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The role of psychosocial and physical work-related factors on the health-related quality of life of Iranian industrial workers

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Abstract.
BACKGROUND: The role of psychosocial and physical work factors in predicting health related quality of life (HRQOL) has not been investigated among Iranian industrial workers.
OBJECTIVE: The present study is designed to assess these relationships among Iranian workers from steel and cosmetic factories.
METHODS: A cross-sectional study was conducted among 280 workers from two factories. Psychosocial and physical work factors and HRQOL were measured by the Persian translations of the following questionnaires: Job Content Questionnaire (JCQ) and the World Health Organization Quality of Life-Brief (WHOQOL-Brief). An instrument was developed to assess socio-demographic, health, and other work-related factors. The data were analyzed using independent *t*-tests, Pearson product moment correlation and hierarchical multiple regression.
RESULTS: Results revealed that the respondents generally had poor HRQOLs especially in the environmental domain. The steel factory workers who were exposed to higher levels of occupational risk factors suffered from poorer HRQOL compared to the cosmetic factory workers. The results of hierarchical regression for all participants revealed that social support, sleep quality, work schedule, smoking and exercise were significant predictors of all domains of HRQOL.
CONCLUSIONS: To improve the worker's HRQOL, intervention programs should focus on promoting social support, sleep quality, exercise and smoking habits. Moreover, reducing hazardous work environments should be considered an important intervention to promote HRQOL.

Keywords: Psychosocial work factors, job content questionnaire (JCQ), health-related quality of life, World Health Organization Quality of Life-Brief, WHOQOL-brief

1. Introduction

The evidence literature suggests that occupational stress is related to psychological and psychosomatic health. In particular, high job stressors are related to serious health problems such as cardiovascular diseases, musculoskeletal disorders, gastrointestinal

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illness, psychiatric diseases, occupational injuries, absence from work, sleep problems, depression, and anxiety [1–7]. Hence, research has focused on the source of stressors among a variety of occupations.

Psychosocial work stressors are among the most important stressors workers face [8, 9]. These are defined as perceived aspects of the work environment resulting from the interplay between work and individuals [10].

Karasek [11] has used two key dimensions of the psychosocial work environment -psychological job demands and decision latitude in defining the Job Demand-Control (JDC) model. The JDC model, one of the most frequently used models of stress, predicts adverse health effects among highly stressed workers [8]. According to the JDC model, a combination of high psychological demands and low control (low decision latitude) in work leads to occupational stress. It should be noted that the JDC model does not measure stress directly. Instead, the JDC evaluates job demands, job control, and job strain to assess stress levels. These job stress dimensions have been reported to influence health [6–9].

Quality of life is an important aspect of one's life. The World Health Organization (WHO) define it as the subjective perception of how healthy, happy and satisfied a person is with his or her life in general [12]. This value judgment depends on the person's culture, education, aims in life and the resources available to achieve personal goals [12]. The concept of health related quality of life (HRQOL) has been used to describe health-related aspects of one's life which are influenced by health or illness [13]. Therefore, HRQOL is an important measure of health and well-being in any population [13, 14].

Studies of working environments has been the main focus of HRQOL [9]. It has been shown that high levels of job stress and poor psychosocial work environment are related to poor HRQOL [8]. A study by Hamaideh [15] which measured the levels of occupational stress and its related variables among Jordanian mental health nurses indicated that occupational stress was negatively correlated with HRQOL dimensions (including physical, psychological and social domains). Similarly, many aspects of psychosocial work factors such as social support, job demand, job control, job insecurity, effort-reward imbalance and workplace violence have been shown to be related to HRQOL [8, 13, 16]. Other work-related risk factors, which might influence HRQOL such as hazardous conditions, physical exertion, and physical isometric load, have been less investigated. To the author's, the relationships between HRQOL and psychosocial work factors have not been investigated among Iranian industrial workers. Additionally, it seems that health and safety standards for workers are relatively low specifically in some provinces such as Kohgilouyeh and Boyer-Ahmad for a couple of reasons. First, traditional, rural life style in the citizens may make them unaware or even careless about health and safety requirements in modern industries. Second, even if there are some concerns about health and safety among the workers, the low job security and/or fear of unemployment, may prevent them from asking managers to provide such workplace health and safety standards. The low job security among these workers in turn may have been influenced by the decline in value of Iran's Rail against the US dollar during July through September 2012, when our research was conducted in Iran, which in turn may have increased the production costs for manufacturers where the final prices of their products may not have increased accordingly. Therefore when the manufacturers were under financial pressure they might be reluctant to invest on work health promotion. Finally, the lack of enforcement of worker protection rules may weaken the process of occupational health supervision which in turn may cause the employers to be unconcerned about work health promotion. However, it seems between the two factories under consideration, the cosmetic factory workers experienced relatively better health and safety standards in their work place. As such, the following hypothesis and questions can be raised:

