

## Relationship Between Manufacturing Worker's Job Stress Levels and Health Risk Behavior

Gyeong-Ha Lee, Cheong-Hwan Lim and Hong-Ryang Jung  
Department of Health Care, Hanseo University, Co 31962 Seosan-si, Korea

**Abstract:** The purpose of this study was to examine potential drinking and smoking differences among workers according to their age, the existence of job stress and its levels to find ways of coping with it. This also meant provides information on stress relief in a corporate environment. The sample consisted of 555 workers of a South Korean company. A self-administered survey and structured interviews were conducted. The Korean Occupational Stress Scale (KOSS) was administered and the amount of drinking and smoking measured. t-tests and one-way ANOVA were carried out, followed by Duncan's multiple range test for multiple comparisons to evaluate intergroup job stress differences. The Cronbach alpha coefficient of the instrument used in this study was 0.824 which indicates a high internal consistency. There were significant gender differences. With regard to smoking, job stress differed according to "physical environments" and "job demands" ( $p < 0.05$ ) but not the amount of drinking ( $p > 0.05$ ). The number of male workers who drank seven glasses of alcohol or more which is a problem behavior was 404 (72.8%) while there were 24 females (52.1%). The findings were statistically significant at the  $p < 0.05$  level. Smoking history was positively correlated with "physical environments" and negatively correlated with job demands improvements/applications. It is required to exert an effort for the improvement of health-related behaviors including smoking and businesses should provide temperance and anti-drinking programs for employee's stress regulation to promote their health.

**Key words:** Job stress, drinking, smoking, workers, health risk behavior, alcohol

---

### INTRODUCTION

In a modern industrial society, advances in technology have brought about rapid changes to industrial and social structures as well as their environments which concurred with a wide variety of huge transformations of work surroundings. Stress is a neural, endocrine, immune and physiological response as well as a psychological reaction to external stimuli which tends to be increasingly rampant among many people in modern society that rose to become more and more complicated and segmented (Chang *et al.*, 2005) argued that stress is experienced at work and that it is gradually rising due to heavy workload, role and interpersonal conflicts as well as feelings about a lack of work autonomy. A job stressor refers to a factor in work that does not fit a worker's competencies or resources available also his or her hope or needs may not be met and there by this provokes a physical or emotional response that is detrimental to the worker. (Tsutsumi *et al.*, 2001) Chronic job stress affects job satisfaction and turnover and it is linked to growing fatigue or depression symptoms triggered by accumulated emotional conflicts; this can take a huge toll on the

organization (Kim *et al.*, 2012). In South Korea, workers are both under physical and psychological pressure due to restructuring, job insecurity and other external factors following the rapidly changing socioeconomic circumstances after the economic crisis in 1997, accompanied by considerable individual pains. The workers health problems became social concerns when the government tried to promote heavy and chemical industries in the early 1960 as a part of the economic development plan and their health maintenance was perceived to be important for the enhancement of business productivity (Oh *et al.*, 2013; Bramley *et al.*, 2002). Therefore, an industrial safety and health act was legislated in 1981, separated from the labor standards act (Yu *et al.*, 2003). The purpose of this study was therefore, to examine differences among Korean workers in drinking and smoking according to their age, overall job stress and its levels considering their sociodemographic characteristics and ways of coping with stress.

### MATERIALS AND METHODS

**Data collection:** A descriptive research study was conducted to explore job stress of selected workers by

gathering information about general characteristics, occupational group, age and their period of service. As for the classification of occupational groups white-collar jobs management and research positions were classified into a group of “office workers” whereas production workers were regarded “professional production workers.” The study purpose was explained to 600 workers from a South Korean manufacturing company. Surveys were conducted with the workers who agreed to participate. A short form of the Korean occupational stress scale was used and the answer sheets from 555 respondents analyzed, except for data from 45 workers which were not readily statistically analyzable (Cha *et al.*, 2008).

**Instrument:** Items used in this study were partially taken from the National Health Insurance Service’s questionnaire. As for job stress a short form of the Korean Occupational Stress Scale was put to use this was an adapted version of the US National Institute for Occupational Safety and Health modified to suit Korean circumstances (Cho, 2006). Job stress was scored on a four-point scale (lowest to highest) for all items: “Not at all,” (four points) “not really”, “somewhat” and “very much” (one point) (Yi and Jung, 2009). The Cronbach alpha coefficient of this instrument was 0.824 which revealed a high internal consistency.

