Research article

A study of the factors and correlations influencing the safety level, job stress and job satisfaction of workers in small business in Korea

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ABSTRACT

Background: Job stress was found to directly increase the likelihood of accidents and indirectly increase the likelihood of accidents by lowering the safety atmosphere. Job stress has a significant impact on the safety environment, and job satisfaction is effective in reducing accident rates. Accordingly, we sought to investigate the correlation between safety level, job stress, and job satisfaction in small businesses with a high risk of industrial accidents. Additionally, we aim to investigate factors that may affect job stress, job satisfaction, and safety levels.
Methods: This study was conducted on 230 workers in small businesses in Korea. First, hierarchical regression analysis was conducted using SPSS software, and anova analysis was used to investigate significant variables. Finally, the relationships between variables were investigated using structural equation modeling (SEM).
Results: The analysis results showed that safety level and job stress had a negative correlation with a coefficient of -0.8. Safety level and job satisfaction had a correlation with a coefficient of 0.2. Job satisfaction and job stress had a negative correlation with a coefficient of -0.7. This shows that when job stress is high, there is a negative correlation between job satisfaction and safety level. In addition, 4 general characteristics items and 3 job characteristics items showed a correlation with job stress. 2 general characteristics items and 8 job characteristics items showed a correlation with job satisfaction. 4 general characteristics items and 11 job characteristics items showed a correlation with safety level.
Conclusion: Small businesses' job stress, safety level, and job satisfaction showed a significant correlation. In addition, the relationship between the variables affecting them was significant. In order to reduce the occurrence of accidents among workers in small businesses, control of factors and efforts to reduce job stress are necessary.

1. Introduction

In order to reduce the number of industrial accidents at industrial workplaces, efforts are being made to improve various safety and health systems and to prevent accidents stemming from changes in the working environment [1]. However, in Korea, more than half of all accidents occur in small businesses with poor working conditions. Most of many research have mainly focused on the working conditions of workers and the working environment and the roles of supervisors [2].

However, since safety accounts for a large portion of domain related to human feeling, decision, and psychology, research on workers feeling and decision is also needed [3–5] General prior studies have also reported that work environment, job demands, relationship conflicts, job insecurity, organizational system, and compensation factors all affect the occurrence of accidents in industrial sites [6]. In addition, excessive and chronic stress causes illness and unsafe action in workers in the workplace, and it can also be a factor that can lead to an industrial accident by falling job engagement in job satisfaction and organization [7]. Many previous studies also emphasized the harmful effects of job stress on workers' job behavior [8]. Job stress can have effects on concentration, inattentive, damage a memory, causing task hesitation and hindering one's decision-making ability unsafe act and accident occurrence [9]. These unsafe acts are an expression of attitudes towards one's job and are associated with job satisfaction [10]. Surprisingly, existing research shows that job satisfaction also affects people's health [11], in that people who are satisfied with their jobs are healthier than those who are not [12]. It has also been found that job satisfaction is the most important factor influencing work stress and that it acts as a mediator in the safety environment and of employee participation [9].

Workers will not behave positively at work if they perceive that the safety level is not being met, and this is directly related to their job satisfaction [13–15].

If safety awareness is positive, more positive attitudes and behaviors can be expected. On the other hand, dissatisfaction with accident risks and hazardous environments can lead to job stress [3,16–18].

Job stress has been shown to directly increase the likelihood of accidents and indirectly degrade the safety climate, thereby increasing the likelihood of accidents [19]. An increase in job stress can reduce workers' resilience, leading to decreased productivity [20]. Job stress significantly impacts the safety climate, and job satisfaction is effective in reducing accident rates [9].

There are studies that show that safety level and job stress or job satisfaction have an effect on industrial accidents. The research focused on single industries such as oil refineries and petroleum companies. Similar research on small workplaces employing 50 or fewer people that have a high accident rate does not exist.

