ORIGINAL

Association of Cognitive Style and Satisfaction with Depressive Symptoms in Workers in Hokkaido, Japan

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ABSTRACT

Recently in Japan, major depression, the depressive state, and suicide are increasingly becoming social problems, especially in the workplace. These requires preventive intervention. The present study was therefore carried out to examine the relationship of cognitive style and other factors with depressive symptoms in order to search for methods of preventive intervention for mental disorders. In January 2005, we conducted a cross-sectional survey of a total of 3057 workers in Hokkaido, Japan. In addition to age, sex, and educational background, we investigated lifestyle factors, work-related conditions, psychiatric consultation, social supports, stressors, loci of control (LOC) for cognitive style, perceived job satisfaction, work environment, home atmosphere, and health with regard to cognitive style, Ozeki's coping style for stress, and the Center of Epidemiological Studies-Depression Scale (CES-D) for depressive symptoms. After excluding data from incomplete responses, we analyzed 2132 workers, consisting of 1245 males and 887 females with an average age of 39.9 years. Multivariate logistic regression analysis revealed a significantly increased risk for a high CES-D score in the more external control group in the LOC for both sexes, and significantly increased risks for high CES-D scores were obtained in the unsatisfied category for job, work environment, home atmosphere, and health status. The external cognitive style and perceived dissatisfaction may increase the risk of depressive symptoms in workers. Thus, it may be possible to prevent the onset of depressive symptoms through intervention involving cognitive style.

1 INTRODUCTION

It is suggested that the occurrence, recurrence, and aggravation of depression might be related to stress, regardless of its internal or mental cause[1]. The "stress vulnerability hypothesis" is advocated for schizophrenia, so it is considered that its occurrence and recurrence are related to stress[2]. In addition, diseases such as asthma, hypertension, peptic ulcer, and irritable bowel syndrome are reported to have a "psychosomatic correlation"[3] related to stress. Stress is also one of the principal factors that influences and motivates overwork suicide, which is recently increasing and becoming a social problem in Japan[4].

Specialists in many disciplines have studied one aspect or another of stress-ranging from the biological sciences such as physiology, biochemistry, and neurophysiology, through the psychological sciences such as psychoanalysis, personality, learning theory, developmental psychology, and social ecology to the social sciences such as anthropology, sociology, and military history[5]. Not surprisingly, the referents to the term "stress" vary across these fields, adding to the confusion. In this study, we define "stressor" as an external occurrence and "stress" as the reaction to the stressor, which is the definition psychologists and sociologists generally adopt[5].

Although it has been reported that they are related to some diseases in Japan, precautions against stressors have not progressed. Why have countermeasures not been developed? It may be that the problem lies in the approach, based on the idea that the stressor has to be removed only because it is a cause of disease, and that it involves only a high risk group and is not prevalent in the general population. When we contemplate these studies, it is necessary to know in detail about stress-related phe-

nomena. We determined questionnaire items after refer-ring to the stress model of Lazarus[6], the NIOSH model of occupational diseases[7], and the basic concept of cognitive therapy[8]. When investigating stress, we must consider the actual stressors, cognitive style, coping style, social supports, and so on. In addition, we presume that depressive symptoms, as one of the results of stress, may be preventable by improving, for example, the cognitive style or coping style.

Recently in Japan, overwork suicide, adjustment disorder, and depression have become serious social problems among workers. Investigations have been performed concerning the actual conditions of occupational mental health. Although there have been some beneficial reports about occupational mental health in Japan[9-11], the influences they noted were extremely weighted in environmental factors such as the occupation and office. To be sure, it is very important to change the occupational environment, but it is more desirable to deal with mental health problems considering both the individual and occupational environments. Stress related to labor occurs not only on the job, but also in the home and individual environment. Taking into account these points, for indi-

vidual intervention, we focused on cognitive therapy, which is widely used in psychiatry and psychology, and hypothesized that preventive intervention based on cognitive therapy might be effective in primary prevention for mental health. In some investigations satisfaction variables were very strongly associated with stress-related factors[12-15], so we directed our attention to satisfaction as a convenient index expressing mental health status. The present study was therefore conducted to examine the association of cognitive style and satisfaction with depressive symptoms in order to develop a strategy of preventive intervention for mental disorders.

2　METHODS

2.1 Study subjects

As shown in Figure 1, a cross-sectional study was conducted in 2005 among workers in Hokkaido, Japan. First, we randomly sampled 100 of the 5760 companies registered in the Hokkaido Occupational Health Promotion Center. Documents for recruitment were mailed to the occupational health sections of these 100 companies. Thirteen companies responded, and 11 decided to participate after receiving more detailed information. In January 2005, the questionnaires and documents explaining the purpose of the study, a request to participate, and affirmation that privacy would be respected were mailed to the 11 companies. Each worker in the 11 companies was requested to read the documents and fill out the questionnaire after agreeing with the terms of the study. They then put the questionnaires in specified envelopes and sealed them. If the questionnaire was filled out and returned, informed consent was interpreted to have been obtained, with approval from the Ethics Committee of Sapporo Medical University. Then we instructed the worker responsible for the survey in the occupational health section of each company not to open the envelopes and to return them to us rapidly.

The study subjects were 3057 workers, 94 from 3 construction companies, 919 from 3 medical- or welfare-related organizations, 1586 from one publishing company, 153 from one finance company, 257 from one airline company, 18 from one security company, and 30 from one manufacturer. After excluding 236 incomplete responses from the 2368 replies, 2132 of them (69.7% of the target population) were analyzed.

