ORIGINAL ARTICLE

Application of Structural Equations Modeling to Assess Relationship among Emotional Intelligence, General Health and Occupational Accidents

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ABSTRACT

Little has been contributed to how emotional intelligence (EI) may be practically applied to enhance both accident prevention program and general health (GH) in workplaces. We aimed to survey the relationship among these variables in a manufacturing company in Iran, in 2014. Moreover, to identify practical approaches to the application of emotional intelligence skills to manage work change processes. This cross-sectional study was conducted among all workers in functional units of a manufacturing company [redacted] (n=178), located in a central province in Iran. Emotional intelligence was assessed using Bradberry and Greaves' questionnaire and Goldberg's General Health Questionnaire (GHQ) was the other tool used in the study. Descriptive statistics was used to describe data by SPSS V22. The relationship between the studied factors was analyzed by the application of Structural Equations Modeling (SEM) using EQS software. Majority of workers (99.32%) were male. Mean (SD) age was 39.13 (8.23) yr, also 64.19% of participants were married. Mean and standard deviation of EI scores calculated were 90.64 and 19.33, respectively. Mean of GH score was 22.24 (±9.83). Analyzing the relationship between main variables (EI & GH) with occupational accidents (with adjust about interfering variables) depicted that both of them were in significant relationship with accidents ($P<0.05$). Regarding the relationship between emotional intelligence and general health with occurrence of accidents in workplaces and GH improvement with increase in EI, three strategies is recommended: appropriate job selection, suitable training and intervention for the improvement of workplace conditions.

KEYWORDS: *Emotional intelligence, General health, Occupational accidents, Structural equations modeling*

INTRODUCTION

About two-thirds of the world's workforces are working in developing countries. Eighty percent from these workers are continuously exposed to harmful agents and conditions in inherently harsh workplaces [1]. According to the ILO global estimates, 2.3 million workers die from occupational accidents and work-related diseases and over 313 million workers suffer non-fatal occupational injuries every year [2].

Bedsides, 4% of the global GDP (roughly 1.25 trillion US dollars) is drained off annually by costs such as loss of working time, workers' compensation, interruption of production, and medical expenses. This is a colossal figure that is over 20 times greater than official development assistance [3-4]. Occupational accident and injuries lead to loss of millions of workdays yearly [5] mainly focused on the manufacturing industries [6-7]. Accident prevention issues for developing countries are vital and have been in progress

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recently. Based on the literature and released documents from Iranian Social Security Organization, 14,114 accidents lead to injury and 468 deaths in 2001 [9]. Occupational accident cases have increased to 20,404 in 2011 and between this decade 220,400 workers had injury totally [10].

In the past years, prevention policies merely relied on equipment and environmental changes such as engineering control, but it seems that these changes do not have enough efficiency and productivity. Based on this fact, emotional intelligence (EI) is generally considered one of the most important works in environmental issues in present and future organizations [11]. Emotions have vital roles in human life. Anger, dislike, anxiety, happiness and fear are parts of emotions that may be experienced by humans. Emotion and attention are closely related. Emotional status is hypothesized to have affected the success with which employees interact with other workers, the solutions they use to manage conflict and stress, and overall job performance [12]. Lack or failure to pay attention to this in workplaces control leads to human errors and accidents. Many researchers in I/O psychology believe that emotions can be adaptive and can alter private and social interactions into positive mood, enriching experiences and behaviors. The EI has emerged as a tool to describe how one uses their skills. These skills relate to those conditions that cause organizational problems and the interpersonal conflicts. It seems that EI is an attractive field of research for industrial organizations as well as occupational health policy makers these days.

Emotional intelligence was predicted to have enhanced positive social relations by helping individuals to detect colleagues' emotional conditions, adopt others' considerations, enhance interactions, and predict safe and unsafe behavior and life outcomes [13]. Based on the literature about EI, it seems emotions are suitable and applicable when the information they provide is attended to, applied accurately, integrated into behavioral analysis, and managed sufficiently [14]. The practical application of EI skills and behaviors can enhance the social relationships [15], decrease processes associated with mental disorders and social anxiety [16] work-life conflicts [17], develop job satisfaction [18], alleviate depression [19] and in contrast, increase organizational commitment [20]. Work empowering, knowledge and technical skills cannot be replaced by emotional intelligence.

