

Mediating role of supervisor on the association between work stress with physical and psychological symptoms among employees of Isfahan Steel Company in 2012

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Abstract

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Background: Nowadays job stress is one of the most important health problems that health and safety professionals are facing with. Much of previous studies have focused on interventions such as stress management and, they have ignored the role of psychosocial factors in occurrence of job stress. This study investigated the mediator role of supervisor support on the association between work stress and both physical and psychological symptoms, among Isfahan steel company employees in 2012.

Materials and Methods: The study questionnaire was completed by 189 employees of Isfahan Steel Company in 2012 who accepted to help with this descriptive study. The questionnaire consisted of items asking about work stress, physical and psychological symptoms as well as supervisor support.

Results: There were significant intercorrelations between the dependent and independent variables under research. Hierarchy regression analysis showed that supervisor support partially mediated the relationship between work stress and physical and psychological symptoms ($p < 0.05$).

Conclusion: It was concluded that supervisor support is a protective shield against the effects of stress on psychological and physical health, among employees working in the steel company.

Keywords: Psychologic Stress, Musculoskeletal Diseases, Psychiatric Diagnosis, Cardiovascular Diseases

Introduction

The steel industry has one of the highest rates of fatal and non-fatal accidents/injuries every year. As a high risk industry, there is a need to investigate factors that affect the occurrence of these accidents in order to helping us to be able to protect workers [1]. Work stress is regarded as an important topic in the field of work health [2] because of its negative impacts on workers' health and safety [3]. It results from Long-term exposure to workplace psychosocial risks, characteristics of the work environment, work design, and organizational management which potentially cause psychological and

social damages [4]. Work stress in occupational setting may also result in a physical or psychological reactions such as absenteeism, turnover, and job burnout [5], cardiovascular and coronary artery disease [6], gastrointestinal complaints, health problems, fatigue, injuries at work [7], sleep disturbance [8], disorder in social activities and quality of time spent with family [9], headaches, nausea, muscle pains [10], job dissatisfaction [11], affective disorder [12],

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increased number of somatic symptoms such as neck and shoulder pain [13], type 2 diabetes in middle-aged women [14], susceptibility to disease [15], an increased risk of depression [16], and psychosomatic symptoms [17].

One of the primary obstacles against work stress and physical –psychological problems can be supervisor support [18]. Supervisors play a critical role in supporting the professional standards, expectations, and requirements that are conducive to a more supportive occupational settings as well as its critical role in the provision of workplace support [19]. Supervisor support is defined as workers' general views about the degree to which their supervisors value their contribution and care about their well-being [20]. Supervisor support provides employees with an important resource to manage stress [21].

The recent research showed supervisor support can buffer the hazardous effect of work stress on feelings of emotional exhaustion [22]. High levels of supervisor support reflecting care and concern for the health of employee leads to a reciprocal relationship in terms of increased safety behavior [23]. Supervisor support provides for employees an important resource to manage stress [21], enhance performance [24] and buffer the adverse effect of job demands on emotional exhaustion in situations with low decision authority [25].

Considering the stated material above, research about supervisor support can have many advantages for organizations and individuals due to increasing employees' safe behaviors and promoting safety level in workplace. However, less research has

focused on psychosocial dimensions of workplace such as supervisor support. Also, the relationship between work stress and reporting of physical and psychological symptoms has not been studied adequately. Previous studies have mainly focused on particular industries [26], and no attempt has been made to describe the association between work stress and physical and psychological symptoms among Steel industry workers.

To summarize, the present study attempted to: 1) the examination of the likely relationship between work stress and physical and psychological symptoms; 2) the examination of the likely relationship between work stress and supervisor support; 3) the examination of the likely relationship between supervisor support and physical and psychological symptoms; 4) the specification of the mediator role of supervisor support in the relationship between work stress and physical and psychological symptoms.

Materials and Methods

This descriptive study was administrated between Jan and Feb 2012 in Esfahan Steel Company. Esfahan Steel Company (Zob Ahan-e Esfahan) opened in late 1960s, is based 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) [27]. In this study, in attention to 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.), Stratified random sampling was used to select the study sample. In stratified random sampling, the strata are formed based on members' shared attributes or characteristics. A random sample from each stratum is taken in a number proportional to the stratum's size when compared to the population. These subsets of the strata are then pooled to form a random sample. Then simple random sampling or systematic sampling was applied within each stratum. This 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 SPSS (version 15), Following the procedure recommended by Molavi (28). Given an, α level 0.05 and a power of 90 percent, the sample size required was estimated to be 180 subjects. Given the likelihood of failure to complete or return questionnaire, almost 200 employees were selected using stratified random sampling and questionnaires were distributed among them. Informed consent was obtained from each participant and the study was approved by the appropriately constituted ethics committees where the work was done.