2.2 Measurements

In addition to age, sex, and educational background, we investigated lifestyle factors, work-related conditions,
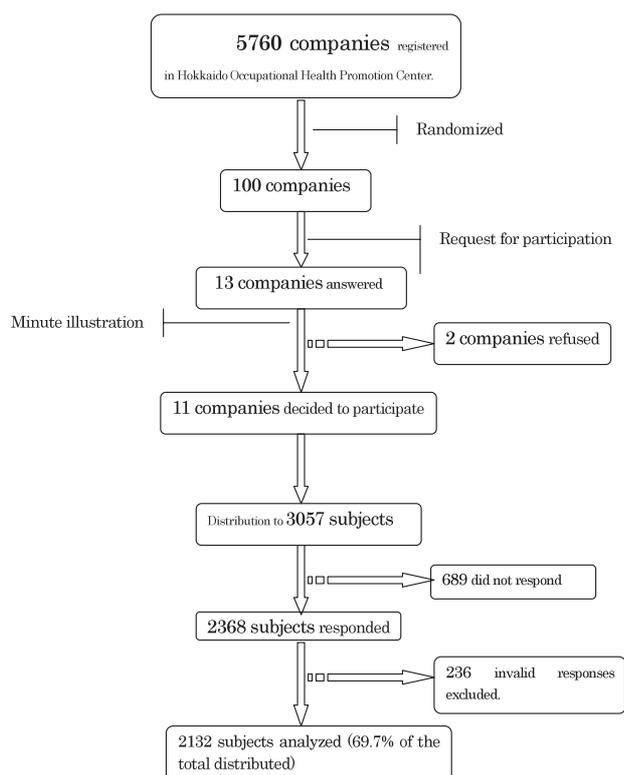

Fig.1　Flow chart showing the procedure used for selection of the participants in this study.

psychiatric consultation, social supports, stressors, loci of control (LOC) for cognitive style[16], perceived satisfaction for cognitive style, Ozeki's coping style for stress[17], and the Center of Epidemiological Studies-Depression Scale (CES-D)[18] for depressive symptoms as follows.

For lifestyle factors, we surveyed the frequency of eating breakfast, a well-balanced diet, regular physical exercise, smoking status, alcohol drinking, and habitual activities such as a hobby. For work-related conditions, we surveyed the kind of occupation, having subordinates, and degree of work load, self discretion, and opinion regarding the value of their job[7,9,19]. Occupations were divided into 3 categories; office work, professional/technical trade/sales and others.

For measuring stress, we referred to the Social Readjustment Rating Scale of Holmes and Rahe[20] and inquired about events with scores of more than 50 points such as the death of a family member, divorce or separation from spouse, and severe diseases experienced by the subject in the previous year. Subjects were classified as potentially having severe stress if they experienced one or more such negative life event in that time. For social supports[21-23], we measured whether superiors, coworkers, or family/friends paid attention to the subject's troubles.

The LOC is a scale developed by Kambara et al.[16], based on Rotter's I-E scale[24]. This scale reflects the degree to which individuals attribute control in their life to either internal or external sources. Externals tend to ascribe control of life events to other individuals and/or to fate. Generally, internally oriented individuals assume personal control of life events. There are 18 items in this questionnaire and each is scored on a four-point scale. The total score is obtained by summing all responses. The higher the total score, the more the locus of control of the individual tends to be internal. On the other hand, a lower total score indicates that the locus of control of the individual tends to be external.

Coping refers to the cognitive, emotional and behavioral strategies that one utilizes to manage or reduce stress and its effects. We used 14 items of Ozeki's coping style[17] in this study and each item was scored on a four-point scale. Each item was divided into three scales: problem-focused coping (P-Co), emotion-focused coping (E-Co), and avoidance coping (A-Co). High total scores for P-Co and E-Co were interpreted to indicate that the individual had a tendency to engage in active behavioral coping and was stronger when combating stress, whereas a high A-Co score was considered to indicate that the individual was weak in combating stress[17,25].

The CES-D[26], which Radloff created in 1977, was designed to measure the current levels of depressive symptoms, and has been used in many countries. The Japanese version[18] of the CES-D, which we used in this study, has been adapted not only for adults but also for adolescents. The subjects were asked to rate the frequency or duration of each symptom in the past week. There are 20 items in this questionnaire, and each item is scored on a four-point scale. The total score is obtained by summing all responses. The subject was classified as having a high CES-D score abbreviated to HCS, if the CES-D score was equal to or more than 16, according to the recommendation of the developers[18,26].

2.3 Statistical analysis

To consider the reliability of the CES-D, LOC, and Ozeki's coping style, we calculated Cronbach's reliability coefficient alpha for each. We evaluated the associations of various dependent variables with the dichotomized CES-D score by sex. The chi-square test for qualitative variables was used to calculate the p-values. The test of linear trends[27,28] was estimated by treating each category as an ordinal variable. Odds ratios (ORs) and their 95% confidence intervals (95% CIs) were computed with logistic regression analysis by forced entry modeling[27-29]. We set up two models for adjusting potential confounding variables. Statistical Package for Social Science (SPSS) 11.5J for Windows[27,29] was used for these analyses. All tests were two-tailed. Probability (P-) values of less than 0.05 were regarded as statistically significant.