Eighty percent of drivers involved in crush accidents had low EI or for emotional control and management had been in trouble [21]. EI is a key factor for work performance and success. In the organization with defined training program for emotional capability development, 1-50% work-time is saved and that can be consumed in the rail of productivity [14].

The relationship between mental health and emotions was documented and workers with good and high levels of emotional intelligence often get ahead and progress well through the ability of stress coping and occupational disease management [22]. Many researches have designed a survey in order to establish the correlation between emotional intelligence and mental health in different environments such as academic complex [22-24] and health care [23] but industrialized organizations that focus on health and safety have been rare [25]. In recent days, development of emotional intelligence procedures is one of the most common research fields in the occupational setting because strong EI skills can give one a competitive advantage in the workplace and make work time far more pleasant and attractive. Basically, all these considerations are relevant and important. Safer works depend on mental health enhancement programs and paying more attention to these issues is essential [11].

Before delving into mental health, it is important to define the term health. Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Besides, mental health is defined as a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to contribute to his or her community [26-27]. This fact file highlights the important aspects of mental health and disorders such as stress and anxiety [28-29]. The most common complaints that lead people to medical treatment are anxiety and depression.

There is a capability associated with emotional intelligence. Therefore, that should help employees to deal sufficiently with disliked emotions and to promote suitable emotions in order to develop both workers' growth and well-being [29]. In a workplace like healthcare, decrease in health status leads to an increase in unsafe behaviors [30]. Along the same line of thought, it would be a correlation between GH and Industrial Accident [31]. For example, in a study on the military people in Australia, a positive correlation between low level of GH and unsafe behaviors (r=0.6) have been reported [32]. As well as, relationship between occupational accident and other factors such as depression [33], stress [34], anxiety [35] and cognitive failure [36-37] have been documented. Without high levels of health status and emotional intelligence, workers and their organizations cannot be productive and would not be an economical healthy complex [38].

The purpose of the present article was to survey the relationship between EI with GH and on the workers of a manufacturing company in Iran, 2014. Outcome of this study would be safety and health enhancement in workplaces and aiding to

related policy makers.

MATERIALS AND METHODS

This cross-sectional study, was conducted among all workers in the functional units of a manufacturing company [redacted] (n=178), located in the central province of Iran. Demographic characteristics were gathered by a researcher's-developed questionnaire, which contained age, sex, work experience, educational level and occupational accident number during working in the company. Occupational accident is considered as a discrete occurrence in the workplace leading to physical or mental injury.

EI was assessed using Bradberry and Greaves' questionnaire [39], It was tested and evaluated in Iran [40]. This tool had questions involving 28 items in the form of four sub-factors namely: self-awareness, self-management, social-awareness, and communication-management.

Responses were on a 1–6 Likert scale, ranging from never to ever so, they had a final score between 28 and 168. The questionnaire's reliability was measured as 0.88 [29] and 0.83 [41] in Iran.

GHQ was the other tool used in the study. This questionnaire is a multiple and self-reporting test that has been developed to assess mental disorders. It can be applied among youths and adults to discover inability to do normal functions and distributing events in life. This test has no diagnostic aspect and can be used to screen individuals in acute situations [42]. GHQ was developed by Goldberg (1972) for the first time [43]. It contains 28 questions and four scales: somatic symptoms, sleeplessness, social dysfunction, and depression. Respondents had four choices (0-3) on Likert scale to select for each question and the final score could be 0-84. Lower score means better status of health. Six [6] and twenty-three [23] were considered as cut-off points for four scales of GH and its total score respectively. If a person gets a score lower than the cut-off points he/she is located in healthy status and vice versa [44-45]. GHQ's validity was approved [46-47] and its reliability has been confirmed [48-49]. Furthermore, ethical issue is considered in our study. Subjects were informed about aims of the study by our teams as well as exit from the study without any charges or outcome.

