

Working Hours, Coping Skills, and Psychological Health in Japanese Daytime Workers

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Received December 27, 2007 and accepted August 12, 2008

Abstract: This study examined the relationship between coping skills, working hours, and psychological health among Japanese daytime workers. Self-administered questionnaires were mailed to a randomly selected sample of 2,000 workers who were members of a pre-recruited market research panel. A total of 1,821 participants responded (response rate=91.1%). Participants completed a questionnaire regarding working hours, coping skills, and psychological health (negative emotions, fatigue, and concentration/activity levels). Analyses of covariance were conducted to determine the relations of number of working hours, coping skills, and their interactions to psychological health with control for sex, age, drinking, job type, and employment type. Results revealed that working hours were significantly associated with fatigue and concentration/activity levels. High levels of instrumental support and positive reframing were significantly associated with low levels of negative emotions, fatigue, and concentration/activity levels. High levels of self-blame, denial, substance use, venting, self-distraction, religion, and behavioral disengagement were significantly associated with high levels of negative emotions, fatigue, and concentration/activity levels. This study suggests that improving coping skills such as using instrumental support or positive reframing may reduce the adverse health effects of long working hours.

Key words: Working hours, Coping skills, Negative emotions, Fatigue, Concentration/activity levels

Introduction

Long working hours and their catastrophic effects on health constitute an important issue in many countries. Long working hours lead to cerebrovascular and cardiovascular diseases¹, high blood pressure², sleep deprivation^{3,4}, fatigue^{4–6}, feelings of depression and confusion⁶, and *karoshi* (death brought on by overwork or job-related exhaustion)^{7,8}. In 2006, the average number of annual working hours per employed person was 1,784 h in Japan, which is almost equal to the number in the United States or Australia but surpasses most of Western Europe⁹. Although the Labour Standards Law in Japan functions as a national regulation that limits the number of working hours, almost every Japanese company signs a legal agreement with trade unions to extend their employees' working hours. As a result, the number of

employees working 60 h or more per week was 6.39 million in 2004, which corresponds to 12% of non-agricultural employees¹⁰. In accordance with such work-related situations, the Industrial Safety and Health Law was revised in 2006. Under the revised law, if the number of overtime working hours exceeds 100 h per month and if cumulative fatigue exists, employees can avail administrative guidance from physicians on request.

Although the associations between long working hours and objective health such as cardiovascular diseases¹ and high blood pressure² have been revealed in several studies, evidence for a relationship between long working hours and psychological health has been inconclusive. The review of van der Hulst¹ examined the relationship between extended hours and subjective health. The results indicated that extended hours were positively associated with fatigue, but evidence for a relationship between extended hours and depression was inconclusive. Japanese workers generally work longer hours than work-

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ers in other countries. Most previous studies, especially those conducted in European countries, had cut-off values of 50 working hours a week to stratify subjects who worked long hours¹⁾. However, in general, the Japanese criteria of long working hours are over 60 h a week (approximately 80 overtime hours a month) or 65 h a week (approximately 100 overtime hours a month). Further study is needed to reveal the relationship between working hours and psychological health based on these criteria.

Reducing the number of working hours is essential to maintain employees' health. However, this is not easy and/or practical in some cases. Caruso *et al.*¹¹⁾ proposed a conceptual framework to study the undesirable impacts of long working hours. The framework begins with two sources of long working schedules: (1) society level: economic, cultural, institutional, and legal factors, and (2) individual level: needs, responsibilities, preferences, and job and schedule options. These factors combine to generate work schedules with long hours. Thus, both society level factors such as "Japanese workers should be willing to work long hours" or "employees should work longer than ever for companies to survive" and individual level factors such as "I must fulfill my work obligations because I am the person assigned to carry out the work" or "premium pay obtained from overtime hours is needed to pay back my loan" need to be altered to reduce their total number of working hours. In fact, the proportion of employees who worked for more than 60 h per week increased from 16.8% in 1995 to 18.0% in 2005, even though the average total number of working hours per employee per week has decreased in the last decade¹²⁾. This figure suggests that some employees cannot reduce their working hours due to various reasons.

For employees who cannot reduce their working hours, the effects of long working hours on their health can be mediated by individual capacities and resources¹¹⁾. However, little is known about the factors that mediate the relationship between working hours and health^{1, 13)}. In this study, we focused on coping skills, one of the most critical personal resources required to maintain employees' health. Coping is defined as cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of a person¹⁴⁾, and generally operates as a mediator of the stressor-strain relationship. Thus, it is not only an explanatory concept regarding variability in response to a stressor, but also a portal for cognitive-behavioral interventions¹⁵⁾. In Japan, several cognitive-behavioral interventions focusing on improving workers' coping skills have recently been conducted. Findings from these studies suggest that enhancing positive, active, and problem-focused coping skills associated with high job stres-

sors may be a key factor for reducing the negative effects of job stressors and psychological distress of workers^{16, 17)}. Although the buffering effect of coping skills with respect to the relationship between working hours and psychological health is unclear, we assume that appropriate coping skills can affect this relationship.

