

# Relationship of Type A Behavior Pattern and Psychosocial Stress with Fatigue Symptoms in Manufacturing Workers

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## Abstract

**Objectives:** The present study was conducted to assess the relationship of Type A Behavior Pattern (TABP) and psychosocial stress with fatigue in manufacturing workers. **Methods/Statistical Analysis:** The subjects were 358 employees working in manufacturing industries with fewer than fifty persons. Data were collected through a survey using a structured self-administered questionnaire. **Findings:** The degree of fatigue experienced by the subjects was significantly higher in the TABP group than in the Type B Behavior Pattern (TBBP) group, and was also significantly higher in the high-risk group of psychosocial stress. Moreover, fatigue Symptoms (MFS) had a significantly positive correlation with TABP and psychosocial stress level. TABP and psychosocial stress were major factors affecting the MFS. **Improvements/Applications:** These survey results suggest that the TABP and psychosocial stress was a profound related with MFS.

**Keywords:** Fatigue, Stress, Type A Behavior Pattern, Worker

## 1. Introduction

Along with rapid structural changes in industry, the physical and mental health of people living in modern society is affected by fatigue. Mental health is an important issue as much as physical health for health management of workers. The maintenance and promotion of workers' health improve productivity and production quality in all industries and this is directly linked to national economic growth. Fatigue experienced by workers in industrial sites is a reversible physiological response to physical and mental workload. However, excess fatigue is a warning sign of health troubles by interfering with homeostasis and inducing illnesses<sup>1-3</sup>. Although a large number of studies have explored fatigue among workers in different occupations<sup>4-8</sup>, studies on the association of personality and psychosocial stress with fatigue have been rarely performed. The TABP is characterized by personality or

traits such as impatience and aggressiveness in certain environmental events, a sense of time urgency and a strong desire for achievement<sup>9</sup>. The characteristics of TABP are a competitive desire for achievement, a sense of time urgency, impatience, job involvement, aggressive behavior in uncontrollable circumstances, hostility and others<sup>10,11</sup>. Stress is neurological, endocrine, immunological, physiological and psychological reaction in response to external stimulation and one of the risk factors that influence mental health<sup>12</sup>. Stress is a natural and inevitable phenomenon of human life and a certain amount of stress works as a dynamic force, necessary for our survival and well-being. On the contrary, when the intensity and frequency of stress exceed one's ability to cope with, maladjustment leads to various stress-related health problems<sup>13</sup>. Stress intensity is gradually increasing due to heavy workload, role and interpersonal conflicts, lack of job autonomy, role ambiguity, inadequate compensation,

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irrational and authoritative organizational culture and others in the workplace<sup>14</sup>. Since fatigue has emerged as one of risk factors that result in low productivity at work, significance of a relationship between fatigue and individual's personality traits and psychosocial stress needs to be investigated. Therefore, this study was performed to find out the fatigue symptoms according to the TABP and psychosocial stress.

## 2. Study Subjects and Methods

### 2.1 Study Subjects

The present study recruited 450 persons who work in manufacturing industries with fewer than fifty employees. The distributed questionnaires were returned from 399 respondents at a return rate of 88.7%. Of these, 41 questionnaires with insincere answers were excluded and the remaining 358 questionnaires were used.

### 2.2 Methods

Data were collected through a survey using a structured anonymous self-administered questionnaire from May 1 to June 30, 2015. The survey examined gender, age, marital status, educational level and religion as variables representing sociodemographic characteristics. Smoking, drinking, regular exercise, sleep duration and subjective health status were used as variables representing health-related behaviors. Average salary, employment duration, job position, employment type, shift work, weekly working hour, absence, physical burden of work, work satisfaction, fit to the job and consider quitting the job were investigated as variables representing job related characteristics. The Framingham Type A Behavior Pattern Scale (TABP) developed by<sup>15</sup> was used to assess TABP. The scale included 10 items to be rated on a four-point Likert scale from 4 (very much), 3 (quite a lot), 2 (somewhat) to 1 (not at all). A higher total score (range, 10-38 points) indicates a tendency for TABP to be more manifested. Subjects with scores higher and lower than the median score were classified as TABP and TBBP groups, respectively. Cronbach's  $\alpha$  coefficient was 0.800, indicating the internal reliability of the scale. Based on the General Health Questionnaire (GHQ) introduced by<sup>16</sup>, the Korean version of Psychosocial Well-being Index (PWI) revised by<sup>17</sup> was used to assess psychosocial stress. The scale included 18 items to be rated on a four-point Likert scale from 0 (always), 1 (frequently),

