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A Study on the Failed Rest After Work in Association with Cardiovascular and Other Diseases as Well as Physical disorders

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〈CONTENTS〉

ABSTRACT

This survey provides, at a participation rate of 70%, 4,790 examinees. The purpose of this study is to study the association of the failed rest after work with 34 diseases including cardiovascular diseases. The index of the failed rest after work was composed of 4 questions about "thinking of work for several hours", "feeling exhausted", feeling unsatisfied or depressed", and "needing to go to bed early for next day's work". Estimation of correlation among 4 variables, factor analysis, and ANCOVA adjusted for sex, age and job were carried out. A self-rating questionnaire of one's own disease history and the "London School of Hygiene Cardiovascular Questionnaire" were used in order to discriminate each morbid group from the opposite group. Brief explanations of the result are as follows:

1) Every variable of failed rest after work shows significant difference between the morbid group and the no morbid group for possible infarction; for angina pectoris in the total, and men.

2) Among 4 variables 'exhaustion' best discriminates the infarction group from the no infarction group, and the angina group from the no angina group.

3) The factor of failed rest after work is a significant factor that distinguishes the infarction group from the no infarction group, and the angina pectoris group from the no angina group.

Therefore, stress management through health education and promotion such as behavioral modification can be used to reduce cardiovascular diseases and stress as perceived by an individual.

Key words : failed rest after work, infarction, angina pectoris, health education and promotion

Ⅰ. Introduction: Biopsychosocial physiology

It has been found, in both laboratory and field studies, that certain conditions produce measurable physiological changes. The heart muscle has proved to be sensitive to catabolic energy-mobilizing hormones, including cortisol, which are secreted by the adrenal cortex. In stressful situations the secretion of cortisol is increased. If this continues for long it can prepare the way for an infarction. On the other hand, anabolic hormones, such as insulin, testosterone (within limits) and, under certain conditions, growth hormone, would seem to be capable of protecting the heart muscle against the action of catabolic hormones(Karasek et al. 1990, 1982). When the body mobilizes in preparation for a great effort, the secretion of adrenaline and noradrenaline increases. Distress in stressing situations tends to increase the secretion of the adrenocortical hormones, including cortisol(Theorell et al. 1987). Hormonal elevations (notably the catecholamines) have been found to be associated with specific work properties (such as time pressure, loud noise, distractions and repetitiveness), and lack of control over task content and execution(Frankenhaeuser 1980). Recent studies of prison personnel in Sweden have shown that employees in prisons with a low level of decision latitude have an elevated urinary excretion of noradrenaline (Härenstam et al. 1988) and also tend to have an elevated prevalence or ventricular ectopic heart beats during work hours(Härenstam et al. 1987). Job strain can induce excessive and long-lasting sympathoadrenal arousal, which leads to sustained blood pressure elevation

(Frankenhaeuser 1980). These physiological reactions - if they are prolonged over an extended period of time - may result in further damage to the cardiovascular system(Johnson et al. 1989).

Ⅱ. Data and method

The data used in this article are from a cross-sectional study, which is a multicenter community-oriented investigation for the primary prevention of ischaemic heart diseases(1984-1986). It utilized 200 sample points, which are representative of Germany. Each sample point-cluster gives a net sample of 36 participants, aged 25-69; thus the maximum total is 7,200 participants. Ultimately, this survey provides, at a participation rate of 70%, 4,790 examinees.

〈Table 1〉 Percentage of each age group in the survey, in comparison with that in German official statistics

Age	Male		Female	
	official (%)	survey (%)	official (%)	survey (%)
25 - 29	13.7	11.8	12.0	11.1
30 - 39	23.4	22.3	20.8	23.3
40 - 49	28.1	29.8	25.7	27.9
50 - 59	21.3	22.0	21.7	20.7
60 - 69	13.5	14.1	19.8	17.0
Total	100.0	100.0	100.0	100.0

Table 1 presents almost the same distribution of age groups in the study sample compared with the total German population, classified in five categories. The distribution of sex in the survey shows that male: female is 2,418(50.4%): 2,373(49.5%).

