Original Article

The role of fatalistic beliefs and safety climate in predicting work situation awareness among workers of one petrochemical industry in Asaluyeh, Iran, in 2014

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Abstract

Background: An important factor in the prevention of industrial accidents is the ability of employees to maintain awareness of the work situation, understand the information it holds, and predict how situations will develop. In the present study, we examined the role of fatalistic beliefs and safety climate in predicting occupational situation awareness (SA) among workers.

Materials and Methods: This was a cross-sectional study. The sample consisted of 180 employees of one petrochemical industry in Asaluyeh, Iran, in 2014. Subjects were selected using the stratified random sampling method and responded to questionnaires about demographic characteristics, occupational SA (Sneddon et al.), fatalistic beliefs (Williamson et al.), and safety climate (Hayes et al.). The data were analyzed using correlation techniques and stepwise regression.

Results: The results showed internal correlation among fatalistic beliefs, safety climate, and occupational SA. Moreover, the results of stepwise regression analysis revealed that fatalistic beliefs and safety climate significantly predicted, respectively, almost 18% and 20% of variances of occupational SA among workers.

Conclusions: According to the findings of the present study, fatalistic beliefs and safety climate can predict occupational SA. Therefore, considering these variables can be important in promoting the awareness of work situation among workers.

Keywords: Safety, Climate, Occupational, Awareness, Workers

Introduction

One critical element in predicting occupational accidents is the ability of employees to maintain an adequate understanding of their work situation. This means having a high level of awareness of job duties and workplace conditions, and judging how these may change in the near future to predict how the situation will develop (1, 2). Cognitive psychologists have long been interested in attention skills (3), and the role of cognitive skills in safety issues is well documented (4). In industrial companies, the necessary attention skills are referred to as situation awareness (SA). SA is defined by Endsley as: "... the perception of the elements in the environment within a volume of space and time, the comprehen sion of their meaning, and the projection of their status inthe near future" (5). SA has been further studied in the aviation industry (6). In recent years, studies have performed on SA in fields such as aircraft maintenance

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(7), the military (8), driving (9), anaesthesia (10), the maritime industry (11), and nuclear power plants (12). In many high-risk industries and organizations, for example in oil and gas exploration, employees work on remote installations, often in high time-pressured, dangerous conditions (13). Ongoing research of the causal events shows failures in SA and risk assessment in these workplaces (14). Therefore, it is important to identify factors which reduce occupational SA. Cognitive skills, such as occupational SA, are known to be susceptible to psychological and organizational factors such as fatalistic beliefs and safety climate (15, 16). This study was designed to examine the role of fatalistic beliefs and safety climate in predicting work safety situation.

Fatalism describes the belief that injuries are unavoidable and occur haphazardly or due to fate (17). It is negatively related with reporting job risk (18) and is positively related with self-care disorder (19). The belief in fatalism has negatively influenced the acceptance of safe work practices (20). Fatalism is described as a complicated psychological construct that can be recognized by perceptions of worthlessness, powerlessness, hopelessness, and futility (21). The results of the study by Patwary, et al. showed that fatalistic beliefs among personnel, who attributed events to fate, of an organization reflect their perceived lack of control over accidents and reveals a lack of organizational awareness that can occur within a culture of fatalism (22).

Furthermore, studies showed that workers with negative perceptions of safety climate in an organization (e.g., high workload, work pressure) tend to engage in unsafe acts, which in turn increases their susceptibility to accidents and injuries (23, 24). Safety climate is defined here as: "employees' perceptions pertaining to safety policies, procedures, and practices" [Zohar (25)]. Policies and procedures are the guidelines established to certify safe behavior, and practices are the implementation process of the policies and procedures as well as workers' perceptions of the relative importance of safe behavior at the workplace (26). The previous researches have indicated that a positive safety climate is a critical part of a safe workplace (27). Based on the abovementioned materials, the aim of the current research was to investigate the relationship of fatalistic beliefs and safety climate with occupational SA. Hitherto, few researches (particularly in Iran) have been carried out on occupational SA and the present research is new in this respect.