2 (sometimes) to 3 (not at all) for positive items or from 3 (always), 2 (frequently), 1 (sometimes) to 0 (not at all) for negative items. PWI was calculated by summing all scores. Those with a total score of less than 8 were defined as the healthy group, between 9–26 as the latent stress group and higher than 27 as high risk stress group. Cronbach's  $\alpha$  coefficient was 0.878, suggesting the reliability of psychosocial stress. Based on the Fatigue Assessment Inventory (FAI) introduced by<sup>18</sup>, for which validity and reliability have been verified, the Korean version of Multidimensional Fatigue Scale (MFS) revised by was used to evaluate subjective fatigue symptoms. The MFS was designed to answer fatigue level felt over the past two weeks. The scale comprised three sub-scales of global fatigue with 8 items, daily dysfunctioning with 6 items and situational fatigue with 5 items to be rated on a seven-point Likert scale from 1 to 7 points. A higher total score (range 22–130 points) means a higher level of fatigue. Cronbach's  $\alpha$  coefficient was 0.930.

### 2.3 Data Processing and Statistical Analysis

The collected data were entered into the statistical software, and statistical analyses were carried out using the SPSS for Windows (ver 22.0). The average scores of TABP, psychosocial stress and fatigue according to sociodemographic, health-related and job-related characteristics were compared with t-test and ANOVA. Correlations between data were analyzed using the Pearson correlation test. A multiple regression analysis was done using fatigue as a dependent variable and sociodemographic, health-related and job-related characteristics, TABP and psychosocial stress with significant differences from univariate analysis as independent variables. The statistical significance level was set at  $p < 0.05$ .

## 3. Results

### 3.1 MFS Levels by Sociodemographic and Health Related Characteristics

The mean score of MFS by sociodemographic and health related characteristics was significantly higher in the poor sleep group than in the good sleep group ( $p = 0.040$ ) and in the subjectively unhealthy group than in the subjectively healthy group ( $p < 0.001$ ). On the other hand, no significant difference was shown in fatigue scores according to gender, age, marital status, educational level, religion, smoking, drinking and regular exercise.

**Table 1.** Mean score of fatigue symptoms according to sociodemographic characteristics and health related factors

Variable	N (%)	Fatigue symptoms	<i>p-value</i>
		Mean $\pm$ SD	
Gender			0.128
Male	201 (56.1)	78.23 $\pm$ 18.99	
Female	157 (43.9)	81.71 $\pm$ 23.14	
Age (year)			0.196
$\leq$ 29	52 (14.5)	85.36 $\pm$ 23.47	
30 ~ 39	98 (27.4)	79.75 $\pm$ 20.25	
40 ~ 49	131 (36.6)	78.63 $\pm$ 19.82	
50 $\leq$	77 (21.5)	77.92 $\pm$ 21.68	
Marital status			0.271
Unmarried	110 (30.7)	81.60 $\pm$ 20.92	
Married	248 (69.3)	78.95 $\pm$ 20.96	
Educational level			0.710
$\leq$ High school	240 (67.0)	79.49 $\pm$ 22.26	
College $\leq$	118 (33.0)	80.31 $\pm$ 18.07	
Religion			0.885
Yes	126 (35.2)	79.98 $\pm$ 21.24	
No	232 (64.8)	79.64 $\pm$ 20.84	
Cigarette smoking			0.216
Yes	111 (31.0)	82.81 $\pm$ 19.69	
No	247 (69.0)	78.84 $\pm$ 21.47	
Alcohol drinking			0.272
Yes	274 (76.5)	79.09 $\pm$ 19.83	
No	84 (23.5)	81.96 $\pm$ 24.26	
Regular exercise			0.376
Yes	125 (34.9)	78.42 $\pm$ 19.83	
No	233 (65.1)	80.48 $\pm$ 21.53	
Subjective sleep evaluation			0.040
Good	159 (44.4)	77.27 $\pm$ 18.32	
Poor	199 (55.6)	81.75 $\pm$ 22.69	
Subjective health status			<0.001
Healthy	320 (89.4)	77.99 $\pm$ 20.55	
Unhealthy	38 (10.6)	94.65 $\pm$ 18.44	
Total	358 (100.0)	79.76 $\pm$ 20.95	

### 3.2 MFS Levels by Job Related Characteristics

The mean score of MFS by job related characteristics was significantly higher in the formal employment group than in the informal employment group ( $p = 0.016$ ), in the group with a higher experience of sick absence than in the lower experience of sick absence group ( $p < 0.001$ ), in the group with heavy burden of physical work than in the group with adequate burden ( $p < 0.001$ ), in the job dissatisfaction group ( $p < 0.001$ ) than in the job satisfaction group, in the group with unfit to the job ( $p < 0.001$ ) than in the group with fit to the job and in the group with consideration quitting the job than in the group with no consideration quitting the job ( $p < 0.001$ ).

