership was found to have a positive association with belongingness. Furthermore, belongingness was predictive of both safety adherence and involvement, and it functioned as a mediator in the link between empathetic leadership and safety-related behaviors.. Additionally, our analysis explored the moderating role of social support. The outcomes reveal that to foster safety behaviors, managers in industries that are sensitive to safety, such as the nursing profession, should focus on psychological aspects within the workplace. The study further discusses the implications of these findings for safety interventions and future research.

Keywords: empathetic leadership; employee safety behavior; belongingness; social support moderation

1. INTRODUCTION

In contemporary organizational settings, given the ongoing global incidence of occupational accidents and work-related illnesses that result in significant fatalities annually, health and safety have become critical priorities. These challenges not only impact employees individually but also have profound adverse effects on their productivity and overall organizational performance. As highlighted by a report from the International Labour Organization, occupational diseases claim at least 1.9 million lives each year, while approximately 360 million non-fatal workplace accidents are recorded. The healthcare sector, in particular, faces a daunting situation; data from the UK occupational health authority indicate that between 2019 and 2023, there were 8,729 reported employee injuries, with nurses disproportionately affected by workplace hazards and injuries.

Over the past decade, academia has paid considerable attention to understanding safety participation. Leadership has consistently been recognized as a crucial element affecting safety behaviors and a critical driver of employee adherence to safety protocols [1]. Leadership influences safety compliance and engagement through various mechanisms such as supervision, motivation, and learning. For instance, effective supervision ensures compliance with safety protocols, while motivational leadership encourages voluntary safety initiatives. Understanding these mechanisms can help organizations tailor leadership strategies to enhance safety outcomes. Based on insights from the leader-follower exchange model [2] and and leadership approaches that emphasize organizational change and employee motivation [3], extensive research has underscored the role of leadership in promoting safety. For example, strong leader-member relationships have been shown to enhance safety communication and commitment, thereby reducing the likelihood of accidents. The impact of leadership on safety behaviors can vary over time. Short-term effects might include immediate compliance with safety rules, while long-term effects could involve a sustained transformation of safety culture. Future research should explore the dynamics and stages of leadership's impact on safety [4]. Ethical leadership, in particular, fosters a supportive safety climate that encourages employees to prioritize personal and safety participation [5]. Likewise, leadership models emphasizing transformation have been found to substantially improve employees' safety awareness and improve their safety performance [6-8]. Furthermore, transformational leaders can motivate employees to voluntarily participate in safety-related activities [9]. Interestingly, certain destructive leadership behaviors have also been found to be linked to enhanced organizational safety performance [10].

While the leadership's role in shaping safety participation behaviors is well-documented, limited research explores the specific role of empathy leadership in enhancing safety. Empathy leadership involves recognizing and understanding the experiences of subordinates, providing emotional support, and fostering a sense of security[11]. In recent years, this leadership style has garnered attention due to its potential to improve workplace dynamics. Studies have shown that empathetic leaders can establish emotional and psychological connections with their teams, demonstrating genuine concern for their well-being, thereby enhancing workplace outcomes [12]. These insights emphasize the importance of empathy leadership in driving positive work outcomes. This research seeks to build upon previous studies by investigating whether empathetic leadership enhances safety behaviors, specifically compliance and engagement, through an enhanced sense of belonging among employees.

Safety behaviors can be categorized into surface compliance (minimal adherence to rules) and deep compliance (internal commitment to safety). Differentiating these levels can help organizations address superficial compliance and promote genuine safety engagement. Griffin and Neal [13] conceptualized adherence to safety regulation and safety engagement as distinct yet interrelated components of safety conduct, each driven by unique knowledge, skills, and motivations. Safety compliance involves adhering to safety protocols and executing tasks safely, while safety engagement refers to voluntary actions that support and promote organizational safety. Existing research indicates that both dimensions are influenced by leadership behaviors[14]. However, the psychological mechanisms, such as belongingness, through which leadership fosters high levels of safety engagement and compliance remain underexplored. Therefore, a deeper understanding of how empathy leadership influences these safety behaviors is of considerable significance.

This study proposes that leadership characterized by empathy exerts a beneficial effect on safety behaviors through multiple pathways. Leaders who demonstrate empathy can establish emotional connections with subordinates, creating an environment where employees are valued as individuals rather than just organizational resources. Employees' psychological states, such as anxiety and worry, can significantly impact their safety behaviors. Leaders must address these emotional factors to foster a nurturing workplace that enhances both psychological well-being and safety compliance. Furthermore, employees who recognize that their workplace prioritizes and reinforces safety measures are more inclined to adopt such behaviors. This emotional connection can enhance employees' positive emotions and their commitment to maintaining safety participation[15] .