The purpose of this study was to examine the associations between working hours, coping skills, and psychological health among Japanese daytime workers. In this study, we divided the subjects based on the Japanese criteria of long working hours of 60 and 65 working hours per week. It was hypothesized that although participants exposed to longer working hours would experience an adverse effect on their psychological health, especially on fatigue, adaptive coping skills such as positive reframing, using social support, or planning, would help mediate these associations.

Subjects and Methods

Participants

Self-administered questionnaires were mailed to a sample of 2,000 workers aged 20 to 65 yr who were members of a pre-recruited market research panel. Stratified random sampling was used to select the subjects based on the ratios of gender, age, and industry of the Labor Force Survey in Japan. In November and December 2006, a total of 1,821 participants responded to the questionnaire (response rate=91.1%). After excluding 601 participants (of whom 130 were unemployed at the time of answering the questionnaires, 103 were shift workers, 188 were self-employed, 4 were employed in the agriculture, forestry, or fisheries industry, and 176 left certain questionnaire items incomplete), the responses of the remaining 1,220 subjects were analyzed. Their mean age was 41.7 yr (\pm SD 11.5) for men ($n=732$) and 41.3 yr (\pm SD 11.3) for women ($n=488$).

The questionnaire elicited information on demographics, lifestyle, and occupational factors. The questions presented in Table 1 were answered by 1,220 workers.

The Research Ethics Committee of the National Institute of Occupational Safety and Health reviewed and approved the study protocol.

Measures

Working hours

Working hours were measured with a single item asking respondents "How long have you worked per week, on average during the past month?" followed by four choices: "50 h or less", "51 to 60 h", "61 to 65 h", and "66 h or more". In this study, we classified responses into three categories: (1) 60 working hours or less a week (approximately less than 80 overtime hours a month), (2)

Table 1. Characteristics of the participants and the results of χ^2 tests by working hours

Working hours per week	a. 60 h or less (N=1,029)		b. 61–65 h (N=100)		c. 66 h or more (N=91)		χ^2
	N	(%)*	N	(%)*	N	(%)*	
Gender							77.1***
Men	563	(54.7)	86	(86.0)	83	(91.2)	
Women	466	(45.3)	14	(14.0)	8	(8.8)	
Age, years							22.8***
20–29	184	(17.9)	23	(23.0)	24	(26.4)	
30–39	258	(25.1)	31	(31.0)	33	(36.3)	
40–49	269	(26.1)	29	(29.0)	21	(23.1)	
50–64	318	(30.9)	17	(17.0)	13	(14.3)	
Smoking							4.70
No	764	(74.2)	65	(65.0)	63	(69.2)	
Yes	265	(25.8)	35	(35.0)	28	(30.8)	
Drinking (days per week)							19.7**
Seldom	505	(49.1)	35	(35.0)	28	(30.8)	
1–2	187	(18.2)	26	(26.0)	21	(23.1)	
3–5	136	(13.2)	12	(12.0)	18	(19.8)	
> 6	201	(19.5)	27	(27.0)	24	(26.4)	
Physical exercise (days per week)							14.1
Never	597	(58.0)	56	(56.0)	57	(62.6)	
Seldom	158	(15.4)	15	(15.0)	23	(25.3)	
1–2	164	(15.9)	16	(16.0)	5	(5.5)	
3–4	69	(6.7)	7	(7.0)	4	(4.4)	
Almost everyday	41	(4.0)	6	(6.0)	2	(2.2)	
Job type							51.6***
Manager	111	(10.8)	17	(17.0)	19	(20.9)	
Professional	203	(19.7)	33	(33.0)	19	(20.9)	
Clerk	239	(23.2)	7	(7.0)	10	(11.0)	
Sales/Service worker	312	(30.3)	31	(31.0)	24	(26.4)	
Skilled worker	100	(9.7)	4	(4.0)	4	(4.4)	
Other	64	(6.2)	8	(8.0)	15	(16.5)	
Employment type							91.3***
Full-time	607	(59.0)	98	(98.0)	83	(91.2)	
Part-time	319	(31.0)	2	(2.0)	7	(7.7)	
Other	103	(10.0)	0	(0.0)	1	(1.1)	
Number of employees							6.3
< 10	163	(15.9)	19	(19.0)	17	(18.9)	
10–49	295	(28.8)	31	(31.0)	27	(30.0)	
50–99	141	(13.8)	11	(11.0)	7	(7.8)	
100–299	136	(13.3)	9	(9.0)	15	(16.7)	
300–999	122	(11.9)	13	(13.0)	9	(10.0)	
> 1000	167	(16.3)	17	(17.0)	15	(16.7)	

*Figures do not always add up to 100% due to rounding or missing data.