The entry criterion for a person to this study was the employment at the company's sectors and the selection from among the members of his/her group randomly. The exclusion criterion of the individual was the delivery of incomplete questionnaire and lack of interest in participating in current research. Six members of the sample due to lack of interest in research topic, and 5 members due to

incomplete questionnaires (in total 11 people) were excluded. Overall, 189 completed questionnaires were collected (95% response rate). In order to control the confounding factors, questionnaires were completed by respondents in a quiet environment. Also, respondents were told that questions were listed in the questionnaire to evaluate only stress, psychological distress and physical symptoms that they have experienced due to their professional duties (not their family duties). Employees gave the written consent for their satisfaction on participating in this research and in order to avoid bias in answering questions, they were ensured that their responses would be confidential.

Validated instruments were used for data collection on work stress, supervisor support, physical symptoms and psychological distress. 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 the 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 workers to ensure that the scales items were comprehensible and appropriate to the context. Moreover, conceptual analysis confirmed the linguistic validity of all instrument. The questionnaires

were distributed to workers with the help of union steward. Participants were assured of confidentiality and informed consent in written format was taken from each them.

Scale of Supervisor Support for safety.

Perceived supervisor support for safety with 15 items of Hayes, Perander, Smecko and Trask [29] was measured. Questions in the questionnaire are based on the amount and how employees interact with their supervisors. Two samples of the questions in this scale were: "My supervisor encourages me to express my ideas and opinions about safety at work", "My supervisor spends time showing me the safest way to do things at work". Respondents indicated the extent of agreement with each statement on a 5-point Likert-type scale (1= strongly disagree; 5= strongly agree). The scores of participants were obtained by adding their responses to a 15-items questionnaire. Total score was grades of 15-75 that higher scores indicate that employees perceive work environment and their supervisors more supportive. Munteanu [30], calculated the internal reliability of this scale using Cronbach's alpha of 0/90. Evidence of reliability of this scale, as administered to Iranian relevant populations, in this research, by Alpha Coefficient is 0.80 and by Split-half is 0.78 The validity coefficients of questions and rating scales PSS are between 0.23 and 0.77 that all the validity coefficients are significant at $p < 0.0001$.

Physical symptoms scale. This scale is a 20 items questionnaire of Barling, Loughlin and Kelloway [31]. It is made based on the frequency of physical symptoms that employees have experienced them in their

jobs during the past month. Scoring is based on a likert style of five degrees from 1 (never) to 5 (more than 5 times). Two samples of the questions in this scale were: "How frequently have you experienced headache or dizziness on the job?", "How frequently have you experienced persistent fatigue on the job?". Sum of the scores given to items is reported as the total score of physical symptoms for a worker. Prior studies surveying many industrials and organizations provide evidence for high internal reliability and validity of the scale (30). Internal consistencies (Cronbach's α) in this study in Iran were 0.81, which was excellent for this scale.

Psychological symptoms scale. This scale is a tool with 7 items of Barling et al. [31]. It is based on the frequency of psychological symptoms that employees have experienced them in their jobs during the past month. Scoring is based on a likert style of five degrees from 1 (never) to 5 (more than 5 times). Two samples of the questions in this scale were: " how frequently have you lost much sleep due to work related worries" and ", how frequently have you felt constantly under strain". Psychological distress scores are from 0 to 28 that high scores indicate more psychological distress experienced by the individual. Mantineau [30] reported the internal validity of this scale using Cronbach's alpha 0/83. Also, she showed that this scale had a good validity. Internal consistencies (Cronbach's α) in this study in Iran were 0.79, which was excellent for this scale.

Work stress. This scale was measured by Perceived Job Stress Scale (PSS)[32]. PSS is

the most widely used psychological instrument for measuring the perceived job stress. It measures the degree to which situations in one's life are rated as stressful. The items asked for respondents how often they find their lives unpredictable, uncontrollable, and overloaded [33]. The scale also includes a number of direct questions about the current levels of experienced stress. All the items we used were modified to ensure that they were appropriate for the industrial context and included a number of direct questions about the current levels of experienced job stress. A sample item is "in the last month in workplace, how often have you been angry because of the things that were outside of your control.". The items of this questionnaire are grasped easily, and the response alternatives understand it simply. Further, the queries are of a public nature and thus are relatively free of content specific to any subpopulation group. The questions in the PSS ask about feelings and thoughts during the last month. In each case, respondents were asked how often they felt a certain way. Scoring was based on a Likert scale of four degrees from 0 (never) to 4 (very often). Mitchell, Crane and Kim [34] mentioned that this questionnaire has a high correlation with scales of "traumatic stress syndrome" and "quality of mental health". Also Demir and Orucu [35], in their study, mentioned the Cronbach's Alpha 0.84 and its correlation with the questionnaire "Public Health", 0.61. Evidence of reliability of this scale, as administered to Iranian relevant populations, in this research, by Alpha Coefficient is 0.82 and by Split-half is 0.77

The validity coefficients of questions and rating scales PSS are between 0.26 and 0.81 and all the validity coefficients are significant at $p < 0.0001$.