This research also delves into the role of workplace collegial support as a moderating factor in this linkage. Social support, defined as interpersonal assistance from colleagues and supervisors, enhances the quality of workplace relationships and mitigates the adverse effects of stress. There is a pressing need to investigate how social support can alleviate psychological distress, particularly in high-stress occupations or industries, to improve employees' safety behaviors. This study focuses on the nursing profession, where safety awareness and performance are often suboptimal, and stress-related issues are prevalent. We propose that high-quality social relationships at work can buffer the impact of stressors and amplify the positive effects of empathetic leadership on belongingness and subsequent safety behaviors.

Grounded in social exchange theory, this research examines the developmental process of safety behaviors in the nursing industry and constructs a chained transmission model of "emotional leadership - organizational identification - safety practice". The study innovatively proposes a dual - effect hypothesis: First, professional sense of belonging, as a key psychological capital, can effectively buffer the cognitive load consumption in the context of safety threats. Second, the organizational support network can enhance the transmission effectiveness of leadership, leading to a multiplier effect of the safety gain from emotional management behaviors.

By deconstructing the transmission path of emotional elements in the safety management system, this study not only expands the extent to which interpersonal exchange mechanisms is applied in occupational safety research but also provides a new paradigm for medical institutions to optimize their safety governance systems. That is, through the parallel approaches of cultivating leaders' emotional intelligence and building a supportive institutional ecosystem, a paradigm shift of safety compliance can be achieved, from passive constraints to active commitment. Ultimately, a safety - culture ecosystem with self - reinforcing characteristics can be formed.

2. HYPOTHESES DEVELOPMENT

2.1 Empathic Leadership and Safety participation Behaviors

According to McAdoo, empathic leadership is a managerial approach that emphasizes recognizing employees' emotional states while actively supporting their well-being and needs[16]. This approach is rooted in relational leadership theory and integrates perspectives from both physicalism and constructivism. From a physicalist perspective, empathy is considered a key factor in achieving positive leadership outcomes [17]. The empathic leadership framework draws on research exploring workplace

emotions and leaders' support for emotional health, as well as motivational language theory. The theoretical foundation of this theoretical framework lies in the conceptual construction of emotional resonance ability, which refers to the trait of leaders achieving emotional resonance by "perceiving and internalizing the emotional experiences of others, just like their own experiences". A key area of current research is whether empathy as an inherent trait or an external behavior has a greater impact on workplace outcomes.

Emotional understanding and support are fundamental human needs in the workplace. Leaders, by demonstrating empathy towards team members, play a crucial role in meeting these needs [18]. This expression of empathy validates employees' feelings and strengthens emotional bonds, fostering positive emotions. These connections enhance employees' overall influence and their perception of the workplace. As the modern workforce increasingly values their humanity over their role as employees, organizations need leaders who can adapt to emotional dynamics and are committed to the well-being of their subordinates.

The development of the theory system of safety behavior has gone through multiple stages of academic evolution: DeJoy pioneered the concept framework of safety practice, defining it as the core element of organizational protection system[19]; Hofmann et al. [20] expanded the operational definition of this concept through empirical research and established its fundamental position in safety management. Borman and Motowidlo [21] made a breakthrough in their performance management model by pointing out that safety behavior is a key antecedent variable for predicting workplace protective effectiveness. Neal and Griffin[22] conducted theoretical deconstruction based on this and proposed a binary classification model for safety behavior - "safety compliance" focuses on employees' compliance with established procedures (such as correct use of protective equipment), while "safety participation" emphasizes spontaneous behavior in actively building a safety culture (including risk warning, peer supervision, etc.). This classification system effectively distinguishes between two types of behavior patterns: institutional constraint based safety practices and autonomous initiative based safety contributions. Neal et al. argued that safety behaviors encompass specific actions taken by employees to achieve organizational safety goals, covering both compliance and participation.

Safety compliance is the behavior that ensures employees follow established safety protocols and procedures, forming the basis for maintaining a safe workplace. Safety participation, on the other hand, is a higher-level behavior that not only requires adherence to rules but also encourages active involvement in safety management, promoting and supporting the formation of a safety culture. Although these behaviors differ in form, they are both essential in alignment with the organization's safety objectives.

The principles of social exchange theory offer key insights into the connection between empathic leadership and safety behaviors. This theoretical framework suggests that personal actions are driven by reciprocal exchanges that produce mutual benefits. In this context, the understanding and support provided by empathic leaders are reciprocated through employees' safety behaviors. As previously mentioned, safety compliance and safety participation serve different organizational goals. While safety compliance ensures adherence to safety protocols, safety participation fosters a supportive safety culture.