According to the Ministry of Employment and Labor's (MOEL) analysis of the status of occupational accidents by size of the business from 2019 to 2021 [21], many accidents and fatalities occur in workplaces that are small and employ fewer than 50 people (Figs. 1 and 2).

In fact, the high risk of an industrial accidents in small business with less than 50 workers makes risk analysis essential [22], and research on the safety and health status and safety management of workplaces has been carried out continuously [23–29]. Previous research has mainly focused on medium or large organizations, with findings or conclusions that may or may not apply to SMEs [30].

However, it should be recognized that when organizational problems arise in small companies, they are less likely to be addressed in a scientific or timely manner and are structurally very different [30].

Therefore, this study aims to identify the correlation between the safety level, job stress, and job satisfaction of workers in small businesses, and to analyze and identify the factors that affect it.

2. Methods

2.1. Participants

This study was conducted from November 3, 2022 to December 31, 2022 and involved workers in small business with fewer than 50 full-time workers in South Korea. A list of small businesses was created and randomly selected.

After explaining the research purpose, survey method, and use of survey data to participants, a survey was conducted by distributing questions through paper questionnaires and Google forms (QR codes).

Before the survey was conducted, the number of subjects required for the study was calculated using the G*Power program. As a result of calculating the number of subjects using G*Power with effect size f = 0.15, err prob = 0.05, power = 0.95 Number of predictors = 5, and Structural equation model analysis, 138 responses were required. Considering the potential dropout rate, the questionnaires were distributed to 250 people and data were finally obtained from 230 people.
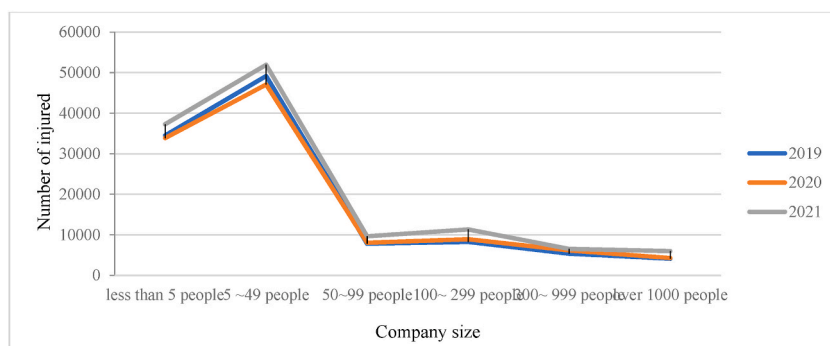

Fig. 1. 2019–2021 industrial accident analysis of the current situation (Injured).
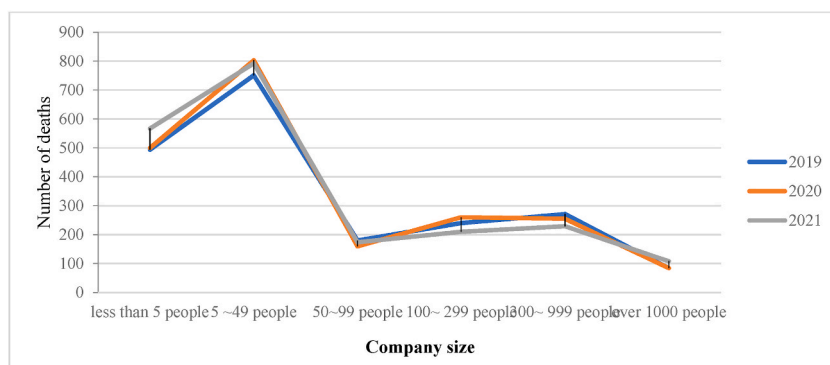
Fig. 2. 2019–2021 industrial accident analysis of the current situation (Deaths).

2.2. Data collection instruments

2.2.1. Safety level

The Safety Awareness Level Diagnostic Questionnaire of the Korea Safety and Health Institute was modified and used to assess the safety levels of the workplaces [31]. Each item, in this case the safety awareness of company owners, voluntary participation by workers, cooperation between departments, cooperation with managers, and support for safety, required an answer of 'not at all', 'not like that', 'is average', 'is so', or 'is very much so', i.e., on a five-point scale. The scores of these ten items about safety levels (out of the total of 84 questions) were converted to a total of 100 points, and the higher the score, the higher the level of safety in the workplace.