In order to test the mediating effect of supervisor support between work stress with physical and psychological symptoms multiple regression analyses were performed separately for each three-variable system in the model to assess the relations between work stress with physical and psychological symptoms via the hypothesized mediator which is supervisor support. According to Baron and Kenny, the following four conditions must be met to establish mediation: (a) The predictor variable must be related to the potential mediator, (b) the predictor must be related to the criterion variable and when the criterion variable is regressed on both the predictor and mediator variables, (c) the mediator must be related to the criterion variable, and (d) the previously significant relation between the predictor and criterion variables is attenuated [36]. All these requirements were examined and, in addition, the Sobel test [37] was used to test size and significance of the mediation effect. Data were analyzed using SPSS 15 software and p value less than 0.05 was considered statistically significant.

Results

The majority of participants were male, because the main occupational groups were at production line in this study. Ages ranged from 18 to 53; the mean age of the participants was 34 yr (SD=5.58 yrs) and average work experience was 12 yr (SD=3.2 yrs) (Table1).

Table 1: Demographic characteristics of the participants (N=189)

Variable	Groups	Frequency	Frequency Percentage [%]
Age	18 to 29 years	68	36%
	30 to 41 years	68	36%
	42 to 53 years	53	28%
Sex	Male	170	90%
	Woman	19	10%
Marital status	Married	113	60%
	Single	76	40%
Education	Master degree	22	12%
	University graduates	45	24%
	High school graduates	113	60%
	Primary school graduates and lower	9	4%
Work experience	5 years and lower	68	36%
	6 to 15 years	45	24%
	16 to 25 years	45	24%
	26 years and higher	31	16%
Shift status	Shift	120	64%
	Not shift	69	36%

Table 2 shows the descriptive statistics and intercorrelations of the study variables. Work stress was positively related to physical symptoms ($r=.34$, $p<.01$), and to psychological symptoms ($r=.43$, ns).

Supervisor support was negatively related to physical symptoms ($r=-.33$, $p<.01$) and to psychological symptoms ($r=-.23$, $p<.05$). Work stress was negatively related to supervisor support ($r=-.25$, $p<.05$).

Table2: Mean, standard deviation and internal correlation between variables (N =189)

Measure	M	SD	Correlations			
			1	2	3	4
1.Chronic work stress	25/35	4/94	1			
2.Physical symptoms	16/93	5/02	0/34**	1		
3.Psychological symptoms	11/1	4/33	0/43**	0/55**	1	
4.Supervisor support	29/1	2/51	2/25*	0/33**	0/23*	1

* $p<0/05$, ** $p<0/01$

We used the approach proposed by Baron and Kenny [36] for testing mediation. In addition, in order to estimate significance and size of the indirect effect we employed the Sobel test (1982) [37]. Regression analyses were used to test the hypotheses about the mediating role of supervisor

support. First, work stress regressed on supervisor support; supervisor support was found to significantly predict work stress ($\beta=-.26$; $p<0.05$) (second step). The regression analysis results are shown in Table 3 & 4.

Table3: Results of mediation analysis for physical symptoms

Baron and Kenny [1986] steps	B	SE	β	t	P
Direct and total effects					
Step 1: physical symptoms regressed on work stress [b path]	.21	.099	.23	2.06	.042
Step 2: work stress regressed on supervisor support [a path]	-.118	.049	-.261	-2.39	.02
Step 3: Physical symptoms regressed on work stress, controlling for supervisor support [b' path]	.16	.12	.17	-2.12	.032
Indirect effect and significant using distribution					
Sobel				z	P
				-2.22	0/03

Note. N = 189.

A hierarchical regression analysis was conducted to examine the successive and independent contributions of work stress and supervisor support on physical and psychological symptoms (first and third steps). The effect of work stress to physical and psychological symptoms was reduced (although it was still significant) after supervisor support was entered in the equation at step 3. This result was consistent with the presence of a partial mediation

effect. The significance of the mediation effect was further confirmed by the significance of the Sobel test for physical symptoms ($z = -2.22, p < 0.05$) and for psychological symptoms ($z = -2.4, p < 0.05$). Hence, the analysis provided support for the hypothesis of the mediating role of the supervisor support on the relation between work stress and physical and psychological symptoms.

