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Effects of long workhours on life-style, stress and quality of life among intermediate Japanese managers

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Objectives In accordance with international coordination of labor conditions a Japanese campaign advocating less work finally got under way recently in the form of work-reducing policies of the government to prevent occupational and stress-related diseases. However, long workhours among intermediate managers, who are key persons in most organizations in Japanese industry, are still considered to be prevalent. This study was conducted to examine the workhours of intermediate managers and clarify the effects of long workhours on the life-style, subjective stress, and subjective quality of life among them.

Methods Questionnaires were administered concerning workhours, life-styles, subjective stress, and subjective quality of life to 3870 heads of a division or a section and 2666 foremen in 110 firms in Japan.

Results The prevalence of ≥ 10 workhours was 69.7% for the divisional or sectional heads and 53.2% for the foremen. Long workhours had significant effects on the managers' life-style, such as sleeping pattern and regularity of daily life and meals. The divisional or sectional managers with long workhours perceived higher stress [odds ratio (OR) 2.51, 95% confidence interval (95% CI) 2.17—2.90] and lower quality of life (OR 1.17, 95% CI 1.02—1.36) than those who worked relatively short hours. The foremen with long workhours perceived higher stress (OR 2.35, 95% CI 2.01—2.75) and lower quality of life (OR 1.26, 95% CI 1.08—1.46) than those who worked relatively short hours.

Conclusions Long workhours may be associated with poorer life-style, higher stress, and lower quality of life among managers at the intermediate level.

Key terms health practice, overtime work, primary prevention, satisfaction.

Recently, long workhours in Japan have often been criticized as a cause of occupational diseases, including "Karoshi", meaning death from fatigue (1), and also stress-related diseases. Shorter workhours have been regarded as an urgent national objective, not only to help prevent work-related diseases and promote health, but also to help improve the quality of life (2—4).

In Japan, however, cuts in workhours without sufficient improvements in productivity are associated with the risk of an increase in voluntary unpaid overtime work and work at home.

Today, with the slow economic growth rate and chronic depression after the collapse of the so-called "bubble economy," adjustment of the work force by prolonging or shortening workhours has exceeded the capacity of individual firms, and the traditional Japanese style of employment, characterized by life-long employment and a seniority system of payment, has become difficult to maintain in some enterprises. As a result,

some companies resort to labor reduction primarily in the middle-aged and aged intermediate management class as part of restructuring. This practice has raised a social issue. In such a difficult occupational environment, the middle-aged and aged management class, who used to feel relatively comfortable about life (3), is considered to receive little benefit from the work reduction campaign.

There is much evidence linking workhours and health status. Harrington (5) has pointed out that most previous investigations are still rooted in studies of relationships between shift work, night work, and health. Working long hours has also been shown to be related to coronary heart disease (1, 6, 7), stress (8, 9), mental health (10), indefinite complaints (11), fatigue (12), dissatisfaction with work (13), and depression (14).

To help prevent chronic diseases, which account for the predominant part of health problems in advanced countries, the evaluation of life-style in the stage of primary prevention is considered important (15, 16). There-

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fore, the effects of long workhours on the life-style of a person should be clarified. Moreover, if working long hours increases workers' stress and deteriorates their quality of life, working less is an important health care problem of the entire organization. In this study, workhours were examined among persons in intermediate management. These people are key persons in industrial organizations. The relationships of workhours with life-style, subjective stress level, and subjective quality of life were also evaluated.

Subjects and methods

Subjects

The subjects were selected from 20 140 intermediate managers at 110 businesses that cooperated in this investigation among the 212 firms that were registered at the Foundation for Promotion of Industrial Medicine, an affiliated organization of the Ministry of Labor, as having at least 500 regular employees and a full-time industrial physician. The subjects were selected from every other position of the hierarchical order adopted by each firm. Thus a questionnaire was distributed to 1244 divisional heads, 3922 sectional heads, and 3738 foremen. The questionnaire was anonymously completed and returned by mail directly to the Foundation for Promotion of Industrial Medicine. It was returned by 6895 subjects (6827 men, 6 women, with 62 not answering) for a response rate of 76.6%. The questionnaire survey was performed between May and July 1990.