〈Table 2〉 Demographic characteristics

	No. (n=4,790)	%
age		
25-29	551	11.5
30-39	1,087	22.7
40-49	1,384	28.9
50-59	1,025	21.4
60-69	743	15.5
sex		
male	2,414	50.4
female	2,371	49.5
job		
blue-collar	1,614	33.7
white-collar	1,667	34.8
etc.	1,509	31.5
risk factor		
obesity(BMI)	1,202	25.1
smoker	1,605	33.5
subjective health		
good	2,031	42.4
bad	757	15.8
etc.	2,002	41.8
No. of visiting doctors within last 4 weeks	2,117	44.2

The purpose of this study is to study the association of failed rest after work with 34 diseases including cardiovascular disease. In order to see the diseases in relation to job stress, 'failed rest after work' was chosen as

an index of job stress. The index of failed rest after work was composed of 4 questions. Each variable consists of 4 points.

Estimation of correlation among 4 variables, factor analysis, and ANCOVA (applied ANOVA) adjusted for "sex, age and job" were carried out. A self-rating questionnaire of one's own disease history and the "London School of Hygiene Cardiovascular Questionnaire" were used in order to discriminate each morbid group from the opposite group.

Ⅲ. Results and Discussion

1. Failed rest after work and cardiovascular disease

The four variables of failed rest after work are as follows: thoughts of work for several hours, feel exhausted, feel unsatisfied or depressed, need to go to bed early for next day's work. Each variable takes the scale of 0(never) through 3(frequently) points. We used data from 4,150, who had or had had jobs. The mean and standard deviation of each variable was shown in Table 3.

〈Table 3〉 Variables of failed rest after work in the German population

No.	Content	Mean	S.D.
1	thoughts of work for several hours (tho)	1.592	0.981
2	feel exhausted (exh)	1.950	0.833
3	feel unsatisfied or depressed (dep)	1.059	0.864
4	need to go to bed early for next day's work (bed)	1.624	0.960

The association of each variable of failed rest after work with 'myocardial infarction or not', 'angina pectoris or not', and 'angina pectoris grade' was tested. Tables 4 and 5 show z-transformed ANCOVA (analysis of covariance) statistics and p-values. P-value(main effect) is defined as the statistical significance of each variable adjusted for sex, age and job while p-value(explained) remains unadjusted for these factors. 'p' means statistical significance which is not adjusted for sex, age and job only when explicitly written as 'p-value (explained)'. Otherwise, 'p' means 'p-value(main effect)' from here on.

From table 4, we can find that all four variables of failed rest after work show significant differences between the possible myocardial infarction group and the no possible infarction group($p<0.05$). In every variable, the mean of the variable score in the possible myocardial infarction group is higher than that in the no possible infarction group. Therefore, we can say that there is a significant difference between the possible infarction group and the no infarction group

〈Table 4〉 Mean of variable score in the possible infarction group and the no infarction group for variables of failed rest after work

	Group	No	tho	exh	dep	bed
men and women	Total	4,150	-.00	.01	-.00	.01
	Pos. Infar.	243	.15	.37	.28	.26
	no Infar.	3,907	-.01	-.01	-.02	-.01
	p (Explained)		0.000***	0.000***	0.000***	0.000***
	p (Main Effect)+		0.004**	0.000***	0.000***	0.000***
men	Total	2,173	.11	-.05	-.02	-.09
	Pos. Infar.	156	.20	.27	.17	.14
	no Infar.	2,017	.10	-.07	-.03	-.11
	p (Explained)		0.000***	0.000***	0.000***	0.009**
	p (Main Effect)+		0.034*	0.000***	0.000***	0.003**
women	Total	1,977	-.12	.07	.02	.11
	Pos. Infar.	87	.05	.55	.46	.47
	no Infar.	1,890	-.13	.05	-.00	.10
	p (Explained)		0.000***	0.000***	0.000***	0.000***
	p (Main Effect)+		0.029*	0.000***	0.000***	0.000***

(p<0.05*; p<0.01**; p<0.001***)
+Adjusted for "sex, age and job" (ANCOVA) - main effect / z-transformation
※ tho : 'thoughts of work for several hours'
exh : 'feel exhausted'
dep : 'feel unsatisfied or depressed'
bed : 'need to go to bed early for next day's work'

in every variable of failed rest after work($p<0.05$). Exhaustion discriminates the possible infarction group from the no infarction group most.

