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The Role of Attitude towards Safety as a Mediator of Safety Training Effectiveness to Fatalism

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Abstract

Aim: Fatalistic employees take serious risks because they have limited knowledge of risks and accidents, leading them to under estimate the possibility of their occurrence. This research examined the effectiveness of safety training on changing employees' fatalism with attention to the mediating role of attitude toward safety issues.

Methods: 204 employees was selected according to the stratified random sampling method in Isfahan Steel Company, divided randomly into control group (n=103) and experimental group (n=101) and the questionnaires of safety attitude and fatalism were applied as data collection instruments. The data was collected before intervention, and educational intervention was then executed in four 90-minute sessions over four days. One month after intervention, post-test was performed and the collected data was analyzed using descriptive indexes, t- and F-tests.

Findings: Results show that there was a significant statistical difference in average numbers of attitude toward safety issues and fatalism before and after training intervention ($p<0.01$). Also, mediation analysis indicated attitude toward safety issues mediated the effect of safety trainings on fatalism ($p>0.05$). Therefore, safety training only by promoting workers' safety attitudes can change the fatalistic beliefs among employees.

Conclusion: By understanding relationship between fatalism and safety attitude, it should be possible to improve the training of employees, such that are less likely to attribute accidents to chance or fate.

Keywords: Fatalism, Safety Training, Safety Attitudes, Health Promotion, Employees, Steel Industry

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Introduction

The steel industry has one of the highest incidents of fatal and non-fatal accidents/ injuries every year. As a high risk industry, there is a need to investigate predictive factors for accidents and occupational injuries to protect employees and enable them to fulfill their health care role sensitively and compassionately [1].

Fatalism is an obstacle to the adoption of safe working behavior [2]. Fatalism describes as the belief that injuries are unavoidable and happen due to chance or fate [3]. It is negatively related with reported job risk [4] and is positively related with unhealthy lifestyle choices [5]. Belief in fatalism have negatively influenced the adherence of safe work practices [6]. Fatalism is a the complicated psychological construct that can be recognized by perceptions of worthlessness, powerlessness, hopelessness and futile [7]. Belief in fatalism may facilitate the attitudes that accidents are unprofitable and consequently it increases helplessness in among workers [8]. The results of Patwary and et al. [9] showed that fatalistic beliefs among personnel of an organization that attributed these events to "*fate*" reflected their perceived lack of control over accidents and revealed a lack of organizational awareness that can occur within a culture of fatalism. Research has shown that a sense of personal control is associated positively with education [10] and can be considered as an attitude variable [11, 12].

Safety training has been shown as an effective procedure for preventing accidents in work environments [13]. It is known that safety trainings have a positive effect on the work safety and health [14]. The training is a process during which employees gain knowledge, learn new skills, or motivate for performing in a specific way [15]. Providing enough training for all workers is crucial to ensure employees' safety and to make them aware of any possible dangers and instruct ways to avoid occupational hazards [16]. However, training is costly both in terms of production and -cost, so the evaluation of its effectiveness is necessary [17]. The main emphasis on safety training effectiveness is making changes in safety performance and future injuries [18]. However, this might imply measuring accidents at the workplace as a basis for assessment of safety training, which shows that such problems like accidents being relatively low-frequent events and incidents have not being recorded in the workplace [19]. One method with approved validity in relation to safety is the measurement of attitudes where they are specifically measured [20, 21]. Attitudes are related to occupational accidents and measuring them to evaluate the effectiveness of safety training can be useful [22]. The safety attitudes are the beliefs and emotions around the safety issues and they

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reflect a sense of responsibility and commitment toward safety issues [12, 23]. Employees' attitudes can act as a mediator between safety climate and accident occurrence and may indirectly influence the individuals' safety behaviors and performance [23, 24]. Safety attitude is related to other variables that are associated with the occurrence of accidents such as: safety compliance practices [25], risk behavior [26], sensation seeking [27], breaking safety rules [28], fatalism [3, 12].

With attention to stated material above, research about safety training and fatalism can have many advantages for the organizations and individuals due to increasing employees' safe behaviors and promoting safety level in workplace. The present study attempts to: 1) the examination of the effectiveness of safety training to change attitude toward safety issues: 2) the examination of the effectiveness of safety training to change fatalism in workers: 3) the specification of the mediator role of attitude toward safety issues in the relationship between safety training and fatalism.