3 RESULTS

Cronbach's reliability coefficient alpha values were 0.87 for the 20 CES-D items, 0.79 for internal control of 9 LOC items, 0.73 for external control of 9 LOC items, 0.71 for 5 P-Co items, 0.60 for 3 E-Co items, and 0.71 for 6 A-Co items. A total of 1245 subjects (58.4%) were males. The mean ages (± standard deviation, SD) of males and females were 41.3 (± 10.08) and 37.9 (± 11.64) years, respectively. The total mean (± SD) of the CES-D was 14.9 (± 8.97); that of males being 13.7 (± 8.68), and that of females being 16.6 (± 9.09). The proportion of all subjects at or over the cutoff level in this study was 40.2% (34.1% for males, 48.7% for females). Significant negative associations of age were observed with the CES-D for both males and females. A significant negative relation to educational background was noted with the CES-D only for males.

The associations of demographic variables and

Table 1 The associations of demographic variables and lifestyle factors with CES-D for workers in Hokkaido.

Variables	Male n=1245			Female n=887		
	non HCS# n=820	HCS# n=425	P-value	non HCS# n=455	HCS# n=432	P-value
Age						
20 ~ 29 yrs	100 (12.3%)	77 (18.1%)	<0.001	137 (30.6%)	166 (38.9%)	<0.001
30 ~ 39 yrs	253 (31.1)	163 (38.4)		122 (27.2)	110 (25.8)	
40 ~ 41 yrs	249 (30.6)	111 (26.1)		88 (19.6)	81 (19.0)	
50 +	212 (26.0)	74 (17.4)		101 (22.5)	70 (16.4)	
P for trend	<0.001			<0.001		
Educational background						
Junior high, or withdrawal from high school	15 (1.8%)	9 (2.1%)	0.027	9 (2.0%)	10 (2.3%)	0.227
High school	223 (27.3)	138 (32.5)		125 (27.7)	127 (29.7)	
Technical, junior college, or withdrawal from college	68 (8.3)	49 (11.5)		218 (48.2)	220 (51.4)	
College or over	510 (62.5)	229 (53.9)		100 (22.1)	71 (16.6)	
P for trend	0.011			0.099		
Eating breakfast						
Every day	530 (64.9%)	202 (47.5%)	<0.001	289 (63.7%)	233 (54.1%)	0.011
Sometimes	140 (17.1)	84 (19.8)		87 (19.2)	94 (21.8)	
Seldom	92 (11.3)	88 (20.7)		58 (12.8)	68 (15.8)	
Not at all	55 (6.7)	51 (12.0)		20 (4.4)	36 (8.4)	
P for trend	<0.001			0.001		
Considering well-balanced diet						
Frequently	209 (25.6)	71 (16.7)	<0.001	120 (26.4)	67 (15.5)	<0.001
Sometimes	396 (48.5)	207 (48.7)		239 (52.5)	227 (52.7)	
Seldom	177 (21.7)	97 (22.8)		82 (18.0)	106 (24.6)	
Not at all	34 (4.2)	50 (11.8)		14 (3.1)	31 (7.2)	
P for trend	<0.001			<0.001		
Regular physical exercise						
Frequently	131 (16.1)	38 (8.9)	<0.001	39 (8.6)	19 (4.4)	0.006
Sometimes	210 (25.7)	88 (20.7)		80 (17.6)	65 (15.1)	
Seldom	338 (41.4)	184 (43.3)		190 (41.8)	168 (39.0)	
Not at all	137 (16.8)	115 (27.1)		146 (32.1)	179 (41.5)	
P for trend	<0.001			0.001		
Smoking habits						
Nonsmoker	211 (25.8)	107 (25.2)	0.055	270 (59.3)	232 (53.8)	0.090
Ex-smoker	244 (29.9)	99 (23.3)		57 (12.5)	44 (10.2)	
Smoking sometimes	30 (3.7)	17 (4.0)		16 (3.5)	20 (4.6)	
Smoking every day	332 (40.6)	202 (47.5)		112 (24.6)	135 (31.3)	
P for trend	0.051			0.023		
Alcohol drinking						
Seldom or not at all	118 (14.4)	81 (19.1)	0.102	163 (35.8)	147 (34.1)	0.678
Sometimes	373 (45.7)	186 (43.9)		220 (48.4)	221 (51.3)	
Every day	326 (39.9)	157 (37.0)		72 (15.8)	63 (14.6)	
P for trend	0.074			0.911		
Habitual activities such as hobby						
Doing	317 (39.3)	125 (29.6)	0.001	165 (36.3)	121 (28.1)	0.009
Not at all	490 (60.7)	298 (70.4)		289 (63.7)	309 (71.9)	

Total numbers differ among variables due to some missing values. #HCS: high CES-D score (≧ 16.).

lifestyle factors for the CES-D are shown in Table 1. A significant association with HCS was observed in those who less frequently ate breakfast, had a less well-balanced diet, did less regular physical exercise (P for trend, P<0.001 for both males and females), and who did not perform habitual activities such as a hobby (P<0.001, for both males and females).

The associations of job-related variables and psychiatric consultation in the CES-D are shown in Table 2. A significant association with the HCS was obtained for those who did not have subordinates, who answered that their work loads were heavy (P=0.008 for males, P=0.010

Table 2 The associations of job-related variables and psychiatric consultation with CES-D for workers in Hokkaido.