**Table 2.** Mean score of fatigue symptoms according to job related factors

Variable	N (%)	Fatigue symptoms	<i>p-value</i>
		Mean $\pm$ SD	
Salary(₩10,000)			0.226
<200	241 (67.3)	80.52 $\pm$ 21.53	
200 ~ 299	73 (20.4)	76.06 $\pm$ 20.16	
300 $\leq$	44 (12.3)	81.72 $\pm$ 18.63	
Job career(year)			0.182
$\leq$ 1	126 (35.2)	83.06 $\pm$ 22.10	
2 ~ 4	71 (19.8)	78.29 $\pm$ 19.87	
5 ~ 9	62 (17.3)	77.51 $\pm$ 19.92	
10 $\leq$	99 (27.7)	78.03 $\pm$ 20.63	
Job position			0.223
Staff	271 (75.7)	80.53 $\pm$ 21.61	
Manager	87 (24.3)	77.37 $\pm$ 18.66	
Employed type			0.016
Formal	288 (80.4)	81.07 $\pm$ 20.06	
Informal	70 (19.6)	74.38 $\pm$ 23.68	
Shift work			0.393
With	69 (19.3)	82.59 $\pm$ 23.57	
Without	289 (80.7)	79.09 $\pm$ 20.26	
Working hour(/week)			0.543
<40	30 (8.4)	77.53 $\pm$ 23.43	

(Continued)

40≤	328 (91.6)	79.96 ± 20.74	
Experience of sick absence(/year)			0.001
Yes	86 (24.0)	86.24 ± 19.11	
No	272 (76.0)	77.71 ± 21.12	
Physical burden of work			<0.001
Adequate	211 (58.9)	74.88 ± 19.85	
Hard	147 (41.1)	86.77 ± 20.56	
Satisfaction of work			<0.001
Satisfaction	223 (62.3)	74.30 ± 19.85	
Dissatisfaction	135 (37.7)	88.78 ± 19.62	
Fit to the job			<0.001
Fit	258 (72.1)	76.12 ± 19.87	
Unfit	100 (27.9)	89.15 ± 20.86	
Consider quitting the job			<0.001
With	182 (50.8)	85.65 ± 20.09	
Without	176 (49.2)	73.67 ± 20.12	
Total	358 (100.0)	79.76 ± 20.95	

### 3.3 MFS Levels by TABP

The mean score of MFS by TABP was significantly higher in the TABP group than in the TBBP group (p < 0.001).

**Table 3.** Mean score of fatigue symptoms according to Type A Behavior Pattern factors

Variable	N (%)	Fatigue symptoms	p-value
		Mean±SD	
Type A Behavior Pattern†			<0.001
Type A	161 (45.0)	84.13±20.97	
Type B	197 (55.0)	76.19±20.30	
Total	358 (100.0)	79.76±20.95	

†: Type A Behavior Pattern classified by the median score: ≥21: Type A Behavior Pattern group, 21<: type B behavior pattern group

### 3.4 MFS Levels by Psychosocial Stress

The mean score of MFS by psychosocial stress was significantly higher in the group with a greater risk of psychosocial stress (p < 0.001).

**Table 4.** Mean score of fatigue symptoms according to psychosocial stress factors

Variable	N (%)	Fatigue symptoms	p-value
		Mean ± SD	
Psychosocial stress (PWI)†			<0.001
Healthy group	19 (5.3)	53.84 ± 19.66	
Latent stress group	242 (67.6)	77.66 ± 19.52	
High risk stress group	97 (27.1)	90.09 ± 18.75	
Total	358 (100.0)	79.76 ± 20.95	

† :The score of psychosocial stress(PWI) was dichotomized into three groups; healthy group (≤8), latent stress group (9 ~ 26) and high risk stress group (27≤)

### 3.5 Correlation Coefficients among Fatigue, TABP and Psychosocial Stress

Based on the correlation among fatigue, TABP and psychosocial stress, fatigue level had significantly positive correlation with psychosocial stress(r = 0.433, p < 0.01) and TABP(r = 0.247, p < 0.01). Psychosocial stress showed significantly positive correlation with TABP(r = 0.184, p < 0.05)

**Table 5.** Correlation coefficients among fatigue, Type A Behavior Pattern and psychosocial stress

Variable	Fatigue symptoms	Psychosocial stress
Psychosocial stress	0.433**	
Type A Behavior Pattern	0.247**	0.184*

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

### 3.6 Factors Affecting Fatigue Level

To identify factors affecting respondents' fatigue levels, this study conducted a multiple regression analysis with fatigue as a dependent variable and significant related factors from univariate analysis as independent variables. As a result, the significant factors affecting fatigue were subjective health status, employment type, physical burden of work, satisfaction of work, turnover intention, TABP and psychosocial stress, and the variance explained by all variables was 32.2%.

