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The Association of Leadership Style and Coronavirus Anxiety with Safety Behavior among Workers of the Sanitary Products Industry in Qom Province, Iran: A Structural Equation Modeling Analysis

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Abstract

Background: Organizational success depends on leadership style. Leadership style probably affects coronavirus anxiety and workers' safety behavior at work. This study aims to examine the structural association between leadership style and coronavirus anxiety with safety behavior among workers in the sanitary products industry in Qom Province.

Materials & Methods: This descriptive-correlative study was conducted on 260 workers in the sanitary products industry in Qom Province in 2020 using a systematic random sampling method. For data collection, Alipour Coronavirus Disease Anxiety Scale (CDAS), Lathans Leadership Style Questionnaire, Mahdinia Safety Behavior Questionnaire, and demographic checklist were used. In addition, multivariate analysis of Structural Equation Modeling (SEM) was performed to analyze the variables via SPSS V.22.0 and Smart PLS V.3.2.8.

Results: Leadership style had a positive significant correlation with safety behavior (r=0.19) (p-value < 0.01), yet it had an insignificant negative correlation with coronavirus anxiety (r= -0.12). Besides, coronavirus anxiety had an insignificant negative correlation with safety behavior. The results of structural equation modeling showed that the path coefficient of leadership style and coronavirus anxiety (r=0.16) with safety behavior (r=0.46) was significant (p-value < 0.01); however, the path coefficient between coronavirus anxiety and safety behavior (r= -0.16) was not significant.

Conclusions: We concluded that the factor loadings coefficients of the structural model were equal to or higher than the acceptable value of 0.4 in all cases confirming the structural model was appropriate. Furthermore, coronavirus anxiety and safety behavior can be predicted among the workers using leadership style.

Keywords: Leadership, Safety, Behavior, Coronavirus, Anxiety, Workers

Introduction

The role of organizational leadership is important in terms of creating a vision and a mission, determining objectives, designing strategies, as well as coordinating all efforts and activities [1, 2]. Besides, it is one of the key factors in the success

or failure of any organization [3]. Leaders use leadership style as an approach to motivating and guiding people [4]. Among leadership styles, one can refer to relationship-oriented and task-oriented styles [5]. The relationship-oriented style is based on informal, personal, and social interactions, which is practiced through mutual trust, social affection, personal support, protection, and friendship. In contrast, the task-oriented style focuses on the formal relationship between the leader and the followers, with the leader giving directions and instructions, and the followers performing the tasks accordingly [6, 7]. Recently, given the high human and financial costs [8], the effects of organizational and managerial factors, such as leadership on effective safety performance, have attracted more attention. Besides, to develop a proactive approach to workplace injury prevention, organizations have turned to key predictors of safety, such as leadership [9]. Since organizational leadership can improve safety performance by providing an appealing vision for the future, it encourages team members to think and makes employees participate in safety activities [10]. In addition, employees are very likely to be influenced by the leader's behavior and act in accordance with his behavior as a safe behavior model. This behavior can be characterized by safety compliance with safety principles, such as following policies and procedures as well as safety participation, such as helping coworkers, promoting safety and its principles, taking the initiative to be safe, and trying to improve safety at work [9]. In this regard, the results of some studies have verified the effect of leadership on safety behavior and accidents in positive and negative ways, respectively [8]. Additionally, in some theories about accident causes, such as Heinrich's domino theory, the multiple causation model, Weaver's updated dominoes, Bird's domino-based model, and human error models, the significant role of employee behavior in causing workplace accidents and events has been established [11]. In addition, the behavior-based safety approach has been introduced as an approach directly leading to significant progress in occupational safety. Besides, it is one of the best techniques for improving safety, which suggests focusing on safety behavior and emphasizing safe behavior encouragement, instead of punishing unsafe behavior to improve safety, thereby reducing accidents and injuries [12, 13].

