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Original Article

An Analysis of Individual and Social Factors Affecting Occupational Accidents

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ABSTRACT

Background: Workforce health is one of the primary and most challenging issues, particularly in industrialized countries. This article aims at modeling the major factors affecting accidents in the workplace, including general health, work–family conflict, effort–reward imbalance, and internal and external locus of control.

Methods: A cross-sectional study was conducted in Esfahan Steel Company in Iran. A total of 450 participants were divided into two groups—control and case—and the questionnaires were distributed among them. Data were collected through a 7-part questionnaire. Finally, the results were analyzed using SPSS 22.0 and Amos software.

Results: All the studied variables had a significant relationship with the accident proneness. In the case group, general health with a coefficient of −0.37, work–family conflict with 0.10, effort–reward imbalance with 0.10, internal locus of control with −0.07, and external locus of control with 0.40 had a direct effect on occupational stress. Occupational stress also had a positive direct effect on accident proneness with a coefficient of 0.47. In addition, fitness indices of control group showed general health (−0.35), work–family conflict (0.36), effort–reward imbalance (0.13), internal locus of control (−0.15), and external locus of control (0.12) have a direct effect on occupational stress. Besides, occupational stress with a coefficient of 0.09 had a direct effect on accident proneness.

Conclusion: It can be concluded that although previous studies and the present study showed the effect of stress on accident and accident proneness, some hidden and external factors such as work–family conflict, effort–reward imbalance, and external locus of control that affect stress should also be considered. It helps industries face less occupational stress and, consequently, less occurrence rates of accidents.

1. Introduction

Workforce health is one of the primary and most challenging issues, particularly in industrialized countries. Accident is one of the phenomena threatening workforce health, which has been expanded by technological advancement and has inflicted financial loss on human societies [1]. Occupational damage has significant adverse effects on families. For instance, Lawton and Parker [2] claimed that the ratio of divorce in workers with musculoskeletal disorders is 1.9 times more than that of a healthy worker. In 2007, about 3,280,000 injuries and occupational diseases were recorded [3]. According to the World Health Organization, each year, nearly 100 million workers get injured, and about 200,000 deaths occur because of occupational accidents [4]. The financial burden of occupational injuries and illnesses is high in comparison with that of cancer, Alzheimer's disease, and human immunodeficiency virus and cardiovascular diseases [5].

Various studies have been conducted to survey the causes of accidents, including the well-known Heinrich's domino theory [6]. After the study by Heinrich in 1931 and the presentation of the domino model, the idea that the human plays the most critical role in the occurrence of the accident was formed. According to his study, 88%, 10%, and 2% of the causes of the accidents are related to unsafe acts, unsafe conditions, and unpredicted factors, respectively [7]. Fig. 1 represents Heinrich's domino model.

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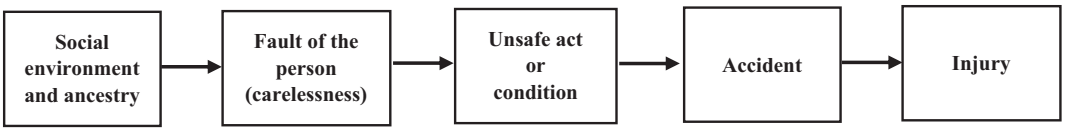

Fig. 1. Heinrich's domino model of accident causation [6].

Because unsafe acts and individual factors have been identified as one of the most important causes of accidents in the past, it is essential to identify the factors that influence the unsafe acts. One of the causes of unsafe acts is stated in studies regarding stress. The International Labour Organization estimated the costs incurred by countries for job stress between 1% and 3.5% of gross domestic product [8]. According to the World Health Organization, more than half of the staff in the industrialized countries suffers from occupational stress [9]. The study of work stress in people with nonfatal accidents can be useful in finding out the causes of workplace accidents [10]. Studies on unsafe acts have shown that occupational stressors constitute a significant contributor to unsafe acts by reducing concentration, distraction, memory impairment, job hesitation, and reducing decision-making power. Accordingly, the results of various studies have shown the role of occupational stressors in 37% of accidents and injuries in industries [11]. In addition to the parameters such as individual factors, environmental conditions (sound, radiation, and lighting), and ergonomic conditions of the workplace, some social and psychosocial parameters can also be considered as effective causes of accidents [12,13]. Neal et al [14] created an efficient framework, which showed that the individual and psychosocial factors in the workplace affect safety outcomes. Today, the occurrence of organizational and managerial changes in the world of work has led to new risks and challenges in the field of occupational safety and health. Psychosocial risks in the workplace are one of the most critical emerging risks in this field [15]. Among these factors, workload and mental load, social support for colleagues, work–family conflict, management feedback, job reward, leadership quality, and work-related stress can be mentioned. These factors can affect the workers or interact with other factors to apply their effects [16]. One of the first steps in preventing accidents is identifying the factors affecting it. Previous studies have examined the relevant parameters and have explained the various causes of accidents. However, the individual and social factors that affect occupational accidents have not been integrated into the steel industry yet, and thus, there is not a comprehensive study conducted considering these factors.