Table 4: Results of mediation analysis for psychological symptoms

Baron and Kenny [1986] steps	B	SE	β	t	P
Direct and total effects					
Step 1: psychological symptoms regressed on work stress [c path]	.35	.079	.45	4.41	.000
Step 2: work stress regressed on supervisor support [a path]	-.118	.049	-.261	-2.39	.02
Step 3: psychological symptoms regressed on work stress, controlling for supervisor support [c' path]	.30	.08	.38	-2.19	.031
Indirect effect and significant using distribution					
Sobel				Z	P
				2.4	0/02

Note. N = 189

Discussion

The results of the present study indicated that work stress has positive correlations with

physical and psychological symptoms and a negative correlation with supervisor support. This is consistent with the findings of the previous studies [1, 38-43] and can be

interpreted on the basis of the following possibilities.

Work stress is the condition in which some factors interfere with the worker to disrupt his or her physical or psychological health [44]. Previous research indicated work stress has positive correlation with physical and psychological symptoms such as Backache [45], Headache [46], Eye strain [47], Sleep disturbance [48], Fatigue [49], the decrease in appetite [50], gastrointestinal problems [51]. For example headache is pain experienced in the upper half and back of the head, in particular is associated with exposure to stressors such as scheduled hours, shift work, and lack of pre-work training [46]. Supervisor support consistently buffered the negative effect of work stress on the physical and psychological health among employee. Theoretical models of work stress also include a central role for support. The importance of supervisor support seems reasonable. Supervisor support is essential to motivating employee to excel and provision of support in workplace. Previous researches showed high levels of supervisor support were related to decreased work stress and a greater appreciation of the work [52].

The results of the present study indicated that supervisor support has a mediatory role in the relationship between work stress and physical and psychological symptoms. This is consistent with the findings of the previous studies [18, 52, 53-55] and can be interpreted on the basis of the following possibilities. Previous research indicated the availability of support from one's supervisor buffered the negative effects of work stress on health of employees. Employees with the perception of supervisor support realize that their health and safety for supervisory management is more important than the mere production; so they do not spend all their time for doing their jobs faster and do their work with more

patience. On the other side, employees with the perception of work pressure have more job stress and want to do their work rapidly; therefore, at the time of working with organizational machinery and perhaps even at the time of their passing are involved in more accidents. The perception of employees about the company philosophy and its supervisor of production or safety, after the organization's policy towards safety, was the second important factor in predicting safety performance [56]. The theory of demand-control [DC], describes work stress as developing from the structural or organizational aspects of the work environment and not the individual characteristics [57]. A part of this theory as interaction between the job demands is put on the employee and the management to coordinate those demands [58]. Employees involved in positions with low control, high demands and low supervisor support, are in a higher danger of physical and psychological harm from work stress [59]. Mcclenahan, Giles and Mallett [60] concluded that high demands and low control and low supervisor support accounted for 26%, 6%, and 8% of the variance in job satisfaction, psychological distress and burnout, respectively. Lack of supervisors' support and poor communication may act as stressors and therefore lead to the perception of work stress [61]. Supervisor support has effects which are beyond the perceived organizational support that is only associated with improved safety communications. Providing essential information and skills about mental health, including occupational stressors, have desired effects on the mental health of employees, at least in the short term [62]. Through providing information for subordinates or transferring attitudes or opinions about safety to them, often supervisors act as a driving force affecting

workplace safety [63]. Perceived support of supervisor and co-workers from safety can reduce stress and the perception of stressors in workplace [64]. Supervisor support can mediate the impact of stressors on workers, in turn, cause them less likely to experience work stress [65]. Supervisor support provides employees with an important resource to manage stress and ultimately reduces the negative effect of work stress impact on physical and psychological symptoms. In order to minimize the occurrence of physical and psychological symptoms, it is important to provide supervisor support for employees [66]. Most organizations spend all their time in designing interventions for reducing stress. Although employees will learn ways to deal with stressors, when they enter the workplace, because of poor relations with supervisors and colleagues, get involved in the paradoxical situation. Learning from interventions becomes pale, and they fall in the same destructive cycle of conflicts. Studies have shown that supervisor support and the quality of communication between the supervisor and employees have a significant impact on learning transfer [67]. Therefore, in organizations supervisors and managers should be taught how to establish good relations with subordinates. Given the above contents, the mediator role of supervisor support in the relationship between work stress and physical and psychological symptoms include: Identifying important factors in the occurrence of work stress and the better design of human relations in the workplace which can mediate the effect of work stress on physical and psychological health of employees. The most effective procedure in which organizations can reduce work stress is modifying the sources of stress and creating a healthy workplace in occupational stress management. Increasing communication

through greater opportunities for participation of employees in workplace and supervisor support training program on stress management might be effective ways for alleviating work stress, which would ultimately enhance workers' health. 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 employees) 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.

Conclusions

The results of the present study showed that supervisor support has a critical role in the relationship between job stress with psychological and physical health among employees.

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