Materials and Methods

Participants and Procedure

In the current research, a randomized experiment - control design was used. This research was administrated between Jan and Feb 2012 in Esfahan Steel Company. Esfahan Steel Company (Zob Ahan-e Esfahan) started in late 1960s, and is located close to the cities of Fooladshahr and Zarrinshahr, Esfahan Province. Esfahan Steel Company (ESCO) is the first and largest manufacturer of constructional steel products in Iran (No=8300) [29]. In this research, keeping in view the extent and distribution of the employees in the different parts of Esfahan Steel Company (Tohid Building, Navard part, blast furnace, steel making, coke, fire, railway, gas, oxygen plant, technical guidance etc.), the sample (n=204) was selected according to the stratified random sampling method. In stratified random sampling, the strata are formed based on members' shared attributes or characteristics. A random sample from each stratum was taken in a number proportional to the stratum's size when compared to the population. These subsets of the strata were then pooled to form a random sample. Then simple random sampling or systematic sampling was applied within each stratum. This strategy often improves the representativeness of the sample by reducing sampling error. It can produce a weighted mean that has less variability than the arithmetic mean of a simple random sample of the population. The sample size was calculated using of SPSS (version 15), following the procedure recommended by Molavi [30]. According to this procedure, first, the sample size will be selected with the condition of compliance with the minimum members required for experimental design and then,

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adequacy of the sample size will be measured by SPSS outputs. if, statistical power is more of 80% and a significant level below 0.05, the sample size will be appropriate for this study [30]. Informed consent form was obtained from each participant and the study was approved for research by the ethics committee at Isfahan university. Participants were randomly assigned into two groups: experimental group (n=101) and control group (n=103). The experimental group received four 90-minute sessions educational program over four days. The control group received no intervention.

Participants in the experimental group were trained by a safety expert in the same company. They were told that the purpose of the training program was to improve the knowledge of safety issues and for learning strategies for coping with safety-related problems at work. The content of training session began by delivery of questions about safety problems and answering these questions during the session and finally knowledge on safety issues were given to employees. In summary, main educational session topics to take a positive attitude toward safety issues and to change fatalistic beliefs were adapted from researches of Muntinu [31] and Williamson and et al. [32], and are presented in Table 1.

Table 1: Main educational session topics to take a positive attitude toward safety issues and to change fatalistic beliefs

- Take personal responsibility for your own safety and the safety of your co-workers
- Pay attention to your training
- - Know and follow the safety rules
- - Use the required personal protective equipment
- - Give work your full attention
- - Keep an eye out for hazards. Ask “What could go wrong here?”
- Put your personal feelings and problems aside while you’re working.
- Urge your co-workers to follow safety rules
- Know what to do in an emergency.
- Ask questions about any procedure precautions that are not clear.
- Report any safety hazards you can’t fix
- Save fooling around or “horseplay” for your own personal time
- Recognize, rectify where possible and report hazards in the work area to designated personnel according to workplace procedures
- Recognize and resolve problems and conflict
- Raise occupational health and safety issues with designated personnel in accordance with workplace procedures and relevant occupational health and safety legislation.
- Identify factors affecting work requirements, assess their impact and take appropriate action to ensure work requirements are met
- Identify hazards and assess risks
- Assess work load and set priorities within allocated timeframes
- Identify factors affecting work requirements, assess their impact and take appropriate action to ensure work requirements are met
- Identify hazards and assess risks
- Prepare and make ready for use relevant maps/charts, electronic navigation aids and navigation equipment
- Report the need for additional personnel and/or specialist equipment to the supervisor
Select personal protective equipment based on the nature of the rescue operation

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The members of control group did not participate in training course. All participants (both experimental and control groups) completed the questionnaires about attitude toward safety issues and fatalism before and after one month. A covering letter explained the purpose of the study, and confidentiality of participation in the study was guaranteed. Respondents were asked to return completed questionnaires inside the sealed envelopes either to the person who had distributed them or directly to the research team.

Measures

Validated instruments were used for data collection about attitude toward safety issues and fatalism. At first, all questionnaires were translated from English into 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.

At next step, Psychometric characteristics of instruments were examined. Linguistic validation was performed by three experts of psychology department and five experts of safety and health departments. Thus, the questionnaires were piloted and finalized with an advisory group of employees to ensure that the scales items were comprehensible and appropriate to the context. Moreover, conceptual analysis was confirmed by the linguistic validity of the instrument. The questionnaires were distributed to employees with the help of union supervisor. Participants were assured of confidentiality and informed consent in written format was acquired from each of them.