We propose that empathic leadership behaviors, such as inspiring safety awareness and monitoring safety practices, can differentially motivate employees to achieve these goals. Empathic leaders build trust, encourage effort, and show genuine concern for the well-being of their followers. Therefore, empathic leadership promotes safety compliance and participation by helping employees recognize the importance of a supportive and safe work environment. Additionally, empathic leaders serve as external resources, guiding employees in identifying and correcting unsafe behaviors. Empathic leadership extends beyond emotional support and significantly promotes safety behaviors through direct influences on employee actions. Empathic leaders inspire and model a culture that values safety, in which employees not only adhere to regulations but also proactively drive safety practices, forming a virtuous cycle of safety. Leaders provide timely feedback and guidance, helping employees identify and correct unsafe behaviors, thereby reducing potential safety risks and enhancing employees' safety awareness. Finally, by affirming and rewarding safe behaviors, leaders reinforce employees' willingness to engage in safety participation practices initiatives, increasing their work engagement and commitment to safety, which further promotes the overall safety level of the workplace.

Based on this reasoning, we propose the following hypotheses:

H1. Empathic leadership has a positive association with adherence to safety compliance.

H2. Empathic leadership positively influences employees' active engagement in safety participation.

2.2 Empathetic Leadership and Safety Behavior: Sense of Belonging as a Mediating Factor

A unique contribution of this study is its exploration of the mechanisms linking empathetic leadership to safety behaviors, particularly through the lens of belongingness. According to the Group Engagement Model, the treatment employees receive from authority figures influences their behavioral efforts, which are determined by their perceived connection to the work group. The model suggests that leaders' actions can either support or undermine employees' status within the team, thereby enhancing or weakening their sense of belonging. A strong sense of belonging reflects an organizational climate that helps employees manage work demands and fosters a healthy work environment. In essence, this sense of belonging signifies management's commitment to employees' psychological well-being, as evidenced by standardized safety procedures and a focus on safety participation.

Research based on the Group Engagement Model and empirical studies supports the view that unmet belongingness needs decrease individuals' willingness to contribute to the group[23]. Conversely, when these needs are met, individuals are inclined to adopt behaviors that support the broader group, including safety-related actions. Blader and Tyler[24] emphasize that meeting belongingness needs encourages individuals to invest more effort in the team's success. These individuals are firmly committed to the well-being of their group and are more likely to act in its best interest. The Group Engagement Model indicates that employees with a stronger psychological connection to the group are more proactive in fulfilling their duties, adhering to safety rules, and seeking opportunities to enhance safety participation.

Previous studies have shown that belongingness to the work group is significantly and positively correlated with safety behaviors. This correlation stems from the psychological safety climate constructed by the sense of belonging, which not only reduces the emotional depletion caused by safety anxiety but also enhances the effectiveness of safety practices by freeing up cognitive resources. In high - stress occupations such as nursing, the sense of belonging can buffer 42% of psychological stress responses.

Empathetic leadership, by meeting employees' belonging needs, not only improves their mental health but also catalyzes a behavior - reinforcement cycle of "emotional support - safety commitment", thus forming a sustainable safety - culture ecosystem.

Therefore, we propose the following hypotheses:

H3. Empathetic leadership is positively associated with belongingness.

H4. Sense of belonging mediates the positive association between empathetic leadership and safety compliance.

H5. Sense of belonging acts as a mediator in the relationship between empathetic leadership and safety participation.

2.3 The Role of Social Support in Empathetic Leadership

In organizational settings, social support is a key factor that significantly impacts employees and their broader work environment. It not only enhances the quality of interpersonal relationships and fosters positive emotional responses but also improves individual performance and mitigates the negative effects of stress. Broadly defined, social support in the workplace includes assistance and encouragement provided by colleagues and supervisors, serving as an important resource for employees.

We propose that social support at work influences the strength of the association between empathetic leadership and sense of belonging. Social support in the workplace not only reflects the characteristics of the social environment but also represents the available resources and quality of interpersonal interactions in employees' social networks. Social support plays a crucial role in helping employees adapt to changing work environments and improve working conditions. It not only enhances employees' adaptability but also strengthens team cohesion and organizational loyalty.

Although there is some debate in the literature about the role of social support in stress management, the prevailing view is that high-quality interpersonal relationships at work can effectively reduce the negative impact of stress. High-quality relationships help employees better cope with workplace challenges, improve their psychological resilience, and enhance their overall well-being. Additionally, social support is often seen as a stabilizing factor in the work environment, playing A vital factor in long-term well-being of employees and the sustainable development of the organization.

Over the past two decades, research has systematically revealed the multiple protective mechanisms of social support in the workplace. From the perspective of stress management, social support not only directly reduces physiological stress responses through resource provision but has also been shown to protect employees from various negative outcomes, including cardiovascular symptoms, work burnout, and negative emotions. Notably, the role of social support extends beyond passive protection; it can also activate employees' proactive safety motivation. Within the framework of empathetic leadership, social

support has taken on new practical implications. Leaders who build support systems through emotional resonance and motivational language can transform abstract safety norms into concrete networks of meaning. This transformation occurs on two levels: first, safety procedures are redefined as tangible expressions of collective care, allowing employees to experience a sense of organizational belonging through compliant behavior; second, safety participation is emotionally rewarded through social exchange mechanisms, creating a virtuous cycle of "support-contribution." When leaders demonstrate sensitivity to employees' emotional needs, employees' safety participation significantly increases, leading to more proactive risk communication and peer supervision.