**Table 6.** Multiple regression analysis for influence of risk factor on fatigue symptoms

Variable	B	SE	Beta	t	p-value
Subjective sleep evaluation (good/poor)	-0.159	1.929	-0.004	-0.082	0.935
Subjective health status (healthy/unhealthy)	6.862	3.257	0.101	2.107	0.036
Employed type (formal/informal)	-8.985	2.390	-0.170	-3.759	<0.001
Experience of sick absence (with/without)	4.394	2.230	0.090	1.970	0.050
Physical burden of work (adequate/hard)	4.917	2.134	0.116	2.304	0.022
Satisfaction of work (satisfaction/dissatisfaction)	6.360	2.539	0.147	2.505	0.013
Fit to the job (fit/unfit)	0.259	2.583	0.006	0.100	0.920
Consider quitting the job (with/without)	-4.400	2.084	-0.105	-2.111	0.035
Type A Behavior Pattern	0.468	0.189	0.114	2.477	0.014
Psychosocial stress (PWI)	0.698	0.128	0.275	5.459	<0.001
Constant	52.496	5.018		10.462	<0.001
$R^2 = 0.322$					

## 4. Discussion and Conclusion

The present paper was performed to find out the relationship of TABP and psychosocial stress with fatigue in workers in manufacturing companies. The validity and reliability of measurement instruments used in survey are key indicators that reduce error in the measurement process and define measurement significance. In the present paper, the Framingham Type A Behavior Pattern Scale (TABP), Psychosocial Well-being Index (PWI) and Multidimensional Fatigue Scale (MFS) were used as measuring tools for TABP and their validity and reliability were verified. Cronbach's  $\alpha$  was greater than 0.80, ensuring high reliability of results. According to the results of this study, the mean score of MFS by sociodemographic and health related characteristics was significantly higher in the poor sleep group than in the good sleep group, and in the subjectively unhealthy group than in the subjectively healthy group. This outcome was comparable to that of a previous study <sup>19</sup>. The mean score of MFS by job related factors was significantly higher in the formal employment group than in the informal employment group ( $p = 0.016$ ), in the group with a higher absence, in the group with heavy burden of physical work than in the group with adequate burden ( $p < 0.001$ ), in the job dissatisfaction group ( $p < 0.001$ ), in the group with unfit to the job

( $p < 0.001$ ), and in the group with consideration quitting the job. In<sup>19</sup> obtained the comparable results in a study on nurses working in general hospitals. MFS levels were significantly higher in the group with job dissatisfaction and unfit to the job. Moreover, a study by <sup>20</sup> demonstrated that fatigue levels were significantly higher in group with a shorter length of work experience, a lower job position and shift work, indicating differences according to various factors. In the present study, the degree of fatigue according to TABP was significantly higher in the group with a greater tendency toward TABP. Fatigue level according to psychosocial stress was significantly higher in the group with a greater risk of psychosocial stress. Likewise, previous studies revealed that fatigue was more intense in the group with a greater tendency toward TABP<sup>21,22</sup> and in the group with a higher risk of psychosocial stress<sup>23</sup>. Based on the correlation between fatigue and related variables, fatigue severity had significantly positive correlation with TABP and psychosocial stress. TABP individuals are more likely to express aggression and hostile as responses to stress compared to TBBP individuals<sup>24</sup>. Moreover, they have a stronger desire for achievement and relatively higher will to realize their goals and a stronger desire to exercise self-control in all circumstances than TBBP individuals, eventually leading to more intense fatigue<sup>25,26</sup>. Therefore, the above findings suggest that

psychosocial factors such as TABP influence fatigue. This study conducted a multiple regression analysis with fatigue as a dependent variable and significant related factors from univariate analysis as independent variables to identify factors affecting respondents' fatigue levels. As a result, the significant factors affecting fatigue were subjective health status, employment type and absence, physical burden of work, satisfaction of work, turnover intention, TABP and psychosocial stress and the variance explained by all variables was 32.2%. To sum up the above study findings, the level of fatigue is affected by individual's sociodemographic characteristics, job related factors or psychological factors such as traits, TABP and psychosocial stress. There are several limitations to note in the present study. First, the results from this survey cannot be generalized all workers in Korea, since the study involved a small number of manufacturing workers. Second, response bias cannot be excluded since the evaluation of TABP and psychosocial stress and fatigue levels were obtained through a survey using subjective self-administration method. Despite these limitations, this study was meaningful in that it revealed that TABP and psychosocial stress were risk factors influencing fatigue in workers, in addition to sociodemographic and job related characteristics. Therefore, further studies are warranted to devise measures for adequate management of psychosocial factors in order to minimize the risk factors of fatigue in workers.

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