** $p < 0.01$, *** $p < 0.001$.

61 to 65 working hours a week (approximately 80 to 99 overtime hours a month), and (3) 66 working hours or more a week (approximately 100 overtime hours or more a month). The criteria of 80 and 100 overtime hours were adopted from the Industrial Safety and Health Law and its related guidelines. Presently, in Japan, if the number of overtime hours exceeds 100 h per month, the employ-

er is required to provide administrative guidance from a physician on an employee's request. Furthermore, the Comprehensive Program for the Prevention of Health Impairment Due to Overwork prescribes that if the number of overtime hours exceeds 80 h per month and an employee requests administrative guidance or the number of overtime hours exceeds 80 h per month for 2 to 6 con-

secutive months, the employer should make an effort to provide employees with administrative guidance by a physician.

Coping skills

Coping skills were assessed using the Brief Coping Orientation to Problems Experienced (COPE) inventory¹⁸⁾, which comprises 28 Likert-scaled items and assesses 14 coping skills: self-distraction (e.g., “I turn to work or other activities to take my mind off things”); active coping (e.g., “I take action to try to make the situation better”); denial (e.g., “I refuse to believe that it has happened”); substance use (e.g., “I use alcohol or other drugs to make myself feel better”); using emotional support (e.g., “I get emotional support from others”); using instrumental support (e.g., “I get help and advice from other people”); behavioral disengagement (e.g., “I give up trying to deal with it”); venting (e.g., “I express my negative feelings”); positive reframing (e.g., “I look for something good in what is happening”); planning (e.g., “I think hard about what steps to take”); humor (e.g., “I make jokes about it”); acceptance (e.g., “I accept the reality of the fact that it happened”); religion (e.g., “I try to find comfort in my religion or spiritual beliefs”); and self-blame (e.g., “I criticize myself”). The original 28-item questionnaire was translated into Japanese by the first author, and was translated back into English by two bilingual speakers who were blind to the original English version. C. Carver, the author of the COPE inventory, reviewed the back-translation, and appropriate corrections were made. The response categories ranged from “I usually don’t do this at all” (1) to “I usually do this a lot” (4). Cronbach’s alpha coefficients for each subscale ranged from 0.63 to 0.91; however, they were low for the self-distraction and active coping subscales (0.46 and 0.47, respectively). High scores indicate high levels of coping skills.

Psychological health

Psychological health was assessed using the “subjective symptoms” subscale of the Accumulated Fatigue Checklist¹⁹⁾. This subscale comprises 12 items derived from the Self-Diagnosis Check List for Assessment of Worker’s Accumulated Fatigue²⁰⁾ presented by the Japanese Ministry of Health, Labour and Welfare. Participants were instructed to rate their psychological health during the past month. Although the response categories in the original scale are 0 (rarely), 1 (sometimes), and 3 (often), we revised the categories to 0 (rarely), 1 (sometimes), and 2 (often) because in Likert scaling, every item is generally scored on an ordinal level with equally spaced response categories in order to estimate the participants’ positions on the continuum with the sum

of the scores of the responses to the items²¹⁾.

The factor structure of the psychological health scale was assessed using the maximum likelihood extraction and Promax rotation methods. The proportion of explained variance suggested a three-factor solution, accounting for 62.8% of the total variance. The loading of the items on each of the three factors (negative emotions, fatigue, and concentration/activity levels) was all above 0.37, and no items loaded above 0.24 on the other factors (Table 2). The “negative emotions” subscale is related to participants’ anxiety or depressive feelings, the “fatigue” subscale is related to physical exhaustion, and the “concentration/activity levels” subscale is related to lack of concentration and low activity. Cronbach’s alpha coefficients for each subscale ranged from 0.70 to 0.83. High scores indicate high levels of subjective poor health.

Potential confounding variables

Age, lifestyle, and occupational factors constituted the other variables. Lifestyle factors included smoking, drinking (number of drinking days per week), and physical exercise (number of days of exercise per week). Occupational factors included job type (manager, professional, clerk, sales/service worker, or other), employment type (full-time, part-time, or other), and number of employees (< 10, 10–49, 50–99, 100–299, 300–999, or > 1,000).

Statistical analysis

Differences in demographic variables and percentages of subjects with different working hours were calculated using the χ^2 test. The scores of the coping skills as independent variables were dichotomized at the mean. Analyses of covariance (ANCOVA) were conducted to determine the relation of working hours (60 h or less, 61–65 h, and 66 h or more), coping skills (high vs. low), and their interactions with psychological health after controlling for sex, age, drinking, job type, and employment type. The significance level of all statistical analyses was $p < 0.05$ (two-tailed test). All data were analyzed using the Statistical Package for the Social Sciences version 14.0 (SPSS, Inc., Chicago, IL).