Attitude toward Safety Issues

The instrument used to collect data about attitude toward safety issues for this research was a self reported questionnaire of Muntinu [31]. This questionnaire is the method most often used for collecting attitudinal data and was therefore the choice for this research. This questionnaire was translated and validated in Persian and its items were amended by that safety and health specialists to adapt with steel industry. The safety attitude inventory is a 66-items self-report scale that measures attitude factors related to accidents. It is presented in a multiple-choice format. The statements are arranged to reflect agreements' intensity from strongly disagree (0) to strongly agree (4). Muntinu [31] concluded that this inventory has high internal reliability (for all factors, Cronbach's Alpha takes values between 0.70 and 0.80) and also has a good validity. Evidence of reliability of this inventory, as administered to the relevant Iranian populations, in this research, was calculated by Alpha Coefficient 0.78 and by Split-half 0.80 (for all factors, Cronbach's Alpha takes values between 0.56

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and 0.87). The validity coefficients of questions and scales of safety attitude with other questionnaires of safety attitude were between 0.24 and 0.79 so that all the validity coefficients were significant at $p<0.0001$.

Fatalism was assessed with the fatalism scale of Williamson et al. [32], translated and validated in Persian. Williamson et al. [32] produced two questionnaires for the safety climate. The latter version was designed for distribution at the workplaces where a longer scale would have been appropriate. At the end of the study, the validated scale was made up of five factors: personal motivation, risk justification, positive safety practice, fatalism and optimism. Fatalism seems to be a factor that is resistant to change because of experience. Fatalism can happen due to the existence of certain stereotypes about safety. The items of this subscale refer to views of importance and controllability of safety. Scoring is based on a Likert style of five scores from 1(strongly disagree) to 5 (strongly agree). Studies provide evidence for high internal reliability and validity of the scale [3, 12 & 32]. Internal consistency (Cronbach's α) in this study was 0.79 which was well for this scale. The questionnaires of attitude toward safety issues and fatalism are represented in Table 2.

The Statistical Package for the Social Sciences (SPSS) was used for descriptive statistics and to summarize and organize the data. The t- and F-tests were used to determine the relationship between the two groups.

Analysis

The t- and F-tests were used to investigate the effectiveness of safety training on changing the variables of fatalism and attitudes toward safety issues. In order to test the mediating effect of attitudes toward safety issues on relationship between safety training and fatalism, multiple regression analyses were performed separately for each three-variable system in the model to assess the relations between safety training and fatalism via the hypothesized mediator which is attitude toward safety issues. According to Baron and Kenny [33], the following three regression equations must be used for the statistically significant predictor of the mediator. The first equation should show that the predictor variable is a significant predictor of the potential mediator. The second equation should show that the predictor is a significant predictor of criterion variable. The third equation should contain the predictor and mediator variables entered simultaneously with the criterion variable. Two conditions must be met in the third equation if a mediator effect is present: (a) the mediator must be related to the criterion variable and (b) the previously significant relationship between the predictor and criterion variables is significantly attenuated or the predictor is no longer a significant predictor of criterion variable.

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Table 2: Questionnaires of attitudes toward safety issues and fatalism

Questionnaires	components	Explanation	The samples of components' questions
Attitudes toward safety issues	Work conscientiousness	Refers to one's sense of competence and responsibility.	-I would describe myself as careful. -I would describe myself as inconsistent.
	Safety consciousness	Refers to one's awareness of safety issues	-I do not use equipment that I feel in unsafe. -I know what procedures to follow if a worker is injured during my shift.
	Leadership	Refers to satisfaction with the leadership (influence, inspirational motivation, intellectual simulation, individual consideration).	-My supervisor avoids making decisions that affect safety on the job. -My supervisor suggests new ways of doing jobs more safety.
	Role overload	Refers to perceptions about whether there is high workload in one's job (i.e. too many hours worked per person).	-I am so busy on the job that I can't get to take normal breaks. -There is too much work to do in my job for it all to be done well.
	Work pressure	Refers to work pace and availability of resources (i.e. time and workplace) available for the job.	-There are enough workers to carry out the required work. -There is sufficient "thinking time" to enable workers to plan/carry out required work.
	Job safety perception	Refers to a global perception over how safe one's job is.	-My job is dangerous. -In my job you could get hurt easily.
	Supervisor safety perception	Refers to perceptions about one's supervisor behavior related to safety	-My supervisor keeps workers informed of safety rules. -My supervisor involves workers in setting safety goals.
	Coworker safety perception	Refers to perceptions about one's coworkers behavior related to safety.	-My coworkers ignore safety roles. -My coworkers encourage others to be safe.
	Management safety perception	Refers to perceptions about one's company management attitudes and behaviors related to safety	-Our management investigates safety problems quickly. -Our management provides safety equipment.
	Safety program and policies perception	Refers to perceptions about the safety program and polices in place.	-Our safety program is worthwhile. -Our safety program helps prevent accidents.
	Interpersonal conflicts at work	Refers to the level respondents get along with others at work.	-How often do you get into arguments with yours coworkers? -How often are your coworkers rude to you at work?
	Job involvement	Refers to beliefs regarding the importance the work plays in one's life.	-My job is a very important part of my life. -To me, my job is a very large part of who I am.
Fatalism		Refers to views of importance and controllability of safety	-If I worry about safety all the time I would not get my job done. -I cannot avoid taking risks in my job. -Accidents will happen no matter what I do. -I can't do anything to improve safety in my workplace.