2.2.2. Job stress and job satisfaction

The job stress questionnaire used in this study was the 'Korean Job Stress Measurement Tool' developed by Jang et al. [32] and cited by Woo [33]. The questionnaire consisted of 24 items, each of which was scored on a four-point scale consisting of 'not at all', 'not like that', 'it is like that', and 'very much like that'. The total score was analyzed on a scale of 100, with higher scores indicating greater job stress. Job satisfaction was measured using the job satisfaction questionnaire by Woo [33], which is a modified version of the 'index of work satisfaction' developed by Slavitt et al. [34]. Each item requires an answer of 'not at all', 'not like that', 'is about right', 'is so' and 'very much so', i.e., on a five-point scale, with higher scores indicating greater job satisfaction.

2.2.3. General characteristics and job characteristics

General characteristics as used here were gender, age, education, marital status, type of enterprise, and type of employment. Job characteristics were working hours, annual income, freedom to take holidays, stable working conditions, and freedom from work authority.

2.3. Data analysis

All statistical analyses were performed using IBM SPSS version 25.0.

In this study, 84 in total questions were used, with questions about 'safety levels' (10 questions), 'job stress' (24 questions), 'job satisfaction' (16 questions), the 'general characteristics' of the research subjects (13 questions), and 'job characteristics' (21 questions).

Regression analysis was conducted to identify statistically significant variables.

Structural equation modeling (SEM) was used to analyze the relationships between independent variables and moderating variables with low significance probabilities using R Studio version 2023.12.0.

SEM has been recognized as a reliable method for deriving reasonable results from structural analysis [35–38].

SEM is a multivariate analysis method that has been widely applied to theoretical exploration and empirical verification in various fields [39].

Structural equation modeling is a more advanced form of statistical method than path analysis and allows the use of mediating variables. Multiple regression models with multiple dependent variables can be tested simultaneously. It shows a form of path analysis that shows causal relationships and correlations between latent variables [40].

3. Results

Descriptive statistics were calculated on the general and job characteristics of safety level, job stress, and job satisfaction.

As a result of the reliability analysis using Cronbach's alpha, items that lowered the reliability of the questionnaire were excluded from the general characteristics and job characteristics items.

Normality test and equal variance were performed, and after satisfying significance with Welch's statistical probability and

significance probability, one-way analysis of variance was performed. When one-way ANOVA was conducted on the general and job characteristics of safety level, job stress, and job satisfaction, statistically significant items were identified.

Hierarchical regression analysis was conducted using statistically significant items as control variables.

Hierarchical regression analysis was conducted with job stress as a control variable.

Partial correlation analysis was conducted to check for correlations among variables showing significant probabilities with safety level, job stress, and job satisfaction.

3.1. Statistical analysis of the participants' general and work characteristics

Statistically significant items for general characteristics according to safety level, job stress, and job satisfaction are shown in Table 1 ($p < .05$).

At the safety level, Academic background, working years, Promotion opportunity, and Accident experience were statistically significant. In terms of job satisfaction, Type of business and Average working hours were statistically significant. ($p < .05$)

Marital status, Type of business, working years, and Promotion opportunity were statistically significant in job stress. ($p < .05$)

The significant items pertaining to the job characteristics according to safety level, job stress, and job satisfaction are shown in Table 2 ($p < .05$).

Significant items ($p < .05$) were 'workspace cleanliness', 'Whether or not dangerous work', 'working space width', 'rest facility', 'Freedom to use vacation', 'air-conditioning facility', 'other business support', 'self-development support', 'adequate wage level', 'stable working conditions', 'freedom of job authority' at the safety level.