- The Cosmetic factory workers have higher HRQOL (all domains) than steel factory workers.
- What roles do the demographic factors play in predicting HRQOL dimensions?
- What roles do the health-related factors play in predicting HRQOL dimensions?
- What roles do the physical work-related factors play in predicting HRQOL dimensions?
- What roles do the psychosocial work-related factors play in predicting HRQOL dimensions?

2. Methods

2.1. Study design and subjects

In this cross-sectional study, workers from two industries (cosmetic and steel) that were the only two

large, modern factories in Kohkilouyeh and Boyer-Ahmad province completed the questionnaires. At the time of the study, there were 190 and 140 workers employed in the cosmetic and steel factories, respectively. A total of 280 out of the 330 workers (response rate: 84.85%) participated in our study (167 and 113 in cosmetic and steel factories, respectively). Participation was voluntary, and approval was obtained from the factories managers. All participants signed an informed written consent form before commencement of the study.

The respondents from the two factories were relatively similar according to income, hours worked, job tenure, employment status and demographic characteristics, but they were different with respect to their work environments. In the steel factory, workers were exposed to occupational risk factors such as heavy physical work, extreme temperatures, air pollution, machinery, noise, radiation, and electrical hazards. In the cosmetic factory, processes were relatively automated and workers were exposed to lower levels of occupational risk factors.

2.2. Measures

The subjects completed three self-reported measures. The Persian version of World Health Organization Quality of Life-Brief (P-WHOQOL-BREF) was used to evaluate the HRQOL, the Persian version of Job Content Questionnaire (P-JCQ) was used to measure psychosocial factors, and an author-developed measurement instrument was used to assess socio-demographic, health, and work-related factors.

2.2.1. Persian version of the World Health Organization Quality of Life-Brief (P-WHOQOL-BREF)

The WHOQOL-BREF is a self-report questionnaire with 26-items based on the World Health Organization Quality of Life questionnaire (WHOQOL-100). It assesses the following broad domains: physical health (7 items), psychological health (6 items), social relationships (3 items) and environmental factors (8 items). Two additional items assess overall QOL and the general health of respondents. Each item is scored using a five point Likert scale (in which 1 indicates very poor/very dissatisfied and 5 indicates very well/very satisfied). Sound psychometric properties have been reported for the P-WHOQOL-BREF by Yousefy et al. [17]. Its internal consistency was also assessed in this study. Cronbach's alphas for physical health, psychological health, social relationships, and environmental conditions were 0.81, 0.72, 0.78 and 0.76, respectively.

Table 1
Dimensions of JCQ with paraphrased items

Dimensions of JCQ	Paraphrased items
Coworker Support	Coworkers component; Coworker interest in me; Friendly coworkers; Coworkers helpful
Supervisor support	Supervisor is concerned; Supervisor pays attention; Helpful supervisor; Supervisor good organizer
Physical exertion	Physical effort; Moving or lifting very heavy loads; Rapid/Continuous physical activity
Hazardous conditions	Exposure to things dangerously stored/placed; Exposure to dirty or badly maintained areas; Dangerous tools, dangerous machinery or equipment; Exposure to fire, burns or shocks; Exposure to dangerous work methods
Physical Isometric	Awkward body positions; Awkward head or arms position