Another factor influencing employee safety behavior is mental health problems, including anxiety and depression [14]. In recent years, the general public has experienced a type of anxiety called "coronavirus anxiety", which is caused by coronavirus spread, being considered one of the most important social events of the 21st century and the most challenging issue since World War II [15]. In fact, this type of anxiety has been affecting a large number of people, causing many deaths in several months [16]. By definition, coronavirus anxiety is the presence of worries, excitement, and concerns among people about coronavirus contraction and the risks associated with it [17]. This anxiety about facing death can be seen in people's behavior, reactions and responses as it does not show itself directly [18]. The results of past research on the effect of anxiety on safety behavior show that people with anxiety, depression, and stress do not pay attention to potential work hazards and take less precaution due to reduced safety behavior, which may lead to more work-related accidents and injuries [19, 20]. The study of Alroomi et al showed that mental health factors, including anxiety and depression, mediated the relationship between occupational stress and individuals' safety participation behavior [21]. Glasscock et al reported that the combination of high levels of psychological symptoms, i.e. stress, and poor safety behavior was associated with a higher risk of accidents [22]. The findings of the study of Jung et al showed that employees' behavioral compliance and safety participation were related to their safety knowledge and motivation as well as depression and anxiety. In addition, job demands, lack of job control, lack of compensation, and lack of organizational justice had a negative effect on safety behavior [23].

It has been well established that different leadership styles are correlated with followers' mental health [24]. In various frameworks and organizational theories, such as the person-environment fit, leader-member exchange, or the demand-job resource model, it is agreed that an individual's perception of leadership behavior is the driver of the relationship between leadership and mental health in organizations [25]. In the study of Doremami et al, a significant positive relationship was found between the relationship-oriented leadership style and employee mental health [26]. In addition, in the study of Hayati et al, a significant relationship was reported between the managers' leadership style and mental health as well as its components, such as physical problems, anxiety, social function, and depression among personnel [27]. Besides, the findings of the study of Omoankhanlen et al verified the positive significant relationship of the supervisor's task-oriented behavior with physiological and psychological stress [28]. In the study of Montano et al, it was reported that relationship-oriented and task-

oriented leadership styles were the strongest predictors of positive mental health outcomes among followers [29]. Therefore, by examining the results of past research and the development of their results, the research gap in the field of the relationship of safety behavior with relationship-oriented and task-oriented leadership styles can be filled, and the effect of safety behavior on coronavirus anxiety can be investigated. Against this background, the present study was designed and conducted aimed at examining the structural relationship of leadership styles and coronavirus anxiety with safety behavior among workers of the sanitary products industry using structural equation modeling analysis in Qom Province.

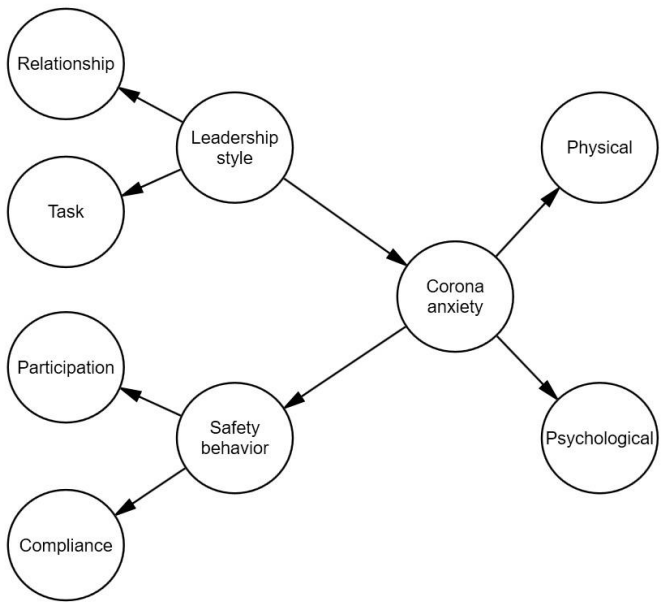

Fig. 1. Conceptual model of the research

Materials and Methods

This descriptive-analytical and cross-sectional study was conducted among workers of the sanitary products industry in Qom Province from April to February 2020. The sample size was calculated using the Morgan's table, and the total number of the workers in the sanitary products industry was 600, including 10% of the additional workers. The systematic random sampling method was used at a regular interval (k = 3) to select the samples by selecting every 3rd person on a list of the workers of the studied industry. Firstly, necessary explanations were given about confidentiality of information, objectives, and stages of the study after receiving signed informed consent forms. Next, through self-reports and surveying medical documents of the workers with physical and mental health as well as at least six months of work experience in the industry, the participants entered the study. Besides, people unwilling to participate in the study, part-time workers, workers with less than six months of work experience, those with a history of mental illnesses, and those taking anti-anxiety drugs were excluded from the study. The data gathering tools were three standard questionnaires and a checklist that were completed by workers' self-report. In addition, the study was approved by the Ethics Committee of Qom University of Medical Sciences under code IR.MUQ.REC.1399.053.