Variables	Male n=1245			Female n=887		
	non HCS# n=820	HCS# n=425	P-value	non HCS# n=455	HCS# n=432	P-value
Kind of occupation						
Office work	157 (19.2%)	87 (20.6%)	0.773	82 (18.9%)	80 (19.2%)	0.992
Professional/Technician/Sales	430 (52.7)	214 (50.7)		311 (71.7)	297 (71.4)	
Others	229 (28.1)	121 (28.7)		41 (9.4)	39 (9.4)	
Having subordinates						
Yes	475 (58.1)	203 (48.0)	0.001	109 (24.0)	93 (21.6)	0.389
No	342 (41.9)	220 (52.0)		345 (76.0)	338 (78.4)	
Work load is heavy.						
Yes	120 (14.8)	93 (21.9)	0.012	174 (38.7)	208 (48.5)	0.024
Rather yes	402 (49.4)	196 (46.1)		180 (40.0)	143 (33.3)	
Rather no	221 (27.2)	109 (25.6)		72 (16.0)	63 (14.7)	
No	70 (8.6)	27 (6.4)		24 (5.3)	15 (3.5)	
P for trend	0.008			0.010		
Self discretion is given in work.						
Yes	197 (24.2)	53 (12.5)	<0.001	79 (17.4)	37 (8.6)	<0.001
Rather yes	461 (56.6)	217 (51.1)		222 (48.9)	174 (40.5)	
Rather no	126 (15.5)	117 (27.5)		122 (26.9)	137 (31.9)	
No	31 (3.8)	38 (8.9)		31 (6.8)	82 (19.1)	
P for trend	<0.001			<0.001		
Job is worthwhile.						
Yes	246 (30.1)	70 (16.5)	<0.001	156 (34.4)	87 (20.2)	<0.001
Rather yes	444 (54.4)	207 (48.7)		215 (47.4)	224 (52.1)	
Rather no	106 (13.0)	115 (27.1)		60 (13.2)	81 (18.8)	
No	20 (2.5)	33 (7.8)		23 (5.1)	38 (8.8)	
P for trend	<0.001			<0.001		
Psychiatric consultation						
Yes	8 (1.0)	25 (5.9)	<0.001	1 (0.2)	11 (2.5)	0.003
No	812 (99.0)	400 (94.1)		454 (99.8)	421 (97.5)	

Total numbers differ among variables due to some missing values.
#: See Table 1.

for females), who had little discretion in their work (P<0.001 for both males and females), and whose jobs were less meaningful (P<0.001 for both males and females). Significant associations with HCS were observed for those who had consulted a psychiatrist (P<0.001 for males, P=0.003 for females).

The associations of stressors, perceived satisfaction, and social support in the CES-D are shown in Table 3. Significant associations with HCS were noted for those who had experienced severe stressors in the previous year (P<0.001 for males, P=0.045 for females). Significant associations with HCS were found in those dissatisfied with their job, office environment, home atmosphere, and health status (P<0.001 for both males and females). In addition, significant associations with HCS were observed in those who received little social support from superiors, coworkers, and family/friends (P<0.001 for both males and females).

The associations of the locus of control and Ozeki's coping style with the CES-D are shown in Table 4. The means (± SD) of the LOC scores for males and females were 48.7 (± 7.03) and 48.2 (± 6.71), respectively. Significant negative associations of the LOC with the CES-D were obtained for both males and females (P<0.001 for both). Similarly, significant negative associations of the E-Co with the CES-D were noted for both males and females (P<0.001 for both). Moreover, in males, a significant negative association of P-Co and positive association of A-Co with the CES-D were noted (P<0.001 for both).

As shown in Table 5 for work-related factors, the CES-D, after logistic regression analysis adjusted for age, educational background, and company, revealed significantly increased risks for subjects with heavier work loads (for males, P for trend, P=0.035, and for females, P for trend, P=0.032). Significantly increased risks of HCS were observed for those given little discretion in their work (for males, P for trend, P<0.001, and for females, P

Table 3 The associations of stressors, perceived satisfaction and social support with CES-D for workers in Hokkaido.

Variables		Male n=1245			Female n=887		
		non HCS# n=820	HCS# n=425	P-value	non HCS# n=455	HCS# n=432	P-value
Severe stressor in the previous year.							
	Yes	133 (16.2%)	101 (23.8%)	0.001	99 (21.8%)	119 (27.5%)	0.045
	No	687 (83.8)	324 (76.2)		356 (78.2)	313 (72.5)	
Satisfaction about job	Satisfied	163 (20.0)	27 (6.4)	<0.001	56 (12.4)	14 (3.3)	<0.001
	Rather satisfied	470 (57.8)	180 (42.4)		239 (53.0)	154 (36.0)	
	Rather unsatisfied	154 (18.9)	166 (39.1)		119 (26.4)	174 (40.7)	
	Unsatisfied	26 (3.2)	52 (12.2)		37 (8.2)	86 (20.1)	
P for trend		<0.001			<0.001		
Satisfaction about office environment							
	Satisfied	141 (17.3)	19 (4.5)	<0.001	47 (10.4)	19 (4.4)	<0.001
	Rather satisfied	389 (47.7)	150 (35.3)		220 (48.5)	112 (26.2)	
	Rather unsatisfied	241 (29.5)	182 (42.8)		133 (29.3)	180 (42.1)	
	Unsatisfied	45 (5.5)	74 (17.4)		54 (11.9)	117 (27.3)	
P for trend		<0.001			<0.001		
Satisfaction about home atmosphere.							
	Satisfied	448 (55.2)	125 (29.8)	<0.001	216 (47.8)	125 (29.4)	<0.001
	Rather satisfied	305 (37.6)	178 (42.4)		185 (40.9)	191 (44.9)	
	Rather unsatisfied	47 (5.8)	90 (21.4)		47 (10.4)	88 (20.7)	
	Unsatisfied	11 (1.4)	27 (6.4)		4 (0.9)	21 (4.9)	
P for trend		<0.001			<0.001		
Satisfaction about health status							
	Satisfied	135 (16.5)	25 (5.9)	<0.001	91 (20.0)	30 (7.0)	<0.001
	Rather satisfied	386 (47.3)	132 (31.1)		218 (47.9)	155 (36.0)	
	Rather unsatisfied	259 (31.7)	205 (48.2)		128 (28.1)	191 (44.3)	
	Unsatisfied	36 (4.4)	63 (14.8)		18 (4.0)	55 (12.8)	
P for trend		<0.001			<0.001		
Support from superiors	Yes	164 (21.4)	35 (8.5)	<0.001	109 (25.1)	60 (14.2)	<0.001
	So-so	394 (51.5)	189 (45.9)		190 (43.7)	164 (38.7)	
	Little	136 (17.8)	105 (25.5)		71 (16.3)	84 (19.8)	
	No	71 (9.3)	83 (20.1)		65 (14.9)	116 (27.4)	
P for trend		<0.001			<0.001		
Support from coworkers	Yes	205 (26.8)	65 (15.6)	<0.001	208 (47.3)	143 (33.3)	<0.001
	So-so	427 (55.8)	199 (47.8)		186 (24.3)	214 (49.9)	
	Little	85 (11.1)	87 (20.9)		25 (5.7)	46 (10.7)	
	No	48 (6.3)	65 (15.6)		21 (4.8)	26 (6.1)	
P for trend		<0.001			<0.001		
Support from family or friends							
	Yes	420 (53.2)	138 (33.2)	<0.001	323 (71.5)	248 (57.9)	<0.001
	So-so	317 (40.1)	180 (43.3)		106 (23.5)	142 (33.2)	
	Little	34 (4.3)	62 (14.9)		19 (4.2)	25 (5.8)	
	No	19 (2.4)	36 (8.7)		4 (0.9)	13 (3.0)	
P for trend		<0.001			<0.001		

