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Original

Association Between Risk-Taking Behaviors and Safety Culture in Construction Workers

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Abstract

Background: Risk-taking behaviors and improper attitude toward occupational health and safety are the core of many occupational accidents and disorders. The aim of this study was to investigate the relationship between level of risk taking and level of safety culture in construction workers. **Methods:** This cross-sectional study conducted on 38 construction workers. Demographic characteristics, risk-taking level (risky decision-making), and level of safety culture measured using specific questionnaires. **Results:** The mean score of safety culture was 245 across the research population. Overall, 13 participants had a safety culture score lower than 225 (coded as a negative safety culture), and 25 subjects had a safety culture score of over 225 (with a positive safety culture). Safety culture was significantly different among married and single subjects. However, there was no significant association between age, background, and level of education with the safety culture. **Conclusion:** Our findings suggest that the level of education, age, and working background have no effect on safety culture. Effective measures should be taken to enhance safety culture in industrial environments.

Keywords: Safety Management; Construction Industry; Risk-Taking

Introduction

In the past 60 years, industries have been trying to lower the rate of their accidents through different methods. The first step in this process was to improve the safety of hardware such as the use of safe guards. The next step which attracted a great deal of attention in the 1960s and 1970s was selection of competent and trained workers and establishing reward systems across the company. The third step was caring for management systems, especially safety management systems. Each of these steps lowered the rate of accidents for some degree. However, after these huge efforts, we hear about new cases of accidents every day. Traditionally, it is believed that most of accidents are occurred due to human errors. Thus, it seems that the next necessary step for reducing occupational accidents and enhancement of workplace health and safety is development of a suitable safety culture. Development and expansion of a positive safety culture at first causes correction of individual behaviors and finally can lead to reduction in human errors and accidents.

Our understanding about the importance of good safety culture is growing. Developing a positive safety culture is one of the most desirable objectives of all organizations. Development of

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safety culture is a long-term and time-consuming process. Therefore, development of a suitable culture requires measures which accelerate transition from bad or unwanted safety culture to the positive or desired safety culture.[1] According to the Health Safety Executive (HSE), safety culture is the beliefs that the entire organization has about an accident or disease.[2] Generally, culture refers to a set of beliefs and values of people which is reflected in their behavior.[3] Safety atmosphere, which is a subset of safety culture, deals with investigation of perceptions and inferences of employees regarding the working environment, level of management's interest in safety, measures associated with safety, and the extent of participation in risk control.[4, 5] Combination of protective and reactive safety indices have attracted attention in recent years. Results of such approaches can be used as a guide for development of safety policy of organizations and comparison of safety performance across different organizations.[6]

Human plays a critical role in the incidence of accidents.[7] Various human characteristics including age, gender, education level, working background, occupational culture, etc. can also be involved in the occurrence of human. One characteristic which may be involved in the incidence of accidents is risk-taking.[8] Risk taking decision making is considered as a type of decision-making with short-term positive consequences but with long-term negative consequences.[9] It can be concluded that predicting the extent of risk-taking of decision-making for individuals under different conditions is of great significance in the safety culture of an organization.[10] The aim of this study was to determine the relationship between demographic information, extent of risk-taking and safety culture level among a group of construction workers.

Methods

This cross-sectional study was conducted on 65 construction workers in Gonabad city, eastern part of Iran. Demographic characteristics, risk-taking level (risky decision-making), and level of safety culture of workers were measured by the questionnaire. The first part of the questionnaire was consisted of general information on demographic characteristics of participants. The second part was about Iowa Gambling Task neuropsychological test. The third section was about safety culture and used an 81-item questionnaire for measurement of safety culture level.

The safety culture questionnaire includes 75 items related to safety culture level and 6 items related to accident (accidents history). The reliability and validity of the questionnaire had already been determined by other researchers and the Cronbach's alpha coefficient was reported to be 81%.[11] The total score of the safety culture was equal to the sum of scores received for all items. Interpretation of the questionnaire was based on predefined cut off values. If the safety culture score was above 225, the safety culture of workers was positive, whereas if the grand score was less than 225, their culture was considered as negative.

To determine the risk-taking level of the workers, Iowa gambling task (IGT) was used. IGT is a psychological task, essentially designed to evaluate real life decision-making in patients suffering from ventromedial prefrontal cortex damage. Today, in addition to the original version of IGT, its computer version has been normalized across different populations, allowing for more accurate and easier implementation of conducting the study for clinical specialists and researchers. In this test, before the start, 2000 bonuses are lent to the subject and they are asked to collect more score across the 100 attempts designed by the software. Iowa task involves four card decks, and selection of each deck brings about certain amounts of win or loss.