2.2.2. Persian version of Job Content Questionnaire (P-JCQ)

Psychosocial and physical work factors were estimated by a P-JCQ which was developed by Karasek et al. [11]. In this study, we measured five dimensions using 18 items: coworker support; supervisor support; physical exertion; hazardous conditions; and physical isometric loads. Table 1 shows the dimensions of JCQ and a brief description of the items. Each item is scored based on a four point Likert scale (in which 1 indicates strongly disagree/often and four indicates strongly agree/never). All dimensions were summed in accordance to the "JCQ User' Guide" [11]. Sound psychometric properties have been reported for P-JCQ by Choobineh et al. [18]. In this study, we used a validated P-JCQ that has been translated under the permission of JCQ center-university of Massachusetts, Lowell-USA (by Dr. Mostafa Ghaffari). Internal consistency was assessed in this study. Cronbach's alphas for coworker support, supervisor support, hazardous conditions, physical isometric loads, and physical exertion were 0.79, 0.85, 0.90, 0.85, and 0.76, respectively.

2.2.3. Socio-demographic, health, and work-related factors questionnaire

A bespoke questionnaire was developed to capture socio-demographic characteristics (i.e., gender, age, marital status, having children under/over two years

and educational level), health-related factors (i.e., smoking, sleep quality and exercise activities), and work-related factors (i.e., job title, job tenure, working schedule, second job, overtime working, work hours per day, work demand, working load, conflict between work and individual, family and social lives, occupational accident, occupational training and job satisfaction).

2.3. Procedures

The questionnaires were distributed among participants after receiving approval from the managers of the two factories. To insure confidentiality, questionnaires were filled out anonymously. Yasuj University of Medical Sciences' ethical committee reviewed and approved the study protocol.

2.4. Statistical analysis

Statistical analyses were conducted using IBM SPSS Statistics 21 (USA, SPSS Inc.). Descriptive statistics were used to describe the characteristics of the study population. Independent *t*-tests were used to compare mean differences between the workers of the two factories in domains of HRQOL and psychosocial and physical work factors. Correlations between psychosocial work factors (JCQ subscales) and each domain of HRQOL were obtained using Pearson product moment correlation. Significance level was set at $p \leq 0.05$. Finally, a hierarchical multiple regression analysis was used to determine which variables could best predict the four domains of HRQOL. Socio-demographic and health-related variables were entered in to the regression model in Step 1, and then work-related factors were entered. In third step, psychosocial work factors were entered into the regression model using hierarchical regression analysis. Independent variables were retained in the model if they explained a significant amount of total variance using $p \leq 0.05$.

3. Results

Of the 280 Participants, most were male (93.9%) and married (76.1%). The mean age of all participants was 31.39 years ($SD = 5.6$; range 19–59), and the mean number of years on the job was 4.35 ($SD = 2.5$). 26.1% of all workers worked a three-shift schedule, 30% had a college education and 23.6% had office works. The mean body mass index (BMI) was 24.9 ($SD = 3.08$). Table 2 shows socio-demographic and health-related factors for the participants. Participants' work-related factors are presented in Table 3. Table 4 shows mean and standard deviations for JCQ and HRQOL dimensions in the subjects.

The results of independent *t*-tests indicated that means for physical health ($t = -3.6$, $p = 0.000$), psychological health ($t = -3.9$, $p = 0.000$), social relationships ($t = -2.0$, $p = 0.048$) and environmental domains ($t = -4.7$, $p = 0.000$) all were significantly higher in cosmetic factory workers compared to steel factory workers.

The correlation between psychosocial work factors and the all domains of HRQOL are presented in Table 5. All four domains of HRQOL were positively correlated with coworker support and supervisor support. Hazardous conditions were negatively correlated to domains of physical health, psychological health and environment, and psychological job demand and physical isometric load were negatively correlated to physical health domain.

Among psychosocial work factors, supervisor support showed the highest correlation with the all domains of HRQOL. As shown in Table 3, the respondents from the two factories had low supervisor and coworker supports, and high levels of hazardous conditions, physical exertion, and physical isometric loads.

