An Empirical Examination of the Relationship between Occupational Stress and Mental Health

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Abstract
An unprecedented economic, social, technological and market change over the last thirty years has led to stressful workplace environment. Occupational stress is a key factor in psychological distress which adversely affects job satisfaction and performance. This study aims to examine the relationship between dimensions of occupational stress and mental health in a large industrial plant in the northwest of Iran. A questionnaire consisted of personal information and items related to respondents' occupational role and general health was distributed among 400 production staff of an assembly plant using backward multiple regression analysis. The findings revealed that while the most significant predictor of somatic symptoms, and anxiety and insomnia were role overload, the most significant predictor of social dysfunction and severe depression was role boundary. The findings and implications for organization and health practitioners are discussed.

Keywords: Occupational Stress, Mental Health, Distress Symptoms, Role

1. Introduction

Global competition, rapid technological development and unprecedented social and cultural changes in recent decades have led to concerns over health issues in workplaces. The effect of occupational stress on physical and mental illness has particularly attracted attention as the risks associated with high work stress have negative impacts not only on employee's health but also on organization productivity and healthcare system. According to Holms (2001), European agency for safety and health at work (EASHW), these risks include asthma, back pain, mood changes, poor mental health, shortness of breath, anxiety, depression, decreased staff morale, increased costs, loss of motivation, increased absence related sickness, poor staff performance, etc.

Occupational stress refers to the harmful physical and emotional responses that occur when the requirements of the job do not match the resources, capabilities and needs of the workers (Alves, 2005). Callahan (1989) identified three groups of signs of occupational stress: Mental signs, physical symptoms and behavioral signs. Some of the physical and psychological impacts of occupational stress have been widely recognized for several decades, such as mental disorders (Fingret 2000), cardiovascular diseases (Theorell and Karasek 1996), musculoskeletal disorders (Choobineh et al. 2009), back pain diseases (Feyer 2000), coronary heart diseases (Holms 2001). In Addition, various studies have shown that there is a negative relationship between occupational stress and job satisfaction

(Karasek et al. 1981; Burke 2002); productivity (Glasser 1984; McGuigan 1999), and employees loyalty to the organization (Mann Layne et al. 2004). Some sources of occupational stress cited in the literature (Barrett et al. 1997; Burke 2002; Sackey and Sanda 2009) are: downsizing, little reward or recognition, inadequate equipment, unpredictable demands on employees' time, task structure, heavy workload, role ambiguity and conflict, job insecurity, repetitive and monotonous work and poor relationships with co-workers and supervisors.

As mentioned, mental ill-health is one possible outcome of severe occupational stress. The world health organization (WHO) defines mental health 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 make a contribution to her or his community (WHO, 2011). Thus promoting employees' mental health to reduce organization's lack of productivity, job dissatisfaction and absenteeism is most crucial and urgent.

Contrary to the common belief that mental stress is a problem in some workplaces or industries, research have shown that it occurs among workers of most industries (Cooper and Sutherland 1987; Rout et al. 1996; Shigemi et al. 1997; Miller et al. 2005; Chen et al. 2009). However, there seems to be higher incidences of mental stress in some industries, including drilling rig on the high sea, emergency rooms and assembly lines, due the nature and complexity of the jobs. For instance, Cooper and Sutherland (1987) in a research on 194 male employees on drilling rig and production platform installations in the United Kingdom and Netherlands in the North Sea concluded that "poor relationships at work and at home" is a significant predictor of reduced mental health. Shigemi et al. (1997) in their survey of 782 workers in an electronic company in Japan found that items related to subjective job stress because of "too much trouble at work", "too much responsibility", "poor relationship with superiors", "not allowed to make mistakes", and "unable to keep up with new technology" were related to mental health conditions. Shigemi et al. (2000) propose that prevention of mental disorders requires smooth line setting, use of a manual for prevention of trouble and safety at work, education and training in the work process, and social support at work. Chen and his collaborators (2009) during a study on the group of platform workers in an offshore oil company in south china, after controlling for age, educational level, marital status and years of offshore working, found that poor mental health is positively associated with occupational stress. In another, Revicki et al. (1993) in a study in emergency medicine residents, found that task and role conflict and work-related stress contribute to symptoms of depression. Also, Chen et al. (2009) in a longitudinal survey (1996-2001) in the UK has reported that an estimated annual average of 3642 new cases of work-related mental illness were diagnosed, which most of them were caused by work-related stress.

Given the finding of some epidemiological studies that have shown an alternation in the presence of psychiatric disorders from 11.7 to 43.2% (Hosseini et al. 2010) and rising of the stress levels in many different occupations (Hicks et al. ,2010), it is vital that organizations develop easily implemented models to reduce occupational stress and risks associated with mental health of their employees. Thus, this study aims to explore the relationship between occupational stress and mental health dimensions in a large industrial plant.