From table 5(total and men), we can find that all four variables of failed rest after work show significant differences between the angina pectoris group and the no angina group($p<0.05$). The mean of the variable score in the angina pectoris group is higher than that in the no angina group in every variable. Again, exhaustion discriminates the angina group from the no angina group most.

From table 5(women), we can see that two variables of failed rest after work, namely, 'feel exhausted' and 'feel unsatisfied or depressed', show significant differences between the angina pectoris group and the no angina group($p<0.01$). The mean of each variable score in the angina pectoris group is higher than that in the no angina group.

No variable of failed rest after work has a statistically significant association with angina pectoris grade in the total population, in men,

〈Table 5〉 Mean of variable score in the angina group and the no angina group for variables of failed rest after work

	Group	No	tho	exh	dep	bed
men and women	Total	3,902	-.01	-.01	-.02	-.01
	Angina	474	.09	.17	.14	.09
	No Angina	3,428	-.02	-.04	-.04	-.02
	p (Explained)		0.000***	0.000***	0.000***	0.000***
	p (Main Effect)+		0.000***	0.000***	0.000***	0.017*
men	Total	2,013	.11	-.07	-.03	-.11
	Angina	212	.27	.10	.16	.11
	No Angina	1,801	.09	-.09	-.06	-.14
	p (Explained)		0.000***	0.000***	0.000***	0.003**
	p (Main Effect)+		0.001**	0.001**	0.000***	0.001**
women	Total	1,889	-.13	.05	-.01	.10
	Angina	262	-.06	.23	.13	.07
	No Angina	1,627	-.14	.02	-.03	.10
	p (Explained)		0.000***	0.000***	0.000***	0.000***
	p (Main Effect)+		0.053	0.000***	0.009**	0.896

(p<0.05*; p<0.01**; p<0.001***)
+Adjusted for "sex, age and job" (ANCOVA) - main effect / z-transformation

or in women. This can be seen in table 6(p>0.05).

The association analysis for each variable of failed rest after work has statistical limitation. If each variable has the less worth than a variable in fact, association analysis as to each variable of failed rest after work doesn't have much meaning(Nunnally 1978). So through the comprehensive variable (i.e. factor) that explains the weight of each variable, this limitation can be overcome (Karasek et al. 1990).

All the correlations among 4 variables are shown(Table 7). Every correlation is statistically significant. So in case of this data, the method of flat summing of all the variables must not be valid. That is because each variable has a significantly different weight.

Therefore, we are able to examine the possibility of factor analysis in this case. The KMO (Kaiser-Meyer-Olkin) measure of sampling adequacy(Norusis 1986) is 0.672, which means factor analysis can be carried out. The p-value (significance) of Bartlett's test of sphericity(Norusis 1986) is 0.00, which is also an important prerequisite for factor analysis. Thus, it was decided to use factor analysis here.

We obtained estimates of the initial factors from the principal components analysis out of several factor extraction methods. In order to determine the number of factors, we used the

〈Table 6〉 Mean of variable score in the angina grade 1 group and the angina grade 2 group for variables of failed rest after work

	Group	No	tho	exh	dep	bed
men and women	Total	474	.09	.17	.14	.09
	angina 1	354	.12	.18	.12	.14
	angina 2	120	-.00	.14	.21	-.04
	p (Explained)		0.001**	0.001**	0.065	0.066
	p (Main Effect)+		0.408	0.981	0.335	0.153
men	Total	212	.27	.10	.16	.11
	angina 1	159	.29	.12	.20	.15
	angina 2	53	.18	.02	.06	-.02
	p (Explained)		0.058	0.023*	0.003**	0.486
	p (Main Effect)+		0.728	0.501	0.318	0.232
women	Total	262	-.06	.23	.13	.07
	angina 1	195	-.02	.23	.06	.12
	angina 2	67	-.15	.23	.33	-.05
	p (Explained)		0.221	0.064	0.250	0.042*
	p (Main Effect)+		0.609	0.655	0.067	0.452

(p<0.05*; p<0.01**; p<0.001***)
+Adjusted for "sex, age and job" (ANCOVA) - main effect / z-transformation

Guttman-Kaiser-criterion, which suggests that only factors that account for variances greater than 1 (the eigenvalue is greater than 1) should be included. In this study, one factor had an eigenvalue which was greater than 1. Matrix of factor loading is shown in Table 8.