In the context of empathetic leadership, social support can make employees view safety procedures and regulations more positively and meaningfully. Employees can see these procedures as tools to enhance job performance and achieve personal safety goals. Therefore, empathetic leadership encourages employees to participate in safety initiatives, contributing to a secure and supportive workplace atmosphere. When employees perceive high levels of social support, the effect of empathy-driven leadership on their sense of belonging and subsequent safety behaviors is enhanced. Therefore, social support not only mitigates stress but also strengthens relational dynamics and promotes a safe and supportive workplace.

Based on the above reasoning, the following hypotheses are proposed in this study:

H6. Social support at work enhances the positive association between empathetic leadership and belongingness.

H7. The indirect impact of empathetic leadership on safety compliance, mediated by employee belongingness, is influenced by social support at work.

H8: The extent to which empathetic leadership influences safety participation through employee belongingness depends on social support at work.

3. RESEARCH METHODOLOGY AND DATA ANALYSIS

3.1 Participant Recruitment and Data Collection

A total of 372 nurses from multiple hospitals in XuZhou were recruited for a two-week research project carried out in 2024. Eligibility criteria required participants to be full-time employees who regularly interacted with their supervisors during work hours.

Participants were assured that the study was solely for academic purposes, with participation being voluntary and anonymous. All data were aggregated to ensure confidentiality. Originally designed in English with established measurement scales, the survey instruments were translated into Chinese through a back-translation procedure. The questionnaire covered key constructs, including Empathetic Leadership, Sense of Belonging, Social Support at Work, Safety Compliance, Safety Participation, and several control variables.

Out of the 372 participants, 135 provided usable responses, yielding a response rate of 36%. Data collection involved an initial survey followed by daily surveys over the two-week period.

3.2 Participant Demographics

The sample comprised 3.7% male and 96.3% female participants. Approximately 21.5% were unmarried, while 78.5% were married. In terms of family status, 25.2% had no children, and 74.8% had at least one child. The age distribution was as follows: 0.7% under 20 years old, 33.3% aged 21–30, 45.2% aged 31–40, 15.6% aged 41–50, and 5.2% over 51 years old.

Regarding educational background, 1.5% had attended technical secondary school, 16.3% had completed junior college, 81.5% held undergraduate degrees, and 0.7% had graduate-level education. The tenure distribution revealed that 4.4% of participants had less than one year of experience, while 11.1% had been employed for 1–3 years. Additionally, 10.4% had 3–5 years of experience, 9.6% had worked for 5–7 years, 34.8% had a tenure of 7–15 years, and 29.6% had been in their roles for more than 15 years. Professional titles included 25.2% registered nurses, 19.3% senior nurses, 40.7% nurse practitioners, 10.4% associate professors of nursing, and 4.4% professors of nursing.

3.3 Measurement Techniques

In this study, all latent variables were measured using a five - point Likert scale (1 = completely disagree, 5 = completely agree). Among them, empathy leadership was assessed through a five-item scale designed by scholars such as Kock (2019), which includes representative statements like "My immediate supervisor can fully recognize my work achievements" and "The supervisor will promptly give positive feedback on my work efforts". This scale shows excellent internal consistency ($\alpha = 0.987$).

Sense of belonging: A three - item scale was used. Typical items include " I feel deeply connected to my work team." and a reverse - scored item "I often feel alienated from the group at work". Its reliability index reaches an ideal level (α = 0.910). In the dimension of safety behavior, safety compliance was gauged using a framework developed by Neal and his collaborators, which includes items such as "I always wear full - set protective equipment as required" (α = 0.894). Safety participation also used a measurement tool from the same source, with representative items like "I will actively propose suggestions for improving work safety" (α = 0.838).

Social support at work: A four - item scale from previous studies was used. The measurement of social support at work integrates the scales of O'Driscoll and Brough's team covering four dimensions: informational support (e.g., getting effective advice), emotional support (e.g., empathetic care), feedback support (e.g., constructive suggestions), and instrumental support (e.g., practical assistance). The overall reliability is 0.927.

Statistical variables: Gender (coded as 0 for female and 1 for male), marital status (0 for unmarried, 1 for married), and child status (1 = without children, 2 = with children) were used as categorical variables; age groups, educational attainment levels, years of service intervals, and position grade sequences were measured as ordinal variables.

4. RESULTS

4.1 Data Analysis

Using Mplus 8.3, a multilevel path analysis was carried out to conduct confirmatory factor analysis. The proposed five-factor model comprised empathetic leadership, sense of belonging, safety compliance, safety participation, and social support at work. Table 2 presents the mean, standard deviation, reliability coefficients, and correlations among study and control variables.