2. Methodology

2.1. Participants

This study was carried out in an automobile assembly plant comprised of three successive shops including body shop (where the body is made), paint shop (where the body is dyed) and trim shop (where the body assembled with other components into a complete vehicle). The plant is a series-flow assembly line which according to Karasek's demand-control model, of series-flow assembly lines usually compromises the health of operators because this type of assembly line leads to decreased control, increased psychological demands, and less social support (Lottridge 2004). Workplace environment in this assembly plant also induces physical and mental distress. There are physical stressors such as noise, vibration, shift work, unpleasant odor, working with dangerous machinery, high-speed of production line and toxic particles in the air (because of painting or welding operations). Psychosocial stressors such as workload, variety, distance between factory and home, job insecurity, lack of social support and perceived risk (e.g. fire, explosion). The target population was comprised of production staff (employees that work in body shop, paint shop and trim shop) of this company. The stratified and simple random sampling procedure was used to collect data. A total of 400 workers in different work stations of the plant who had at least one year of working experience in their present job were invited to participate in the study.

2.2. Measures

A self-reported and anonymous questionnaire was distributed among participants which included respondents' demographic characteristics (4 items), occupational role questions (60 items) and general health questions (28 items). Answers that workers reported concerning their occupational stress and general health were limited to a month prior to participating in the study.

The information regarding respondents' demographic characteristics included age, level of education, years of experience in current job and marriage status. The occupational role questionnaire (ORQ) designed by Osipow (1998) was used to measure occupational stress status and comprised of 6 sub-scales including: role overload, role insufficiency, role ambiguity, role boundary, role responsibility and physical environment. Each subscale contains 10 items and items are scored on a 5-point Likert scale that assesses the frequency with which an item applies to the respondent, from 1 (never) to 5 (always). The cut score for the distribution of the stress score on six subscales and total occupational role stress are shown in the Table 1:

Table 1: Severity - rating index for stress scale

Type / Degree	role overload	role insufficiency	role ambiguity	role boundary	role responsibility	Physical environment	Total occupational role stress
Without stress	10 - 21	10 - 15	9 - 14	10 - 14	10 - 19		60 - 133
Normal stress	22 - 35	16 - 28	15 - 26	15 - 26	20 - 23	10 - 19	134 - 216
Moderate stress	36 - 43	29 - 35	27 - 32	27 - 32	24 - 39	20 - 24	217 - 258
Sever stress	43 - 50	36 - 42	33 - 39	33 - 39	40 - 47	25 - 30	259 - 300

The General Health Questionnaire or GHQ-28 was used to measure the mental health of respondents (Goldberg and Hillier 1979). This 28 items questionnaire has 4 sub-scales,

including somatic symptoms, anxiety and insomnia, social dysfunction and severe depression respectively. Each sub-scale has 7 items and are scored using 4-point Likert scale (0, 1, 2 and 3) and the total score of these 28 items was calculated to represent the level of mental health with high scores denoting poor mental health. Total score in this questionnaire was varied between 0 and 84 and the cut-off point was 23.

3. Findings

The total response 178 questionnaires (94.5%) were returned, of which all were male and had a mean age if 26 years old and a mean working experience of 3 years. Over %71 of respondents were married, 84% had high school diploma, 10% associated degree and 3% bachelor degree or higher. The study examined the relationship between the dependent with the independent variables in all three work halls (body shop, paint shop, trim shop) and produced regression equation, P-P plot for regression standardized residual and scatter plot for each hall. However, since showing all these findings is long, repetitive and space-consuming, here only the findings for the combined effects of independent variables on dependent variable in the plant is shown. Furthermore, a normal P-P plot for the normality of residuals and scatter plot for the homogeneity of residuals and Durbin-Watson statistics for the non-correlated residuals condition for the final model and VIF test to check the linear independence of independent variables is shown only for the somatic symptoms regression equation.