Therefore, the present study aims to model these factors (including general health, work–family conflict, effort–reward imbalance, and the internal and external locus of control), which according to the previous studies, influence individual acts and occurrence of the accident.

2. Methodology

This cross-sectional study was conducted in Esfahan Steel Company. Because the steel industry is composed of different parts and according to the statistics and severity of accidents recorded in the safety and health department, the rolling section was selected as the case study, and the accident statistics of the past 5 years were collected and analyzed. Based on the statistics of accidents recorded in years 2014–2018, 225 participants were selected as the case group. To conduct analysis and statistical tests, 225 participants who had not experienced an accident during the past 5 years were randomly selected as the control group. The inclusion criteria in the case group were the lack of mental illness, the lack of specific drug use, having at least 1 year of work experience in the company, and having an accident experience during the last 5 years, and the inclusion criteria in the control group were the lack of mental illness, the lack of specific drug use, having at least 1 year of experience in the job, and having no accident experience in the past 5 years. The questionnaires were distributed among all 450 participants of both the groups. All participants were men, and they received safety training. They were notified about the aims of the research and lack of disclosure before they completed the questionnaires. They also completed the questionnaires in the presence of the researchers.

2.1. Research hypotheses

The proposed model presented in Fig. 2 intends to investigate the assumptions that are consistent in this study, model them, and then apply the model to one part of the steel industry. The hypotheses of the present study are that whether general health (hypothesis 1), work–family conflict (hypothesis 2), effort–reward imbalance (hypothesis 3), internal locus of control (hypothesis 4), and external locus of control (hypothesis 5) have a direct impact on occupational stress in both studied groups. The sixth hypothesis is that whether occupational stress has a direct impact on accident proneness (a measure for occupational accidents).

2.2. Research materials

Data were collected via a seven-part questionnaire. The sections of this questionnaire were as follows:

1. Demographic characteristics such as age, occupation, marital status, and a question whether the participants have already had a safety training orientation.
2. Work–family conflict questionnaire: The work–family conflict questionnaire designed by Carlson et al [17] was used as the second part. This questionnaire considers all three conflict segments (time, pressure, and behavior) in two areas of work-to-family and family-to-work conflict. The scientific credit and Cronbach α of the questionnaire is 0.87. In addition, Likert's five-point scale (1 = completely disagree to 5 = completely agree) was used in this study [18]. Validity and reliability of this questionnaire were investigated by Motesharrei and Arshadi [19] and confirmed by obtaining Cronbach α of 0.91.
3. Effort–reward imbalance questionnaire: The questionnaire was designed by Bosma et al [20] which includes 23 questions and three parts of effort, reward, and commitment. The scope of effort is measured with six questions and refers to work conditions and requirements. The highest level in this area reflects the overwhelming efforts the individuals put into their work, so they get more stressed. In the present study, this questionnaire was used, and Cronbach α, for determining the internal consistency of the questionnaire, was considered as 0.61, 0.85, and 0.67 for effort, reward, and commitment, respectively.
4. General health questionnaire: This questionnaire is a screening tool developed by Goldberg [21] which was used in epidemiology studies of psychiatric disorders. This questionnaire has 28 questions in four subscales of physical symptoms, anxiety and insomnia, social function, and depression. Taghavi [22]