Materials and Methods

Participants

This cross-sectional study was administrated between October and November 2014 at one petrochemical industry in Asaluyeh, Iran. Asaluyeh is located on the shore of the Persian Gulf some 270 km southeast of the provincial capital of Bushehr and is best known as the site of the land-based facilities of the large Pars Special Energy Economic Zone (PSEEZ) project (28). In this study, considering the extent and distribution of the employees in different parts of this company, stratified random sampling method was used to select subjects. To determine the sample size, a pilot study was carried out in which 50 petrochemical employees participated. Based on the results of the pilot study, with confidence level of 95% and study power of 80%, sample size was calculated to be 190 workers. Participants in this research were randomly selected from the corresponding personnel list; thus, workers of important jobs and units (i.e. operation, engineering, security, health, safety, and the environment (HSE), and firefighting, maintenance, and office workers) were included. In order to have enough subjects in each job group, proportional to size methodology was applied

(29). All participants were men. An informed consent was obtained from each participant. In addition, the study was approved by the ethics committee of the School of Psychology and Educational Sciences of Allameh Tabataba'i University. The inclusion criteria of this study were employment at the company's sectors and random selection from among the members of his/her group. The exclusion criteria were the delivery of an incomplete questionnaire, and unwillingness to participate in the current research. Finally, 4 subjects were excluded unwillingness to participate, and 6 due to incomplete questionnaires (in total 10 people). In total, 180 completed questionnaires were collected. In order to control the confounding factors, questionnaires were completed by subjects in a quiet environment and away from the noise. Written informed consents were obtained from each of the participants to participate in this research. Moreover, a cover letter explained the purpose of the study, and assured the participants of the confidentiality of the results. They were ensured that their responses would not be viewed by managers and supervisors and the results will be evaluated collectively, not individually. Respondents were asked to return completed questionnaires inside sealed envelopes either to the person who had distributed them or directly to the research team. This study was approved and financially supported by the Research Committee of the School of Psychology and Educational Sciences of Allameh Tabataba'i University and National Petrochemical Company.

Measurements: Validated instruments were used for data collection on occupational SA, fatalistic beliefs, and safety climate. First, all questionnaires were translated from English to Persian and independently back-translated into English by a second translator. The few discrepancies between the original English and the back-translated version resulted in adjustment in the Persian translation based on direct discussion between the translators. In the next step, psychometric characteristics of instruments were examined. Linguistic validation was performed by 3 experts of the Department of Psychology and 5 experts of Department of Health and Safety. Thus, the questionnaires were piloted and finalized with an advisory group of workers to ensure that the items of the scales were comprehensible and appropriate to the context. Moreover, conceptual analysis confirmed the content validity of all instruments. The questionnaires were distributed among workers with the help of the union steward. The following questionnaires were used**.**

- **Demographic factors**: In this questionnaire, 6 demographic factors, namely age, gender, marital status, education, years of working experience, and shift were included. Marital status was classified as married or not married (including divorced and widowed).
- **Occupational situation awareness (SA):** The 20-items questionnaire was designed by Sneddon and et al. (30). Respondents indicated the extent of their agreement with each statement on a 5-point Likert-type scale [0 (very often)-5 (never)]. This scale consists of 5 positive questions (such as: "I think ahead of my work to plan for different possible outcomes"), and 15 negative questions (such as: "I am easily distracted by my thoughts or feelings"). Sneddon et al., in their study, calculated and obtained acceptable internal reliability (Cronbach's alpha = 0.86) and good validity for this scale (30). The reliability of this scale, as administered to Iranian relevant populations, was calculated in this research; alpha coefficient = 0.79 and split-half coefficient = 0.75. The validity coefficients of questions were between 0.25 and 0.79, and all validity coefficients were significant at $p < 0.001$.