Total numbers differ among variables due to some missing values.
#: See Table 1.

for trend, P<0.001), those who found their work less meaningful (for males, P for trend, P<0.001, and for females, P for trend, P<0.001), had consulted a psychiatrist (for males, P<0.001 and for females, P<0.001), had experienced a severe stressor in the previous year (for males, P<0.001, and for females, P<0.001), and were in the more external control group in the LOC when the reference score was 53 points or more (for males, P for trend, P<0.001, and for females, P for trend, P<0.001). For coping styles, significantly increased risks of HCS were seen in those adopting less P-Co for males (P for trend, P<0.001), those adopting less E-Co (for males, P for trend, P<0.001, and for females, P for trend, P=0.014), those adopting more A-Co for males (P for

Table 4 The associations of locus of control and coping style with CES-D for workers in Hokkaido.

Variables	Male n=1245			Female n=887		
	non HCS# n=820	HCS# n=425	P-value	non HCS# n=455	HCS# n=432	P-value
Locus of control						
43 or less	102 (12.6%)	159 (37.9%)	<0.001	63 (14.3%)	126 (29.9%)	<0.001
44 ～ 47	176 (21.7)	110 (26.2)		84 (19.0)	115 (27.3)	
48 ～ 52	222 (27.3)	95 (22.6)		145 (32.9)	106 (25.2)	
53 or more	312 (38.4)	56 (13.3)		149 (33.8)	74 (17.6)	
P for trend	<0.001			<0.001		
Problem-focused coping						
9 or less	135 (19.3%)	107 (26.4%)	<0.001	90 (21.2%)	91 (21.7%)	0.323
10 ～ 11	157 (22.1)	108 (26.7)		103 (24.2)	101 (24.0)	
12 ～ 13	166 (23.4)	92 (22.7)		101 (23.8)	119 (28.3)	
14 or more	250 (35.2)	98 (24.2)		131 (30.8)	109 (26.0)	
P for trend	<0.001			0.459		
Emotion-focused coping						
5 or less	79 (11.0%)	74 (18.2%)	<0.001	33 (7.7%)	50 (11.8%)	0.015
6 ～ 7	221 (30.8)	148 (36.4)		104 (24.4)	129 (30.4)	
8	126 (17.5)	79 (19.4)		79 (18.5)	75 (17.6)	
9 or more	292 (40.7)	106 (26.0)		211 (49.4)	171 (40.2)	
P for trend	<0.001			0.001		
PAvoidance coping						
11 or less	178 (25.0%)	59 (14.6%)	<0.001	51 (12.2%)	57 (13.8%)	0.678
12 ～ 13	192 (26.9)	94 (23.3)		69 (16.5)	72 (17.4)	
14 ～ 16	209 (29.3)	157 (38.9)		142 (33.9)	146 (35.3)	
17 or more	134 (18.8)	94 (23.3)		157 (37.5)	139 (33.6)	
P for trend	<0.001			0.257		

Total numbers differ among variables due to some missing values.
#: See Table 1.

trend, P<0.001), in the group less satisfied with their jobs, when the reference was the satisfied group (for males, P for trend, P<0.001, and for females, P for trend, P<0.001), in the group less satisfied with their office environments, when the reference was the satisfied group (for males, P for trend, P<0.001, and for females, P for trend, P<0.001), the group less satisfied with their home atmosphere, when the reference was the satisfied group (for males, P for trend, P<0.001, and for females, P for trend, P<0.001), and in the group less satisfied with their health status, when the reference was the satisfied group (for males, P for trend, P<0.001, and for females, for trend, P<0.001). For social supports, significantly increased risks of HCS were observed in those who disclosed that support from their superiors was insufficient (for males, P for trend, P<0.001, and for females, P for trend, P<0.001), those who disclosed that support from their coworkers was insufficient (for males, P for trend, P<0.001, and for females, P for trend, P<0.001) and those who disclosed that support from their family and friends was insufficient (for males, P for trend, P<0.001, and for females, P for trend, P<0.001).

