

ORIGINAL ARTICLE

Evaluating the Impact of Safety Communication Strategies on Safety Attitudes with the Mediating Role of Job Burnout: A Study in the Tile and Ceramic Industry in Mashhad City

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ABSTRACT

Background: Safety attitudes, reflecting individuals' beliefs about workplace safety, are crucial for enhancing safety behaviors and organizational safety culture. Effective safety communication promotes positive attitudes and reduces incidents, but job burnout may moderate this relationship. This study explores safety communication strategies, safety attitudes, and the mediating role of job burnout in the tile and ceramic industry in Mashhad, Iran.

Methods: A correlational design was used, collecting data from 385 employees via convenience sampling. Standardized questionnaires Zhang's Safety Communication Questionnaire, Shirali's Safety Attitude Questionnaire, and the Maslach Burnout Inventory assessed safety communication, attitudes, and burnout. Pearson's correlation and linear regression were used to analyze variable relationships.

Results: Safety compliance ($r = 0.684$, $p < 0.001$), participation ($r = 0.721$, $p < 0.001$), and adaptability ($r = 0.698$, $p < 0.001$) strongly correlated with safety attitudes. Safety communication positively correlated with personal responsibility ($r = 0.743$, $p < 0.001$), adaptability ($r = 0.712$, $p < 0.001$), and risk management ($r = 0.735$, $p < 0.001$), and negatively with job burnout ($r = -0.628$, $p < 0.001$).

Conclusion: Effective safety communication enhances safety attitudes and reduces burnout, supporting social learning theory, the theory of planned behavior, and the Job Demands-Resources model. Targeted communication interventions can strengthen safety culture and employee well-being.

KEYWORDS: Safety Communication Strategies; Safety Attitude; Job Burnout

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INTRODUCTION

Safety attitudes, defined as individuals' beliefs, thoughts, and feelings regarding workplace safety, are pivotal in shaping safety behaviors and the overall safety culture within organizations. Research indicates a strong correlation between positive safety attitudes and increased adherence to safety protocols, enhanced communication, and a reduction in occupational accidents. Conversely, negative safety attitudes can lead to non-compliance with safety regulations and an elevated risk of incidents [1, 2]. Several factors influence the development of safety attitudes, including organizational culture, leadership style, job design, and social norms. For instance, a robust safety culture, characterized by management commitment, open communication, and active employee participation, fosters positive safety attitudes [3]. Furthermore, job designs that incorporate autonomy and variety can enhance employee motivation to comply with safety procedures [4].

Effective safety communication is a cornerstone of successful safety programs, contributing to a safe work environment by disseminating information on hazards, policies, and best practices. Studies have demonstrated that effective safety communication can lead to decreased accident rates, improved productivity, and heightened employee morale [5, 6]. The efficacy of safety messages is amplified through the use of diverse communication channels, the promotion of frequent and two-way communication, and the incorporation of clear, audience-relevant content [7, 8].

However, the influence of these communication strategies on safety attitudes can be moderated by psychological factors such as job burnout. Job burnout, characterized by emotional exhaustion, depersonalization, and a diminished sense of personal accomplishment, can exert a detrimental effect on safety attitudes and behaviors [9, 10]. Research suggests that clear and participatory safety communication can mitigate the adverse effects of job burnout by reducing ambiguity and providing support to employees [11, 12]. Moreover, the establishment of social support networks and the encouragement of safe behaviors through positive reinforcement can improve safety attitudes and alleviate job burnout [13].

Nevertheless, a more precise understanding of the mediating role of job burnout in the relationship between safety communication strategies and safety attitudes is needed. This is particularly salient in high-stress work environments, where employees

often face significant psychological pressures and heavy workloads. Examining this relationship can enable organizations to develop targeted interventions aimed at improving not only safety outcomes but also employee psychological well-being [10, 14].

Given the critical role of safety attitudes in accident prevention and the promotion of a positive safety culture, this research aims to investigate the impact of safety communication strategies on safety attitudes, with a specific focus on the mediating role of job burnout. The objective of this study is to provide scientific evidence that can inform the design of more effective communication interventions within organizations and mitigate the negative consequences of job burnout on safety outcomes.

MATERIALS AND METHODS

This research employs a correlational study design to examine the relationship between safety communication strategies, safety attitudes, and the mediating role of job burnout among employees within the tile and ceramic industry in Mashhad, Iran. Data were collected through the distribution of questionnaires designed to assess the levels of safety attitudes, safety communication strategies, and job burnout. The data were analyzed using statistical techniques, including correlation analysis and linear regression, to determine the strength and direction of the relationships between the variables [15, 16].