- **Fatalistic beliefs:** The 4-items questionnaire was made by Williamson and et al. (31). The items refer to views on importance and controllability of safety hazards and are scored based on a 5-point Likert style scale from 1 (strongly disagree) to 5 (strongly agree). A sample item is: ‘‘Accidents will happen no matter what I do’’. The scores of participants were obtained by adding their responses to a 4-items questionnaire. The higher scores indicate that employees perceive safety hazards as inevitable and uncontrollable. The reliability of this scale, as administered to Iranian relevant populations, with original data of this research, was calculated using alpha coefficient (0.78) and split-half coefficient (0.73).
- **Safety climate:** Workers’ perceptions of safety climate were measured with the 20-item Workplace Safety Scale (WSS) developed by Hayes et al. (32). This instrument assesses employees’ perceptions of work safety and measures 5 distinct constructs of safety climate, each with 10 items. The 5 constructs consist of job safety perception (sample item: “Safety programs are effective”; α = .88), coworker safety perception (sample item: “Pay attention to safety rules”; α = .77), supervisor safety perception (sample item: “Enforce safety rules”; α = .91), safety management perception (sample item: “Respond to safety concern”; α = .89), and safety programs and policies perception (sample item: “Effective in reducing injuries”; α = .81). The total coefficient α score was 0.91. The WSS was scored on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly disagree). The scores of participants were obtained by adding their responses to the 20 items of the questionnaire. Higher scores indicate that employees perceive a better safety climate in their work environment. Past research has shown this questionnaire to have good psychometric properties (33). The reliability of this scale, as administered to Iranian relevant populations, in this research, was calculated using alpha coefficient (0.87) and split-half coefficient (0.77). The validity coefficients of questions were between 0.24 and 0.87 and all validity coefficients were significant at $p < 0.001$.

Table 1: Demographic characteristics of the subjects (n = 180)

		Frequency	**Frequency percentage** (%)
Age	18 to 29 years	49	27.5
	30 to 41 years	122	67.5
	42 to 53 years	9	5
Sex	Male	180	100
	Woman	-	-
Marital status	Married	162	90
	Single	18	10
Education	M.Sc. (M.A.) degree or higher	58	32.5
	B.Sc. (B.A.) degree	49	27.5
	High school graduates	73	40
	Primary school graduates and lower	-	-
Work experience	5 years and lower	63	35
	6 to 15 years	43	24
	16 to 25 years	43	24
	26 years and higher	31	17
Shift status	Shift work	130	72.5
	No shift	50	27.5

- **Statistical analyses**: The Statistical Package for the Social Sciences (SPSS) software (version 15, SPSS Inc., Chicago, IL, USA) was used to analyze the data. Moreover, descriptive statistics was used to summarize and organize the data, and stepwise regression analysis to analyze the data.

Results

Demographic characteristics of participants of this study are presented in table 1. Mean, standard deviation, and internal correlations of variables under study are presented in table 2.

Table 2: Mean, standard error, and internal collections of variables

			Correlations		
	$\bar{X}$	SD	1	2	3
Fatalistic beliefs	14.13	3.12	1		
Safety climate	67.97	8.21	0.24**	1	
Occupational situation awareness	68.97	9.14	-0.47**	0.49**	1

As can be seen, there were significant relationships among fatalistic beliefs, safety climate, and occupational SA ($P < 0.01$). To assess the predictive power of occupational SA by fatalistic beliefs and safety climate variables, stepwise regression analysis was used. The results of model summary are presented in table 3.

Table 3: Summary of regression analysis model

Variable	R	R^2	ΔR^2	ΔF	Sig.
Step 1: safety climate	0.49	0.24	0.24	56.65	< 0.001
Step 2: safety climate and fatalistic beliefs	0.61	0.39	0.14	39.01	< 0.001

The results of regression model for explaining occupational SA based on fatalistic beliefs and safety climate indicated that F-statistic for both models is significant ($P < 0.01$). The regression coefficients of stepwise regression analysis are presented in table 4.

As can be seen, safety climate with a β of 0.40 can significantly predict almost 20% of the variance of occupational SA. In addition, fatalistic beliefs with a β of -0.38 can significantly predict almost 18% of the variance of occupational SA.

Table 4: Summary of stepwise regression analysis to predict occupational situation awareness based on fatalistic beliefs and safety climate

Variable	β	B	SE B	t	R^2	Sig.
Safety climate	0.40	0.45	0.07	6.59	0.20	< 0.001
Fatalistic beliefs	-0.38	-0.37	0.06	-6.25	0.18	< 0.001

Discussion

Previous studies have demonstrated that occupational SA is related to workplace safety behavior and accident occurrence (1, 5, 30). Hence, this research aimed to discover how fatalistic beliefs and safety climate, as psychological and organizational factors, can affect occupational SA.

The results of this research showed that fatalistic beliefs significantly predicted

occupational SA among workers. This is consistent with the findings of previous studies (34-37) and can be interpreted on the basis of the following possibilities.