**Data analysis:** The collected data were analyzed by a statistical package SPSS for Windows, Version 22.0. Descriptive data (frequencies, percentages, means, standard deviations) were obtained and the Cronbach alpha coefficient of the job stress inventory was calculated. In addition, one-way ANOVA was utilized to examine differences in general characteristics, occupational group, gender, age, the period of service, drinking as well as smoking.

**RESULTS AND DISCUSSION**

**General characteristics of the subjects:** About 509 subjects of the 555 workers were male (91.7%) and 46 female (8.3%). The 109 respondents belonged to the 20’s age group (19.6%) 130 to the 30’s (23.4%), 186 (33.5%) to the 40’s, 128 (23.1%) to the 50’s and two were in their 60’s (0.4%). By occupational group, office workers numbered 218 (39.3%) and professional production workers 337 (60.7%). Regarding the periods of service, the most frequent was between 16 and 20 years (n = 146, 26.3%) and the least common 1-5 years or less (n = 69, 12.5%); 77 respondents (13.9%) had worked for 26 years or longer (Table 1).

Table 1: General sample characteristics (N = 555)

Characteristics/division	N (%)
<b>Gender</b>	
Man	509 (91.7)
Women	46 (8.3)
<b>Age (Years)</b>	
20-29	109 (19.6)
30-39	130 (23.4)
40-49	186 (33.5)
50-59	128 (23.1)
60 years or older	57 (0.4)
<b>Job</b>	
Office	218 (39.3)
Professionals in the field	337 (60.7)
5 or less	69 (12.5)
<b>Years of service</b>	
6-10 or less	90 (16.2)
11-15 or less	89 (16.0)
16-20 or less	146 (26.3)
21-25 or less	84 (15.1)
26 or more	77 (13.9)

Table 2: Technology statistics for sub-factors of job stress

Division	N	Min.	Max.	M±SD
Physical environment	555	1.00	3.33	2.16±.41
Work requirement	555	1.00	4.00	2.33±.44
Voluntary duty	555	1.00	4.00	2.21±.43
Conflict in relationship	555	1.00	4.00	1.97±.36
Unstable work	555	1.00	4.00	2.01±.54
Structure of organization	555	1.00	3.57	2.12±.32
Job competence	555	1.00	4.00	2.14±.38
Work culture	555	1.00	4.00	2.05±.68

**Job stressors:** “Job demands” were the strongest job stressor (M = 2.33, SD = 0.44) but not statistically significant (p>0.05). “Relational conflicts” were least stressful (M = 1.97, SD = 0.36, also n.s. at the p>0.05 level). However, “physical environments” turned out to be a statistically significant job stressor (p<0.05) and therefore included in this study as a possible hazards in the manufacturing business (Table 2).

**Smoking and drinking behaviors:** Smoking Behaviors 215 workers (38.7%) were nonsmokers and 155 workers (27.9%) had quit, smokers numbered 185 (33.3%). For nonsmokers, “job demands” were most (M = 2.39, SD = 0.45) and “relational conflicts” least stressful (M = 1.97, SD = 0.34). With regard to smokers, “job competency” was the strongest job stressor (M = 2.17, SD = 0.39) and “relational conflicts” were the weakest (M = 1.97, SD = 0.37). The corresponding statistics for workers who had quit smoking were “physical environments” (M = 2.18, SD = 0.39) on one end and “job insecurity” (M = 1.97, SD = 0.49) on the other end of the extreme. In overall for smokers “physical environments” and “job demands” were strongest job stressors (p<0.05) (Table 3).

**Drinking behaviors:** For those who drank five glasses of alcohol or less, “job demands” were most (M = 2.36, SD =

Table 3: Relationships between work stress and smoking

Division	Non-smoker	Former smoker	Smoker	p-values
	M±SD	M±SD	M±SD	
N	0.215	0.155	0.185	-
Physical environment	2.07±0.40	2.18±0.39	2.07±0.41	0.001
Work requirement	2.39±0.45	2.07±0.45	2.07±0.40	0.045
Voluntary duty	2.23±0.44	2.07±0.40	2.07±0.40	0.700
Conflict in relationship	1.97±0.34	1.99±0.37	1.97±0.37	0.849
Unstable work structure of organization	2.00±0.49	1.97±0.49	2.07±0.61	0.377
Job competence	2.14±0.40	2.10±0.37	2.17±0.39	0.283
Work culture	2.06±0.40	2.03±0.39	2.07±0.45	0.684