The target population for this research comprised all employees of tile and ceramic factories in Mashhad, estimated to be 1280 individuals. This population included employees across all organizational levels, from production line workers to senior management. To determine an appropriate sample size, both Morgan's table and Cochran's formula were consulted. Based on Morgan's table, a sample size of 295 was initially suggested for a population of 1280. However, to enhance the precision of the results and account for potential incomplete or non-responses, a final sample size of 385 was selected. This decision was further supported by calculations using Cochran's formula, which yielded a similar result of 296 individuals. Cochran's formula is presented below:

$$n = \frac{N * Z^2 * p * q}{(d^2 * (N - 1) + Z^2 * p * q)}$$

Where:

n = sample size

N = population size (1280)

Z = standard normal value of the variable, which is 1.96 at the 95% confidence level

p = proportion of the trait present in the population (if not available, 0.5 can be assumed)

q = percentage of individuals in the population who lack that trait ($q = 1 - p$)

d = margin of error (usually 0.05)

The sampling method employed in this study was convenience sampling (a non-probability method). To mitigate the potential bias associated with the use of convenience sampling, several complementary measures were undertaken. First, questionnaires were distributed across all organizational units, including Production, Administrative, Technical & Engineering, and Quality Control departments, and among different work shifts, to ensure broad representativeness. Second, although the minimum required sample size was calculated using Cochran's formula, the sample was expanded to 385 participants in order to reduce sampling error and the sensitivity of results to selection bias. Third, data collection was conducted at different times and locations within the workplace to avoid the overrepresentation of any particular subgroup. Fourth, participants were assured of the voluntary and anonymous nature of their responses, which helped reduce response bias. Finally, the demographic composition of respondents, including variables such as age, gender, job tenure, and department, was monitored throughout the data collection process, and additional efforts were made to recruit participants from underrepresented groups when necessary.

This method was selected due to constraints related to time and budget, the ease of access to employees within the factory setting, and the potential challenges associated with non-cooperation in random sampling approaches [17].

In this study, three standardized questionnaires were utilized for data collection:

- Zhang's Safety Communication Questionnaire (2022): This instrument comprises 10 items distributed across three dimensions: safety compliance, safety participation, and safety adaptation. Responses are collected using a Likert scale. The validity of this questionnaire was established in the study by Jahaniyan and Nabagh (2023) [18], and its reliability was confirmed using Cronbach's alpha.

- Shirali's Safety Attitude Questionnaire (2017): The Safety Attitude Questionnaire (SAQ) was employed to measure safety-related perceptions. The instrument consists of five sub-dimensions: teamwork climate, safety climate, job satisfaction, collaboration, and

personal responsibility. Each sub-dimension was measured using Likert-scale items, and higher scores indicate more positive safety attitudes. In the original submission, only *personal responsibility* was explicitly mentioned, which may have created confusion. In this revised version, all sub-dimensions are clearly listed to provide full transparency and consistency with the results section [19].

- Maslach Burnout Inventory (2000): This inventory comprises 22 items distributed across three components: emotional exhaustion, depersonalization, and lack of personal accomplishment. The validity of this instrument was confirmed in the study by Ghafrani et al. (2016), and its reliability was reported with a Cronbach's alpha of 0.92.

Subsequently, the questionnaires were distributed to employees of tile and ceramic factories located in Mashhad. Prior to this distribution, the research team coordinated with factory management and obtained the necessary permissions. Participants were assured that their responses would be treated as confidential and used solely for research purposes. Following the collection of the completed questionnaires, the data were prepared for analysis. Both descriptive and inferential statistical methods were employed. Descriptive statistics included the calculation of means (to determine data centrality), standard deviations (to assess data dispersion), and the generation of scatter plots (to illustrate relationships between variables). Inferential statistics included the Shapiro-Wilk test (to evaluate the normality of the data distribution, a prerequisite for the use of parametric tests) [15]. Pearson's correlation coefficient was used to quantify the strength and direction of linear relationships between quantitative variables (i.e., safety communication, safety attitude, and job burnout). Linear regression analysis was used to model the relationship between the dependent variable (safety attitude) and the independent variables (safety communication and job burnout), and to examine the mediating role of job burnout [16].

In this study, participation was voluntary, and informed consent was obtained from all participants prior to their completion of the questionnaires. All participant-identifying information was held in strict confidence, and the data were used exclusively for research purposes.