First, According to the cultural theory of risk (34), cultural settings and values, such as fatalistic beliefs have an important role in shaping risk perception and SA in individuals. Fatalists tend not to know and worry about the things that they perceive as being out of their personal control and desire, resulting in a lower risk perception in some domains, and also low work situations (35). In addition, people with fatalistic beliefs tend to explain incidents by uncontrollable and random elements, such as fate or bad luck, which are unchangeable. Thus, they are more likely to become passive in regard to safety issues, which, in turn, may lead to less willingness to take precautions or obey workplace safety rules (36). Fatalistic beliefs might affect both risk perception and unsafe behaviors especially in countries with a high degree of religious conservatism. These beliefs are associated with ignorance of safety precautions and attributing occupational accidents to uncontrollable and random factors (37).

Second, fatalism can be a sub-division of the external locus of control (38). Individuals with internal locus of control tend to believe that they can prevent accidents and injuries. In contrast, employees with external locus of control tend to believe that accidents and injuries are due to forces outside their control, such as fate, or fatalism (39). Kouabenan concluded that fatalistic workers take bigger risks because they have limited knowledge and SA, leading them to misestimate the possibility of accident occurrence (40). Henning et al. showed fatalism to be negatively related to attitudes and safety climate (41). In total, fatalistic beliefs are a potential barrier to the enhancement of safety, especially participation in maintaining awareness and preventing injuries, and also contribute to risk taking. Fatalistic beliefs have been found to be related to occupational accidents in some developing countries. Although studies in this respect are scarce, they show that the nature and extent of fatalistic beliefs differ in each country (42).

Furthermore, the results showed that safety climate significantly predicted occupational SA among workers. This is consistent with the findings of previous studies (43-48) and can be interpreted on the basis of the following possibilities.

First, studies have shown that safety climate is related to perceived helplessness and uncontrollability. The perception of uncontrollability usually occurs when a person has previously failed to achieve their career goals. If people think that they are unable to control events and attribute them to internal/stable/global causes, they will feel helpless. Helpless individuals perceive future events as uncontrollable, and therefore, decrease their attention to work situation (43). The weak safety climate in work situations often suggested a sense of helplessness and lack of control. They felt that they had no control over accident occurrence, which, to them, seemed to be unavoidable and uncontrollable; therefore, they felt that maintaining awareness of their work situation cannot help them prevent accidents (44).

Second, workers' positive perspectives regarding safety climate cause them to perceive their organizations as supportive, concerned, and interested in their general well-being and safety, as a result, they are more likely to perceive their organizations as valuing their safety rather than more production (45, 46). Therefore, they pay more attention to their surrounding environment in order to reduce injuries caused as a result of negligence and carelessness due to low SA (46, 47).

Third, workers with positive safety climate perceptions expressed more job satisfaction and were more compliant with safety procedures and rules in workplaces. Therefore, they are performing their tasks with higher awareness and satisfaction (48). This is in accordance with the norms of reciprocity and the social exchange theory. Compliance with safety procedures and rules seemed to be an avenue for high organizational support and positive perceptions concerning management's concern and support. High levels of job satisfaction results from the perception of positive safety climate. This finding corroborates suggestions that have regarded the social exchange theory and the norms of reciprocity as a basis of workers' safety-related behaviors and actions (48, 49). Safety climate has been related with decreases in accident frequency, where task and informational support from the organization have reduced the incidence of injuries (50). It is worth noting that efforts to increase the awareness of workers, and thus, motivate them to engage in safe work behaviors may fail if the safety climate is weak (51).

Conclusion

The findings of this research emphasize the importance of fatalistic beliefs and safety climate variables in predicting occupational SA among workers. Safety intervention needs to focus on these variables, as well as on their prevention methods, coping mechanisms, and these concepts influence the increase in occupational SA, directly or indirectly. It is recommended that future researches examine the effects of safety interventions on increasing SA. Furthermore, with designing these interventions and paying more attention to them, we can affect one of the most important and influential variables in the incidence of occupational accidents. The present study needs to be replicated in different populations and needs more empirical support. Until then, the findings of the present study should be interpreted with caution. In addition, the cross-sectional design of the study and its participants (i.e., a group of employees) exert some limitations on the generalizability of the findings. Finally, the problems and limitations on the use of self-reporting instruments should not be overlooked.

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