Job satisfaction was 'workspace cleanliness', 'whether or not dangerous work', 'working space width', 'freedom to use vacation', 'annual income', 'number of full-time workers', 'adequate wage level', ' Stable working conditions', 'freedom of job authority', and 'retention qualifications' were significant. ($p < .05$)

Job stress was 'Freedom to use vacation', 'air-conditioning facility', 'heating facility', 'Other business support', 'Adequate wage level', 'Stable working conditions', and 'Freedom of job authority' were significant. ($p < .05$)

3.2. Hierarchical regression analysis between safety level, job stress, and job satisfaction

After controlling for exogenous variables, hierarchical regression analysis was conducted using general characteristics as control variables to determine whether job satisfaction and safety level affect job stress (Table 3).

As a result of the analysis [Model 1] F = 5.380 ($p < .01$), [Model 2] F = 26.228($p < .001$), [Model 3] F = 35.186($p < .001$) regression model were deemed adequate.

The square change amount increased to [Model 1] $R^2 = 0.145$, [Model 2], $R^2 = 0.487$, and [Model 3] $R^2 = 0.590$. With the significance probability p = .000 according to the change in F of R^2, the independent variable is statistically significant in the description of the dependent variable after inputting the control variable.

Safety level $\beta = -0.635$, Job satisfaction $\beta = -0.360$, the sign is negative ($-$), so when Job stress increases, safety level and Job satisfaction decrease.

And the general characteristics items Academic background, marital status, Type of business, working years, average working hours, promotion opportunity, and Accident experience are significant variables.

This shows that safety level, job stress, and job satisfaction are correlated with general characteristic variables.

After controlling for exogenous variables, hierarchical regression analysis was conducted using job characteristics as control variables to determine whether job satisfaction and safety level affect job stress (Table 4).

After controlling for exogenous variables, hierarchical regression analysis was conducted using job characteristics as control variables to determine whether job satisfaction and safety level affect job stress.

Analysis result [Model 1] F = 14.918 ($p < .01$), [Model 2] F = 16.157 ($p < .001$), [Model 3] F = 21.088($p < .001$) regression model were deemed adequate.

The square change amount increased to [Model 1] $R^2 = 0.511$, [Model 2], $R^2 = 0.548$, and [Model 3] $R^2 = 0.628$. With the significance probability $p = .000$ according to the change in F of R^2 the independent variable is statistically significant in the description of the dependent variable after inputting the control variable.

Table 1
Significant general characteristics according to safety level, job stress, and job satisfaction.

Characteristic		Safety level (p)	Job satisfaction (p)	Job stress (p)
Academic background	q3	0.034	0.835	0.454
Marital status	q4	0.925	0.098	0.028
Type of business	q5	0.524	0.040	0.002
Working years	q8	0.017	0.276	0.046
Average working hours	q11	0.984	0.030	0.154
Promotion opportunity	q12	0.000	0.414	0.008
Acciden experience	q13	0.000	0.443	0.113

*$p < .05$, **$p < .01$, ***$p < .001$.

Table 2
Significant job characteristics according to safety level, job stress, and job satisfaction.

Characteristic		Safety level (p)	Job satisfaction (p)	Job stress (p)
Workspace cleanliness	q15	0.000	0.000	0.084
Whether dangerous work	q16	0.000	0.000	0.102
Working space width	q17	0.000	0.000	0.292
Rest facility	q18	0.000	0.055	0.282
Freedom to use vacation	q19	0.000	0.007	0.000
Number of full-time workers	q23	0.141	0.004	0.234
Air-conditioning facility	q26	0.000	0.525	0.000
Heating facility	q27	0.059	0.109	0.000
Other business support	q28	0.012	0.996	0.001
Self-development support	q29	0.000	0.174	0.055
Adequate wage level	q31	0.000	0.000	0.000
Stable working conditions	q32	0.000	0.000	0.000
Freedom of job authority	q33	0.000	0.000	0.000
Retention Qualifications	q34	0.187	0.043	0.330

$*p < .05$, $**p < .01$, $***p < .001$.