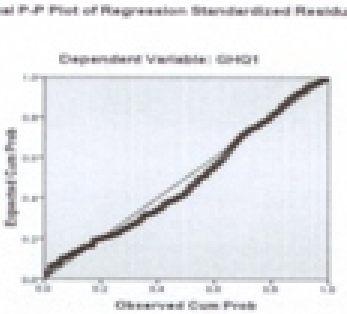
Table 2: Results of regression analysis

	Multiple R	BETA	T	P-VALUE
Somatic symptoms				
1. constant	-3.050		-2.632	0.009
2. role overload	0.142	0.213	4.230	0.000
3. role insufficient	0.114	0.203	4.136	0.000
4. environment	0.103	0.183	3.682	0.000
Anxiety and insomnia				
1. constant	-10.707		-7.360	0.000
2. role overload	0.157	0.240	4.958	0.000
3. role insufficient	0.076	0.138	2.711	0.007
4. role ambiguity	0.088	0.126	2.482	0.014
5. responsibility	0.261	0.214	4.330	0.000
6. environment	0.093	0.171	3.423	0.000
Social dysfunction				
1. role boundary	0.255	0.686	5.330	0.000
2. environment	0.090	0.275	2.145	0.035
Severe depression				
1. constant	-5.071		-4.702	0.000
2. role boundary	0.132	0.565	6.607	0.000
3. responsibility	0.082	0.298	3.438	0.017

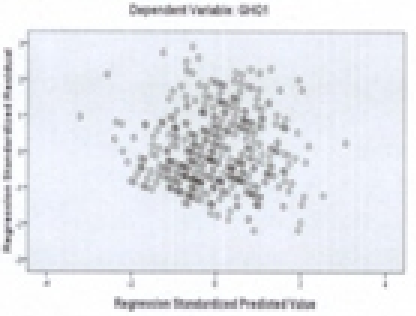
The regression equation for somatic symptoms, showing the constant and coefficient for the respective variables is:

Somatic symptoms = -3.05 + 0.142 * score of role overload + 0.114 * score of role insufficient + 0.103 * score of environment

According to table 2, in all of three halls, the most significant important predictor of "somatic symptoms" at $\alpha \leq 0.05$ was "role overload" with Beta = 0.213. To check the normality of residuals, a normal P-P plot where somatic symptoms defined as GHQ1, was used as following:



In addition, to check the homogeneity of residual variances, the scatter plot where somatic symptoms defined as GHQ1, was used as following:



To check the non-correlated residuals condition, Durbin-Watson statistics was calculated 2.017 for the final model. Finally, to check the linear independence of independent variables, VIF test was used which the results satisfied this condition.

The regression formula for anxiety and insomnia is as following:
Anxiety and insomnia = -10.707 + 0.157 * score of role overload + 0.076 * score of role insufficient + 0.084 * score of role ambiguity + 0.201 * score of responsibility + 0.093 * score of environment. According to Table 2, in all of three halls, the most significant important predictor of "anxiety and insomnia" at $\alpha \leq 0.05$ was "role overload" with Beta = 0.240.

The regression formula for social dysfunction is as following:
Social dysfunction = 1.798 + 0.184 * score of role insufficient + 0.067 * score of role ambiguity + 0.086 * score of role boundary According to Table 2, in all of three halls, the most significant important predictor of "social dysfunction" at $\alpha \leq 0.05$ was "role boundary" with Beta = 0.684.

The regression formula for severe depression is as following:
Severe depression = -8.053 + 0.105 * score of role overload + 0.142 * score of role boundary + 0.128 * score of responsibility According to Table 2, in all of three halls, the most significant important predictor of "severe depression" at ($\alpha \leq 0.05$) was "role boundary" with Beta = 0.565.

Finally, the regression formula for mental health as the function of total score of occupational variables is as following:

Total score of mental health = -20.239 + 0.283 * total score of occupational stress

According to Table 2, occupational stress with Beta = 0.588 was significant predictor for mental health.

4. Discussion and conclusion

The findings of this study generally confirm that findings of similar studies, particularly at auto assembly plants (Lottridge, 2004; Oleske et al. 2004; Edimansyah et al. 2008). A greater number of respondents indicated that their mental distress is due to social dysfunction (10.6%) and somatic symptoms (7.4%) compared to anxiety and insomnia (4.2%) and severe depression (1.1%). Overall, some 56% of respondents have experienced mental distress during the previous month which supports the Lottridge's findings (2004) and his warning about various factors that may endanger workers mental health at assembly lines.

A glance at regression equations, when keeping demographic variables constant, reveals that there is a positive relationship between scores of occupational stress dimensions and mental health dimensions; the higher the scores obtained for occupational stress, the higher the mental stress in the work environment and conversely the higher the scores obtained for the mental health dimensions, the lower the state of the mental health. In addition, the findings show that there is a positive relationship between occupational stress and mental illnesses (Ganster and Schaubroeck 1991; Burke 2002; Lee and Wang 2002; Lottridge, 2004; Chen 2009; Sackey and Sanda 2009). In the auto assembly line in the study, the most important predictors of mental health is related to job role, particularly role overload and role boundary. Thus, it is suggested that management should pay greater attention to various aspects of role and its management, including role transparency, role suitability and role justice.

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