All items of the questionnaire were completed by 3870 divisional or sectional heads and 2666 foremen, who were all males; these intermediate managers comprised the total in the present study. The mean ages were 47.01 (SD 5.01) and 46.31 (SD 5.71) years for the divisional or sectional heads and foremen, respectively. Of these managers, 87.1% belonged to firms listed on the stock exchange, 3.8% were in electricity, gas, and heat supply industries, 6.3% in finance and insurance industries, 1.1% in transport and communication industries, 0.1% in the construction industry, 86.0% in the manufacturing industry, 1.0% in the service industry, and 1.7% in other industries. By type of division, 48.7% of subjects were in manufacturing and 51.3% were in other divisions.

Investigated items

The questionnaire was completed by each subject. Their height and weight were recorded, and responses to other questions were selected from suggested possibilities.

Workhours. The questionnaire asked about the usual worktime per day on weekdays. The original form of the

question was: "How long was the recent mean actual workhours per day." The subjects selected from "7 hours or less," "8 hours," "9 hours," "10 hours," and "11 hours or longer." A 1-h interval was adopted for the central three categories.

Life-style (habits in everyday life). Significant relationships between life-style and physical and mental health have been established by Breslow, Morimoto and their colleagues (15, 16, 19—22). We have also previously shown that the frequency of chromosome aberrations (SCE) is lower (19) and the natural killer cell activity is higher (20) as the desirable features of life-style increase. In other studies (21, 22), life-style was significantly related to both mental and physical health. In this study, we evaluated smoking, drinking, sleep, exercise, degree of obesity, breakfast, eating between meals, salt intake, intake of beverages of taste, nutritional balance, hobbies, degree of business, regularity of daily life, regularity of meals, and physical condition during the last six months, including the seven life-style items recommended by Berkman & Breslow (15).

Subjective stress level. We compiled overall indices on subjective stress. The self-rating of stress, which was made on a single-item response, was scored on a three-point scale. The subjective stress level was selected from "high," "average," and "low" and was scored by giving 3, 2, and 1 points to the respective answers. Validity and reliability were analyzed with respect to natural killer cell activity (20), primary symptoms (21), and general health questionnaire data (22). From these analyses, we found that the subjects with a higher subjective stress level (level 3) tended to have less natural killer cell activity, more symptoms and poorer mental health than the low-stress group (level 1 or 2). Thus subjects for whom the subjective stress score was 3 were regarded as the high-stress group.

Subjective quality of life. The questions on the seven items concerning subjective quality of life were derived from European and American literature with modifications by Japanese concepts about the quality of life (23). They covered occupational and nonoccupational aspects of quality of life, such as home and leisure time, namely, "perception of good work," "human relations at the workplace," "physical environment of the workplace," "income," "family life," "use of leisure," and "hopes for the future." Each question was answered as "very satisfactory," "moderately satisfactory" (1 point was given to both answers), "fair," or "unsatisfactory" (a rating of 0 was given to these answers). The total score of the seven items (0—7 points) was regarded as an index of subjective quality of life. The alpha coefficient of internal reliability was 0.67. Subjects for whom the score of subjec-

tive quality of life was 3 or less were regarded as the low quality-of-life group because the mean quality of life score of the total subjects was 3.77.

Analytical methods

The subjects were divided into the age groups of ≤ 44 years, 45–49 years, and ≥ 50 years separately for the divisional or sectional heads and the foremen, and the following analyses were performed. To determine the distribution of workhours and the relationship between workhours and life-style, the subjects were divided into those who worked ≥ 10 hours (long workhour group) and those who worked for ≤ 9 hours (short workhour group). Then, the percentage of individuals with an undesirable life-style was calculated for each group at each age level and with all the age levels combined. Workhours were considered to be related directly or indirectly via life-style to subjective stress and subjective quality of life. Therefore, the relationship between workhours and subjective stress and the relationship between workhours and subjective quality of life were also evaluated. The theoretical model of this study is shown in figure 1. The indirect effects of long workhours on health through life-style was not analyzed.

For the statistical analysis the chi-square test was performed for the distribution of workhours and the relationship between workhours and life-style. A oneway analysis of variance was performed to determine the relationship between workhours and subjective stress and the relationship between workhours and quality of life, and the odds ratios of the appearance of the high-stress group and low-quality of life group were calculated with the effects of multiple factors (age, number of years in managerial positions, number of subordinates, and type of division) taken into consideration.

Results

Workhours

Figure 2 shows the distribution of the workhours of the divisional or sectional heads and foremen. The divisional or sectional heads tended to work longer hours than the foremen.