Communality of the variable refers to the proportion of variance explained by the common factor(s). Communality can range from 0 to 1, with 0 indicating that all the variance is explained by the common factor(s). In this study, all 4 variables have enough communalities which are more than 0.37.

〈Table 7〉 Correlations between the variables of failed rest after work(N=4,150)

Correlation	tho	exh	dep	bed
tho	1.0000 p = .			
exh	.3095 p = .000	1.0000 p = .		
dep	.3654 p = .000	.3375 p = .000	1.0000 p = .	
bed	.1468 p = .000	.3545 p = .000	.2499 p = .000	1.0000 p = .

〈Table 8〉 Matrix of factor loading

Variable	Factor Loading	Communality
exh	.74717	.55826
dep	.72513	.52581
tho	.65841	.43350
bed	.61009	.37221
Eigenvalue	1.88987	

Since one of the goals of factor analysis is to reduce a large number of variables, it is often desirable to estimate factor scores for each case. A factor can be estimated as a linear combination of the original variables. The factor scores can be used in subsequent analyses to represent the values of the factors. In order to derive factor score coefficients, Anderson-Rubin method is used in this study.

$$FSz = \sum_{i=1}^{p} Ci * Xsiz$$

FSz : Factor score in case z;

Xsiz : Standardized score of variable i in case z

Ci : Factor score coefficient in variable i

The linear equation of the failed rest after work factor is as follows:

FSz = (0.348)*Xslz + (0.395)*Xs2z + (0.383)*Xs3z + (0.322)*Xs4z

Xs1z : 'thoughts of work for several hours'

Xs2z : 'feel exhausted'

Xs3z : 'feel unsatisfied or depressed'

Xs4z : 'need to go bed early for next day's work'

The higher the factor score is in this equation, the higher the failed rest after work is.

From table 9, there is a significant difference between the possible infarction

〈Table 9〉 Mean of the factor score of failed rest after work in the possible infarction group and the no infarction group

Group	No	men + women	men	women
Total	4,149	0.00	-0.02	0.02
infarct.	243	0.38	0.29	0.56
no Inf.	3,906	-0.02	-0.04	-0.00
p (Explained)		0.000***	0.000***	0.000***
p (Main Effect)+		0.000***	0.000***	0.000***

(p<0.05*; p<0.01**; p<0.001***)

+Adjusted for "sex, age and job" (ANCOVA) - main effect / z-transformation

〈Table 10〉 Mean of the factor score of failed rest after work in the angina group and the no angina group

Group	No	men + women	men	women
Total	3,902	-0.02	-0.04	-0.00
infarct.	474	0.18	0.23	0.14
no Inf.	3,428	-0.05	-0.07	-0.03
p (Explained)		0.000***	0.000***	0.000***
p (Main Effect)+		0.000***	0.000***	0.001**

(p<0.05*; p<0.01**; p<0.001***)
+Adjusted for "sex, age and job" (ANCOVA) - main effect / z-transformation

group and the no infarction group in the factor of failed rest after work(p<0.001). The mean of the factor scores in the possible infarction group is higher than that in the no possible infarction group.

From table 10, there is a significant difference between the angina pectoris group and the no angina pectoris group for the factor of failed rest after work(p<0.001). The mean of this factor score in the angina pectoris group is higher than that in the no angina pectoris group.

For angina pectoris grade, the factor of failed rest after work does not have statistical significance, as can be seen in table 11(p>0.05).