Kleidon in his study [32] presented a model, in which EI had a role as mediator between safety of climate and poor health (contained fatigue, strain and need for recovery), and poor heath was directly related to errors. In the present research, we examined a model as obviously shown in Fig.1. Testing direct relationship between accidents with EI as well as its relationship with health conditions in a company in Iran is the novelty of the model. Descriptive statistics was used to describe data by SPSS V22 (Chicago, IL, USA). Also, relationship between studied factors was analyzed by the application of Structural Equations Modeling using EQS software.

RESULTS

Out of the 178 administered questionnaires, 148 valid ones were returned (response rate: 83.15%).

Demographic factors: The questionnaires provided the following information on demographic characteristics: 147 (99.32%) of workers were males and there was just a female among participants, their mean (SD) age was 39.13 (8.23) and in the range of 20-61 years, 64.19% of them were married. Regarding work experience, mean (±SD) was 14.54 (±4.4) years. On the average, every worker had experienced 0.25 work-related accidents (±0.65) but it ranged from zero to 5. Table 1 lists other information.

Table 1. Education level and marital status description (n=148)

Factor	Sub-factors	Frequency (%)
Education level	Lower secondary	79 (53.38)
	Secondary	55 (37.16)
	Junior college	6 (4.06)
	Bachelor degree	8 (5.40)
Marital status	Married	95 (64.19)
	Single	53 (35.81)

Emotional Intelligence (EI): After gathering data, the questionnaire's reliability was assessed and Cronbach's α value was=0.86. Cronbach's α value for each EI dimension was measured: self-awareness was 0.6, social-awareness was 0.55, self-management had 0.52 and communications-management was 0.82.

Mean and standard deviations of EI score calculated were 90.64 and 19.33, respectively. Comparing mean scores on EI with 98 as total mean score (28(number of questions)×3.5(mean score for each question)) shows that is lower. Among four sub-factors of EI, communications-management had the highest score (28.32) and on the other hand, social-awareness had the lowest one (15.93). Table 2 depicts details on EI related information.

Table 2. EI and its scales description (n=148)

Factors	Min.	Max.	Mean±SD
Self-awareness	6	29	20.85±4.36
Self-management	8	40	26.38±5.88
Social-awareness	5	25	15.93±4.12
Communications-Management	7	39	28.32±6.61
Total EI	28	138	90.64±19.33

General Health (GH): The total questionnaire's reliability was 0.86 using

Cronbach's α. In addition, the alpha for social dysfunction, sleeplessness, somatic symptoms and depression were 0.74, 0.86, 0.87 and 0.88, respectively. The results indicated that mean score of GH was 22.24 (±9.83). Social dysfunction had the highest mean (10.22) and is in the worst condition but, somatic symptoms is the best one (Table 3).

Table 3. GH and its scales description (n=148)