Results of the hierarchical multiple regression analyses are summarized in Table 6. The final model (third step) for all participants showed that sleep quality, exercise activity, smoking and supervisor support were significant predictors of physical health. Sleep quality and coworker support were found to be significant predictors of psychological health. Social relationships were influenced significantly by sleep quality, having children over two years, work schedule and supervisor support, whereas the environment domain was influenced by educational level, sleep quality, exercise activity, smoking, work schedule, skill discretion, coworker support and supervisor support. Our regression models for all participants explained 49%, 32%, 29% and 37% of the total variance (R^2) of physical health, psychological health, social relationships and the environmental domain, respectively. The third model, in which psychosocial work factors were entered, explained additional 4%, 6%, 7% and 7% of cumulative R^2 in physical health, psychological health, social relationships and the environmental, respectively.

Table 2
Scio-demographic and health-related factors of the study subjects ($n = 280$)

Characteristics	All participants *n* (%)	Participants from Steel Factory *n* (%)	Participants from Cosmetic Factory *n* (%)
Age groups (years)			
≤29	105 (37.5)	56 (49.6)	49 (29.3)
30–39	151 (53.9)	47 (41.6)	104 (62.3)
≥40	24 (8.6)	10 (8.8)	14 (8.4)
Gender			
Male	263 (93.9)	113 (100)	150 (89.9)
Female	17 (6.1)	0 (0)	17 (10.2)
Marital status			
Single	67 (23.9)	41 (36.3)	26 (15.6)
Married	213 (76.1)	72 (63.7)	141 (84.4)
Having children under 2 years			
Yes	71 (25.4)	25 (22.1)	46 (27.5)
No	209 (74.6)	88 (77.9)	121 (72.5)
Having children over 2 years			
Yes	115 (41.1)	44 (38.9)	71 (42.5)
No	165 (58.9)	69 (61.1)	96 (57.5)
Educational Level			
Elementary	55 (19.6)	34 (30.1)	21 (12.6)
Diploma	141 (50.4)	43 (38.1)	98 (58.7)
University degree	84 (30.0)	36 (31.9)	48 (28.7)
Sleep quality			
Very good	11 (3.9)	3 (2.7)	8 (4.8)
Good	71 (25.4)	13 (11.5)	58 (34.7)
Neither poor nor good	134 (47.9)	56 (52.2)	75 (44.9)
Poor	44 (15.7)	25 (22.1)	19 (11.4)
Very poor	20 (7.1)	13 (11.5)	7 (4.2)
Exercise activity			
No	163 (58.2)	62 (54.9)	101 (60.5)
Once a week	63 (22.5)	24 (21.2)	39 (23.4)
Twice or thrice a week	42 (15.0)	21 (8.6)	21 (12.6)
Every day	12 (4.3)	6 (5.3)	6 (3.6)
Smoking			
Yes	33 (11.8)	23 (20.4)	10 (6.0)
No	247 (88.2)	90 (79.6)	157 (94.0)

4. Discussion

The respondents generally had poor HRQOLs especially in the environmental domain. There was a significant correlation between psychosocial work factors and HRQOL. Additionally, sleep quality, exercise activity and social support (coworker and supervisor support) were the best predictors of HRQOL. So, it seems the low health and safety standards in Kohgilouyeh and Boyer-Ahmad's industries in the time period when our research was done may depend on factors such as financial pressure on manufacturers, weak supervision or enforcement for the fulfillment of worker protection rules, unfamiliarity or carelessness about health and safety requirements for working in modern industries as well as low perceived job security among the workers. These factors may have increased adverse psychosocial and work-related factors in the industries under consideration, which in turn may have increased the rates of work injuries and as well had decreased the HRQOL among these workers.