In addition to age (quantitative variables), educational background (4 categories) and each of the 11 companies, 6 lifestyle factors, psychiatric consultation, 5 job-related variables, 3 coping styles (quantitative variables), severe stressors, and social supports were adjusted for as potential confounders, focusing on the cognitive style. As shown in Table 6, a significantly increased risk of HCS was denoted in the more external control group in the LOC when the reference score was 53 points or more (for males, P for trend, P<0.001, and for females, P for trend, P<0.001), and in the group less satisfied with their jobs when the reference was the satisfied group (for males, P for trend, P<0.001, and for females, P for trend, P<0.001). There were more depressive symptoms in the group less satisfied with the office environment (for males, P for trend, P=0.002, and for females, P for trend, p=0.012). Significantly increased risks of HCS were found in the groups less satisfied with their home atmosphere (for males, P for trend, P<0.001, and for females, P for trend, P<0.001), and less satisfied with their health status (for males, P for trend, P<0.001, and for females, P for trend, P<0.001).

Table 5-1 Odds ratios (ORs) and 95% confidence intervals (95% CIs) of high CES-D score (HCS#) adjusted for age (quantitative variables), educational background (4 categories), and each of the 11 companies by logistic regression analysis for workers in Hokkaido.

Variables		Male ORs (95% CIs)	Female ORs (95% CIs)
Workload is heavy.	Yes	1.90 (1.11-3.27)	1.99 (0.96-4.14)
	Rather yes	1.20 (0.74-1.96)	1.26 (0.62-2.58)
	Rather no	1.31 (0.78-2.17)	1.40 (0.66-2.96)
	No	1.00 (reference)	1.00 (reference)
P for trend		0.035	0.032
Self discretion is given in work.			
	Yes	1.00 (reference)	1.00 (reference)
	Rather yes	1.64 (1.15-2.33)	1.51 (0.96-2.37)
	Rather no	3.21 (2.11-4.87)	2.01 (1.25-3.27)
	No	3.85 (2.13-6.96)	5.20 (2.85-9.47)
P for trend		<0.001	<0.001
Job is worthwhile. Yes		1.00 (reference)	1.00 (reference)
	Rather yes	1.70 (1.23-2.36)	1.97 (1.41-2.77)
	Rather no	4.09 (2.76-6.05)	2.78 (1.78-4.34)
	No	5.70 (3.02-10.76)	2.87 (1.56-5.23)
P for trend		<0.001	<0.001
Psychiatric consultation	Yes	6.96 (3.07-15.80)	10.01 (1.25-80.82)
	No	1.00 (reference)	1.00 (reference)
Severe stressor in the previous year.			
	Yes	1.64 (1.21-2.22)	1.40 (1.02-1.93)
	No	1.00 (reference)	1.00 (reference)
Locus of control [†]	43 or less	9.59 (6.46-14.24)	4.16 (2.70-6.39)
	44 ~ 47	3.95 (2.68-5.82)	3.20 (2.11-4.85)
	48 ~ 52	2.65 (1.80-3.90)	1.68 (1.14-2.48)
	53 or more	1.00 (reference)	1.00 (reference)
P for trend		<0.001	<0.001
Problem-focused coping [†]	9 or less	1.95 (1.37-2.78)	1.40 (0.95-2.04)
	10 ~ 11	1.72 (1.21-2.44)	1.25 (0.85-1.84)
	12 ~ 13	1.46 (1.02-2.45)	1.18 (0.79-1.78)
	14 or more	1.00 (reference)	1.00 (reference)
P for trend		0.001	0.380
Emotion-focused coping [†]	5 or less	2.49 (1.67-3.72)	1.86 (1.12-3.09)
	6 ~ 7	1.94 (1.42-2.64)	1.61 (1.14-2.27)
	8	1.82 (1.26-2.64)	1.19 (0.81-1.74)
	9 or more	1.00 (reference)	1.00 (reference)
P for trend		<0.001	0.014
Avoidance coping [†]	11 or less	1.00 (reference)	1.00 (reference)
	12 ~ 13	2.17 (1.45-3.26)	0.76 (0.48-1.20)
	14 ~ 16	2.40 (1.66-3.48)	0.90 (0.57-1.43)
	17 or more	1.50 (1.01-2.23)	0.97 (0.58-1.63)
P for trend		<0.001	0.537

† : Categorized by quartiles.

#: See Table 1.

4   DISCUSSION

We surveyed and analyzed categories of mental status including depressive symptoms and cognitive styles in workers in Hokkaido, Japan. As a result, we discovered the actual depressive symptoms assessed by the CES-D, and strong associations between depressive symptoms and cognitive styles; that is to say, there were more depressives in the external cognitive group and among those who expressed dissatisfaction with the job, office environment, home atmosphere, and health status. Although the results were in part differentiated by gender, and the strength of some associations diminished as adjustment accommodated more potential variables, the important factors concerning cognition were predominantly maintained. In Japan, there have been some bene-

Table 5-2 Odds ratios (ORs) and 95% confidence intervals (95% CIs) of high CES-D score (HCS#) adjusted for age (quantitative variables), educational background (4 categories), and each of the 11 companies by logistic regression analysis for workers in Hokkaido.