Demographic Checklist: The checklist was designed by the authors, which included information on work experience, educational level, gender, marital status, age, work system, daily working hours, underlying illnesses, history of suspected or definitive coronavirus contraction among colleagues, friends, and relatives, as well as occupation.

Coronavirus Disease Anxiety Scale (CDAS) questionnaire: This questionnaire was designed and validated by Alipour et al (2018) in Iran and used to measure anxiety caused by the prevalence of the coronavirus disease. The final version of this questionnaire had 18 items and 2 subscales. Questions 1 to 9 measured psychological symptoms, and questions 10 to 18 measured physical symptoms. The tool was rated on a 4-point Likert scale (never = 0, sometimes = 1, most often = 2, and always = 3). Therefore, the highest and lowest scores that the respondents received for this questionnaire were between 0 and 54. In fact, higher scores in this questionnaire indicated a higher level of anxiety in individuals. The reliability of this tool was determined at 0.88 by the Cronbach's alpha method for the first factor, 0.86 for the second factor, and 0.92 for the total

questionnaire. To check the validity of this questionnaire, it was correlated with the GHQ-28 questionnaire. To check the validity of this questionnaire, it was used to correlate this tool with the GHQ-28 questionnaire, and the results have shown that the Corona anxiety questionnaire is equal to the total score of the GHQ-28 questionnaire, and the anxiety component, physical symptoms, social functioning disorder, and depression respectively. with 0.483, 0.507, 0.418, 0.333, and 0.269, all these coefficients were significant at the 0.01 level.

Leadership style questionnaire: This questionnaire was designed by Luthans (1985). Accordingly, it has 35 items and 2 subscales, with 15 items measuring the relationship-oriented leadership style and 20 items measuring the task-oriented leadership style. The questionnaire is rated on a Likert scale with the options of always (A), frequently (F), occasionally (O), seldom (S), or never (N). According to Luthans' scoring method, if the workers' response to items 7, 8, 12, 18, 19, 30, 34, and 35 is S (seldom) or N (never), they will get score 1; if their response to those items is A (always) or F (frequently), they will get score 0; if the workers' response to the rest of the items is S (seldom), N (never), or occasionally (O), they will get score 1; in addition, if their response to these items is A (always) or F (frequently), they will get score 0. The validity of the Luthans leadership questionnaire (1985) has been confirmed in many studies by researchers. The validity of this questionnaire has also been confirmed by Brdner [7]. Additionally, Metzkas and Moghimi verified it in their book (Moghimi, 2007: 278) [31]. In the Persian version of this questionnaire, divergent validity of the questionnaire was verified using the Fornell and Locker's method, with its validity coefficient having been greater than 0.7. In addition, in terms of its convergent validity using the Average Variance Extracted (AVE) criterion, the validity coefficient of greater than 0.5 was approved for all constructs. Furthermore, the Cronbach's alpha values were obtained for the relationship-oriented, task-oriented, and the entire questionnaire subscales at 0.96, 0.89, and 0.93, respectively [32].

Safety behavior questionnaire: This questionnaire was designed and validated by Mahdinia et al (2015) in Iran. Accordingly, it has 23 questions for measuring safety behavior, which includes two subscales of safety compliance (12 questions) and safety participation (11 questions). The questionnaire is rated on a Likert scale (always (5), often (4), sometimes (3), rarely (2), and never (1)). In addition, the minimum and maximum score is 23 and 115, respectively, with larger scores indicating safer behavior. Besides, the Cronbach's alpha coefficient of the total questionnaire and that of the subscales of safety compliance and safety participation was 0.90, 0.86, and 0.87, respectively. Furthermore, the validity of the questionnaire has been confirmed by Lawshe's method, with higher values of the content validity ratio (CVR) and the content validity index (CVI) of more than the minimum acceptable value of 0.62 [33]. This questionnaire was completed by workers' self-reports.