Table 3
Effects of general characteristics on safety level, job stress, and job satisfaction.

Variables	Model 1			Model 2			Model 3		
	B	SE	β	B	SE	β	B	SE	β
Academic background	0.300	0.705	0.028	0.600	0.548	0.056	0.636	0.491	0.059
Marital status	0.693	1.197	0.040	1.467	0.931	0.086	2.471	0.845	0.144
Type of business	−4.181	1.302	−0.221	−2.747	1.018	−0.145	−2.400	0.913	−0.127
Working years	−1.052	0.519	−0.150	−1.210	0.403	−0.172	−1.361	0.362	−0.194
Average working hours	1.910	0.899	0.152	1.664	0.698	0.132	1.103	0.630	0.088
Promotion opportunity	3.366	0.815	0.285	1.082	0.660	0.092	1.342	0.593	0.114
Accident experience	−2.257	1.535	−0.100	0.381	1.211	0.017	0.065	1.086	0.003
Safety level				−0.840	0.069	−0.635	−0.649	0.067	−0.491
Job satisfaction							−0.324	0.044	−0.360
F(p)	5.380***			26.228***			35.186***		
R^2	0.145			0.487			0.590		
adj. R^2	0.118			0.468			0.573		

Dependent variable: Job stress $*p < .05$, $**p < .01$, $***p < .001$.

Table 4
Effects of job characteristics on safety level, job stress, and job satisfaction.

Variables	Model 1			Model 2			Model 3		
	B	SE	β	B	SE	β	B	SE	β
Workspace cleanliness	0.562	1.026	0.035	0.652	0.989	0.041	0.638	0.899	0.040
Whether dangerous work	−1.715	0.930	−0.111	−1.229	0.904	−0.080	−1.178	0.822	−0.077
Working space width	−1.238	0.865	−0.079	−0.982	0.836	−0.063	−1.028	0.760	−0.066
Rest facility	−0.428	0.602	−0.039	−1.012	0.596	−0.093	−0.811	0.543	−0.075
Freedom to use vacation	1.000	1.250	0.041	0.445	1.212	0.018	0.218	1.102	0.009
Annual income	−0.560	0.445	−0.067	−0.505	0.429	−0.060	−1.129	0.401	−0.134
Number of full-time workers	1.098	0.332	0.177	0.952	0.321	0.153	0.763	0.293	0.123
Air-conditioning facility	0.191	1.548	0.007	0.063	1.492	0.002	0.906	1.362	0.035
Heating facility	0.956	0.806	0.065	1.306	0.781	0.088	1.204	0.710	0.082
Other business support	0.643	0.390	0.088	0.555	0.377	0.076	0.763	0.344	0.105
Self-development support	0.113	0.394	0.016	−0.105	0.383	−0.015	−0.002	0.349	0.000
Adequate wage level	−0.766	0.730	−0.067	−0.547	0.705	−0.048	−0.073	0.645	−0.006
Stable working conditions	−2.657	0.939	−0.225	−0.747	1.013	−0.063	−0.271	0.924	−0.023
Freedom of job authority	−3.622	0.865	−0.312	−2.805	0.856	−0.241	−1.785	0.793	−0.154
Retention Qualifications	1.182	1.037	0.063	0.726	1.005	0.039	−0.237	0.925	−0.013
Safety level				−0.457	0.109	−0.345	−0.401	0.100	−0.303
Job satisfaction							−0.304	0.045	−0.337
F(p)	14.918***			16.157***			21.088***		
R^2	0.511			0.548			0.628		
adj. R^2	0.477			0.514			0.599		

Dependent variable: Job stress $*p < .05$, $**p < .01$, $***p < .001$.

Safety level $\beta = -0.345$, Job satisfaction $\beta = -0.337$, the sign is negative (−), so when Job stress increases, safety level and Job satisfaction decrease.