Variables		Male ORs (95% CIs)	Female ORs (95% CIs)
Satisfaction about job	Satisfied	1.00 (reference)	1.00 (reference)
	Rather satisfied	2.19 (1.40-3.45)	2.74 (1.45-5.20)
	Rather unsatisfied	6.46 (4.02-10.36)	6.33 (3.30-12.06)
	Unsatisfied	10.81 (5.70-20.50)	9.11 (4.40-18.85)
P for trend		<0.001	<0.001
Satisfaction about office environment			
	Satisfied	1.00 (reference)	1.00 (reference)
	Rather satisfied	2.82 (1.67-4.75)	1.24 (0.68-2.25)
	Rather unsatisfied	5.66 (3.34-9.57)	3.50 (1.93-6.37)
	Unsatisfied	10.90 (5.87-20.25)	5.23 (2.74-9.98)
P for trend		<0.001	<0.001
Satisfaction about home atmosphere			
	Satisfied	1.00 (reference)	1.00 (reference)
	Rather satisfied	2.16 (1.64-2.86)	1.88 (1.37-2.59)
	Rather unsatisfied	6.86 (4.52-10.39)	3.59 (2.32-5.54)
	Unsatisfied	8.78 (4.13-18.67)	10.38 (3.37-31.99)
P for trend		<0.001	<0.001
Satisfaction about health status			
	Satisfied	1.00 (reference)	1.00 (reference)
	Rather satisfied	2.09 (1.29-3.40)	2.11 (1.30-3.41)
	Rather unsatisfied	4.96 (3.06-8.03)	4.49 (2.75-7.33)
	Unsatisfied	10.31 (5.60-19.00)	10.58 (5.23-21.37)
P for trend		<0.001	<0.001
Support from superiors	Yes	1.00 (reference)	1.00 (reference)
	So-so	2.64 (1.73-4.03)	1.73 (1.16-2.56)
	Little	4.33 (2.73-6.88)	2.31 (1.45-3.68)
	No	6.30 (3.80-10.44)	3.51 (2.21-5.56)
P for trend		<0.001	<0.001
Support from coworkers	Yes	1.00 (reference)	1.00 (reference)
	So-so	1.81 (1.28-2.56)	1.76 (1.30-2.39)
	Little	4.47 (2.88-6.93)	3.64 (2.07-6.41)
	No	5.73 (3.48-9.41)	1.95 (1.01-3.76)
P for trend		<0.001	<0.001
Support from family or friends			
	Yes	1.00 (reference)	1.00 (reference)
	So-so	1.99 (1.50-2.63)	1.98 (1.44-2.73)
	Little	6.41 (3.99-10.31)	2.26 (1.18-4.31)
	No	6.55 (3.49-12.28)	4.43 (1.36-14.47)
P for trend		<0.001	<0.001

#: See Table 1.

ficial stress-related studies in the occupational health field[9,10,30,31]. The results of these studies might lead to effective preventive interventions, but there were few factors joining cognitive variables with actual preventive methods in them. When considering preventive intervention for individuals in occupational health, we hypothesized that the individual's cognitive style might have an effect on mental health problems, and that intervention based on cognitive therapy might be effective. Considering these points, our data may offer useful information for occupational mental health.

The mean CES-D score and the proportion of all subjects at or over the cutoff point in this study were 14.9 (13.7 for males, 16.6 for females) and 40.2% (34.1% for males, 48.7% for females), respectively, levels that were high when compared with the reports for antecedent stud-

Table 6　Odds ratios (ORs) and 95% confidence intervals (95% CIs) of high CES-D score (HCS#) adjusted for some potential confounders* by logistic regression analysis for workers in Hokkaido.

Variables		Male ORs (95% CIs)	Female ORs (95% CIs)
Locus of control [†]	43 or under	5.14 (3.13-8.43)	2.71 (1.56-4.69)
	44 ~ 47	2.64 (1.64-4.27)	2.34 (1.40-3.93)
	48 ~ 52	2.17 (1.37-3.45)	1.20 (0.75-1.92)
	53 or over	1.00 (reference)	1.00 (reference)
P for trend		<0.001	<0.001
Satisfaction about job	Satisfied	1.00 (reference)	1.00 (reference)
	Rather satisfied	1.77 (0.97-3.24)	2.09 (0.99-4.39)
	Rather unsatisfied	3.65 (1.90-6.99)	3.40 (1.55-7.48)
	Unsatisfied	4.07 (1.63-10.19)	3.89 (1.54-8.81)
P for trend		<0.001	0.005
Satisfaction about office environment			
	Satisfied	1.00 (reference)	1.00 (reference)
	Rather satisfied	1.88 (0.96-3.67)	1.06 (0.54-2.10)
	Rather unsatisfied	2.96 (1.48-5.91)	1.89 (0.93-3.84)
	Unsatisfied	3.92 (1.70-9.04)	2.14 (0.95-4.84)
P for trend		0.002	0.012
Satisfaction about home atmosphere			
	Satisfied	1.00 (reference)	1.00 (reference)
	Rather satisfied	2.08 (1.44-3.00)	1.79 (1.23-2.63)
	Rather unsatisfied	4.93 (2.83-8.61)	2.67 (1.57-4.54)
	Unsatisfied	6.90 (2.56-18.60)	12.87 (2.64-62.64)
P for trend		<0.001	<0.001
Satisfaction about health status			
	Satisfied	1.00 (reference)	1.00 (reference)
	Rather satisfied	2.07 (1.10-3.87)	1.97 (1.12-3.48)
	Rather unsatisfied	3.87 (2.07-7.23)	2.83 (1.59-5.04)
	Unsatisfied	6.27 (2.86-13.76)	9.12 (3.88-21.46)
P for trend		<0.001	<0.001

* :　Adjusted for age (quantitative variables), educational background (4 categories), each of the 11 companies, 6 lifestyle factors, psychiatric consultation, 5 job-related variables, 3 coping styles (quantitative variables), severe stressor, and social supports.

† :　Categorized by quartiles.