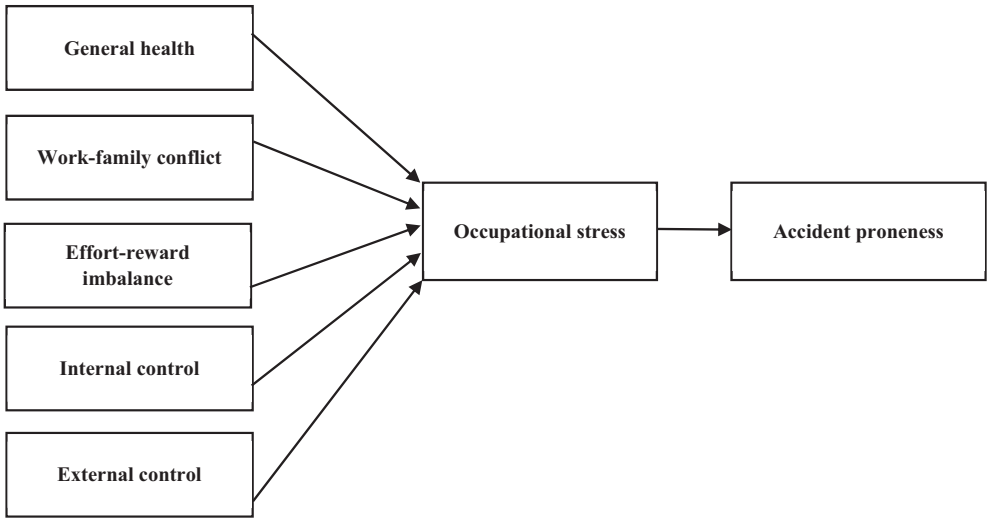

Fig. 2. Theoretical model of the present study.

reported the reliability of the questionnaire with three methods of reevaluation, coordination, and Cronbach α as 0.70, 0.93, and 0.90, respectively.

5. The work locus of control questionnaire: This questionnaire, which was developed by Spector [23], has 16 questions. Questions 1–8 of the questionnaire measure internal locus of control (the control of individuals on tasks and their inhibitions), and the questions 9–16 are designed to evaluate external locus of control (efforts and external factors). Responses were designed in the six-level Likert scale and range from "strongly disagree" to "strongly agree". In the research by Zandipour et al [24], the Cronbach α for this tool was obtained as 0.88.
6. Occupational stress questionnaire: This questionnaire was developed by Wooten et al [25] to measure employee perceptions of job stresses, which includes 15 questions and four subscales: performance, work density, organizational field, and decision-making, and it has six choices: "1 = absolutely disagree", "2 = disagree", "3 = somewhat disagree", "4 = somewhat agree", "5 = agree", and "6 = absolutely agree". The reliability of this questionnaire was obtained as 0.87.
7. Accident proneness questionnaire: Accident proneness is one of the most important personality traits and very important in the safety of workplace [26]. Accident proneness is completed by a questionnaire consisting of 39 questions on a five-point Likert scale. After collecting the questionnaires, each question was scored as "1 = absolutely disagree", "2 = disagree", "3 = no idea", "4 = agree", and "5 = absolutely agree". In a study conducted by Barkhordari et al [27], Cronbach α was obtained as 0.86 to determine the internal consistency of the questionnaire.

Finally, using SPSS 22.0 software, statistical analysis of correlated variables was examined, and then, using Amos software, seven main parameters along with 139 questions related to six sections of work–family conflict, occupational stress, general health, effort–reward imbalance, work locus of control, and accident proneness were reviewed, and a corresponding model was presented. The Kolmogorov–Smirnov test was not significant in this study, which shows the normality of the data. Hence, correlation between independent and dependent variables was calculated using Pearson correlation coefficient. To examine the fitness of the proposed model, three categories of absolute, comparative, and parsimonious fit indices were used.

3. Results

The mean and standard deviation of their age were 36 and 5.3 years, respectively; the youngest and oldest participants were 25 and 55, respectively. A total of 26 participants (6.4%) were single, and 379 participants (93.6%) were married. The mean and standard deviation of their work experience were 14 and 5.4 years with a minimum and maximum experience of 5 and 29 years, respectively.

Two correlation matrices in the two studied groups are separately presented in Tables 1 and 2. As shown in these tables

Table 1
Correlation matrix of the studied parameters for the case group.