Table 4: Relationship between drinking amounts and job stress

Division	5 drinks	10 drinks	15 drinks	20 drinks	p-values
	M±SD	M±SD	M±SD	M±SD	
Physical environment	2.14±0.39	2.14±0.40	2.23±0.46	2.58±0.46	0.17
Work requirement	2.36±0.25	2.29±0.44	2.44±0.50	2.18±0.47	1.38
Voluntary duty	2.20±0.44	2.20±0.38	2.35±0.53	2.25±0.65	0.38
Conflict in Relationship	1.99±0.34	1.94±0.34	2.14±0.42	1.79±0.50	0.14
Unstable work	2.04±0.53	1.93±0.52	2.03±0.73	2.12±0.58	0.70
Structure of organization	2.13±0.38	2.09±0.27	2.15±0.25	2.32±0.72	0.12
Job competence	2.15±0.38	2.12±0.39	2.14±0.27	2.15±0.51	0.28
Work culture	2.08±0.42	1.99±0.37	2.16±0.50	2.00±0.44	0.28

0.25) and “relational conflicts” least stressful (M = 1.99, SD = 0.34). Drinkers of 10 glasses of alcohol or less likewise reported “job demands” to be most stressful (M = 2.29, SD = 0.44) but “job insecurity” as the weakest job stressor (M=1.93, SD = 0.52). Identical to the former for those in the group with 15 glasses of alcohol or less, “job demands” were the strongest (M = 2.44, SD = 0.50) and “job insecurity” was the weakest stressors (M = 2.03, SD = 0.73). However, drinkers of 20 glasses of alcohol or less disclosed that “physical environments” were most (M = 2.58, SD = 0.46) and “relational conflicts” least stressful (M = 1.799, SD = 0.50). There were no statistically significant differences on the p>0 .05 level for job stress related to drinking amounts (Table 4).

**Correlations of smoking and drinking with job stressors:** Smoking correlated positively with physical environments and it was negatively with job demands. The amount of drinking was only negatively associated with job demands. Generally, physical environments were positively correlated with job autonomy, relational conflicts, job insecurity, the organizational system, job competency as well as the workplace culture among the job stressors. In a similar vein, job demands correlated positively with job autonomy, relational conflicts, job insecurity, the organizational system and workplace

Table 5: The correlation of job stress to smoking and drinking

1	2	3	4	5	6	7	8	9	10
0.029									
0.188*	0.80								
-0.098*	-0.098*	0.064							
-0.035	0.013	0.161**	0.137**						
0.005	0.027	0.120**	0.095*	0.294**					
0.038	0.015	0.350**	0.199**	0.093*	0.204**				
0.004	0.040	0.354**	0.234**	0.397**	0.468**	0.378**			
0.032	0.014	0.152**	0.150**	0.293**	0.157**	0.082	0.156**		
0.000	0.030	0.377**	0.230**	0.247**	0.298**	0.477**	0.466**	0.126**	

\*p<0.05, \*\*p<0.01

culture and they were negatively correlated with job competency. Job autonomy displayed positive associations with relational conflicts, job insecurity, the organizational system, job competency as well as the workplace culture. Relational conflicts correlated positively with job insecurity, job competency, the organizational system and the workplace culture. Job insecurity factor was also positively correlated with the latter two. Finally, the organizational system factor was positively associated with job competency and workplace culture, while job competency was solely positively correlated with the latter (Table 5).

- Smoking
- Alcohol consumption
- Physical environment
- Dutydemand
- Dutyautonomy
- Relationconflict
- Duty instability
- Organization system
- Dutyability
- Workculture