Relationship between workhours and life-style

Table 1 includes only the items which showed a statistically significant difference between workhours and life-style in all the age groups separately for the divisional or sectional heads and the foremen. Other items have been described in the text. The cut-off points for a high-risk life-style were as follows: cigarette smoking (smoker), alcohol consumption (every day), sleeping pattern (6 h or less per day), physical exercise (once or less per day),

obesity ($\geq 10\%$ underweight and $\geq 10\%$ overweight), eating breakfast (not every day), eating between meals (yes), salt take (poor control), black tea or coffee (5 or more cups), nutritional balance (unbalanced), enjoying hobbies (no), feeling busy (yes), regularity of daily life (irregular), regularity of meals (irregular), and physical condition during the last six months (worse).

Smoking and drinking. Among the foremen, the percentage of smokers or frequent drinkers was higher in the long workhour group at all the age levels, and significant differences were observed between workhours and smoking at the age level of 45–49 years and for all the age levels combined and between workhours and drinking for the age levels of 45–49 years, ≥ 50 years, and all age levels combined.

Sleep. The sleeping time was 6 h or less more frequently in the long workhour group at all the age levels. Significant differences were observed between the workhours and sleeping hours for the divisional or sectional heads in each age level and for all the age levels combined and for the foremen in the age levels of ≤ 44 years, 45–49 years, and all the age levels combined.

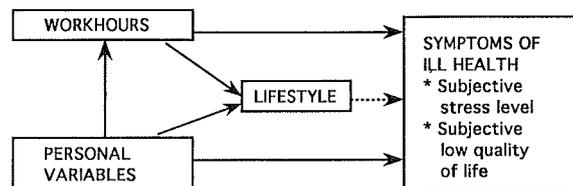


Figure 1. Theoretical model of the relationship between workhours and outcomes. The direct links between the variables of this study (ie, the solid lines in the figure) were analyzed.

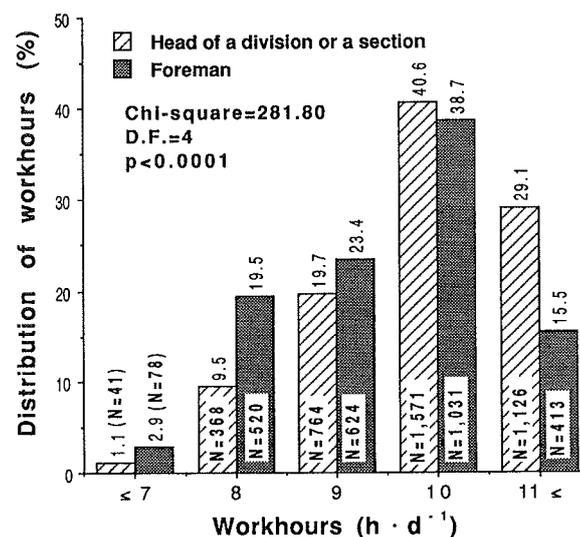


Figure 2. Distribution of the workhours of 3870 heads of a division or section and 2666 foremen.

Table 1. Prevalence of high-risk life-style factors in the two workhour groups of the heads of a division or a section (N = 3870) and the foremen (N = 2666) according to age group.