Results

Demographic characteristics

Characteristics of the participants and the results of χ^2 tests by working hours are shown in Table 1. A total of 1,029 participants reported working 60 h or less per week, 100 reported working 61–65 h per week, and 91 reported working 66 h or more per week. Significant differences in gender ($p < 0.001$), age ($p < 0.001$), drinking ($p < 0.01$), job type ($p < 0.001$), and employment type

Table 2. Factor analysis of the 12 subjective symptom items using maximum likelihood extraction and Promax rotation method (N=1,220)

	<i>F1</i>	<i>F2</i>	<i>F3</i>
<i>F1: Negative emotions</i>			
Feel anxious	0.857	-0.059	-0.063
Feel depressed	0.762	0.035	0.040
Feel restless	0.638	-0.055	0.207
Feel irritated	0.555	0.191	-0.090
<i>F2: Fatigue</i>			
Get tired more quickly than before	-0.088	0.754	0.060
Feel tired when I get up in the morning	0.004	0.723	0.067
Feel exhausted (except for after exercise)	0.133	0.691	-0.098
Physically feel in a bad shape	0.055	0.620	0.064
<i>F3: Concentration/activity levels</i>			
Have trouble concentrating	0.083	-0.090	0.841
Become very sleepy during work	-0.149	0.234	0.399
Feel no desire to do anything	0.232	0.180	0.379
Make mistakes frequently	0.125	0.072	0.377
Inter-factor correlations			
	<i>F1</i>	<i>F2</i>	<i>F3</i>
<i>F1</i>	1.000	0.612	0.725
<i>F2</i>		1.000	0.588
<i>F3</i>			1.000

($p < 0.001$) were noted by working hours per week (Table 1). Overall, in the “66 h or more” working group, 83 of 91 (91.2%) were males and 57 of 91 (62.6%) were young (less than 39 yr). The proportion of female workers was higher in the “60 h or less” group (466 of 1,029; 45.3%). For lifestyle factors, a significant difference was evident only in the number of drinking days per week: the number of participants who drank for 6 d or more in a week was significantly higher ($p < 0.01$) in the “61–65 h” group (27 of 100; 27.0%) and in the “66 h or more” group (24 of 91; 26.4%) compared with the “60 h or less” group (201 of 1,029; 19.5%). Participants who were classified into the “66 h or more” and “61–65 h” groups were significantly ($p < 0.001$) more likely to be managers (19 of 91 [20.9%] and 17 of 100 [17.0%], respectively), significantly less likely to be clerks (10 of 91 [11.0%] and 7 of 100 [7.0%], respectively), and significantly more likely to be full-time employees (83 of 91 [91.2%] and 98 of 100 [98.0%], respectively) than the corresponding numbers in the “60 h or less” group. No significant differences were observed with respect to smoking, physical exercise, or number of employees.

Working hours, coping skills, and psychological health

Tables 3 to 5 showed the results of two-way ANCOVA on negative emotions, fatigue, and concentration/

activity levels with respect to working hours and coping skills. The F values of the main effects of the levels of working hours on each psychological health were 10.59–13.28 for fatigue, 1.88–5.42 for concentration/activity levels, and 1.38–2.83 for negative emotions in order of descending scores. Significant main effects of the levels of working hours were found for fatigue and concentration/activity levels. Multiple comparisons indicated that participants in the “61–65 h” and “66 h or more” groups displayed higher levels of fatigue than those in the “60 h or less” group. They also indicated that participants in the “66 h or more” group showed higher levels of concentration/activity levels than those in the “60 h or less” group in general. However, the number of working hours was found to have no association with negative emotions.

For coping skills, high levels of using instrumental support ($F = 5.03$, $p < 0.05$) and positive reframing ($F = 15.44$, $p < 0.001$), and low levels of self-distraction ($F = 5.72$, $p < 0.05$), venting ($F = 9.19$, $p < 0.01$), religion ($F = 4.69$, $p < 0.05$), and self-blame ($F = 20.30$, $p < 0.001$) were related to low levels of negative emotions (Table 3). High levels of using instrumental support ($F = 4.28$, $p < 0.05$) and positive reframing ($F = 6.38$, $p < 0.05$), and low levels of denial ($F = 6.61$, $p < 0.05$), substance use ($F = 4.83$, $p < 0.05$), and self-blame ($F = 6.68$, $p < 0.01$) were related to low levels of fatigue (Table 4). High levels of using instrumen-