Model 1 demonstrated excellent fit indices: $\chi^2(125) = 536.399$, $\chi^2/df = 4.291$, RMSEA=0.05, CFI = .982, TLI = .978, SRMR = .018. Model 2 (Four-Factor): Integrating safety compliance and participation ($\chi^2(129) = 1880.741$, $\chi^2/df = 14.579$, RMSEA = .106, CFI = .922, TLI = .908, SRMR = .091). Model 3 (Three-Factor): Combined empathetic leadership and sense of belonging ($\chi^2(132) = 4227.581$, $\chi^2/df = 32.027$, RMSEA = .160, CFI = .819, TLI = .790, SRMR = .142). Model 4 (Two-Factor): Combined social support at work, safety compliance, and safety participation ($\chi^2(134) = 7988.705$, $\chi^2/df = 59.617$, RMSEA = .220, CFI = .652, TLI = .603, SRMR = .202). Model 5 (One-Factor): Combined all items into a single factor ($\chi^2(135) = 10212.690$, $\chi^2/df = 75.640$, RMSEA = .249, CFI = .554, TLI = .494, SRMR = .215).

4.2 Verification of Leadership Safety Hypothesis

We conducted a simultaneous test of these hypotheses using Mplus 8.3. The results, summarized in Table 3, indicate that empathetic leadership is positively associated with safety compliance (β = .088, SE = .023, p < .01) and safety participation (β = .120, SE = .028, p < .01), confirming hypotheses 1 and 2. Additionally, empathetic leadership was a significant predictor of a sense of belonging (β = .253, SE = .044, p < .01), supporting hypothesis 3. The mediating role of sense of belonging was validated, as it significantly explained the effect of empathetic leadership on both safety compliance (β = .044, SE = .012, p < .01) and safety participation (β = .064, SE = .018, p < .01), supporting hypotheses 4 and 5. Furthermore, social support at work moderated the link between empathetic leadership and sense of belonging (β = .176, SE = .038, p < .01), aligning with hypothesis 6. It also moderated the indirect effects of empathetic leadership on safety compliance (β = .096, SE = .026, p < .01) and safety participation (β = .113, SE = .028, p < .01) through sense of belonging, supporting hypotheses 7 and 8.

Table 1. Descriptive statistics (Study 1).

Variable	Individual		Team		1	2	3	4	5	6	7	8	9	10	11	12
	M	SD	M	SD												
1. ID	67.55	38.084	67.55	38.084	—	—	—	—	—	—	-.27**	.21**	-.21**	.03	—	—
2. xb	—	—	—	—	.071	—	—	—	—	—	—	—	—	—	—	—
3. hy	—	—	—	—	-.028	-.079	—	—	—	—	—	—	—	—	—	—

4. sy	—	—	—	—	.018	-.150	.883	—	—	—	—	—	—	—	—	—
5. nl	—	—	—	—	.092	-.078	.538**	.613	—	—	—	—	—	—	—	—
6. xl	—	—	—	—	-.001	-.014	.270	-.358	.164	—	—	—	—	—	—	—
7. zc	—	—	—	—	.023	-.104	.510	.548	.735	.524	—	—	—	—	—	—
8. gznx	—	—	—	—	.032	-.249	.679	.764	.718	.453	.788	—	—	—	—	—
9. EL	3.695	.9059	3.695	.693	.028	.154	.058	-.005	.087	.045	.014	.024	—	—	—	—
10. BE	2.852	.536	2.852	.3538	.103	.080	-.041	-.066	-.007	.060	.003	.000	.352	—	—	—
11.SC	3.075	.627	3.075	.487	-.023	.014	-.104	-.100	-.076	-.016	-.063	-.080	.148	.256	—	—
12.SP	2.976	.552	2.976	.368	.070	.060	-.062	-.072	-.036	.069	-.038	-.065	.249	.401	.340	—
13.SS	3.6468	.861	3.6468	.861	.113	.150	-.083	-.113	-.021	.048	-.039	-.051	.147	.230	.007	.097

Notes: This study adopts a multi-layer data analysis framework, with a sample structure consisting of 135 team level units and 135 individual level observation objects. In the correlation coefficient matrix between variables, the correlation parameters at the team level are distributed above the diagonal, while the correlation coefficients at the individual level are located below the diagonal. The internal consistency coefficients (Cronbach's alpha) of each scale are indicated in bold on the diagonal positions. The statistical significance annotation follows the general standard of * $p<0.05$ and * * $p<0.01$.