Previous studies have shown that industrial workers in hazardous environments, suffer from poor HRQOL [8, 19]. Similarly, we found that the steel factory workers who were exposed to higher levels of occupational risk factors suffered from poorer HRQOL compared to cosmetic factory workers. The lower HRQOL scores among steel factory workers might be associated with hazardous environments including heavy physical work, extreme temperature, air pollution, machinery, noise, radiation, and electrical hazards. The latter hypothesis was supported by the observation that for these workers, hazardous conditions were an important predictor for physical health domain. It has been demonstrated that

Table 3
Work-related factors of the study subjects ($n = 280$)

Characteristics	All participants *n* (%)	Participants from Steel Factory *n* (%)	Participants from Cosmetic Factory *n* (%)
Job title			
Office	66 (23.6)	23 (20.4)	43 (25.7)
Other Jobs	214 (76.4)	90 (79.6)	124 (74.3)
Job tenure (years)			
≤5	212 (75.7)	93 (82.3)	119 (71.3)
>5	68 (24.3)	20 (17.7)	48 (28.7)
Working schedule			
Day-work	163 (58.2)	27 (23.9)	136 (81.8)
Two-shift	44 (15.7)	16 (14.2)	28 (16.8)
Three-shift	73 (26.1)	70 (61.9)	3 (1.8)
Second job			
Yes	18 (6.4)	12 (10.6)	6 (3.6)
No	262 (93.6)	101 (89.4)	161 (96.4)
Overtime working			
Yes	249 (88.9)	98 (86.7)	151 (90.4)
No	31 (11.1)	15 (13.3)	16 (9.6)
Working hour			
≤8	37 (13.2)	6 (5.3)	31 (18.6)
>8	243 (86.8)	107 (94.7)	136 (81.4)
Working demand			
Physical	58 (20.7)	17 (15.0)	41 (24.6)
Mental	41 (14.6)	17 (15.0)	24 (14.4)
Physical-mental	181 (64.6)	79 (69.9)	102 (61.2)
Working load			
Light	8 (2.9)	4 (3.5)	4 (2.4)
Medium	112 (40.0)	48 (42.5)	64 (38.3)
Heavy	160 (57.1)	61 (54.0)	99 (59.3)
Conflict between work and individual life			
Very much	77 (27.5)	36 (31.9)	41 (24.6)
Much	53 (18.9)	18 (15.9)	35 (21.0)
Somewhat	107 (38.2)	39 (34.5)	68 (40.7)
Low	35 (12.5)	19 (16.8)	16 (9.6)
Very low	8 (2.9)	1 (0.9)	7 (4.2)
Conflict between work and family life			
very much	65 (23.2)	30 (26.5)	35 (21.0)
Much	68 (24.3)	27 (23.90)	41 (24.6)
Somewhat	94 (33.6)	37 (32.7)	57 (34.1)
Low	39 (13.9)	17 (15.0)	22 (13.2)
very low	14 (5.0)	2 (1.8)	12 (7.2)
Conflict between work and social life			
very much	70 (25.0)	37 (32.7)	33 (19.8)
Much	73 (26.1)	28 (24.8)	45 (26.9)
Somewhat	85 (30.4)	31 (27.4)	54 (32.3)
Low	41 (14.6)	14 (12.4)	27 (16.2)
very low	11 (3.9)	3 (2.7)	8 (4.8)
Occupational accident			
Yes	84 (30.0)	48 (42.5)	36 (21.6)
No	196 (70.0)	65 (57.5)	131 (78.4)
Occupational training			
Yes	153 (54.6)	68 (60.2)	85 (50.9)
No	127 (45.4)	45 (39.8)	82 (49.1)
Job satisfaction			
Yes	167 (59.6)	64 (56.6)	103 (61.7)
No	113 (40.4)	49 (43.4)	64 (38.3)

exposure to extreme temperatures [20], perceived physical demands [21] and air pollution [22] lead to adverse health effects in industrial workers.