Multivariate analysis of the structural equation modeling technique (SEM) was used to analyze the variables in this study. The model's compatibility was assessed with the sample's data. In addition, the model's suitability and reliability of the structures were assessed by examining factor loads. Furthermore, the Cronbach's alpha coefficient as well as its combined reliability and validity were assessed by calculating the mean extracted variance (AVE) and divergent validity (calculating coefficients). Additionally, suitability of the structural model was established by the 3 criteria of significant coefficient Z, Q-square, and R-square; in this respect, values larger than 1.96 for the Z-coefficient for each structure confirmed its significance, with the confidence level of 95% needed. In addition, the three values of 0.19, 0.33, and 0.67 were considered as the basis values for weak, medium, and strong levels of R2. In addition, values larger than 0.35 for the Q2 criterion indicated the strong predictive power for the model. Furthermore, SPSS V.22.0 and Smart PLS V.3.2.8 programs were used for statistical analysis and data collection.

Results

Incompletely answered questionnaires were removed. Next, based on the results of the surveys collected on 244 out of 260 employees, it was determined that 39.3 and 60.7% of them were male and female, respectively. In addition, the employees' average age and work experience were 32.05±8.26 and 3.6±3.43 years, respectively. Other demographic characteristics of the employees, including the educational levels of elementary, associate's degree, bachelor's degree, as well as master's degree and higher were 29.1, 56.1, 1.6, and 9.8%, respectively. The average daily working hour was 8.31±1.86. Besides, 86.9% of the subjects were married (being the highest percentage). In addition, 12.7 and 81.1% of the student population were shift workers and daily workers, respectively. Additionally, 4.9% of them stated that they had underlying illnesses, such as diabetes, hypertension, and so on. Besides, the

prevalence of the people with the coronavirus disease and suspected cases among colleagues, friends, and relatives of the student population was 8.9 and 3.2%, respectively.

Table 1. Description of studied factors

Variables	Minimum	Maximum	Mean	Std. deviation
Coronavirus anxiety	0	52	12.68	14.31
Psychological	0	26	8.59	8.05
Physical	0	46	5.03	8.92
Leadership style	9	79	21.15	8.65
Relationship	2	61	7.88	7.16
Task	6	18	13.26	3.10
Safety behavior	65	109	84.86	9.98
Compliance	28	55	38.53	5.46
Participation	31	62	46.33	7.80

Table 1 shows the results of the mean scores of the studied questionnaires.

The convergent validity criterion examined the degree of correlation of each structure with the apparent variables of that structure. For this purpose, the AVE index was calculated, which was equal to and higher than 0.4 for all structures, indicating suitable convergence [34]. The Cronbach's alpha coefficient was around or more than 0.7, indicating reliability of each structure in other areas. In addition, the values of the combined reliability index of all structures were reported to be about or more than 0.7, indicating relatively acceptable convulsion of the models (Table 2).

Table 2. Convergent validity and reliability of the questionnaires' factors

Variables	Number of questions	Cronbach's alpha	Combined reliability	*AVE
Compliance	9	0.70	0.72	0.40
Coronavirus anxiety	18	0.95	0.96	0.58
Leadership style	17	0.66	0.71	0.40
Participation	9	0.78	0.89	0.42
Physical	9	0.96	0.98	0.84
Psychological	9	0.92	0.94	0.66
Relationship	7	0.81	0.61	0.57
Safety behavior	18	0.66	0.64	0.44
Task	10	0.79	0.64	0.38

*AVE: Average Variance Extracted

In addition to reporting the Cronbach's alpha coefficients and combined reliability, the values of factor loads were estimated, during which questions with a factor load of less than 0.4 were removed. After performing the aforementioned corrective action, all factor loads were higher than 0.4, indicating that the criterion is appropriate (Fig. 2).