Life-style factor	Heads of a division or a section				P ^a	Foremen				
	≥ 10 workhours or longer		≤ 9 workhours			≥ 10 workhours or longer		≤ 9 workhours		P ^a
	N	%	N	%		N	%	N	%	
Sleeping pattern (≤ 6 hours)										
≤ 44 years of age	589	53.2	133	40.8	< 0.0001	326	50.8	110	29.3	< 0.0001
45—49 years of age	557	56.1	170	42.8	< 0.0001	251	47.1	188	39.2	< 0.05
≥ 50 years of age	341	57.2	179	39.8	< 0.0001	120	44.6	140	38.0	NS
Total	1487	55.1	482	41.1	< 0.0001	697	48.3	438	35.8	< 0.0001
Feeling busy (yes)										
≤ 44 years of age	881	79.5	125	38.3	< 0.0001	477	74.3	156	41.6	< 0.0001
45—49 years of age	781	78.7	165	41.6	< 0.0001	398	74.7	215	44.9	< 0.0001
≥ 50 years of age	454	76.2	182	40.4	< 0.0001	209	77.7	159	43.2	< 0.0001
Total	2116	78.5	472	40.2	< 0.0001	1084	75.1	530	43.4	< 0.0001
Regularity of daily life (irregular)										
≤ 44 years of age	551	49.7	118	36.2	< 0.0001	346	53.9	187	49.9	NS
45—49 years of age	488	49.1	142	35.8	< 0.0001	259	48.6	237	45.5	NS
≥ 50 years of age	248	41.6	132	29.3	< 0.0001	102	37.9	126	34.2	NS
Total	1287	47.7	392	33.4	< 0.0001	707	49.0	550	45.0	< 0.05
Regularity of meals (irregular)										
≤ 44 years of age	611	55.1	120	36.8	< 0.0001	340	53.0	171	45.6	< 0.05
45—49 years of age	510	51.4	130	32.7	< 0.0001	239	44.8	205	42.8	NS
≥ 50 years of age	248	41.6	97	21.6	< 0.0001	81	30.1	112	30.4	NS
Total	1369	51.5	347	31.0	< 0.0001	660	45.7	488	39.9	< 0.005
Physical condition during the last six months (worse)										
≤ 44 years of age	167	15.1	30	9.2	< 0.01	129	20.1	52	13.9	< 0.05
45—49 years of age	137	13.8	41	10.3	NS	112	21.0	55	11.5	< 0.0001
≥ 50 years of age	65	10.9	41	9.1	NS	42	15.6	32	8.7	< 0.01
Total	369	13.9	112	9.6	NS	283	19.6	139	11.4	< 0.0001

^a Chi-square test, NS = not significant.

Exercise. In the long workhour group, the frequency of exercise was generally one time per week or less at all the age levels. A significant difference was observed for the workhours and exercise of the divisional or sectional heads in the age group of ≤ 44 years and for all the age groups combined and for foremen in the age groups of ≤ 44 years, and 45—49 years and for all the age groups combined.

Degree of obesity, whether breakfast is eaten every morning or not, eating between meals, and salt intake. No significant relationship was observed between workhours and the degree of obesity, whether breakfast was eaten or not every morning, eating between meals, and salt intake for the divisional or sectional heads or the foremen.

Intake of black tea and coffee. The percentage of individuals who frequently drank black tea or coffee was higher in the long workhour group in all the age groups. Significant differences were observed for both the divisional or sectional heads and the foremen in the age groups of ≤ 44 years, 45—49 years, and all the age groups combined.

Nutritional balance. The percentage of persons who paid little attention to nutritional balance was higher in the long workhour group at all the age levels. The difference was significant for the divisional or sectional heads when all the age groups were combined.

Hobbies and business. The percentage of persons who had no hobbies was high in the long workhour group at each age level, but the difference was not significant. A significantly higher percentage of both the divisional or sectional heads and the foremen felt busy in the long workhour group at each age level and when all the age levels were combined.

Regularity of daily life and meals. The percentage of persons who had an irregular daily life and irregular meals was higher in the long workhour group at each age level. Significant differences were observed in the regularity of both the daily life and the meals of the divisional or sectional heads at each age level and when all the age groups were combined and in the regularity of life for the foremen when all the age groups were combined and in the regularity of meals for the foremen aged ≤ 44 years and when all the age groups were combined.

Physical condition during the last six months. The percentage of persons who experienced deterioration in their physical condition was higher in the long workhour group at each age level. Significant differences were observed for the divisional or sectional heads aged ≤ 44 years and the foremen of each age group and when all the age groups were combined.

Relationship between workhours and subjective stress

Figure 3 shows the results of the oneway analysis of variance concerning the relationship between workhours and stress separately for the divisional or sectional heads and the foremen. For both the divisional or sectional heads and the foremen, the subjective stress level was significantly higher as the workhours increased. A similar relationship was observed at each age level. Table 2 shows the odds ratios of the appearance of the high-stress group calculated in consideration of the effect of age. The percentage of divisional or sectional heads for whom the stress level was high was 2.51 times higher in

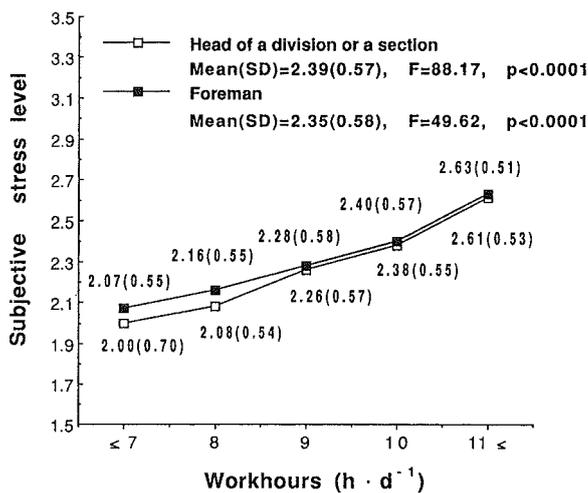


Figure 3. Relationship of the number of workhours to the score of subjective stress for 3870 heads of a division or section and 2666 foremen (oneway analysis of variance). Note: For both the divisional or sectional heads and foremen, the subjective stress level was significantly higher as the workhours increased (Scheffes's test).