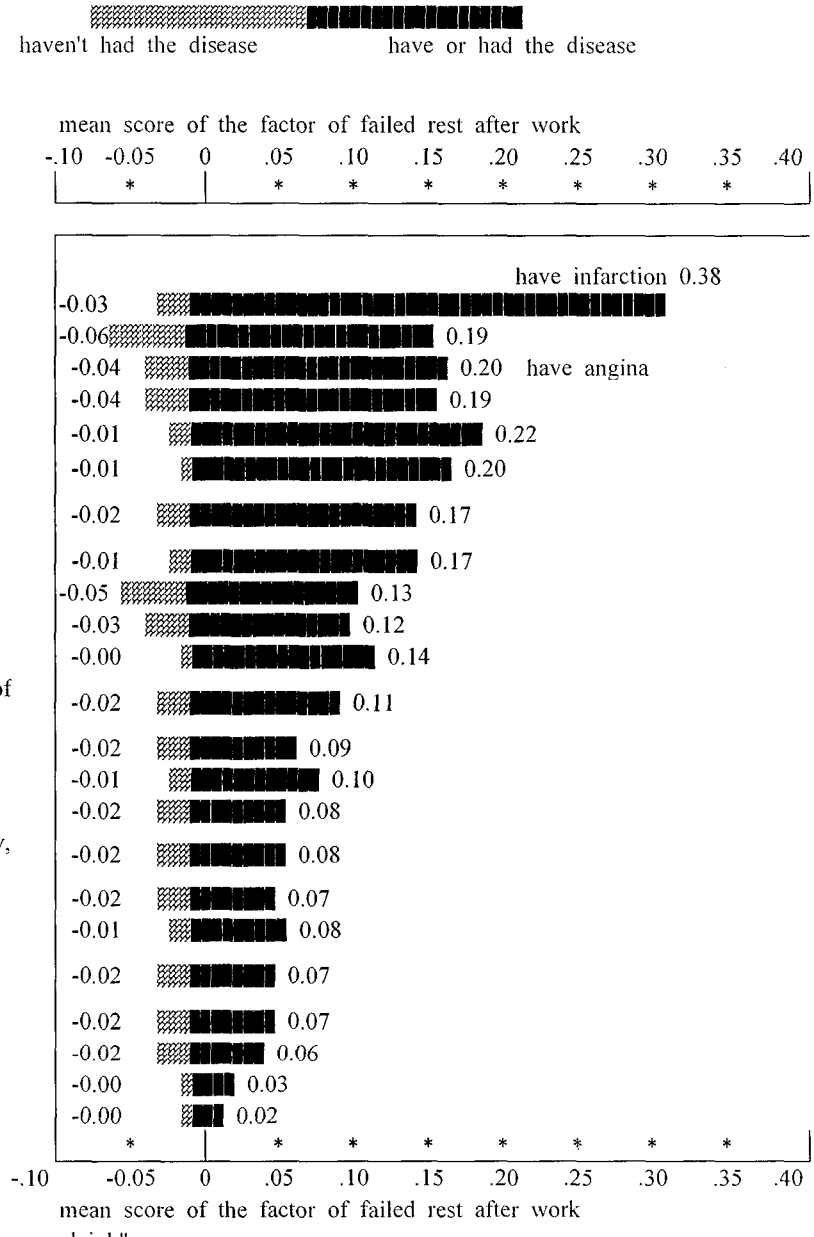
2. Failed rest after work and general diseases

Associations between failed rest work and diabetes, stroke, gout, asthma, hepatitis, hepatic induration, goiter, thyrosis, hay fever, disability of upper extremities or shoulder, disability of lower extremities or hip, cancer do not reach statistical significance(p>0.05). Thus, failed rest after work does not discriminate each morbid group of them from

〈Table 11〉 Mean of the factor score of failed rest after work in the angina grade 1 group and the angina grade 2 group

Group	No	men + women	men	women
Total	474	0.18	0.23	0.14
angina 1	354	0.20	0.27	0.14
angina 2	120	0.12	0.09	0.14
p (Explained)		0.000***	0.006**	0.035*
p (Main Effect)+		0.698	0.236	0.612

(p<0.05*; p<0.01**; p<0.001***)
+Adjusted for "sex, age and job" (ANCOVA) - main effect / z-transformation



/ANCOVA, adjusted for "sex, age and job"
/p<0.05*; p<0.01**; p<0.005***
/not significant: diabetes; stroke; gout; asthma; hepatitis; hepatic induration; goiter, thyrosis; hay fever; disability of upper extremities or shoulder; disability of lower extremities or hip; cancer
/(symptom): diagnosis through symptom questionnaire. If there is no letter for '(symptom)' in this figure, the diagnosis was through the self-rating questionnaire of one's own disease history.