Table 2. Findings from the confirmatory factor analysis

	χ^2	*df*	χ^2/df	*CFI*	*TLI*	*RMSEA*	*SRMR*
Model 1: 5-factor	***536.399***	***125***	***4.291***	***0.982***	***0.978***	***0.052***	***0.018***
Model 2: 4-factor	***1880.741***	***129***	***14.579***	***0.922***	***0.908***	***0.106***	***0.091***
Model 3: 3- factor	***4227.581***	***132***	***32.027***	***0.819***	***0.790***	***0.160***	***0.142***
Model 4: 2-factor	***7988.705***	***134***	***59.617***	***0.652***	***0.603***	***0.220***	***0.202***
Model 5: 1-factor	***10212.690***	***135***	***75.640***	***0.554***	***0.494***	***0.249***	***0.215***

Note: (1) In the four-factor competing model, safety compliance and safety participation are merged into a single latent construct, while retaining empathy leadership, sense of belonging, and social support as independent dimensions.

(2) The three - factor alternative model further integrates empathy leadership and sense of belonging into the same construct dimension, while keeping safety behavior (including compliance and participation) and social support independent.

(3) The two - factor simplified model unifies workplace Workplace support, adherence to safety protocols, and engagement in safety initiatives into a comprehensive safety practice factor, and only retains empathy leadership and sense of belonging as independent dimensions. This nested model setting aims to systematically test the discriminant validity of the measurement model by gradually merging theoretically related constructs.

Table 3. Empirical results of hypothesis testing (Study 1)

	BE				SC				SP			
	Estimate	S.E.	P	95% CI	Estimate	S.E.	P	95% CI	Estimate	S.E.	P	95% CI
1. EL	0.25**	0.04	0.00	[0.17, 0.34]	0.09**	0.02	0.00	[0.04, 0.13]	0.12**	0.03	0.00	[0.06,0.18]
2. BE					0.17**	0.03	0.00	[0.10,0.23]	0.25**	0.04	0.00	[0.17,0.33]
3. GR												
4. XB					-0.04	0.11	0.68	[-0.25,0.16]	-0.02	0.10	0.83	[-0.22,0.18]
5. HY					-0.11*	0.12	0.35	[-0.34,0.12]	0.01	0.08	0.96	[-0.15,0.16]
6. SY												
7. NL					-0.02	0.10	0.81	[-0.21,0.17]	0.06*	0.07	0.39	[-0.07,0.19]
8. XL					0.01	0.12	0.93	[-0.21,0.23]	0.15*	0.11	0.15	[-0.06,0.35]
9. ZC					0.00	0.08	0.93	[-0.14,0.15]	-0.03	0.053	0.58	[-0.13,0.08]
10. GZNX					-0.01	0.05	0.81	[-0.10,0.08]	-0.05*	0.049	0.27	[-0.15,0.04]
11. BE					0.55**	0.13	0.00	[0.34,0.74]	0.64**	0.083	0.00	[0.48,0.81]
12. SS	0.13	0.033	0.00	[0.06,0.19]	-0.07**	0.03	0.02	[-0.12,-0.01]	-0.03*	0.019	0.11	[-0.1,0.01]
13. EL* SS	0.176	0.038	0.000	[0.102,0.249]								

Notes. Team level, n = 135; individual level, n = 1206. *p < .05, **p < .01.

5. DISCUSSION

5.1 Empathy leadership and safe behavior: the role of belonging and support

This study examines the intrinsic link between empathetic leadership and safety behaviors, with a particular emphasis on the mediating role of belongingness and the moderating influence of social support at work. The findings reveal several critical insights:

Firstly, the research establishes a significant positive association between empathetic leadership, safety compliance, and safety participation. When leaders exhibit genuine concern for employees' emotional well-being, they foster a workplace environment characterized by respect and psychological security. In such settings, employees are more inclined to adhere to safety protocols and engage proactively in safety initiatives.

Second, belongingness plays a crucial bridging role between empathetic leadership and safety behaviors. When employees truly develop a strong attachment to their team, they will be more proactive in taking actions to maintain safety participation. Empathetic leaders can significantly enhance belongingness by establishing deep emotional bonds with them and sincerely caring about their physical and mental well - being. Moreover, a sense of belonging can effectively relieve employees' psychological stress, enabling them to allocate more energy and attention to cultivating and maintaining safe behaviors.

Third, social support at work moderates the link between empathetic leadership and belongingness. Sufficient social backing enhances the positive influence of empathetic leadership on fostering belongingness. This result fully highlights the importance of creating a supportive work environment. Such an environment helps to strengthen interpersonal relationships, enhance belongingness, and in turn, promote the implementation of safety behaviors.

5.2 Empathy Leadership: Research and Prospects for Safety participation

Recent research and industry analyses have increasingly underscored the importance of empathetic leadership and its influence on workplace dynamics. This study contributes to this expanding body of literature in two significant ways. First, it builds upon the group engagement model (Tyler & Blader, 2000), which suggests that leaders' interpersonal interactions shape employees' behavioral commitment through their perceived affiliation with the workgroup. By incorporating empathetic leadership, belongingness, and safety behaviors within this model, the study offers a more holistic perspective on these interconnections. Second, it refines social exchange theory by emphasizing the reciprocal nature of the link between empathetic leadership and employee behaviors, reinforcing positive exchange mechanisms that strengthen safety participation.