Table 3. Negative emotion scores by weekly working hours and 14 coping skills

Coping skills (Cronbach's alpha coefficients)	Working hours per week						Analysis of covariance (ANCOVA) [†]					
	a. 60 h or less (N=1,029)		b. 61-65 h (N=100)		c. 66 h or more (N=91)		Working hours		Coping		Working hours x Coping Interaction effects	
	N	Adj. M	(SE)	Adj. M	(SE)	Adj. M	(SE)	Main effects	Multiple comparison ^{††}	Main effects		Multiple comparison ^{††}
Self-distraction ($\alpha=0.46$)	714	2.63	(0.08)	2.89	(0.31)	3.02	(0.34)	2.83		5.72*	High>Low	0.21
Active coping ($\alpha=0.47$)	506	2.02	(0.10)	2.56	(0.28)	2.49	(0.28)	1.63		2.05		0.16
Denial ($\alpha=0.69$)	802	2.28	(0.08)	2.56	(0.26)	2.69	(0.27)	1.76		3.01		0.15
Substance use ($\alpha=0.91$)	418	2.61	(0.11)	3.02	(0.35)	2.81	(0.37)	1.91		3.18		0.01
Using emotional support ($\alpha=0.72$)	612	2.63	(0.09)	2.85	(0.31)	2.88	(0.32)	2.00		1.64		1.43
Using instrumental support ($\alpha=0.80$)	608	2.16	(0.09)	2.59	(0.28)	2.55	(0.30)	2.29		5.03*	Low>High	0.83
Behavioral disengagement ($\alpha=0.73$)	487	2.64	(0.11)	2.99	(0.33)	2.94	(0.32)	1.83		2.15		0.44
Venting ($\alpha=0.63$)	733	2.23	(0.09)	2.57	(0.28)	2.59	(0.30)	2.19		9.19**	High>Low	0.77
Positive reframing ($\alpha=0.70$)	634	2.44	(0.09)	2.59	(0.29)	2.45	(0.29)	1.84		15.44***	Low>High	1.04
Planning ($\alpha=0.67$)	586	2.35	(0.10)	2.86	(0.31)	3.06	(0.33)	1.75		2.39		2.49
Humor ($\alpha=0.70$)	725	2.27	(0.09)	2.64	(0.28)	2.40	(0.28)	1.64		0.80		0.24
Acceptance ($\alpha=0.63$)	495	2.58	(0.10)	2.84	(0.31)	3.29	(0.36)	2.77		3.81		3.98*
Religion ($\alpha=0.64$)	729	2.57	(0.08)	2.89	(0.27)	2.72	(0.31)	1.75		4.69*	High>Low	0.69
Self-blame ($\alpha=0.74$)	491	2.14	(0.10)	2.42	(0.33)	2.70	(0.31)	1.38		20.30***	High>Low	0.12

[†]: Adjusted for sex, age, drinking, job type, and employment type as covariates.

^{††}: Tukey-Kramer method.

* $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Table 4. Fatigue scores by weekly working hours and 14 coping skills

Coping skills	N	Working hours per week						Analysis of covariance (ANCOVA) [†]					
		a. 60 h or less		b. 61–65 h		c. 66 h or more		Working hours		Coping		Working hours x Coping	
		Adj. M	(SE)	Adj. M	(SE)	Adj. M	(SE)	Main effects	Multiple comparison ^{††}	Main effects	Multiple comparison ^{††}		
(N=1,029)	(N=100)	(N=91)	F	p<0.05	F	p<0.05	F	p<0.05	F				
Self-distraction	High	714	2.60	(0.08)	3.08	(0.31)	3.33	(0.34)	13.28***	b, c>a	0.53		1.30
	Low	506	2.10	(0.10)	3.09	(0.27)	3.38	(0.28)					
Active coping	High	802	2.34	(0.08)	2.87	(0.26)	3.26	(0.27)	12.71***	b, c>a	3.41		0.66
	Low	418	2.51	(0.11)	3.53	(0.34)	3.61	(0.37)					
Denial	High	612	2.54	(0.09)	3.39	(0.31)	3.76	(0.31)	12.92***	b, c>a	6.61*	High>Low	0.70
	Low	608	2.26	(0.09)	2.86	(0.28)	3.01	(0.30)					
Substance use	High	487	2.68	(0.11)	3.17	(0.32)	3.89	(0.32)	12.65***	b, c>a	4.83*	High>Low	1.02
	Low	733	2.22	(0.09)	3.11	(0.27)	2.99	(0.30)					
Using emotional support	High	634	2.42	(0.09)	3.04	(0.28)	3.06	(0.29)	13.05***	b, c>a	1.75		1.35
	Low	586	2.39	(0.09)	3.18	(0.30)	3.76	(0.33)					
Using instrumental support	High	725	2.29	(0.08)	2.90	(0.28)	3.19	(0.27)	12.93***	b, c>a	4.28*	Low>High	0.22
	Low	495	2.57	(0.10)	3.38	(0.31)	3.71	(0.35)					
Behavioral disengagement	High	729	2.48	(0.08)	3.34	(0.26)	3.35	(0.30)	11.94***	b, c>a	1.55		0.66
	Low	491	2.29	(0.10)	2.73	(0.33)	3.39	(0.31)					
Venting	High	518	2.59	(0.10)	3.47	(0.32)	3.46	(0.36)	11.77***	b, c>a	3.23		0.37
	Low	702	2.27	(0.08)	2.82	(0.27)	3.30	(0.27)					
Positive reframing	High	531	2.17	(0.10)	2.57	(0.30)	3.32	(0.34)	12.83***	b, c>a	6.38*	Low>High	1.31
	Low	689	2.58	(0.08)	3.58	(0.28)	3.44	(0.28)					
Planning	High	843	2.34	(0.08)	2.85	(0.25)	3.42	(0.25)	10.59***	b, c>a	1.63		1.42
	Low	377	2.54	(0.11)	3.72	(0.38)	3.22	(0.43)					
Humor	High	647	2.37	(0.09)	2.85	(0.29)	3.42	(0.29)	12.10***	b, c>a	0.60		0.62
	Low	573	2.44	(0.09)	3.35	(0.29)	3.31	(0.32)					
Acceptance	High	851	2.38	(0.08)	2.77	(0.26)	3.32	(0.27)	12.99***	b, c>a	3.67		1.88
	Low	369	2.46	(0.12)	3.73	(0.35)	3.50	(0.37)					
Religion	High	554	2.51	(0.10)	3.32	(0.31)	3.49	(0.33)	12.35***	b, c>a	1.85		0.11
	Low	666	2.31	(0.09)	2.92	(0.28)	3.28	(0.29)					
Self-blame	High	490	2.73	(0.10)	3.43	(0.31)	3.62	(0.35)	11.18***	b, c>a	6.68**	High>Low	0.05
	Low	730	2.19	(0.08)	2.82	(0.27)	3.19	(0.27)					