Adapted for Muntinu [39], P. 22-23

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Results

90 percent (n=184) of participants in experimental group and control group were male because the majority of sample members were working in the production line. Chi-square test showed no significant difference between the two groups ($p>0.05$). Participants in experimental and control groups ranged in age from 18 to 53; the mean age of the participants was in experimental group 39 years (SD=5.58 yrs) and control group 38 years (SD=4.12 yrs); t student test showed no significant difference between the two group ($p>0.05$). 62 percent (n=126) of the participants were high school graduates, 38 percent (number=78) were university graduates; Kruskal-Wallis H test shows no significant difference between the two group ($p>0.05$). 88 percent (n=179) were married and 12 percent (n=25) were unmarried; average work experience was 12 yr (SD=3.2 yrs) in both groups.

Attitude toward Safety Issues

Despite the robustness of the t- and F-tests regarding violations of the assumptions underlying them [34], we examined the data on attitude toward safety issues and fatalism and found that there was not only homogeneity of variance, but in addition, the data were normally distributed. A repeated measures ANOVA indicated a significant difference between the pre-measure (M=206.9, SD=15.4) and post-measure of attitude toward safety issues (M=214.3, SD=17.6) for employees who attended in safety training courses ($F (1, 202) = 12.4$, $p<0.001$). Planned t-tests revealed a significant difference between the experimental group (M=214.382, SD=17.642) and control group (M=202.032, SD=15.203) on the measurement of attitude towards safety issues at the end of the training program ($t=2.651$, $df =202$ $P<0.05$). Hence, the first hypothesis was supported. Statistical power 95 per cent showed high accuracy of the current sample in post-test phase. Additionally, attitude toward safety issues at the end of the training program correlated significantly with perceived job stress ($r=.47$, $p<.01$) assessed 1 months later.

Fatalism

A repeated measures ANOVA revealed a significant difference between the pre-measure (M=23.03, SD=4.23) and post-measure of fatalism (M=26.52, SD=4.23) for employees who attended the safety training courses ($F (1, 202) = 7.54$, $p<0.01$). Planned t-tests revealed a significant difference between the experimental (M=26.52, SD=4.23) and control group (M=23.41, SD=4.84) on the measurement of fatalism 1 months later of the training program ($t=4.40$, $df=202$ $P<0.01$). Hence, safety training had a significant effect on fatalism. Statistical power of 78 percent indicated that

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the sample size was sufficient to examine this hypothesis.

Mediating Effects

To test whether attitude toward safety issues at the end of the training program mediated the effect of the safety training on fatalism, a series of regression equations, as outlined by Baron and Kenny [33], were conducted (see Table 3).

Table 3: Results of mediation analysis

Independent variables	Dependent variables		
	Step 1	**Step 2**	**Step 3**
	Fatalism	**Attitude toward safety issues**	**Fatalism**
Safety training (R^2)	0.14**	0.23***	0.03
Attitude toward safety issues (R^2)	-	-	0.40***
F value	7.54**(1, 202)	14.22***(1, 202)	1.33(2, 201)

*p<0.05 **p<0.01 ***p<0.001

Results showed that there was a significant statistical difference in average numbers of attitude toward safety issues and fatalism before and after training intervention (p<0.01). When fatalism was regressed onto both attitude toward safety issues and safety training, attitudes toward safety issues remained significant (p<0.001). However, the training program was no longer a significant predicator of job stress (p>0.05). Thus, attitude toward safety issues fully mediated the relationship between safety training and fatalism.

Discussion

The purpose of this study was to evaluate the effectiveness of safety trainings on changing the fatalism in employees with attention to the mediator role of attitude toward the safety issues.