Survey data from specific manufacturing company’s workers were examined which might limit the generalizability of the findings. In the future, Job stress levels and health behaviors need to be investigated in more detail, particularly for the purpose of constructing comprehensive plans that help in workers job stress management and in providing effective health promotion programs. More extensive research should be conducted, considering a wider variety of variables that might affect stress and health behaviors as well as the productivity of the respective companies that workers belong to (Chang *et al.*, 2005). This study is expected to raise awareness about the importance of health among businesses and to provide useful information for the development of health promotion programs. The instrument used in this study to measure job stress was the short form of the Korean Occupational Stress Scale (KOSS-SF) (Chang *et al.*, 2005). This scale covered seven

areas by 24 items job demands (four items), job autonomy (four), relational conflicts (three), job insecurity (two), organizational system (four), improper compensation (three) and workplace culture (four). In addition to these areas, physical environments seemed to be a major job stressor, so, this factor was additionally accounted for by three items. Therefore, the final instrument consisted of 27 items for 8 areas. The number of the nonsmokers was 155 (27.9%) and this rate was lower than that in data released by Statistics Korea for 2014 (42.1%, Park and Jung, 2010). This study's results also correspond to an earlier study on the relationship of job stress levels to health behaviors in male and female workers from large companies. However, the amount of (problem) drinking frequencies was larger among the subjects which indicates the necessity for temperance and anti-drinking health promotion programs. This study revealed that there was a relationship between job stress and smoking behaviors, linked to material needs and job demands. Additionally, drinking amounts were closely associated to job demands. This is in line with a finding about daily health problems such as a slight cold caused by smoking or drinking also functioned as a factor to detract from workers productivity (Tsutsumi *et al.*, 2001) also found that job stress is significantly related to smoking but not with drinking which it is similar to the findings of this study (Park and Jung, 2010). Vigorous competition increases not only psychological stresses but also physical problems (Ajilchi and Kargar, 2015). In order to stay fit in this intense competition, one needs to concentrate on one's work (Shin and Kim, 2015).

### CONCLUSION

The job stress of manufacturing workers and its relationship with drinking and smoking was investigated. Kang's thesis on the relationship between drinking levels and serum lipid concentrations in male workers found that a larger amount of drinking led to a higher rate of smoking (which are both health-related behaviors) but the study demonstrated that job stress was significantly related only to smoking but not drinking to promote the health of manufacturing workers, every business should provide temperance and anti-drinking programs which are interventions geared toward helping them regulate stress in a balanced way.

### REFERENCES

- Ajilchi, B. and F.R. Kargar, 2015. Prediction of job stress among employees through the dimensions of time management skills by managers. *Indian J. Sci. Technol.*, 8: 1-1.
- Bramley, T.J., D. Lerner and M. Sames, 2002. Productivity losses related to the common cold. *J. Occup. Environ. Med.*, 44: 822-829.
- Cha, K.T., I.W. Kim, S.B. Koh, S.J. Hyun and J.H. Park *et al.*, 2008. The association of occupational stress with self-perceived fatigue in white collar employees. *Korean J. Occup. Environ. Med.*, 20: 182-192.
- Chang, S.J., S.B. Koh, D. Kang, S.A. Kim and M.G. Kang *et al.*, 2005. Developing an occupational stress scale for Korean employees. *Korean J. Occup. Environ. Med.*, 17: 297-317.
- Cho, D.R., 2006. Workers job stress status and related factors-using Korean occupational stress questionnaire short form. *Korean J. Occup. Health Nurs.*, 6: 58-71.
- Kim, J.S., H.S. Hong and K.N. Yeon, 2012. A study of fatigue, depression and sleep disorders in patients with chronic liver disease. *Korean Soc. Biol. Nurs. Sci.*, 14: 1-7.
- Oh, H.S., S.R. Chang and D.J. Kim, 2013. Design of HSE management system in a shipyard using object-oriented component-based development method. *J. Korean Soc. Mar. Environ. Saf.*, 19: 71-77.
- Park, H.J. and H.S. Jung, 2010. Health behaviors by job stress level in large-sized company with male and female workers. *J. Korean Acad. Nurs.*, 40: 852-862.
- Shin, E.H. and H.K. Kim, 2015. Factors influencing health-related quality of life among male workers in Korea. *Indian J. Sci. Technol.*, 8: 236-246.
- Tsutsumi, A., K. Kayaba, T. Theorell and J. Siegrist, 2001. Association between job stress and depression among Japanese employees threatened by job loss in a comparison between two complementary job-stress models. *Scand. J. Work Environ. Health*, 27: 146-153.
- Yi, Y.J. and H.S. Jung, 2009. Analysis on female workers job stress in sales and retail industries. *Korean J. Occup. Health Nurs.*, 18: 22-32.
- Yu, S.Y., C.N. Kim, J.H. Roh and H.S. Kim, 2003. A comparison of recognition on the working environmental measurement between industrial workers and health administrators. *Korea Inst. Occup. Health*, 13: 173-181.