Variables	1	2	3	4	5	6	7	Mean	SD
General health	———							50.208	5.362
Work–family conflict	−0.42**	———						49.280	5.016
Effort–reward imbalance	−0.15**	0.51**	———					54.471	7.658
Internal locus of control	0.49**	−0.48**	−0.60**	———				24.982	3.689
External locus of control	−0.50**	0.47**	0.58**	−0.81**	———			34.041	4.458
Occupational stress	−0.66**	0.53**	0.39**	−0.69**	0.75**	———		40.453	6.110
Accident proneness	−0.28**	0.38**	0.53**	−0.37**	0.39**	0.47**	———	81.035	15.603

(1) General health, (2) work–family conflict, (3) effort–reward imbalance, (4) internal locus of control, (5) external locus of control, (6) occupational stress, and (7) accident proneness.
**$p < 0.05$.
SD, standard deviation.

Table 2
Correlation matrix of the studied parameters for the control group.

Variables	1	2	3	4	5	6	7	Mean	SD
General health	———							45.008	4.832
Work–family conflict	0.05	———						65.680	6.091
Effort–reward imbalance	0.14**	0.38**	———					42.164	4.701
Internal locus of control	0.02	−0.03	−0.64**	———				32.826	3.875
External locus of control	−0.08	0.17**	0.65**	−0.52**	———			25.911	6.430
Occupational stress	−0.32**	0.41**	0.39**	−0.32**	0.37**	———		36.804	8.167
Accident proneness	−0.20**	0.08	0.06	0.06	0.01	0.09	———	78.604	17.454

(1) General health, (2) work–family conflict, (3) effort–reward imbalance, (4) internal locus of control, (5) external locus of control, (6) occupational stress, and (7) accident proneness.
**$p < 0.01$.
SD, standard deviation.

(correlation matrices of the case and control groups including all studied parameters), all the studied variables had a significant relationship with accident proneness.

4. Theoretical model test of the study

4.1. Fitness of the case group–related model

In Table 3, the fitness indices of the control group are separately reported.

Fig. 3 illustrates the proposed model of the case group. In this figure, general health with a coefficient of −0.37, work–family conflict with 0.10, effort–reward imbalance with 0.10, internal locus of control with −0.07, and external locus of control with 0.40 have a direct impact on occupational stress. Occupational stress also has a positive direct impact on accident proneness with a coefficient of 0.47. The direct effects and T coefficients are presented in Table 4.

In Table 4, general health with a coefficient of −0.37 has a significant adverse effect on occupational stress, so that with increasing general health, occupational stress decreases. It should also be noted that work–family conflict (0.10), effort–reward imbalance (0.10), and external locus of control (0.40) have a positive effect on occupational stress. Internal locus of control (−0.07) has no significant effect on occupational stress, and occupational stress with a coefficient of 0.47 has a significant positive effect on accident proneness.

4.2. Analyzing the mediating role of occupational stress in the case group

In the present study, occupational stress plays the role of a mediator in the relationship among general health, work–family conflict, effort–reward imbalance, internal locus of control, external locus of control, and accident proneness. The indirect effects of this variable's mediating role are presented in Table 5. The results of this table show that general health with a coefficient of −0.17 has an adverse indirect effect on accident proneness and that external locus of control with a coefficient of 0.19 has a positive indirect effect on accident proneness.

4.3. Fitness of the control group–related model

The fitness indices of the control group are separately reported in Table 6. In Fig. 4, general health with a coefficient of −0.35, work–family conflict with, 0.36, effort–reward imbalance with, 0.13, internal locus of control with, −0.15, and external locus of control with, 0.12 have a direct effect on occupational stress. In addition, occupational stress with a coefficient of 0.09 has a direct effect on accident proneness.

Table 7 shows the direct effects and T coefficients. In this table, general health (−0.35) has a significant adverse effect on occupational stress; hence, increasing general health reduces occupational stress. It should also be noted that lack of work–family conflict (0.36), external locus of control (0.12), and internal locus of control (−0.15) had a significant effect on occupational stress. The effect of effort–reward imbalance was not significant on occupational stress. Moreover, occupational stress with a coefficient of 0.09 does not have a significant impact on accident proneness.

4.4. Analyzing the mediating role of occupational stress in the control group

In this study, occupational stress plays a mediating role in the relationship between general health, work–family conflict, effort–reward imbalance, internal and external locus of control, and accident proneness. Table 8 shows the results of estimating indirect impacts of this mediator. These results demonstrated that in the case group, occupational stress does not have a mediating role in this relationship.

4.5. Comparing the theoretical models for the case and control groups and analyzing the hypotheses

The results of examining the hypothesis related to the differences between these two groups in terms of different parameters are presented in Table 9.