As was showed in the results section, safety training significantly changed employees' attitude toward safety issues in the post-test rather than pre-test. These results were aligned with findings of other research [22, 35 & 36]. Dong and colleagues [36] showed that safety training played a positive role in improving occupational attitudes and consequently in reducing the number of job related accidents. Harvey et al. [22] observed meaningful improvements in beliefs and attitudes before and after a safety training intervention. Colter [37] found that at the time of investigating an accident, important reasons that you hear from the employees are: "I did not know", "I did not see", "I did not think." "I do not think I slip and fall". He suggested that we must act proactively,

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and only "training, training, training" is important. Quick, Stephenson, Michael, Witte and Vaught [38] stated that the important predictor of the consideration of protective behaviors by individuals are safety attitude. Safety training should have an effective role in improving safety attitudes and subsequently in promoting safety culture in organizations. These results stress on the important role of safety training courses to reduce unsafe behaviors and promote worker' health.

Also, the current research results indicated that the safety training could change fatalism in post-test phase. For explaining the relationship, we can use the uncontrollability content. 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 would perceive helplessness; Helpless individuals perceive future events uncontrollable [39]. It can be said that the feeling of helplessness and uncontrollability can be related to the lack of information and awareness about safety issues [40]. Therefore, safety training by increasing employees' awareness can decrease the perception of lack of control in workers, and can improve employees' control on safety issues andit can change beliefs and attitudes toward fatalism in workers.

Also, in cases where individuals hold 'un-scientific' views about accidents or disease causation, it is taken as an evidence of their need for training. Thus in their review of successful interventions to prevent accidents and diseases, Gyekye1551 [8], conclude that fatalistic attributions of accidents may be more dependent on cultural background rather than on differences between work environments. Employees' Fatalistic attributions may arise from general cultural influences, it may also be a feature of their helplessness in the face of risk, or they may use fatalism to explain themselves their lowly position in society [41]. 'Health promotion courses should underline the values of rationality, logical thought, planned decision making, self-efficacy and an internal locus of control [42]. Fatalism can be considered as a sub-division of external locus of control [14].

Individuals with internal locus of control tend to believe that they can prevent accidents and injuries. In contrast, an employee with external locus of control tends to believe that accidents and injuries are due to forces outside his or her control, such as fate, or fatalism [43].

Safety training can be reach employees to the belief that they are in control of their lives and have the capacity to act effectively and decisively, then their chance of pursuing a given healthy action which they believe is rational is much greater than those having a different self-concept. It is better that the

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individuals reach to the belief that everybody is charge of one's own life; this belief is a key value of the effective health promotion courses [42, 44].

About the mediating effect of attitude toward safety issues on the relationship between safety training and fatalism, the results showed attitude toward safety issues fully mediated the relationship between safety training and fatalism. This result represents that providing safety trainings alone aren't adequate for workers; only training that can change attitudes toward safety issues can be effective in changing fatalism in employees. This is consistent with the findings of the previous studies [11, 12]; Mearns et al. [11] and Rundmo and Hale [12] concluded that fatalism concerning occupational accident prevention has been examined as an attitude variable [11, 12]; Patwary and et al. [41] and Henning and et al. [3] have found evidence of relationship between safety attitude and fatalistic beliefs.

According to these results, we can say that one of the causes of fatalism in employees can be their weak attitudes toward safety issues and can decrease fatalism by promoting their safety attitudes. Safety training with increasing employees' awareness and by changing their attitudes toward safety issues can change the fate culture in organizations and can improve employees' health.

Conclusion

It is worthy that the effectiveness of safety training programs be assessed by changing attitude toward safety issues; it is a useful tool because changing safety attitudes can decrease fatalism among fatalistic individuals. Further, by distinguishing these interventions and better investment on them, we can affect one of the most important influential variables in incidence of occupational accidents. In designing training courses fatalism beliefs should be measured and the kind of locus of control among the participants and thus provide for them safety training programs.

Limitations

The present study needs to be replicated in different populations and needs more empirical support. Till then, the findings of the study should be interpreted with caution. Further, the cross-sectional design of the study and participants [i.e., a group of employee] exert some limitations on the generalization of the findings. Finally, the problems and limitations on the use of self-reporting instruments should not be overlooked. Also, researchers must focus on measuring the long term effects of these interventions; i.e. many researchers only focus on short term changes while we need to be able to produce long term ones with safety interventions. In the areas of occupational interventions and of safety management, there

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were hypotheses in the literature whose effects are mainly short term. Moreover, it would be useful to see some external validation of the positive effects of the training, e.g., in the form of supervisor reports of the participations' safety behaviors. These observations would be investigated in the future research.

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