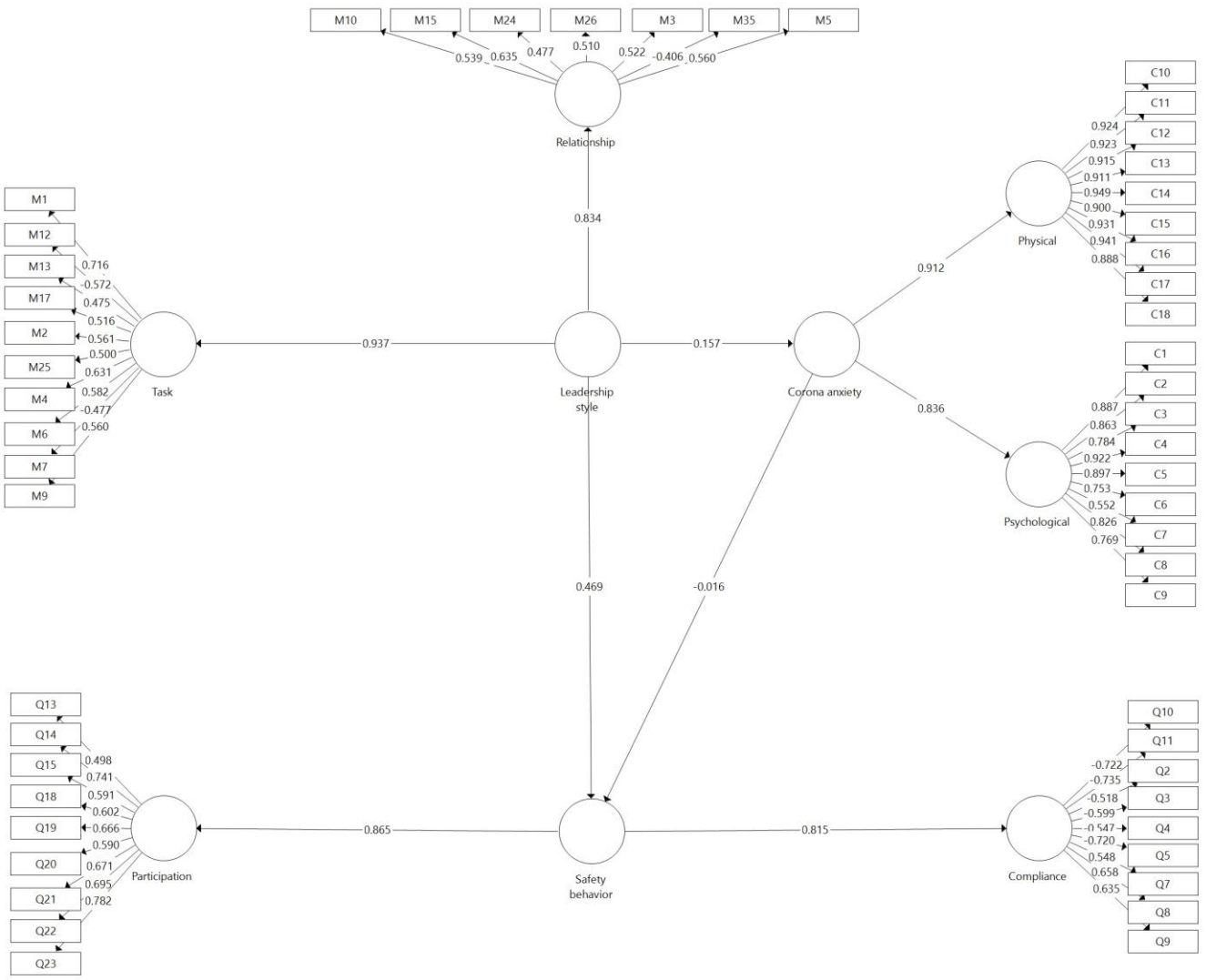

Fig. 2. The Implemented model with factor load coefficients

The results of the Spearman's correlation coefficient showed a significant direct relationship between leadership style and safety behavior (p-value < 0.01). Besides, no significant relationship was established between coronavirus anxiety with leadership style and safety behavior. On the other hand, there was an inverse correlation between coronavirus anxiety with leadership style and safety behavior (Table 3).

Table 3. The relationship among variables of the study

Variable	1	2	3
1. Safety behavior	1		
2. Leadership style	0.191**	1	
3. Coronavirus anxiety	-0.120	-0.056	1

** The correlation is significant at the level of 0.01 (2-tailed).

Table 4 shows that inter-correlation values were moderately strong among the subscales of the studied variables. In addition, the highest inter-correlation was observed among the psychological and physical coronavirus subscales of the anxiety questionnaire (0.642).

Table 4. Inter-correlations of the studied questionnaires' subscales

Subscale	1	2	3	4	5	6
1. Participation	1.000					
2. Compliance	0.010	1.000				
3. Task	0.278**	-0.189**	1.000			
4. Relationship	0.364**	0.091	0.467**	1.000		
5. Physical	-0.234**	-0.036	-0.082	0.070	1.000	
6. Psychological	-0.117	-0.020	-0.103	0.054	0.642**	1.000

** The correlation is significant at the level of 0.01 (2-tailed).

The divergent validity criterion that examines the correlation of queries in the relevant domain and other domains, according to the cross-loading coefficients obtained, shows a higher correlation in almost all queries in the relevant domain than in other ones. In addition, index R^2 that indicates the effect of an exogenous variable on an endogenous variable shows appropriate compatibility of the structural model (Fig. 3).