Table 3
Fitness indices of the examined model (case group).

Indices	Name	Abbreviation	Fitness	Obtained amount
Absolute fitness indices	Goodness-of-fit index	GFI	>0.9	0.91
	Adjusted goodness-of-fit index	AGFI	>0.9	0.95
Comparative fitness indices	Normed fit index	NFI	>0.9	0.94
	Comparative fit index	CFI	>0.9	0.96
	Incremental fit index	IFI	(0,1)	0.90
Normed fit index	Parsimonious normed fit index	PNFI	>0.5	0.61
	Root mean squared error of approximation	RMSEA	<0.1	0.07
	Normed Chi-square	X2/df	(1,3)	2.03

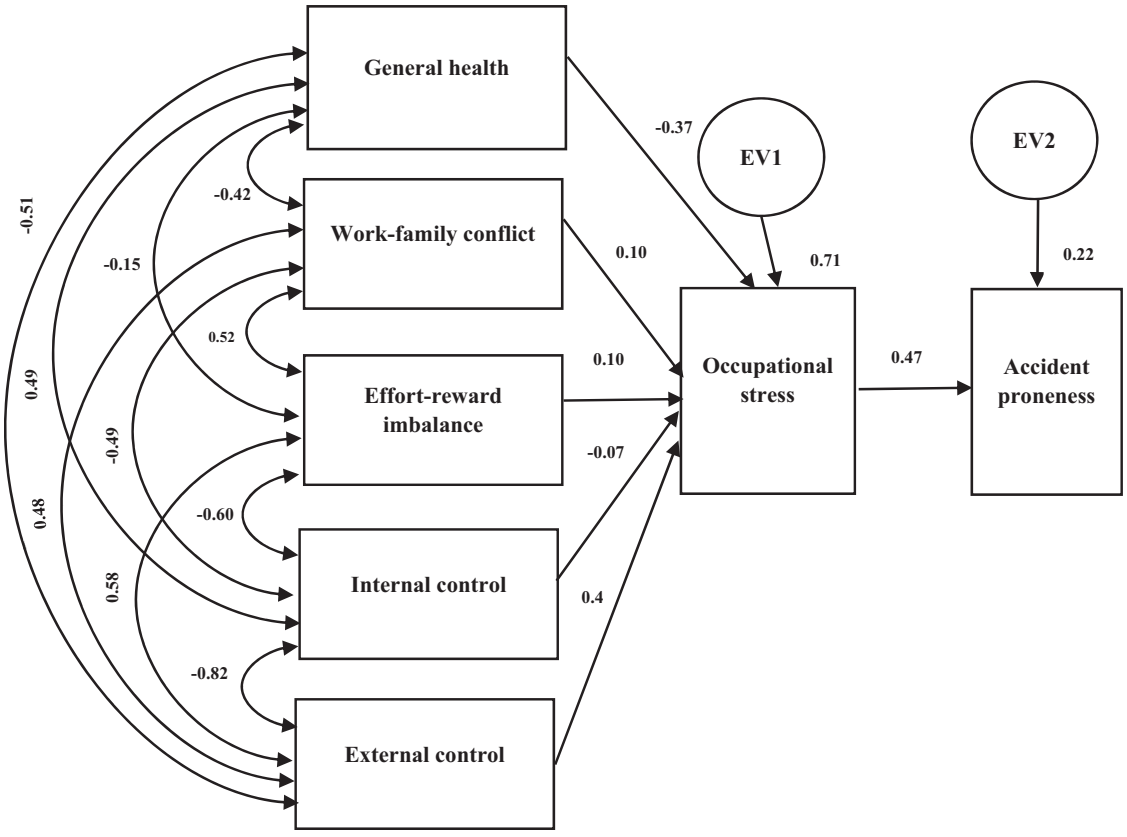

Fig. 3. Theoretical model of the present study for the case group.

Table 4
Direct effects of the examined model on the case group.

Path	Direct effect	T-statistics	Explained variance (EV)	Significance level
On occupational stress from	—		0.71	—
General health	−0.37	−7.97	—	0.001*
Work−family conflict	0.10	2.15	—	0.001*
Effort−reward imbalance	0.10	2.01	—	0.001*
Internal locus of control	−0.07	−1.02	—	0.30
External locus of control	0.40	6.08	—	0.001*
On accident proneness	—	—	0.22	—
Occupational stress	0.47	8.01	—	0.001*

*$p < 0.01$.