And the job characteristics items workspace cleanliness, whether dangerous work, working space width, rest facility, freedom to use vacation, annual income number of full-time workers, air-conditioning facility, heating facility other business support, self-development support, adequate wage level, stable working conditions, freedom of job authority, and retention qualifications are significant variables. This shows that safety level, job stress, and job satisfaction are correlated with job characteristic variables.

Partial correlation analysis was conducted to check for correlations among variables showing significant probabilities with safety level, job stress, and job satisfaction (Table 5).

It can be said that the regression model is appropriate as [Model 1] F = 164.166 (p < .001), [Model 2] F = 126.283 (p < .001) after controlling for exogenous variables by entering safety level and job satisfaction as independent variables with job stress as the dependent variable.

With the significance probability $p = .000$ according to the change in F of R^2, the independent variable is statistically significant in the description of the dependent variable after inputting the control variable.

3.3. Path analysis using structural equation models

Based on the significant variables, several models were derived, and the final model is shown in (Fig. 3) considering the model fit index and the proposed relationship. The analysis results showed that safety level and job stress had a negative correlation with a coefficient of −0.8. Safety level and job satisfaction had a correlation with a coefficient of 0.3. Job satisfaction and job stress had a negative correlation with a coefficient of −0.7. This shows that when job stress is high, there is a negative correlation between job satisfaction and safety level, and vice versa.

In addition, for job stress, 4 items of general characteristics (Marital status, Type of business, working years, Promotion opportunity) and 3 items of job characteristics (Freedom to use vacation, Annual income, Freedom of job authority) were correlated.

For job satisfaction, 2 items of general characteristics (Type of business, Average working hours) and 8 items of job characteristics (Stable working conditions, Freedom to use vacation, Annual income, whether dangerous work, Number of full-time workers, working space width, Freedom of job authority, Workspace cleanliness) were correlated.

For safety level, 4 items of general characteristics (Academic background, Accident experience, Promotion opportunity, working years) and 11 items of job characteristics (Working space width, Freedom of job authority, Stable working conditions, Freedom to use vacation, Adequate wage level, Workspace cleanliness, whether dangerous work, Self-development support, Air-conditioning facility, other business support, Rest facility) were correlated.

<Fig. 3> shows that safety level, job stress, and job satisfaction can affect each other, and that there are general characteristic factors and job-specific factors that can directly and indirectly affect each other.

Analysis results: The analysis results were judged to be fair as they satisfied Absolute Fit Index 1, incremental fit indexes 1, and parsimony-adjusted index 1 (Table 6).

In the Absolute Fit Index, RMSEA <0.08 was satisfied when one out of three Chisq/RMSEA/GFI values was satisfied.

In Incremental Fit Indices, CFI>0.9 was satisfied when only 1 out of 4 AGFI/CFI/TLI/NFI values was satisfied.

The parsimony-adjusted index Chisq/df was satisfied when Chisq/df < 3.0.

Several models were drawn based on significant variables, and considering the model fit index and proposed relationships, the final model is shown in Fig. 3.

4. Discussion

This study investigated the relationships among safety level, job stress, and job satisfaction in Korean small businesses. Moreover, we examined the influence of general and job characteristics on these relationships.

To confirm the relationship between observed and latent variables, we tested them with SEM.

All hypotheses were supported, and the model fit indices indicated a good fit. Confirmatory factor analysis was conducted to assess the extent to which the observed variables adequately represented their corresponding latent variables, and all factor loadings were greater than 0.3. The results of this study demonstrate that safety level in Korean small businesses is significantly correlated with job stress and job satisfaction.

Table 5

Mutual effects of safety level, job stress, and job satisfaction.