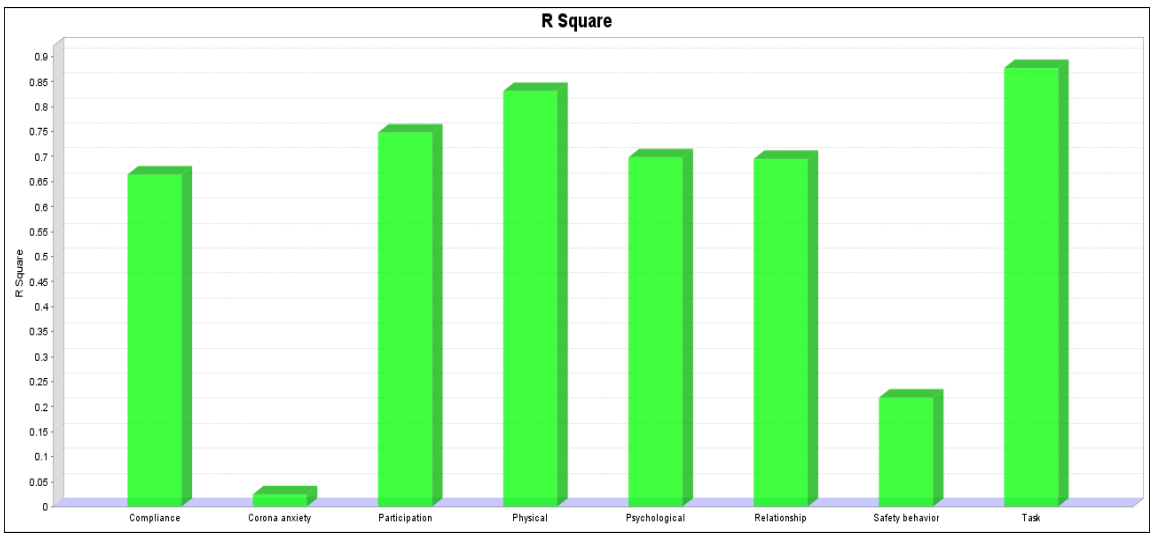

Fig. 3. Graph of R^2 values for the studied factors

Table 5 shows t- and p-values of Z coefficients. In addition, the effect of latent variables on each other is shown in this table. Accordingly, the Z coefficient was shown only for the effect of the coronavirus anxiety variable on safety behavior, having been less than 1.96; thus, their significance in relation to each other was not proven (p-value > 0.05). Besides, other relationships of the effect of latent variables on each other were determined to be significant (p-value < 0.01).

Table 5. The t- and p-values of the effect of variables on each other

Variables	T-Statistics	P-Values
Coronavirus anxiety -> Physical	82.819	**0.000
Coronavirus anxiety -> Psychological	23.085	**0.000
Coronavirus anxiety -> Safety behavior	0.358	0.72
Leadership style -> Coronavirus anxiety	2.16	*0.031
Leadership style -> Relationship	30.924	**0.000
Leadership style -> Safety behavior	7.493	**0.000
Leadership style -> Task	98.711	**0.000
Safety behavior -> Compliance	37.662	**0.000
Safety behavior -> Participation	46.32	**0.000

*P-value < 0.01
**P-value < 0.05

As for the Q2 criterion values, since this value for all structures except coronavirus anxiety and safety behavior was more than 0.10, the results show that the model moderately predicted the structures (Table 6).

Table 6. Q^2 values

Variables	Q^2
Compliance	0.242
Coronavirus anxiety	0.014
Participation	0.303
Physical	0.694
Psychological	0.454
Relationship	0.18
Safety behavior	0.048
Task	0.269

Discussion

In this study, the relationship of leadership styles and coronavirus anxiety with safety behavior was assessed among the workers of the sanitary products industry. After performing a preliminary confirmatory factor analysis and review, the questions of the questionnaires with a factor load below the acceptable level of 0.4 were corrected and deleted [35]. The Coronavirus Anxiety Scale Questionnaire, with average variance of 0.58 for the extracted values and compound reliability of 0.96, was similar to the study of Alipour et al with the Cronbach's alpha coefficient of 0.92 [30]. In addition, the total leadership style questionnaire, with average variance for the extracted values and compound reliability of 0.71, was similar to the study of Abbaspour et al [32], having had convergent validity and acceptable reliability. Besides, the safety behavior questionnaire had the average variance value of 0.44 and the compound reliability of 0.649, and in the study of Mehdinia et al, the Cronbach's alpha coefficient was 0.902 [33]. Altogether, analysis results showed that the main variables, including coronavirus anxiety, leadership style, and safety behavior were acceptable in terms of reliability [36].