the long workhour group than in the short workhour group. In addition, 2.35 times more foremen felt a high level of stress in the long workhour group.

Relationship between workhours and subjective quality of life

Figure 4 shows the results of the oneway analysis of variance of the relationship between workhours and subjective quality of life. There was a significant difference ($P < 0.01$) concerning quality of life between the divisional and sectional heads and the foremen. According to workhours, the subjective quality of life was lower for the foremen than for the divisional or sectional heads, and it was the lowest for both the divisional or sectional heads and the foremen when the workhours were ≥ 11 h. Similar results were obtained also for each age group. Table 3 shows the odds ratios of the appearance of low quality-of-life individuals calculated with respect to the effect of age. For the divisional or sectional heads, the frequency of the low quality-of-life group was 1.17 times

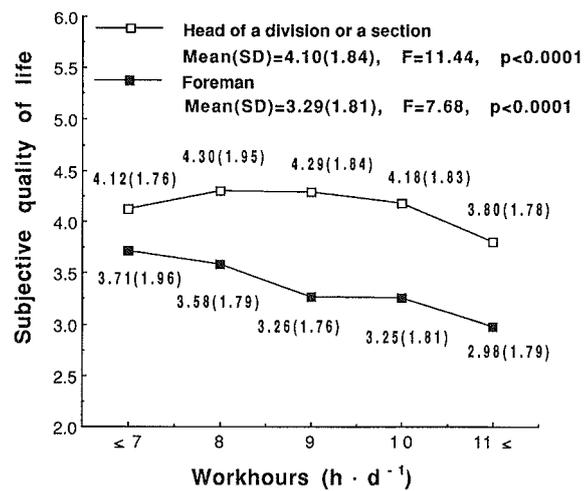


Figure 4. Relationship of the number of workhours to the score of subjective quality of life of 3870 heads of a division or section and 2666 foremen (oneway analysis of variance). Note: It was significantly lower for both the divisional or sectional heads and the foremen when the workhours were ≥ 11 hours (Scheffe's test).

Table 2. Prevalence of high subjective stress according to the number of hours worked by the heads of a division or a section (N = 3870) and the foremen (N = 2666).^a

Workhours	Heads of a division or a section				Foremen			
	N	Prevalence (%)	OR ^b	95% CI ^c	N	Prevalence (%)	OR ^b	95% CI ^c
≥ 10 hours	2697	50.8	2.51		1444	58.0	2.35	
≤ 9 hours	1173	28.6		2.17—2.90 ^{b***}	1222	30.0		2.01—2.75 ^{b***}

^a The subjects were classified as reporting ≥ 10 workhours and ≤ 9 workhours. Adjustment for age, number of years in managerial positions, number of subordinates, and type of division.

^b Calculated as the odds of high subjective stress among the intermediate managers with ≥ 10 workhours divided by the odds of high subjective stress among the intermediate managers with ≤ 9 workhours.

^c Approximate 95% confidence interval for the odds ratio (OR) based on a transformation of approximate limits for the log of the OR.

*** $P < 0.001$.

Table 3. Prevalence of perceived low level of quality of life (3 or less) according to the number of hours worked by the heads of a division or a section (N = 3870) and the foremen (N = 2666).^a

Workhours	Heads of a division or a section				Foremen			
	N	Prevalence (%)	OR ^b	95% CI ^c	N	Prevalence (%)	OR ^b	95% CI ^c
≥ 10 hours	2697	37.7	1.17		1444	58.0	1.26	
≤ 9 hours	1173	32.7		1.02—1.36 [*]	1222	51.4		1.08—1.46 ^{**}

^a The subjects were classified as reporting ≥ 10 workhours and ≤ 9 workhours. Adjustment was made for age, number of years in managerial positions, number of subordinates, and type of division.