Table 5
Indirect effects of the examined model on the case group.

Path	Direct effect	T-statistics	Significance level
On accident proneness from	—	—	—
General health	−0.17	3.78	0.001*
Work−family conflict	0.05	0.67	ns**
Effort−reward imbalance	0.05	0.90	ns**
Internal locus of control	−0.03	0.12	ns**
External locus of control	0.19	3.29	0.001*

*$p < 0.01$.
**ns, nonsignificant.

5. Discussion

The purpose of this study is to model the factors that affect the accident in the workplace. The findings of this study demonstrated that there is a significant correlation among accident proneness and general health, work−family conflict, effort−reward imbalance, work locus of the control, and occupational stress in the case group. In this way, accident proneness had an inverse relationship with general health and internal locus of control and correlated with the other variables. On the other hand, this association was found only between accident proneness and general health in the control group, and the relationship between these two variables is inverse. In addition, the analysis of the path showed that the goodness-of-fit indices in the case group were higher than the acceptable level, and the model was correctly matched. In addition, structural equations showed that the studied variables explain occupational stress up to 40% in the control group and 71% in the case group. Furthermore, stress does not account for 1% of accident proneness changes in the control group and 22% in the case group. In general, the model presented for the control group showed that factors such as general health and internal locus of control are inversely affecting occupational stress. However, work−family conflict, effort−reward imbalance, and external locus of control directly affect occupational stress. The reason for this could be that according to studies, if one considers themselves as

Table 6
Goodness-of-fit index of the studied model (control group)

Indices	Name	Abbreviation	Fitness	Obtained amount
Absolute fitness indices	Goodness-of-fit index	GFI	>0.9	0.97
	Adjusted goodness-of-fit index	AGFI	>0.9	0.93
Comparative fitness indices	Normed fit index	NFI	>0.9	0.94
	Comparative fit index	CFI	>0.9	0.95
	Incremental fit index	IFI	0-1	0.95
Normed fit index	Parsimonious normed fit index	PNFI	>0.5	0.62
	Root mean squared error of approximation	RMSEA	<0.1	0.03
	Normed Chi-square	X2/df	(1,3)	3.03