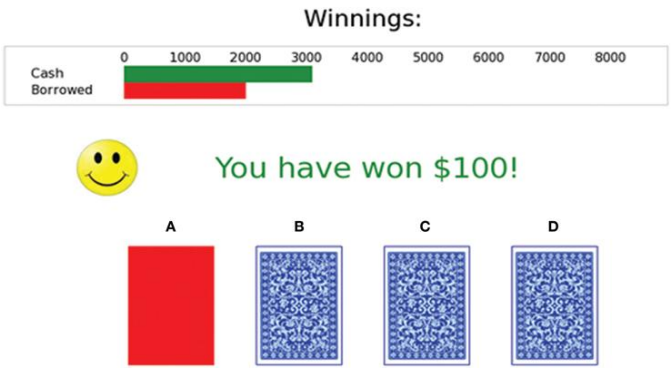

Figure 1. The risk-taking test based on Iowa Gambling Task

This means that with selection of each deck of cards, the subject may either win or lose to a certain extent. The decks of cards are known with different names in various studies. As an instruction, the subject is told that some cards are better than the others. Experimental studies show that subjects usually become aware of risk parameters and risk taking decisions generally after 20 attempts. After each selection, the value of scores that they have gained or lost is displayed on the monitor screen. Furthermore, the person can also see the total score they have gained. With every choice the person wins, the green band grows in size, while with every choice they lose score, the red band grows in length. The collected data were fed into SPSS 18 and tested using descriptive statistics and analytical parametric tests.

Results

Overall, in this study 65 male workers employed in construction centers of Gonabad city who were approached. However, 17 of them did not return the questionnaire and data analysis finally performed on 48 workers. The mean age of the participants was 26.5 (SD=9.07), while their mean working experience was 5.23 (SD=5.16) years. The mean safety culture score in the participants was 245 (SD=30.33) and total score of risk taking test was 1739.06 (SD=743.13). Overall 13 subjects had a safety culture score below 225, There was no significant association between safety culture and IGT results. No significant correlation was found between the age and risk-taking of the subjects (r=-0.261; p>0.05).

The mean score of safety culture in married and single workers was 239.40 and 259.01, respectively (Table 1). The results of t-test showed that there is a significant difference between the level of safety culture among single and married individuals (p <0.05). The mean score of risk-taking in married and single workers was 1625.67 and 1988.33, respectively, which was not significantly different. Moreover, safety culture was not significantly different across individuals with different education level (Table 2). Results of ANOVA test revealed that there is no significant difference between risk-taking score in term of education. However, there was also no correlation between the extent of positive safety culture and risk-taking test score.

Table 1. The mean and standard deviation (SD) of safety culture and Iowa gamble task (IGT) score in construction workers based on marital status

Education	n	Safety culture (SD)	IGT score (SD)
Single	15	259.01 (27.07)	1988.33 (783.98)
Married	33	239.4 (30.09)	1625.67 (707.01)
p- value		0.04	0.11

Table 2. The value of safety culture across different levels of education in construction workers

Education	n	Mean (SD)	*p*-vaue
Middle school	16	252.05 (28.89)	0.54
Diploma	22	242.02 (27.15)	
University degree	10	241.08 (39.58)	
Total	48	245.05 (30.33)	

Discussion

Continuous loss of life of workers as well as numerous unwanted damages, harms, and injuries tell us that safety has remained a major problem in the construction industries.[12] According to the results of this study, the mean score of safety culture in the research population was 245, which is higher than the cutting score determined for specifying the boundary between positive and negative safety culture. Based on the results of this study, there was no significant correlation between the age and background history with safety culture of workers. In a study on safety culture and its influential factor in detergent company workers, the mean total score of safety culture of subjects was obtained as 180.51.13 Given the higher mean of this score in individuals younger than 39 years old, the difference between the final score of safety culture and the age of individuals across all of the three age groups was not statistically significant.[13] which is in line with the results of our research. Other studies also found that safety culture is independent of age of participants.[14, 15] however, some other studies found a direct and positive association between safety and health culture and age.[16-18] In this research, the mean score of safety culture in married and single workers was significantly different.

Today, all industries especially large industries have reached the conclusion that the attitude towards cultural and social aspects of safety should be altered. Although various factors can influence the development of a positive safety culture, the results of studies suggest that management is the key element in safety culture. Change in culture occurs over time very slowly. In a company with positive safety culture, all individuals should take care of each other.[19] Regarding risk-taking behavior of individuals and its relationship with safety culture and accidents, studies are very limited. Risk-taking behaviors are the core of many social harms including drug abuse, pathological gambling, personality disorders, and taking aggressive measures.[20] Risk-taking behaviors refer to functions which have both some degree of potential harm or loss and probability of achieving different types of reward. The research performed on the relationship between impulsivity and cognitive function suggests that impulsivity consequences are not always negative.21 Studies have also shown that impulsivity is one of the most important personality risk factors of tendency to drug abuse.[21] As previously stated, no study has been conducted on the relationship between impulsivity and risk-taking with the number of accidents and safety culture. Based on these points, the reduction of devastating implications of risk-taking behaviors is one of the research priorities in the field of occupational health and safety.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgment

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