Variables	Model 1			Model 2		
	B	SE	β	B	SE	β
Safety level	−0.856	0.067	−0.647	−0.677	0.065	−0.512
Job satisfaction				−0.320	0.045	−0.355
F(p)	164.166 ***			126.283 ***		
R^2	0.419			0.527		
adj. R^2	0.416			0.522		

Dependent variable: Job stress *p < .05, **p < .01, ***p < .001.
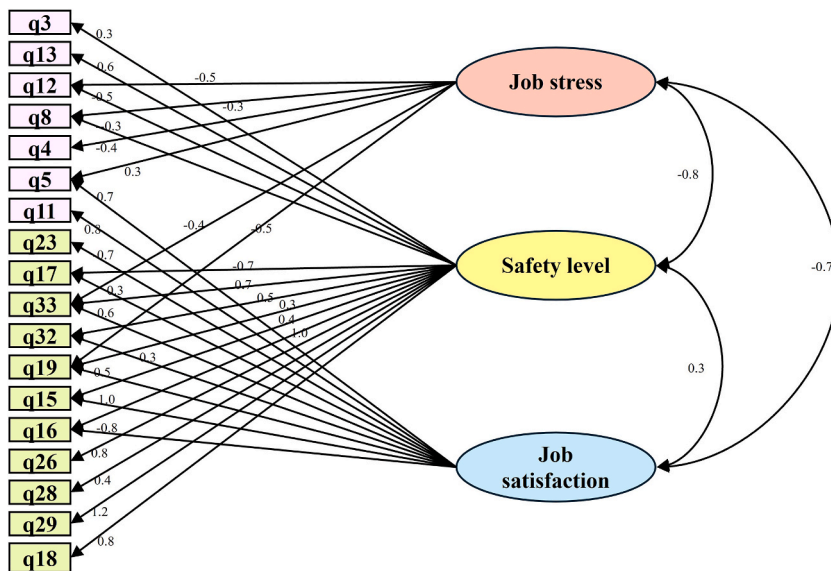
Fig. 3. Path analysis through structural equation model.

Table 6
Modeling results.

	criterian	data
chisq	chisq	948.769
df	df	817
pvalue	pvalue>0.05	0.001
rmsea	rmsea<0.1	0.026
rmsea.ci.lower	rmsea.ci.lower	0.018
rmsea.ci.upper	rmsea.ci.upper	0.034
rmsea.pvalue	rmsea.pvalue<0.05	1
gfi	gfi>0.9	0.864
cfi	cfi>0.9	0.977
tli	tli>0.9	0.967
srmr	srmr<0.1	0.063

Furthermore, the findings suggest that Characteristic factors moderate these relationships.

Workers in small businesses with less than 50 employees showed a negative correlation between safety level and job stress, and a negative correlation between job stress and job satisfaction. This means that a high safety level means low job stress and high job satisfaction, and a low safety level means high job stress and low job satisfaction. This is consistent with previous studies that job stress affects safety or job satisfaction, and job satisfaction affects safety [9,13–15,41–44].

Previous studies have demonstrated that job stress directly increases the likelihood of accidents and indirectly increases the likelihood of accidents by decreasing safety climate [9,19]. Similarly, a study on mining industries showed that adherence to safety regulations was correlated with both job stress and job satisfaction, which is consistent with our findings [45]. Another study concluded that job stress has a significant impact on safety climate, and job satisfaction is the most important factor influencing job stress [9]. These findings are also in line with our results, which indicate a negative correlation between high job stress and both job satisfaction and safety levels.

According to the results of the characteristics that affect safety level and job stress and job satisfaction, safety level was affected by general characteristics such as "Academic background ", Accident experience, "Promotion opportunity ", and "Working years". Factors belonging to the job characteristics group were "Working space width ", "Freedom of job authority ", "Stable working conditions ", "Freedom to use vacation ", "Workspace cleanliness", "Whether dangerous work ", "Air-conditioning facility ", "Other business support ", "Self-development support", and "Rest facility".

The rest facilities provided in the workplace affect the safe working environment, and there were differences in safety awareness depending on work experience and academic background [46,47].

There are research results showing that education level and Accident experience affect safety attitudes [48], efficient working conditions are very important for safety, physical working conditions are potential hazards, and environmental satisfaction of the workspace is very necessary for securing safety [49–51].