〈Figure 1〉 Failed rest after work according to diseases

the opposite(Figure 1).

In contrast, the associations between failed rest after work and almost all other diseases, such as possible infarction(symptom), gastritis, angina(symptom), blockage, indigestion, cerebral circulatory disturbance, cardiac weakness, circulatory disturbance in the legs, chronic bronchitis, too low blood pressure, prostatis of men, pulmonary tuberculosis, disability of spine, allergy, ulcer, hypertension, inflammation of bladder, kidney, urinary passage, damaged intervertebral disk, obesity, phlebitis, varicose vein, thrombosis, lumbago, rheumarthritis, high cholesterol, and

〈Table 12〉 Simple regression analyses of failed rest after work on 10 disease factors

Dependent var. Independent var.	B	SE B	Beta	R Square	Sig T
FSD1					
FRAW	.053	.014	.054	.002	***
FSD2					
FRAW	.066	.014	.065	.004	***
FSD3					
FRAW	-.036	.014	-.036	.001	*
FSD4					
FRAW	.052	.014	.052	.002	***
FSD5					
FRAW	.003	.014	.003	.000	-
FSD6					
FRAW	.059	.014	.059	.003	***
FSD7					
FRAW	.022	.014	.022	.000	-
FSD8					
FRAW	.009	.014	.009	.000	-
FSD9					
FRAW	-.005	.014	-.005	.000	-
FSD10					
FRAW	.056	.014	.056	.003	***

($p<0.05$*; $p<0.01$**; $p<0.001$***)

*FRAW : failed rest after work
*FSD1 : factor of angina, infarction, and cardiac weakness
*FSD2 : factor of phlebitis & varicose vein & thrombosis, blockage & indigestion, goiter & thyrosis, and circulatory disturbance in the legs
*FSD3 : factor of hypertension, too low blood pressure, obesity, and diabetes
*FSD4 : factor of damaged intervertebral disk, lumbago, disability of spine, rheumarthritis, and cancer
*FSD5 : factor of disability of lower extremities or hip, stroke, disability of upper extremities or shoulder, and cerebral circulatory disturbance
*FSD6 : factor of ulcer, and gastritis
*FSD7 : factor of gout, high cholesterol, and inflamation of bladder, kidney & urinary passage
*FSD8 : factor of asthma, chronic bronchitis, and pulmonary tuberculosis
*FSD9 : factor of hepatitis, hepatic induration, and cholecystitis
*FSD10 : factor of hay fever, and allergy

cholecystitis [in the order of the difference of failed rest after work between each disease group and the opposite], reach statistical significance($p<0.05$; $p<0.01$; $p<0.005$). Failed rest after work can distinguish each above morbid group from the opposite group. So we can say that failed rest after work is significantly associated with almost all of these diseases(Figure 1).

Some people have more than one disease. In this case we may use factor analysis with 33 disease variables. The KMO measure of sampling adequacy is 0.760, which is adequate for factor analysis. The p-value of Bartlett's test of sphericity is 0.000, that again is appropriate for factor analysis. Factor analysis yields 10 disease factors here. The results of simple regression of failed rest after work on 10 disease factors are shown in Table 12.

FSD1(factor of angina, infarction, and cardiac weakness), FSD2(factor of phlebitis & varicose vein & thrombosis, blockage & indigestion, goiter & thyrosis, and circulatory disturbance in the legs), FSD3(factor of hypertension, too low blood pressure, obesity, and diabetes), FSD4(factor of damaged intervertebral disk, lumbago, disability of spine, rheumarthritis, and cancer), FSD6(factor of ulcer, and gastritis), and FSD10(factor of hay fever, and allergy) show statistical significance in relation to the 'failed rest after work' factor (but each R squared value is small).

The association of failed rest after work with the factor of cardiovascular disease is not always stronger than that with the other factors of diseases. It means that failed rest after work, which is a kind of job stress, is not only a risk factor of heart disease but also a general (non-specific) risk factor for many disease (however, a weak one).

3. Failed rest after work and physical disorders

Factor analysis with 24 physical disorder variables was used. The KMO measure of sampling adequacy is 0.926, which is adequate for factor analysis. The p-value of Bartlett's test of spericity is 0.000, which is also appropriate for factor analysis. Factor analysis yields 5 factors here. The results of simple regression of failed rest after work on 5 physical disorder factors are shown in Table 13.