RESULTS

Demographic Characteristics Table 1 summarizes the demographic characteristics of 385 employees in the

Table 1. Demographic Variables

Variable	Category	Frequency	Percentage
Age Group	20- 30 years	95	24.7 %
	31- 40 years	157	40.8 %
	41- 50 years	98	25.5 %
	51- 60 years	35	9.1 %
Gender	Male	289	75.1 %
	Female	96	24.9 %
Years of Service	1- 5 years	87	22.6%
	6- 10 years	129	33.5%
	11- 15 years	93	24.2 %
	16 -20 years	52	13.5 %
	>20 years	24	6.2 %
Education Level	High school or below	112	29.1 %
	Associate degree	98	25.5%
	Bachelor's degree	135	35.1 %
	Master's degree or higher	40	10.4 %
	Production	203	52.7 %
Work Department	Administrative	82	21.3 %
	Technical & Engineering	67	17.4 %
	Quality Control	33	8.6 %

Table 2. Kolmogorov-Smirnov Test Results for Data Distribution

Variable	K-S Statistic	Degrees of Freedom	p-value
Safety Compliance	0.984	385	0.127
Safety Participation	0.991	385	0.236
Safety Adaptability	0.998	385	0.189
Overall Safety Attitude	0.993	385	0.312
Safety Communication & Cooperation	0.987	385	0.176
Adaptability	0.989	385	0.205
Risk Management	0.992	385	0.287
Collaboration	0.986	385	0.163
personal responsibility			
Overall Safety Communication	0.994	385	0.342
Job Burnout	0.990	385	0.218

tile and ceramic industry in Mashhad, Iran, including age, gender, years of service, education level, and work department.

Table 2 presents the results of the Kolmogorov-Smirnov test, indicating that all variables safety compliance, safety participation, safety adaptability, overall safety attitude, safety communication and personal responsibility, adaptability, risk management, personal responsibility, overall safety communication, and job burnout have p-values greater than 0.05. This confirms that the data are normally distributed, justifying the use of parametric tests such as Pearson's

correlation and linear regression [15].

Pearson correlation tests were conducted to evaluate the research hypotheses (H1–H8). The results are summarized below.

Table 3 presents the correlation coefficients (r) and significance levels (p) between the components of the questionnaires. The results indicated that safety compliance ($r = 0.684$, $p < 0.001$), safety participation ($r = 0.721$, $p < 0.001$), and safety adaptability ($r = 0.698$, $p < 0.001$) were significantly and positively correlated with safety attitude, suggesting that higher compliance, participation, and adaptability are associated with

Table 3. Pearson Correlation Results for Hypothesis 1-8

Hypothesis	Variable 1	Variable 2	Correlation Coefficient (r)	p-value
1	Safety Compliance	Safety Attitude	0.684	<0.001
2	Safety Participation	Safety Attitude	0.721	<0.001
3	Safety Adaptability	Safety Attitude	0.698	<0.001
4	Safety Communication	Communication & Cooperation	0.756	<0.001
5	Safety Communication	Adaptability	0.712	<0.001
6	Safety Communication	Risk Management	0.735	<0.001
7	Safety Communication	Personal responsibility	0.743	<0.001
8	Safety Communication	Job Burnout	-0.628	<0.001

more positive safety attitudes. Furthermore, safety communication showed strong positive correlations with cooperation & personal responsibility ($r = 0.756$, $p < 0.001$), adaptability ($r = 0.712$, $p < 0.001$), and risk management ($r = 0.735$, $p < 0.001$). In addition, safety communication was strongly correlated with personal responsibility ($r = 0.743$, $p < 0.001$). Finally, a moderately strong negative correlation was observed between safety communication and job burnout ($r = -0.628$, $p < 0.001$), indicating that improved safety communication is associated with reduced job burnout. It should be noted that all reported relationships were statistically significant ($p < 0.001$), and no non-significant relationships were observed in this study.

DISCUSSION

This study confirms that fostering positive safety attitudes and effective safety communication significantly enhances safety performance and reduces job burnout in the tile and ceramic industry. The findings indicated that all relationships among the components of the questionnaires were statistically significant, suggesting a high degree of internal consistency. This result highlights the comprehensive role of safety communication in enhancing safety attitudes and reducing job burnout, with no evidence of non-significant associations in the studied context.

The strong positive correlation between safety compliance and safety attitude ($r = 0.684$, $p < 0.001$) aligns with findings from Li et al. (2021) and Yang et al. (2021), who underscore the critical role of safety behaviors in improving safety attitudes and outcomes [20]. This relationship can be interpreted through Bandura's (1977) social learning theory, which posits that safe behaviors are reinforced through direct experience and observation, cultivating positive attitudes [21, 22]. Additionally, Ajzen's (1991) theory

of planned behavior suggests that a positive safety attitude promotes adherence to safety regulations, likely fostering a reciprocal relationship [23, 24]. The Job Demands-Resources (JD-R) model [25] further positions safety compliance as a job resource that mitigates stress and strengthens safety attitudes. These findings suggest that prioritizing safety compliance can bolster organizational safety culture and reduce workplace incidents.