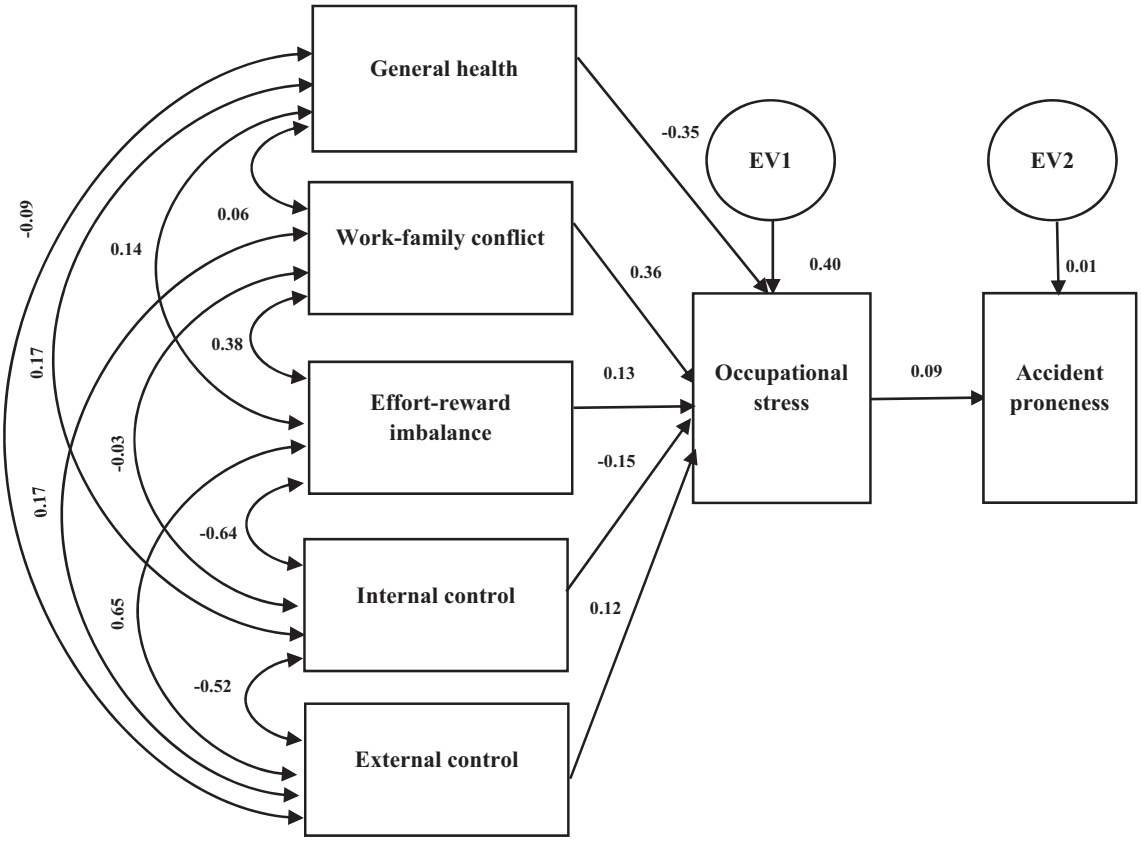

Fig. 4. Theoretical model of the present study for the control group.

Table 7
Direct effect of the studied model on the control group

Path	Direct effect	T-statistics	Explained variance (EV)	Significance level
On occupational stress from	—	—	0.40	—
General health	−0.35	−7.97	—	0.001*
Work−family conflict	0.36	2.15	—	0.001*
Effort−reward imbalance	0.13	1.48	—	0.13
Internal locus of control	−0.15	−2.02	—	0.05
External locus of control	0.12	2.69	—	0.05
On accident proneness	—		0.01	—

*$p < 0.01$.

responsible for their own behavior and performance, they will try to do everything perfectly to reduce their pressure. In addition, the healthier the person is physically and psychologically, the less pressure he/she tolerates. On the other hand, there are pressure factors such as family-to-work conflict and occupational responsibilities, lack of proper management to balance the person's activity, and feedback and rewards received from the environment. Moreover, the idea that a person does not control his/her own behavior and all controls are inflicted from outside increases the pressure and leads to a higher level of occupational stress [20,28]. As mentioned earlier, general health can also affect occupational stress; hence, the healthier the person is physically and psychologically, the more pressure he/she tolerates, which increases the level of occupational stress. The study conducted by Day et al [29], who examined the different levels of mental health and occupational stress and the relationship among these factors and

Table 8
Indirect effects of the examined model on the control group

Path	Direct effect	T-statistics	Significance level
On accident proneness from	—	—	—
General health	0.03	0.14	ns*
Work–family conflict	0.03	0.90	ns*
Effort–reward imbalance	0.01	0.89	ns*
Internal locus of control	−0.01	0.67	ns*
External locus of control	0.01	0.67	ns*

ns, nonsignificant.

occupational accidents, showed that there is a significant correlation between general health and occupational stress, which is consistent with the results of the present study. It can also be concluded that exposure to occupational stress can affect attention and mental health of the individual, so by disrupting the person, a reduction in the efficiency and safety level of the individual occurs.

The results of the test were consistent with the second hypothesis and showed that work–family conflict in both groups positively affects occupational stress, so that when work–family conflict increases, the level of occupational stress increases. Hammer et al [30] showed the relationship among psychosocial factors in the workplace and occupational stress. The results of this study were consistent with those of Malakoutikhah et al [18] and Smith and DeJoy [31]. Malakoutikhah et al [18] modeled the factors affecting the accident and concluded that work–family conflict affects stress, which leads to an increase in occupational accidents. Smith and DeJoy [31] also examined the factors affecting occupational accidents in a comprehensive study, and one of their organizational parameters was work–family conflict. Their results showed that this kind of conflict among other organizational parameters had more association with the accident, and some of those with more conflict, experienced the higher level of accident severity. Their results are similar to the ones in the present study, which demonstrated that this kind of conflict is an effective factor in the occurrence of the accident. Because conflict means inconsistency between responsibilities, if the conflict arises between the family and occupational responsibilities of the person, the pressure imposed on the individual increases, which leads to a higher level of occupational stress. As the results of the present study suggest, it can affect the occurrence of the accident; hence, managers can control occupational accidents by controlling this type of conflict and stress and increase the health level of their employees.