Job stress was found to be affected by promotion opportunities, "marital status ", "working years ", "type of business ", "freedom of

job authority ", and "freedom to use vacation". This is similar to the research results that worker in small business manufacturing in Korea had high job stress [52].

It also showed that job role ambiguity increases job stress and that providing appropriate support at work can reduce stress [53,54].

Job satisfaction was more influenced by the Type of business, Average working hours. In addition, the influence of freedom to use vacation, salary, stable working conditions, presence of hazardous work, number of full-time workers, width of workspace, freedom of work authority, cleanliness of work space, support for self-development, air conditioning facilities, other work support, and rest facilities were observed.

Workers need a space to spend their break time, and the physical work environment (cleanliness, controllable heat) affects job satisfaction [55–57].

Workers in small businesses can be seen as having a close relationship between job stress, safety level, and job satisfaction. In order to prevent industrial accidents in small businesses with a high accident frequency in the future,

Factors based on these correlations should be considered and managed. The process of thinking is that there is a complex cause that cannot be judged simply [15].

Therefore, the results of this study will ultimately be able to suggest directions that can contribute to the prevention of industrial accidents in small businesses in Korea.

4.1. Implications

This study investigated the interrelationships among safety level, job stress, and job satisfaction among employees in small businesses (fewer than 50 employees) in South Korea, where a significant number of accidents and fatalities occur.

Our results suggest that small businesses in Korea should view job stress, safety level, and job satisfaction as an interconnected system.

Furthermore, we identified specific characteristics that influence these factors.

These findings highlight the importance of considering these interconnected relationships when developing strategies to improve safety levels in small businesses with high accident rates.

Future research should focus on developing and implementing appropriate systems to improve safety levels, job stress, and job satisfaction based on the findings of this study.

There are also some limitations of this study.

First, while previous studies were conducted on subjects according to industry or occupation, this study targeted workers according to the size of the business. It should be noted that the limitation of this study is that it is limited to domestic small and medium-sized enterprises.

Second, in addition, there is a lack of data analysis for various industries and jobs.

And the influence of non-occupational stress due to family and community environment was not investigated. In addition, the job stress questionnaire was designed for Korean workers, so applying it to other countries may compromise the validity of the results. This is another limitation.

Limitations of this study include the fact that various industries were not investigated and the lack of industry-specific data analysis. These limitations therefore need to be addressed in future studies.

5. Conclusion

This study investigated the interrelationships among safety level, job stress, and job satisfaction among employees in small businesses (fewer than 50 employees) in South Korea, where a significant number of accidents and fatalities occur. The findings revealed a significant correlation between job stress, safety level, and job satisfaction among employees in small Korean businesses. Our results suggest that small businesses in Korea should view job stress, safety level, and job satisfaction as an interconnected system. Furthermore, we identified specific characteristics that influence these factors. These findings highlight the importance of considering these interconnected relationships when developing strategies to improve safety levels in small businesses with high accident rates.

This study is one of the first to explore these issues in small Korean businesses. Future research should focus on developing and implementing practical systems to improve safety levels, reduce job stress, and enhance job satisfaction.

By addressing these interconnected factors, small businesses can create a safer and more positive work environment.

CRediT authorship contribution statement

Myung-Hee Kim: Writing – original draft, Methodology, Formal analysis, Conceptualization. **Won Choi:** Methodology, Investigation. **Woo-je Lee:** Methodology, Investigation. **Jin Woo Jung:** Writing – review & editing.

Availability of data and material

The data underlying this article will be shared on reasonable request to the corresponding author.

Ethics approval and consent to participate

This study was approved by the Seoul National University of Science and Technology Life Ethics Committee on November 3, 2022.
Seoul National University of Science and Technology Life Ethics Committee approval number is 2022-0015-01.
This survey was targeted at participants who voluntarily agreed to the survey.
Written informed consent was obtained from all the participants.
The questionnaire was anonymized.
participants free to opt out of participation in the study whenever they were uncomfortable.
All participants gave consent before taking the survey.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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