The results of the analysis showed that leadership style, based on the path analysis model presented, had a significant positive effect on the workers' safety behavior. Consistent with this finding, the positive effect of safety leadership was reported on employees' safety behavior (compliance, participation, and adaptability) by Zhang et al [37]. Yu et al reported that the pressure applied by supervisors in terms of safety responsibility had a positive relationship with safety behavior, yet it had a negative relationship with work environment, work tasks, internal organization, role conflicts, and career progress [38]. This finding could be explained by the direct effect of leadership (management) safety commitments on participation and compliance safety behaviors, as well as employees' motivation and safety knowledge through adequate support for the safety and management of production pressure on employees [39]. Besides, role leadership is a source of richer safety culture and climate creation in organizations, being a predictor of perceived safety behavior among employees [33]. Regarding other factors affecting employees' safety behavior, one can refer to the effects of some factors, such as job requirements, job control, compensation, and organizational justice influence on safety behavior [23].

The results showed a direct negative relationship between leadership style and coronavirus anxiety among the workers. According to the results of the study by Jung et al, due to the negative effect of high anxiety on knowledge acquisition, safety motivation, and safety behaviors, a significant relationship was reported between employees' trait anxiety with a reduction in participation safety behavior and compliance [23]. In line with the present study, some studies reported negative effects of mental health problems on employees' safety behaviors [40]. The study of Vingilis et al reported that an increase in stress and anxiety caused by the COVID-19 pandemic were among the possible factors with negative effects on road safety, so this result is similar to the negative influence of the COVID-19 pandemic on safety behavior in the present study [41]. To explain this result, one can refer to the lack of employees' attention to safety requirements, job safety conditions, and unsafe behaviors as a result of a reduction in cognitive functions due to mental health problems, such as stress, anxiety, and depression [42]. Besides, mental health problems, such as stress and anxiety leading to time management inability, purposeful behavior, nervous pressure increase, and the reduction in the possibility of safe behavior, could make a person behave unsafely [38].

Concerning the other objectives of this study, the results showed a direct significant positive relationship between leadership style and coronavirus anxiety. Similar to the present study, a significant direct relationship was reported between task-oriented management style and job stress in creating mental health problems, like anxiety [43]. Similarly, Arifin's study reported a significant positive relationship between leadership style and work stress [44]. According to the findings of this research, the task-based leadership style had higher effects than the relationship-based style. This indicates that performing tasks is the priority of managers, which itself causes an increase in stress and anxiety, thereby aggravating anxiety due to the increase in employees' fear of the possibility of contracting coronavirus [5]. In this situation, managers are advised to strike a balance between the objective performance of their tasks and controlling fear and anxiety among employees, especially when they are in an unknown new situation, such as the Coronavirus, in terms of its consequences [45]. By helping employees adapt to this situation, managers in addition to maintaining subordinates' health will make an improvement in employee performance [46, 47]. Developing empathy in the organization so that all people think they are more important than the routine tasks of the organization can be useful in managing such

situations [48]. Concerning the Q2 standard values, the index shows how good the structures are, with values more than 0.1 confirming the goodness of the structure.

In the present study, the effects of demographic variables and other influencing factors on the variables of safety behavior and coronavirus anxiety among employees were examined. For future research, in addition to examining the effect of the aforementioned variables, it is recommended that the model be examined in other industries or organizations, such as hospitals. The present study was cross-sectional, so future studies can be designed longitudinally to check whether the presented model is without change over time or if it has changes. Besides, it is suggested that in this model the influence of other mediating factors on variables, such as the safety climate, job satisfaction, safety culture, and the like be examined for future studies.

Conclusion

Based on the results obtained, in addition to the safety behavior of workers affected by coronavirus anxiety, the leadership style can affect the safety behavior and coronavirus anxiety among the workers. In addition, based on the method of structural equation modeling, it is possible to predict anxiety and safety behavior among workers using the leadership style.

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Conflict of interest: None declared.

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