^b Calculated as the odds of a perceived low level of quality of life among the intermediate managers with ≥ 10 workhours divided by the odds of a perceived low level of quality of life among the intermediate managers with ≤ 9 workhours.

^c Approximate 95% confidence interval for the odds ratio (OR) based on a transformation of approximate limits for the log of the OR.

* P < 0.05, ** P < 0.01.

higher in the long workhour group than in the short one. For the foremen, the difference was 1.26 times higher.

Discussion

Our study indicated that the majority of managers at the intermediate level work relatively longer. From the time of our investigation, statistics from the Japanese government (4) have indicated that the annual net workhours of the total population of workers have been decreasing. However, some discrepancies may exist between the figure in the statistics and the actual workhours, since voluntarily unpaid overtime work might not be included in the statistical figure. Therefore the actual workhour conditions of the intermediate management class might not have changed significantly from the time of our investigation. In this study, we evaluated the effects of long workhours on health from the following two approaches. First, we could not evaluate the long-term effects on health because our study was a cross-sectional investigation. Accordingly, we assessed the effects of long workhours on life-style. Secondly, the direct effects of long workhours on mental health were evaluated by subjective stress and subjective quality of life.

Concerning the effects of long workhours on life-style, the men who generally worked longer tended to have an unhealthy life-style as compared with those who worked relatively shorter hours. Of the seven health practices recommended by Berkman & Breslow (15), sleep time was the most significantly influenced by long workhours. The present findings that people felt busy and their life and diets tended to be irregular when the workhours were longer suggest that the length and distribution of workhours determine the framework of work-life and that workhours regulate the cycle of daily living. Concerning other aspects of life-style, workhours were significantly related to the frequency of black tea or coffee intake. The increased chances of drinking beverages of taste in long workhours may be a factor in the high incidence of peptic ulcer among the Japanese. The

fact that long workhours were closely related to many aspects of life-style, including the regularity of sleep, daily life, and meals, suggests that the shortening of daily workhours may be more effective for improving life-style than increasing the number of regular weekly holidays or paid holidays.

It was a remarkable finding that the frequency of high stress was 2.51 times higher for the divisional or sectional heads and 2.35 times higher for the foremen among those who worked long hours than among those who worked relatively shorter hours. The frequency of low quality of life was 1.17 times higher for the divisional or sectional heads and 1.26 times higher for the foremen among those who worked long hours than among those who worked relatively short hours. We introduced the evaluation of quality of life because the goal of health management in Japan has shifted from decreasing the rate of unhealthy conditions and stress to realizing greater satisfaction with both work and daily life. The finding that the correlation between quality of life and long workhours was lower than that between stress and long workhours suggests that intermediate management in Japan generally accepts long workhours to some extent in the Japanese employment style characterized by life-long employment and the seniority of payment, even though they suffer severe stress from long workhours.

Some reports on the relationship between long workhours because of excessive overtime work and health among white-collar workers have been published. In Japan, Uehata (1) showed that, of the occupational accident counseling cases, 70.1% of overfatigue deaths due to stroke or cardiac disease was caused by long workhours. Only a few studies have evaluated the effects of long workhours on the health of intermediate managers. Cooper and his colleagues (8, 10) found a strong relationship between long workhours and mental health as a source of stress among supervisory police officers and tax officers (higher grade). Recently, Hurrell & Lindström (13) reported that physical symptoms such as headache and heart symptoms were caused by long workhours among male managers in Finland. Our results agreed well with these findings.

The following methodological weaknesses should be considered when our results are analyzed. First, stress may not be caused solely by long workhours, rather there may be another cause. In the present study, we did not consider factors such as personality as confounders; we included only age and type of division. The effects of other factors should be considered in future studies. Second, further evaluations should be done on the validity and reliability of the questionnaire on subjective stress and subjective quality of life. Finally, the indirect effects of long workhours on health through life-style, as illustrated in the model in figure 1 should be clarified by cohort studies.

Workhours are difficult to adjust for on the individual level and therefore measures must be taken on an organizational basis. There are theories suggesting that Japanese social and business organizations have characteristic vertical structures (24) and that the Japanese managerial system characterized by communityism and groupism is prevalent in the workplace (25). The results of our study suggest that it will be difficult for the organization to become a comfortable place to work unless intermediate-level managers, who are key persons in the organization, shorten their workhours and correct their life-style for better mental life and quality of life. Our results underlined the importance and urgency of shortening the workhours of these managers to improve both mental and physical health in the workplace.

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