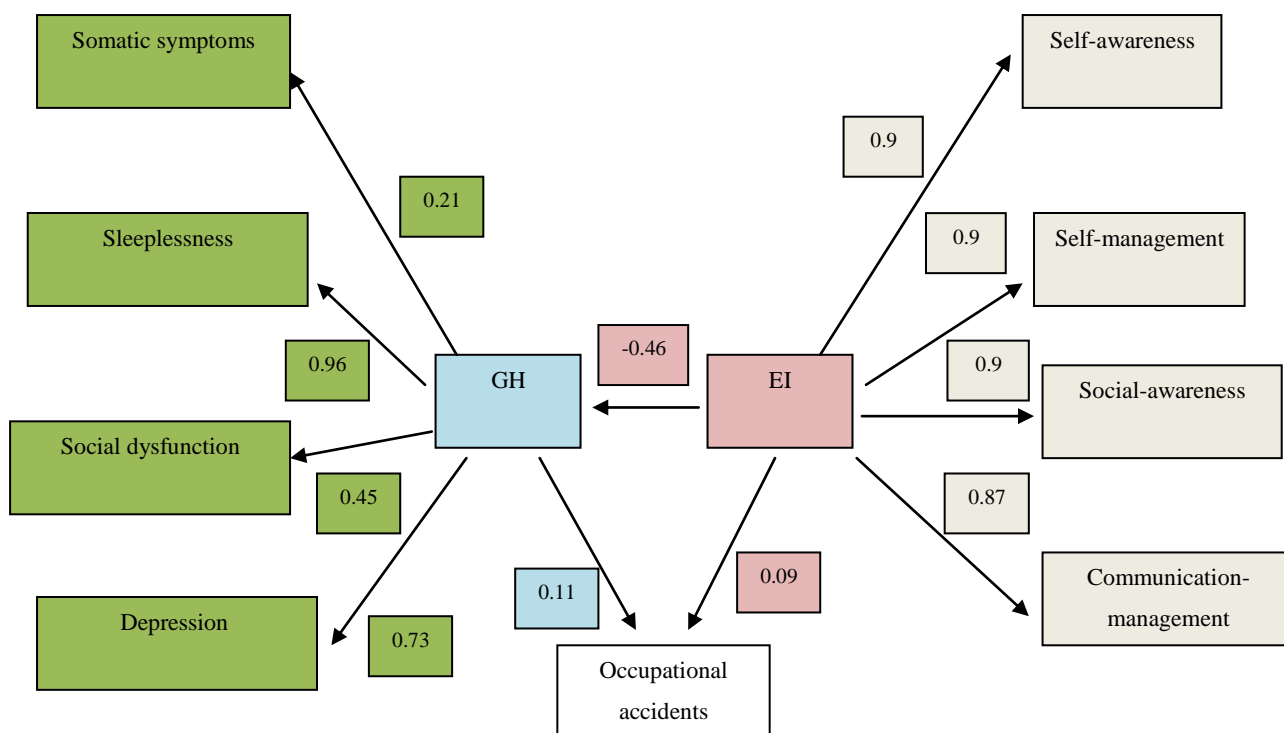| Factors	Min.	Max.	Mean±SD
Social dysfunction	1	21	10.12±3.54
Sleeplessness	0	19	5.29±4.25
Somatic symptoms	0	19	4.86±4.04
Depression	0	16	2.13±3.65
Total GH	7	63	22.24±9.83

Comparing 6 with 23 (as cut-off points), 104 workers (70.7%) in somatic symptoms, 87 staffs (66.7%) in sleeplessness, 15.6% (23 ones) in social dysfunction, 129 participants in depression (87.7%) and finally, 94 workers representing 63.9% in total GH were located in healthy situations.

Structural Equations of Modeling (SEM): Relationship among EI, GH and occupational accidents has been assessed through SEM and results were captured in Fig.1. In fact, accidents were predicted with two others. Fig.1 shows that work related accidents were predicted significantly with GH and EI ($P<0.05$).

Multiple indices should be used to assess a model's goodness of fit. Various fit indices were used to assess the fit of the model to the data, i.e., Degrees of Freedom (DF), Comparative Fit Index (CFI), GFI, Chi-Square (x^2) and Root Mean-Square Error of Approximation (RMSEA) and the result is reasonable. The fit indices of the model for x^2, DF, CFI, GFI and RMSEA were respectively 3009.311, 1519, 0.639, 0.584, 0.074.

Beta (β) coefficients resulted from the model which were illustrated in Fig.1, pose that social awareness and communication-management with coefficients of 0.99 and 0.87 have the best and the worst relationship with EI, respectively. Besides, sleeplessness (β=0.96) had the most and social dysfunction (β=0.45) had the lowest relationship with GH.