We found that the means of job demands and occupational risk factors for participants from the two factories were relatively high, while mean values of

Table 4
Mean and standard deviations for JCQ and HRQOL dimensions

Questionnaires	Dimensions	Mean (*SD*) for Steel Factory	Mean (*SD*) for Cosmetic Factory	Mean (*SD*) for all participants
JCQ	Coworker Support	12.7 (2.0)	11.9 (1.9)	12.2 (2.0)
	Supervisor Support	11.3 (2.7)	11.6 (2.7)	11.5 (2.7)
	Hazardous Conditions	12.2 (3.2)	8.4 (3.1)	10.0 (3.7)
	Physical Exertion	9.2 (2.0)	8.3 (2.2)	8.7 (2.2)
	Physical Isometric Load	5.9 (1.6)	5.6 (1.7)	5.7 (1.7)
HRQOL	Physical Health	12.3 (2.3)	13.4 (2.9)	13.0 (2.7)
	Psychological Health	12.6 (2.2)	13.8 (2.7)	13.3 (2.6)
	Social Relationships	13.7 (3.4)	14.5 (3.5)	14.2 (3.5)
	Environmental Domain	11.7 (2.5)	13.1 (2.4)	12.6 (2.5)

Table 5
Correlation between the psychosocial work factors scales and domains of HRQOL of the study subjects ($n = 280$)

Variable	1	2	3	4	5	6	7	8	9	10
1.Physical health	1									
2. Psychological health	0.68**	1								
3. Social relationships	0.51**	0.61**	1							
4. Environmental	0.60**	0.64**	0.66**	1						
5. Coworkers support	0.13*	0.23**	0.23**	0.23**	1					
6. Supervisor support	0.39**	0.35**	0.37**	0.36**	0.44**	1				
7. Hazardous conditions	–0.36**	–0.24**	–0.010	–0.28**	0.14*	–0.24**	1			
8. Physical exertion	0.07	0.03	0.03	–0.01	0.25**	0.05	0.39**	1		
9. Physical isometric load	–0.17**	–0.02	0.06	–0.05	0.16**	0.01	0.33**	0.58**	1	
10. Psychological job demand	–0.14*	0.04	–0.05	–0.07	0.06	–0.1	0.19**	0.36**	0.29**	1

*$p < 0.05$; **$p < 0.01$.

job control and control support were relatively low. Based on the JDC model, these findings can lead to occupational stress among workers [6, 11].

One of the important psychosocial work factors is supervisor support [10, 18, 23]. Hierarchical regression analysis for all participants indicated that this factor was an important predictor of physical health, social relationships and the environmental domains. Generally, the supervisor support subscale was found to be low which was consistent with the results of other studies of Iranian workers [6, 18, 24]. The low supervisor support in work environments may be related to the financial pressures on manufacturers as well as an increased unemployment rate in Iran in the time period when our research was conducted, which in turn not only may diminish valuing the work force but also may decrease the supervisors' concern about losing their workers (for example, due to low support). These findings warrant further investigation of supervisor support in future health-related studies among Iranian workers. Coworkers support was another important predictor for HRQOL. After controlling for the effects of socio-demographic, health and work-related factors, coworker support remained in the regression model as a significant predictor of the psychological and environmental domains of HRQOL. These results were in line with the findings of Edimansyah et al. (2007) in which social support (measured by two subscales of supervisor and coworker support) was found to be the most important predictor of all domains of HRQOL [8]. Lack of social support has been shown to be associated to various aspects of work-related physical and psychological health such as ischemic heart disease [25], absence from work due to illness [26], burnout and fatigue [27], and emotional exhaustion [28].

In this study, a strong positive association was also found between physical activity and HRQOL. This was consistent with those studies reporting that physical activity improved HRQOL [29, 30]. Those respondents who did not exercise regularly, had lower mean scores on the domains of HRQOL compared to those workers who exercised every day. Previous studies have indicated that job stress is negatively correlated with physical activity [31, 32]. In a recent review of literature, Matthew et al. found that both objective and subjective measures of stress were associated with work stress [33]. They found that stress was associated with reduced motivation and effort for physical activity.

The regression analysis for all participants showed that smoking was another health-related predictor of the physical health and the environmental domains of HRQOL, consistent with other studies [34, 35].