FSZ1(factor of globus hystericus, difficulty in swallowing, panting, feeling of weakness, lancinating or dragging pain in the breast, nausea, sensation of dizziness or giddiness, and tremor), FSZ2(factor of irritability, brooding, subjective feeling of unrest, fatigue, and insomnia), FSZ3(factor of hypersensitivity to coldness, hypersensitivity to heat, excessive

〈Table 13〉 Simple regression analyses of failed rest after work on 5 physical disorder factors

Dependent var. / Independent var.	B	SE B	Beta	R Square	Sig T
FSZ1					
FRAW	.128	.015	.127	.016	***
FSZ2					
FRAW	.409	.013	.411	.169	***
FSZ3					
FRAW	.141	.015	.140	.019	***
FSZ4					
FRAW	.140	.015	.140	.019	***
FSZ5					
FRAW	.026	.015	.026	.000	-

($p<0.05$*; $p<0.01$**; $p<0.001$***)

*FRAW : failed rest after work

*FSZ1 : factor of globus hystericus, difficulty in swallowing, panting, feeling of weakness, lancinating or dragging pain in the breast, nausea, sensation of dizziness or giddiness, and tremor

*FSZ2 : factor of irritability, brooding, subjective feeling of unrest, fatigue, and insomnia

*FSZ3 : factor of hypersensitivity to coldness, hypersensitivity to heat, excessive necessity for sleep, feeling of heaviness & wearness in the legs, unrest in the legs, decrease in weight

*FSZ4 : factor of lumbago or backache, and pain in the neck or shoulder

*FSZ5 : factor of heatburn, strong sweating, and feeling of pressure or repletion in the trunk

necessity for sleep, feeling of heaviness & wearness in the legs, unrest in the legs, decrease in weight), and FSZ4(factor of lumbago or backache, and pain in the neck or shoulder) show statistical significance in relation to the 'failed rest after work' factor($p<.0001$). R squared value of FSZ2 (factor of irritability, brooding, subjective feeling of unrest, fatigue, and insomnia) is very meaningful.

Ⅳ. Conclusion and implication to health education and promotion

Brief explanations of this study result are as follows:

Firstly, every variable of failed rest after work such as "thinking of work for several

hours", "feeling exhausted", "feeling unsatisfied or depressed", and "needing to go to bed early for next day's work" shows statistically significant differences between the morbid group and the no morbid group for possible myocardial infarction in the total, men, and women; for angina pectoris in the total, and men.

Secondly, among all 4 variables of failed rest after work, 'exhaustion' best discriminates the infarction group from the no infarction group, and the angina group from the no angina group.

Thirdly, the factor of failed rest after work is a statistically significant factor that distinguishes the myocardial infarction group from the no infarction group, and the angina pectoris group from the no angina group. However, it cannot discriminate between the angina grade 1 group and the angina grade 2 group.

It is proved that stressful emotional situations affect the severity of cardiovascular diseases. Therefore, stress management through health education and promotion such as behavioral modification can be used to reduce cardiovascular diseases and stress as perceived by an individual.

At the beginning of the twentieth century, Sir William Osler concluded, in an often cited-set of lectures on angina pectoris, that such neurogenic factors could cause coronary heart disease(Karasek et al. 1990). Recently, the role of a stressful work environment in the development of cardiovascular disease has become a matter of interest(Kasl 1977, 1981; House et al. 1979; Frankenhaeuser 1980; Levi et al. 1982; House et al. 1986). Middle-aged male heart disease victims more often reported work dissatisfaction or an unusual accumulation of life events at work during the period of or preceding myocardial infarction than did nonvictims(Buell et al. 1960; Blohmke et al. 1969; Wolf 1969; Sales et al. 1971; Theorell et al. 1971, 1972).

As the worksite cardiovascular preventive potential including health education and promotion, the chance to learn something new at work, deep relationships with other people, and many contacts with acquaintances proved to be associated with a low adrenaline level in the blood. A low/high blood adrenaline level turned out to be associated with normal/high systolic blood pressure at rest(Theorell et al. 1987).

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