Fig.1. Path model with its coefficients (P<0.05)

As mentioned above, analyzing relationship between main variables (EI & GH) with occupational accidents depicted that both of thems are in a significant relationship with accident (P<0.05). GH had a higher beta value than EI, 0.11 against 0.09. EI has in a divers relationship with GH (β=-0.46, P<0.05). That means GH will get better with an increase in EI, or higher EI for improved GH.

DISCUSSION

The result of EI assessment tool presents 90.64 as the mean score and that was visibly lower than the outcome of past studies (123.58) [50]. About the level of each of the sub-factors of EI, it can be said that according to

research conducted by Farsani et al. [51] communication management and self-management were two factors with higher scores and self-awareness and social-awareness had lower ones, this is like the results of present study. As training can lead to enhanced EI, it is suggested that a comprehensive EI training plan be provided for workers. Furthermore, Neuro-Language Planning (NLP) technique can be used [52].

In this research, Goldberg' questionnaire had 22.24 as the mean score of GH which is acceptable in comparison with related cut-off point. That score was 24 among university students [53]. In comparison with epidemiological studies among Iranians, [54] it is reasonable. Our results demonstrated that social dysfunction had the worst state and this is in line with some previous researches [31, 55]. The outcome of SEM analyses tells us that GH and occupational accidents are related; increasing GH score or its movement to unhealthy situations, number of accidents will rise with a coefficient of 0.11 and this was confirmed in a previous study [31].

Depending on our results and in the line of other researches [56] upturn in EI will influence workers' mental health positively. Outcomes of a study aimed to assess relationship between EI and mental health among university students depicted that there was a statistically significant relationship between them ($P<0.01$, 24). Pearson and Spearman correlations showed EI and GH were positively correlated respectively [57-58]. Similar to our findings in the work of Namazi et al. it was revealed thatthere was a positive correlation between the components of EI and GH like social function, distress, and anxiety [59]. Kleidon assessed six factors (general factors, safety of climate, errors, Health, EI and fatigue) among 420 staff members of the Australian defense force and reported negative relationship (-0.17) between EI and low health conditions and a positive relationship (0.60) between low health conditions and unsafe acts/errors [32] Unsuitable health condition, such as symptoms of anxiety, depression and social dysfunction, and also higher levels of trait aggression explained unsafe driving behavior lead to accident [60].

In contrast with earlier studies [14, 21] which publicized drivers relationships between EI and accidents and the attendant problems, in this research increasing EI will put up work-related accidents, however its coefficient is 0.09. They know themselves and the surrounding environment then self-confident is boosted so much so that they consequently get involved in accidents. It could be a reason for

the result. This important issue should be in the minds of planners during trainings.

Although we found a poor relationship between EI, accidents but elements of EI training will lead to the reduction in stress and anxiety [61], and it seems that can be beneficial to prevent accidents and injuries in workplaces. Studied companies need to design a plan to provide favorable conditions for workers by reviewing mistakes and errors and strengthen cognitive systems and as a result, help to improve conditions in the future. There is a connection between cognition, emotion and safety culture that are useful in analyzing errors, creating awareness of their structure and finally to learn from the mistakes and avoid them [62]. Mental health is related to lifestyle [63], sleep quality [64] accidents [36] and injury [37] so; correction of health field behaviors such as revision of lifestyles is able to improve workers' mental health situations. Aside other factors, physical conditions of work are also useful in corrections as well as helping to improve employees' health.

CONCLUSION

Altogether, EI and general health are in acceptable status in the company of study. Regarding the significant relationship between EI and GH with the occurrence of accidents in workplaces and the improvement of GH with increase in EI, three strategies are recommended to prevent injuries and to make workplace healthier. The first strategy is appropriate employee selection for jobs, but there are not sufficient scientific documents around its effects on occurrence of accidents and there is need for more studies. Suitable training for handling stressful situations and enhancing EI is the other strategy that is often used in organizations. The last recommended strategy is intervention at the right time to help workers who are in unsuitable occupational conditions. However, this work is in the scope of questionnaire researches with their limitations, hence more researches especially about the relationship between EI and occupational accidents are recommended.

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