Table 6
Total model compared to steel and cosmetic factories' models
(*to be continued*)

Characteristics	Total Model						Model for Steel Factory						Model for Cosmetic Factory					
	Step 1		Step 2		Step 3		Step 1		Step 2		Step 3		Step 1		Step 2		Step 3	
	β	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*
Physical Health																		
Age (years)							0.21*	0.03	0.2*	0.04	N.S							
Having children over 2 years (yes)													0.16*	0.43	0.15*	0.43	N.S	
Educational Level																		
Elementary versus university degree	–0.14*	0.43	N.S		N.S													
Sleep quality	–0.44***	0.15	–0.33***	0.16	–0.32***	0.16	–0.33***	0.22	–0.27**	0.22	–0.24**	0.21	–0.46***	0.21	–0.38***	0.24	–0.38***	0.24
Exercise activity																		
No exercise versus every day	–0.42**	0.69	–0.34**	0.67	–0.26*	0.67												
Once a week versus every day	–0.23*	0.72	–0.24*	0.71	N.S													
Smoking (yes)	–0.18***	0.43	–0.12*	0.43	–0.12*	0.42							–0.25***	0.81	–0.23**	0.86	–0.25***	0.85
Working schedule																		
Three-shift versus day-work															0.16*	1.6	0.17*	1.6
Job Satisfaction (no)															–0.15*	0.44	N.S	
Supervisor support					0.17**	0.06					0.20*	0.08					0.17*	0.09
Hazardous conditions											–0.31*	0.10						
R^2	0.35		0.45		0.49		0.29		0.46		0.54		0.39		0.49		0.54	
Psychological Health																		
Sleep quality	–0.26***	0.16	–0.19**	0.18	–0.18**	0.17							–0.34***	0.22	–0.33***	0.25	–0.31***	0.25
Exercise activity																		
No exercise versus every day	–0.32*	0.73	–0.28	0.74	N.S								–0.52**	1.0	–0.51**	1.0	–0.53**	1.1
Once a week versus every day													–0.35	1.0	–0.35*	1.1	–0.36**	1.1
Twice a week versus every day															–0.29*	1.2	–0.30	1.2
Having children over 2 years (yes)	0.13*	0.36	N.S		N.S								0.15*	0.41	N.S		N.S	
Overtime working (yes)																	–0.20*	0.78
Working schedule																		
Two-shift versus day-work			–0.13*	0.43	–0.12*	0.42									–0.19*	0.53	–0.15*	0.53
Three-shift versus day-work			–0.19**	0.41	–0.17*	0.44												
Educational Level																		
Diploma versus university degree			0.14*	0.37	0.13*	0.52												
Co-worker support					0.15*	0.09												
Supervisor support					0.14*	0.06												
R^2	0.17		0.26		0.32		0.05		0.17		0.25		0.24		0.34		0.40	

Table 6
(*Continued*)

Characteristics	Total Model						Model for Steel Factory						Model for Cosmetic Factory					
	Step 1		Step 2		Step 3		Step 1		Step 2		Step 3		Step 1		Step 2		Step 3	
	β	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*
Social Relationships																		
Sleep quality	–0.19**	0.22	–0.16*	0.24	–0.15*	0.24							–0.27***	0.31	–0.24**	0.33	–0.23**	0.32
Having children over 2 years (yes)	0.19**	0.49	0.16*	0.50	0.14*	0.48			0.24*	0.83	N.S		0.18*	0.57	N.S		N.S	
Working schedule																		
Two-shift versus day-work			–0.16*	0.60	–0.15*	0.59									–0.22**	0.69	–0.18*	0.68
Second job (yes)															–0.18*	1.4	N.S	
Working demand																		
Physical															–0.21*	0.68	–0.21*	0.65
Supervisor support					0.22**	0.09											0.29**	0.12
Physical isometric loads					0.14*	0.15												
R^2	0.12		0.22		0.29		0.11		0.18		0.23		0.15		0.34		0.42	
Environmental																		
Educational Level																		
Elementary versus university degree	–0.15*	0.44	N.S		–0.15*	0.45												
Sleep quality	–0.26***	0.16	–0.20**	0.17	–0.21**	0.16							–0.35***	0.20	–0.32***	0.22	–0.30***	0.22
Smoking (yes)	–0.20***	0.45	–0.15*	0.45	–0.13*	0.44	–0.21*	0.57	0.27**	0.57	0.24*	0.58						
Working schedule																		
Two-shift versus day-work			–0.18**	0.42	–0.17**	0.40									–0.26***	0.48	–0.23**	0.47
Second job (yes)															–0.19**	0.92	–0.14*	0.91
Job satisfaction (no)															–0.18*	0.40	N.S	
Job tenure (years)									–0.37**	0.11	–0.27**	0.11						
Accident (yes)									–0.23*	0.50	N.S							
Co-worker support					0.19**	0.08												
Supervisor support																	0.12*	0.08
Hazardous conditions					0.15*	0.05												
R^2	0.20		0.30		0.37		0.16		0.33		0.39		0.20		0.41		0.47	