†: Adjusted for sex, age, drinking, job type, and employment type as covariates.

††: Tukey-Kramer method.

* $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Table 5. Concentration/activity level scores by weekly working hours and 14 coping skills

Coping skills	Working hours per week						Analysis of covariance (ANCOVA) [†]					
	a. 60 h or less (N=1,029)		b. 61–65 h (N=100)		c. 66 h or more (N=91)		Working hours		Coping		Working hours x Coping Interaction effects	
	Adj. M	(SE)	Adj. M	(SE)	Adj. M	(SE)	Main effects	Multiple comparison ^{††}	Main effects	Multiple comparison ^{††}		
Self-distraction	High	2.17	(0.07)	2.27	(0.26)	2.57	(0.28)	5.42**	c>a	3.43		1.17
	Low	1.57	(0.09)	2.14	(0.23)	2.34	(0.24)					
Active coping	High	1.77	(0.07)	2.15	(0.22)	2.35	(0.22)	3.35*	c>a	3.43		0.39
	Low	2.26	(0.09)	2.34	(0.29)	2.66	(0.31)					
Denial	High	2.08	(0.08)	2.37	(0.26)	2.71	(0.27)	4.26*	c>a	4.60*	High>Low	0.20
	Low	1.79	(0.08)	2.08	(0.23)	2.19	(0.25)					
Substance use	High	2.33	(0.09)	2.59	(0.27)	2.85	(0.27)	4.44*	c>a	12.42***	High>Low	0.03
	Low	1.67	(0.07)	2.01	(0.23)	2.19	(0.25)					
Using emotional support	High	1.87	(0.08)	2.05	(0.24)	2.33	(0.25)	4.52*	c>a	2.29		0.31
	Low	2.00	(0.08)	2.42	(0.25)	2.62	(0.28)					
Using instrumental support	High	1.80	(0.07)	2.16	(0.24)	2.25	(0.23)	4.63***	c>a	3.90*	Low>High	0.36
	Low	2.12	(0.09)	2.30	(0.26)	2.82	(0.30)					
Behavioral disengagement	High	2.12	(0.07)	2.44	(0.22)	2.58	(0.26)	4.41*	c>a	7.08**	High>Low	0.22
	Low	1.65	(0.08)	1.83	(0.28)	2.29	(0.26)					
Venting	High	2.10	(0.08)	2.56	(0.27)	2.58	(0.31)	3.97*	c>a	4.54*	High>Low	0.40
	Low	1.81	(0.07)	1.95	(0.23)	2.36	(0.23)					
Positive reframing	High	1.81	(0.08)	1.53	(0.26)	2.22	(0.28)	3.74*	c>a	13.54***	Low>High	4.38*
	Low	2.03	(0.07)	2.81	(0.24)	2.62	(0.24)					
Planning	High	1.78	(0.06)	1.96	(0.21)	2.62	(0.21)	1.88		1.17		4.61*
	Low	2.28	(0.10)	2.79	(0.32)	1.91	(0.36)					
Humor	High	2.04	(0.07)	2.16	(0.25)	2.59	(0.25)	4.16*	c>a	0.66		0.48
	Low	1.81	(0.08)	2.28	(0.25)	2.29	(0.27)					
Acceptance	High	1.91	(0.06)	2.05	(0.22)	2.50	(0.23)	3.63*	c>a	0.54		0.77
	Low	1.99	(0.10)	2.52	(0.29)	2.35	(0.31)					
Religion	High	2.04	(0.08)	2.36	(0.26)	2.73	(0.28)	4.35*	c>a	3.54		0.32
	Low	1.85	(0.07)	2.09	(0.24)	2.23	(0.24)					
Self-blame	High	2.36	(0.08)	2.82	(0.26)	3.02	(0.29)	4.15*	c>a	29.28***	High>Low	0.84
	Low	1.66	(0.07)	1.71	(0.23)	2.06	(0.23)					

†: Adjusted for sex, age, drinking, job type, and employment type as covariates.