The strong positive correlation between safety participation and safety attitude ($r = 0.721$, $p < 0.001$) is consistent with Yang et al. (2021) and Wu J et al. (2021) [20, 26]. From the perspective of Bandura's (1977) social learning theory, active participation in safety activities enhances employees' awareness and sense of ownership [21, 22]. The JD-R model (Bakker & Demerouti, 2017) also identifies participation as a job resource that boosts motivation and positive attitudes. This finding highlights the value of participatory programs in building a robust safety culture and improving employee attitudes.

Likewise, the strong positive correlation between safety adaptability and safety attitude ($r = 0.698$, $p < 0.001$) supports the JD-R model [27] and findings by Hakanen et al. (2024) [28]. Adaptability to safety regulations, as a job resource, reduces stress and fosters positive attitudes. This result aligns with Wu J et al. (2021) and Yang et al. (2021), who emphasize the role of safety behaviors in attitude enhancement [20, 26]. Additionally, the strong positive correlation between safety communication and Communication & Cooperation ($r = 0.756$, $p < 0.001$) corroborates the JD-R model [25, 26]. Safety communication, as a job resource, strengthens team Communication & Cooperation. Taherpour et al. (2021) further demonstrated that transparent communication reduces fatigue and enhances Communication & Cooperation [29].

The strong positive correlation between safety

communication and adaptability ($r = 0.712$, $p < 0.001$) is consistent with Taherpour et al. (2021) [29]. Effective communication minimizes ambiguity and stress, thereby improving adaptability to safety regulations. The JD-R model [25] also emphasizes the role of communication in enhancing adaptability. On the other hand, the strong positive correlation between safety communication and risk management ($r = 0.735$, $p < 0.001$) aligns with the JD-R model [25, 26]. Effective communication heightens risk awareness and improves risk management. This finding is supported by Maleki et al. (2021), who highlighted the role of organizational factors in safety [30]. Similarly, the strong positive correlation between safety communication and personal responsibility ($r = 0.743$, $p < 0.001$) is consistent with the JD-R model [25, 26]. Effective communication fosters participation and team personal responsibility. This result aligns with Taherpour et al. (2021), who linked reduced fatigue to improved personal responsibility [29]. Finally, the moderately strong negative correlation between safety communication and job burnout ($r = -0.628$, $p < 0.001$) corroborates findings by Salvagioni et al. (2017), Garcia et al. (2020), and Bakker & de Vries (2021) [27, 31, 32]. As a job resource (Bakker & Demerouti, 2017), effective communication reduces stress and job burnout [25].

LIMITATIONS

This study has several limitations that should be acknowledged. One of the main limitations lies in the use of convenience sampling, which may increase the likelihood of selection bias. Although several actions were taken to minimize this issue—such as expanding the sample size, ensuring coverage of different departments and shifts, and emphasizing voluntary and anonymous participation—complete elimination of such bias is not possible. Moreover, the cross-sectional design of the study restricts the ability to establish causal inferences among the variables. The reliance on self-reported questionnaires may also introduce potential biases, such as social desirability and recall errors. Additionally, the study was limited to the tile and ceramic industry in Mashhad, Iran, which may affect the generalizability of the findings to other sectors or cultural contexts. Finally, although regression-based mediation analysis was applied, future studies are encouraged to employ probability-based sampling strategies and advanced statistical techniques such as structural equation modeling (SEM) with larger and more diverse samples to validate and extend the present results.

CONCLUSION

This study establishes that safety compliance, participation, adaptability, and communication are significantly associated with safety attitudes and personal responsibility, with safety communication playing a pivotal role in reducing job burnout. These findings align with social learning theory (Bandura, 1977), the theory of planned behavior (Ajzen, 1991), and the JD-R model (Bakker & Demerouti, 2017), highlighting the importance of cultivating a safety culture and effective communication in the tile and ceramic industry. The results provide actionable insights for managers and safety professionals, enabling them to enhance employee safety and well-being while minimizing workplace incidents through targeted training, increased participation, and improved communication. This research bridges theory and practice, laying the groundwork for future studies in occupational safety.

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Conflict of Interest

The authors declare no conflict of interest.

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Author's Contributions

Study Conception or Design:

Data Acquisition:

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AI Statement

The authors confirm that no AI tools or services were used during the preparation of this work.

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