Besides, the results of this study showed a significant and direct correlation between the work–reward imbalance and occupational stress in the case group, which confirms the third hypothesis. An explanation for this finding can be found in the study conducted by Rehman et al [32] who examined the relationship between effort–reward imbalance model and occupational stress, and they strongly supported the effort and reward theory through their findings. The results of this study showed that a high percentage of employees had both occupational stress and job dissatisfaction, which were shown by high effort and low reward in their occupational life. Tsutsumi and Kawakami [33] have argued that occupational effort and reward have direct effects on occupational stress. However, the fundamental theory and their main models showed significant support for the relationship between these two variables. The present study also showed that there is a significant and direct correlation between effort–reward imbalance and occupational stress. Both factors of effort and reward are likely to have substantial effects on stress. According to the results of this study and other similar studies, we can conclude that almost always we face different ratios of effort–reward imbalance, the most frequent of which is between 40% and 60% of the total number of workers.

Furthermore, the results showed that in the control group, the effect of internal locus of control on occupational stress was negative and significant, and with the increase in internal locus of control, the amount of job stress decreased. The findings from the study conducted by Kirkcaldy et al [34] showed that there is a relationship between work locus of control and some outcomes such as stress and health. In their research, they found that the source of internal locus of control was associated with low levels of job stress. On the other hand, Karimi and Alipour [35] found that people with an external locus of control have a poor physical health, such as mental health, and feel higher stress in their work environment. These findings are consistent with our results in both groups, and thus, the fourth and fifth considered hypotheses are confirmed.

In elaborating the sixth considered hypothesis, occupational stress had a significant positive effect on accident proneness in the case group, but in the control group, this relationship is not significant. We can refer to the results of the present study based on the structural model test, which shows that occupational stress has a significant positive effect on accident proneness in the case group, but this is not significant in the control group. This result is in line with that of the study conducted by Mohammadfam et al [36] who investigated the relationship between occupational stress and unsafe acts of occupational accidents and found that there is a

Table 9
Examining and comparing these two groups regarding the considered hypotheses

Path	Group	Group effects	T-statistics	p	Hypothesis analysis
General health > occupational stress	Case Control	−0.37 −0.35	−7.97 −7.97	0.40	In both groups, it has a significant negative impact on occupational stress. The two groups do not have significant differences.
Work–family conflict> occupational stress	Case Control	0.10 0.36	2.15 3.27	0.01*	In both groups, it has a significant positive effect on occupational stress. The effect of work–family conflict on occupational stress is higher in the control group, and the difference is significant in both groups.
Effort–reward imbalance > occupational stress	Case Control	0.10 0.13	2.01 1.48	0.01*	It has significant differences in the case group, but has no significant differences in the control group.
Internal locus of control >occupational stress	Case Control	−0.07 −0.15	−1.02 −2.02	0.01*	There is no significant effect in the case group, but in the control group, the effect of internal locus of control on occupational stress is negative and significant.
External locus of control	Case Control	0.40 0.12	6.08 2.69	0.01*	It has a positive and significant effect on both groups.
Occupational stress > accident proneness	Case Control	0.47 0.09	8.01 1.42	0.01*	Occupational stress has a significant positive effect on accident proneness in the case group, but in the control group, this relationship is not significant.

* $p < 0.05$.

significant direct relationship between occupational stress and insecure acts and incidents, so that 1% increase in unsafe acts increases occupational stress by one score, and it has an increasing impact on accidents. In addition, the work by Julià et al [37] examined the relationship between occupational stress and accidents and showed that there is a significant relationship between stress and occupational accidents. Although outliers may obviously affect the estimations of our parameters [38], the results of previous studies are consistent with those of the present study, and therefore, the sixth hypothesis is also confirmed.

In the current article, we considered some hidden and external, but crucial, factors affecting occupational stress, which itself based on the previous studies, affects accidents in the workplace. Industries can control and reduce the level of severity of occupational stress to reduce the occurrence of accidents. However, to do so, some factors such as work–family conflict, effort–reward imbalance, and external locus of control should be taken into account by educating individuals and creating a balanced environment with defined responsibilities. This article demonstrated that occupational stress can be reduced by increasing general health, training for accountability, and internal locus of control in individuals.

The limitation of this study lies more in the fact that only questionnaires were used to examine all the hypotheses. It is possible that people recall bias in reporting to questionnaires.

Conflicts of interest

The authors declare no conflict of interest.

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