††: Tukey-Kramer method.

*p<0.05, **p<0.01, ***p<0.001.

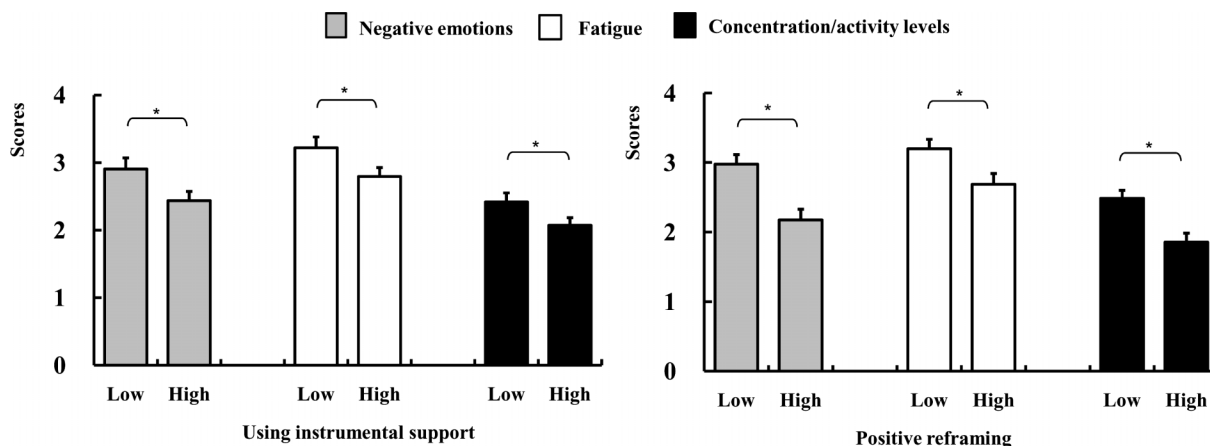


Fig. 1. Comparison of psychological health scores with using instrumental support or positive reframing.
* $p < 0.05$ by the Tukey-Kramer method.

tal support ($F=3.90$, $p < 0.05$) and positive reframing ($F=13.54$, $p < 0.001$), and low levels of denial ($F=4.60$, $p < 0.05$), substance use ($F=12.42$, $p < 0.01$), behavioral disengagement ($F=7.08$, $p < 0.01$), venting ($F=4.54$, $p < 0.05$), and self-blame ($F=29.28$, $p < 0.001$) were related to low levels of concentration/activity levels (Table 5). Figure 1 shows the scores of psychological health (mean and standard error) with sex, age, drinking, job type, and employment type as covariates by using instrumental support or positive reframing.

Discussion

The focus of the present study was to examine the association of coping skills with working hours and psychological health among Japanese daytime workers. Workers were classified into three groups according to their working hours. The results reveal that: (1) long working hours were associated with high levels of fatigue and concentration/activity levels, but had no association with negative emotions; (2) regardless of working hours, high levels of using instrumental support and positive reframing were associated with low levels of psychological ill health; and (3) regardless of working hours, maladaptive coping skills such as self-blame, denial, substance use, venting, self-distraction, religion, and behavioral disengagement were associated with high levels of psychological ill health. Although a reduction in the number of working hours is essential to maintain employees' psychological health, our findings imply that appropriate coping skills, such as using instrumental support or positive reframing, may have the potential to buffer the adverse health effects on fatigue and concentration/activity levels that result from long working hours. Interestingly, although we could not find significant associations between working hours and negative emotions, our find-

ings suggest that high levels of appropriate coping skills such as using instrumental support or positive reframing were associated with low levels of negative emotions.

Working hours were associated with high levels of fatigue and concentration/activity levels, supporting previous findings from many countries³⁻⁶). However, working hours had no significant association with negative emotions, suggesting a limited relationship between working hours and negative emotions. A possible explanation for this result is the differences in the ability to control long working hours. In a representative sample of the US population, Grosch *et al.*²²) revealed that control over working hours tends to be higher for those in managerial and professional jobs, and that those who work overtime are more likely to have higher levels of education and income, to be male and white collar, and to have higher levels of decision making and the opportunities to develop their special abilities. In addition, significant positive associations were found between long working hours and job satisfaction²²). Data on long working hours in our study were primarily from males and managerial or professional workers. Those who work long hours are generally intensely involved in their work and often willingly put in long work days; thus, it is unlikely that their work would increase negative emotions. However, they are also likely to suffer from fatigue and concentration/activity levels.