5.3 Theoretical Implications

This study has achieved dual theoretical breakthroughs in the field of organizational behavior:

First, it enhances the theoretical foundation of the Team Engagement Model introduced by Tyler and Blader [25]. By integrating the emotion - oriented leadership style, organizational identification mechanism, and protective work behaviors into a unified analytical framework, it reveals the specific path through which leaders' interpersonal interaction styles drive employees' behavioral engagement via employees' sense of organizational identification. A multi - dimensional explanatory model of "leadership style - psychological cognition - safety practice" is constructed.

Second, it advances the boundary understanding of the social exchange theory. Through empirical verification of the two - way interaction mechanism between emotion - based leadership and employees' safety behaviors, it systematically explains how organizational trust based on emotional connection strengthens the sustainability of safety commitment, thus constructing an organizational safety ecosystem with self - reinforcing characteristics. This represents a shift away from the conventional one-directional social exchange framework, offering a novel theoretical perspective on fostering safety culture in contemporary organizations.

5.4 Management Insights and Strategic Paths

The empirical findings of this study provide dual strategic guidelines for the optimization of organizational safety management systems:

First, organizations need to incorporate the emotion - based leadership model into the core strategy of safety culture construction. By systematically cultivating managers' emotional cognitive abilities (such as emotion decoding and demand response), the driving mechanism of safety behaviors can be reconstructed. Based on leaders' accurate identification of employees' emotional needs and empathetic feedback, the internalization efficiency of safety compliance can be significantly improved, transforming compliance behaviors from passive obedience to value - based identification and participation behaviors from task execution to shared responsibility.

Second, the study reveals the synergistic effect of the organizational support network. When institutional guarantees (such as anonymous risk reporting mechanisms) and relational support (such as cross - level safety dialogue platforms) are coordinated, the safety - promoting effect of empathetic leadership will be exponentially amplified. This requires organizations to prioritize the construction of a "emotion - institution" dual - support system in resource allocation. For example, digital emotion recognition technology can be used to assist leaders in implementing precise interventions, and a safety contribution scoring system can be established to enhance the visibility of social exchanges.

5.5 Research Boundaries and Expansion Directions

Although this study deepens the understanding of the driving mechanism of safety behaviors, its contextual constraints need to be carefully considered. The sample selection focuses on nursing groups in Chinese medical institutions, and the characteristics of high - power - distance culture and occupational risks may affect the cross - contextual transferability of the conclusions. It is recommended that subsequent research breakthrough in three dimensions:

First, conduct cross - cultural comparative studies (such as comparing individualistic and collectivistic cultures) to analyze the regulatory laws of institutional environments on the effectiveness of emotion - based leadership.

Second, expand the research objects to industries with dynamic risks (for instance, air traffic regulation and the chemical manufacturing) to explore the threshold of the role of emotional support under different risk levels.

Third, introduce neuro - management tools (such as eye - tracking and skin conductance monitoring) to capture the emotion - cognition interaction mechanism in safety decision - making in real - time. These explorations will help construct a more ecologically valid theoretical framework for safety behaviors and provide a scientific basis for organizations to design context - intelligent safety management solutions.

6. CONCLUSIONS

In conclusion, this research demonstrates that empathetic leadership plays a pivotal role in fostering safety behaviors among employees, where belongingness serves as an intermediary variable and social support regulates the relationship. The findings highlight the significant impact of empathetic leadership on safety practices, particularly when these behaviors are supported by a socially nurturing environment. By cultivating a workplace culture characterized by empathy and support, organizations can enhance safety compliance and participation, ultimately fostering a workplace that is both safer and more efficient.

Organizations should invest in leadership training programs that emphasize empathy and supportive behaviors. Such initiatives not only contribute to employee well-being but also improve safety performance. Furthermore, fostering a socially supportive workplace can enhance the impact of empathetic leadership, establishing a reinforcing cycle that continuously improves both safety participation and employee well-being. As safety participation becomes increasingly critical, this study offers meaningful insights for organizations aiming to better comprehend and utilize empathetic leadership in shaping employees' safety-related behaviors.

DECLARATION OF CONFLICTING INTERESTS

The author(s) affirm that no conflicts of interest exist concerning the research, authorship, or publication of this article.

DATA SHARING AGREEMENT

The datasets utilized and/or examined in this study can be obtained from the corresponding author upon reasonable request.

ACKNOWLEDGEMENT

This research was funded by the National Social Science Foundation of China (Grant No. 24FGLB139).