*: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.

Smoking has been shown to be correlated with job stress [36]. Those workers who face more job stress smoke more cigarettes to alleviate stress effects and to cope with job stressors [35, 36].

Interestingly work schedule was shown to be related with HRQOL. Those respondents who had shift work schedules (two- and three-shift workers), had lower mean scores on the domains of HRQOL compared to workers who had day shift work schedules. Researchers have demonstrated that shift workers undoubtedly suffer from physical and psychological impairments as well as social problems [37, 38]. These problems can affect HRQOL among shift workers. Wong et al. in a study among Chinese professional drivers, found a strong relationship between shift work and HRQOL [39]. Sleep disturbances are among the most important health problems and have well-documented impacts from shift work [37–39]. In this study, poor sleep quality was negatively correlated with all domains of HRQOL. Poor sleep quality was an important predictor of physical health, psychological health and the environmental domain of HRQOL. Previous studies have found that poor sleep quality and sleep disorders were negatively correlated with HRQOL [37–40].

There were some important limitations and/or methodological problems with the study. It used a cross-sectional design, and so it was not possible to draw causal relationships among variables. Instruments were self-report questionnaires which are subject to distorted or incorrect responses. The participants were from two specific industries (steel and cosmic factories) and so generalization of these results to all Iranian industrial workers is not possible. Additionally, because of the number of women in our sample (263 men versus 17 women), the relatively young age of participants (31.39 years, on average) and the short job tenure (4.47 years, on average) findings may not be generalized to all Iranian industrial workers.

5. Conclusions

This study demonstrated associations between HRQOL and poor social support, poor sleep quality, irregular work schedules, smoking and lack of exercise activity. A hazardous work environment affected the workers' HRQOL. Consequently, in order to improve the workers' HRQOL, occupational health and ergonomics intervention programs should focus on promoting and improving the status of social support especially leadership support, improve sleep quality, increase exercise and reduce smoking among industrial workers. Also, it is recommended that controlling and reducing hazardous work environments should be considered an important intervention in promoting worker's HRQOL. Clearly, there are some barriers carrying out these interventions, generally in Iran, and specifically in Kohgilouyeh and Boyer-Ahmad province. First, there is a lack of statistics about work injuries in the industries under consideration. Thus, encouraging the managers to employ occupational health professionals and/or seeking advice from occupational health organizations to help them in analyzing work related injuries could be helpful in designing prevention programs. In addition, giving specific incentives, such as tax exemptions to those industries that invest in improving job health and safety standards could be helpful in carrying out aforementioned interventions successfully. Also as noted earlier, lack of awareness among citizens about the health and safety standards required for working in such modern industries, could impede attempts to improve these standards. So, one possible solution for the problem could be devising and implementing occupational safety trainings, especially about the meaning and the importance of work health and safety standards, both before and after employing workers, thereby increasing their knowledge and concern about these standards. Finally, it seems increasing financial support for manufacturers in Iran may increase their ability and willingness to improve health and safety standards in their industries.

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Conflict of interest

The authors have no competing interests to report.

Contributors

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