Irrespective of the number of working hours, high levels of using instrumental support, which aims at getting emotional support, comfort, or understanding from others, exhibited significant associations with low levels of negative emotions, fatigue, and concentration/activity levels. Using instrumental support was categorized into active, problem-focused coping, and seeking advice, assistance, or information to manage stressors²³). These types of coping skills are positively related to adaptation to the envi-

ronment and good health²⁴). Gander *et al.*²⁵) revealed that regular access to adequate supervision at work reduced fatigue and clinical errors among junior doctors in New Zealand who worked for more than 40 h a week. We assume that adequate advice from supervisors, which may be instrumental in increasing the usage of instrumental support, plays a key role in keeping employees' psychological health in good condition, even if their working hours are long.

High levels of positive reframing, that is, trying to see the positive aspects of the stressors, were also associated with low levels of negative emotions, fatigue, and concentration/activity levels, regardless of the number of working hours. Viewing a stressful transaction in positive terms should intrinsically lead employees to continue or resume active, problem-focused coping actions²⁴). Thus, positive reframing may increase employees' positive attitudes or emotions toward their work and broaden the scope of attention and thought-action repertoires^{26–28}).

Other coping skills, such as self-blame, denial, substance use, venting, self-distraction, religion, and behavioral disengagement had positive associations with subjective poor health, irrespective of the number of working hours. These coping skills are classified into passive and maladaptive skills, and they are basically not effective in solving the existing problems in the workplace. In particular, self-blame was found to have positive associations with all three types of psychological ill health examined in this study. Self-blame was found to be a predictor of poor adjustment under stressors^{29, 30}). Our results appear to be in line with previous findings. Interestingly, these coping skills had positive associations with psychological ill health regardless of the number of working hours, which suggests that reducing passive and maladaptive types of coping skills may ameliorate the levels of negative emotions, fatigue, and concentration/activity levels, even if working hours are long.

Although significant interaction effects for working hours and coping skills for negative emotions and concentration/activity levels were found, we believe that our data suggests a general lack of interaction between working hours and coping skills because the number of these interactions is quite small (a total of 3 out of a possible 42 in Tables 3 to 5) and does not seem to be much greater than what one might expect by chance. These results suggest that both reducing long working hours at an organizational level and improving adaptive coping skills such as using instrumental support and positive reframing at the individual level may have positive associations with employees' psychological health. Although most previous research has mainly focused on the direct association between long working hours and ill health^{1–8}), our findings suggest that improving adaptive coping skills through cognitive-behavioral

intervention or stress management training may improve psychological health, regardless of working hours. Further research is needed with regard to this supposition.

We could not find any significant differences in three types of psychological health between the two highest working hours groups (i.e., 61–65 h; 66 h or more), suggesting that the negative associations with psychological health are already present at 60 h and don't seem to increase much after that. However, some studies revealed that extreme long working hours had adverse effects on psychological health. For example, Nagashima *et al.*³¹) found that working ≥ 260 h/month (approximately 100 overtime hours or more a month) had negative associations with depression, fatigue, irritability, anxiety, and chronic tiredness in a sample of 843 male daytime workers in Japan. In the 2002 General Social Survey conducted by the US National Opinion Research Center, Grosch *et al.*²²) revealed that the level of 'feeling used up at the end of the day' showed consistently elevated odds ratios across the three overtime groups (41–48 h/wk, 48–69 h/wk, and 70 and above hours/week). Further study is needed to determine whether a dose-response relationship exists between working hours and psychological health.

Several limitations of this study should be noted. First, we could not identify prospective relations because our study design was cross-sectional. Therefore, a cause-effect relationship between working hours, coping skills, and psychological health could not be determined. Long working hours and maladaptive coping skills may have led to high levels of psychological ill health, but it is also possible that daytime workers with high levels of psychological ill health led to long working hours and high use of maladaptive coping skills. A longitudinal cohort study will be required in future to determine cause-effect relationships. Second, although the response rate was relatively high (91.1%), those not responding to the study might represent a population who suffered from more health problems than the respondents, or they might have been unavailable at the time of the study owing to their long working hours. A possibility exists that some workers who had serious health problems or who worked long hours were unable to answer the questionnaires; thus we cannot disregard a healthy worker effect in our results. Third, information on coping skills and psychological health was obtained by self-report measures, which may introduce recall/reporting bias. Therefore, it might be difficult to generalize the findings of the study to objectively measured coping skills or psychological health.

After allowing for these limitations, we conclude that although further study is warranted using instrumental support and positive reframing have positive associations with psychological health, even if working hours are long.

Acknowledgements

The present study was supported by a grant-in-aid for project research on prevention of accumulated fatigue due to overwork from the National Institute of Occupational Safety and Health, Japan (P18-01).

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