REFERENCES

[1] Choo A, Xia Y, Zhang G P, et al. (2024). “Leader behavioral integrity for safety and its impact on worker preventive maintenance behavior and operational performance.” Safety Science, 177: 106577.
[2] Matta, F. K., Frank, E. L., Farh, C. I., & Lee, S. M. (2024). “Do intelligent leaders differentiate exchange relationships intelligently? A functional leadership approach to leader-member exchange differentiation.” Journal of Applied Psychology, 109(4), 490.
[3] Chandranathan, P. (2024). Entrepreneurial leadership and transformational leadership: a historical-comparative conceptual analysis. Journal of management history.
[4] Chen, Y., Qiang, W., & Li, F. (2024). Leader trait affective presence and safety behaviors: The role of work engagement. Safety science, 169, 106339.
[5] Walumbwa, F. O., et al. (2010). "Servant Leadership, Procedural Justice Climate, Service Climate, Employee Attitudes, and Organizational Citizenship Behavior: A Cross-Level Investigation." Journal of Applied Psychology 95(3): 517-529.
[6] Liu, C., Ahmad, N., Jiang, M., & Arshad, M. Z. (2024). Steering the path to safer food: The role of transformational leadership in food services to combat against foodborne illness. Journal of Retailing and Consumer Services, 81, 103958.
[7] Sankar, S. S., & Anandh, K. S. (2024). Navigating leadership styles through qualitative exploration for enhanced safety in the construction sector. Safety science, 175, 106495.
[8] Ali, B. (2024). What we know about transformational leadership in tourism and hospitality: a systematic review and future agenda. The Service Industries Journal, 44(1-2), 105-147.
[9] Omidi, L., Karimi, H., Pilbeam, C., Mousavi, S., & Moradi, G. (2025). Safety leadership and safety citizenship behavior: the mediating roles of safety knowledge, safety motivation, and psychological contract of safety. Theoretical Issues in Ergonomics Science, 26(1), 66-83.
[10] Dan, W., et al. (2017). "A study on intergenerational impact of destructive leadership on miners ' safety performance." China Safety Science Journal 27(02): 24-29.
[11] Kock, N., et al. (2019). "Empathetic Leadership: How Leader Emotional Support and Understanding Influences Follower Performance." Journal of Leadership & Organizational Studies 26(2): 217-236.

[12] Chang, R. (2024). The Impact of Employees' Health and Well-being on Job Performance. Journal of Education, Humanities and Social Sciences, 29, 372-378.
[13] Neal, A., et al. (2000). "The impact of organizational climate on safety climate and individual behavior." Safety Science 34(1-3): 99-109.
[14] Anderson, M. H., & Sun, P. Y. (2024). Re-Envisioning a Hierarchy of Leadership Behaviours Using Insights from the Psychological Literature on Personality Traits. Journal of Management Studies, 61(4), 1165-1191.
[15] Wang, Z., Jiang, Z., & Blackman, A. (2024). Why and when do emotionally intelligent employees perform safely? The roles of thriving at work and career adaptability. Applied Psychology, 73(2), 723-747.
[16] McAdoo, J. (2024). The Impact of Vulnerable Leadership on Employee Empowerment. Open Journal of Business and Management, 13(1), 1-23.
[17] Mayfield, M. and J. Mayfield (2017). ""What's past is prologue": A look at past leadership communication research with a view toward the future." International Journal of Business Communication 54(2): 107-114.
[18] Cornelis, I., et al. (2013). "When leaders choose to be fair: Follower belongingness needs and leader empathy influences leaders' adherence to procedural fairness rules." Journal of Experimental Social Psychology 49(4): 605-613.
[19] DeJoy, D. M. (1944). "Managing Safety in the Workplace: an Attribution Theory Analysis and Model." Journal of Safety Research 25(1): 3-17.
[20] Hofmann, D. A., et al. (1995). "High Reliability Process Indutries: Individual Micro, and Macro-organizational Influences on Safety Performance." Joumal of Safety Research 26(3): 131-149.
[21] Borman, W. C. and S. J. Motowidlo (1998). "Expanding the Criterion Domain to Include Elements of Contextual Performance." Personnel selection in organizations 71(1993): 98.
[22] Neal, A. and M. A. Griffin (2006). "A study of the lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels." The Journal of applied psychology 91(4): 946-953.
[23] Shaarani, A. S., & Bakar, N. (2021). A new flipped learning engagement model to teach programming course. International Journal of Advanced Computer Science and Applications, 12(9):231-238.
[24] Blader, S. L. and T. R. Tyler (2009). "Testing and Extending the Group Engagement Model: Linkages Between Social Identity, Procedural Justice, Economic Outcomes, and Extrarole Behavior." Journal of Applied Psychology 94(2): 445-464.
[25] Tyler, T. R. and S. L. Blader (2000). Cooperation in groups: Procedural justice, social identity, and behavioral engagement. Philadelphia, Psychology Press.