:　See Table 1.

ies on Japanese workers[23,30,31], but low compared with the results for our previous studies on Japanese junior college students[32,33] and studies on Japanese adolescents[34,35]. Nakata et al. reported that the mean CES-D score of Japanese daytime workers was 12.2[30], whereas that of Japanese shift workers was 14.3[31]. However, we did not investigate shift work. Some reports concluded that the CES-D score of females was higher than that of males[36-39]. Similar results were noted in our study. The difference (3.9 points) of the mean CES-D score between males and females in this study was similar to the 3.6 points reported in the data of Pikhart et al[39].

The CES-D score was higher for younger workers than for older ones. In our previous survey of junior college students[32,33], the CES-D score for younger persons had a tendency to be higher than that of older ones, and the incidence of major depression is known to be greatest at about 40 years of age[40]. Recently, however, there have been some reports in which depression occurred most frequently at about 25 years of age[40]. Thus, it is important to further investigate the prevalence of the depressive state by age.

We used the LOC score as one measurement of cognitive style, and found that the score significantly correlated with depressive symptoms. This result was consistent with our previous studies on junior college students[32,33]. Those with more external control in the LOC represented a greater percent of depressive persons aged 16 or older in the CES-D. Because the association remained significant even after adjusting for potential confounders, we interpreted this to mean that the LOC was independently associated with the CES-D. That is, those who attribute control of life events to external sources might be liable to suffer depressive symptoms.

Takakura and Sakihara[34,37] reported a similar result in which there was an association between the CES-D and the LOC in their studies using the correlation coefficient as an index of association. Although there have been reports about the association between cognitive style and depressive symptoms that use the correlation coefficient as an index of association[34,37], there has been no report categorized as in our study. The odds ratio is better than the correlation coefficient for understanding the strength of association between cognitive style and depressive symptoms.

We assessed perceived satisfaction with the job, office environment, home atmosphere, and health status as one measurement of cognition for each item and quality of life, and found that the measurement was significantly associated with depressive symptoms. Some investigations[12-15] have been conducted using perceived satisfaction when studying stress-related variables, and these studies indicated that the satisfaction variables were very strongly associated with stress-related factors. However, we could not find any studies in which the individual's satisfaction with the office environment and home atmosphere as well as multiple satisfaction measurements were included. Although our questionnaire about perceived satisfaction was simple, we found that these variables had strong associations with depressive symptoms. However, because we did not investigate the actual occupational and domestic environments, it will be necessary to consider the association between each type of satisfaction and the concrete environment in the future.

Most of our results were consistent with previous reports about the associations of lifestyle factors[41-43], job-related variables[11,44], coping styles[25], and social supports[21-23] with depressive symptoms. For instance, Ezoe and Morimoto[43] reported that a healthy lifestyle is conducive to better mental health, which was similar to our results. For job-related variables, Fujigaki et al.[11] disclosed that job overload had a significant effect on the prevalence of depressive symptoms. Furthermore, in Japan there were some studies[9,44,45] conducted with a Job Content Questionnaire (JCQ) in which job demands, job control, including self determination and social support based on the Demand/Control model[19], were taken into account. Kojima et al.[44] reported that depression was more frequent in those with low job control and low support as indicated by the JCQ. Kageyama et al.[25] reported that active coping was inversely associated with depression, whereas avoidance coping was positively associated with it. In addition, regarding social support, Iwata et al.[23] found that subjects who experienced poor relationships with a spouse and/or with their parents were more depressed, which was consistent with our results.

There are some limitations to our study. First, because this research was a cross-sectional study, we could not conclude that the associations between depressive symptoms and cognitive styles such as LOC and satisfaction were causal. Several other cohort studies reported the associations of life satisfaction or self-rated perceived health with suicide and mortality[12,46,47]. When contemplating the effects of cognitive therapy on the relapse of depression[48] and people at high risk of depression[49,50], it is strongly suggested that "cognitive bias" might bring about depressive symptoms and depression. Second, while the validity and reliability of measurements such as the CES-D, LOC, and Ozeki's coping style have been repeatedly reported in the literature[16-18,51], as has Cronbach's reliability coefficient alpha, which was also measured in this study, they might need to be assessed for other original measurements such as social supports and satisfaction. Third, because the subjects of this study were workers of 11 companies in Hokkaido, Japan, and were voluntary and limited by time, there is possibility of selection bias, particulary for the 11 companies selected from 5760 companies registered in the Hokkaido Occupational Promotion Center. Although medical or welfare works account for 12.5% of 5760 companies, they accounted for 37.2% of the subjects of this study. Were we to conduct another study using the same design, we would request information about occupational health provisions and awareness of mental health problems when documents for recruitment are mailed to each respective personnel section, regardless of ultimate participation. Fourth, although we analyzed using two models differing in how they adjust for possible confounders, variables not investigated in this study such as actual working hours and shift work should be considered in a future study.

In conclusion, the associations between depressive symptoms and lifestyle variables, psychiatric consultation, job-related variables, severe life events, coping styles, and social supports were significant by univariate analysis. Even after adjusting for these variables, significant associations between depressive symptoms and cognitive styles were maintained. In Japan, mental health is one of the most important issues for occupational health, and it is necessary to prepare for preventive intervention such as cognitive therapy. Thus, further studies of various groups drawn from the general population are needed to

verify the relationship between cognitive style and depression.

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北海道の労働者における抑うつ症状と
認知方策および満足度との関係

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近年日本では，うつ病，うつ状態，および自殺の増加が，特に労働現場において社会問題化してきており，予防介入が必要とされる．それ故本調査は，抑うつ症状と認知方策，その他の要因との関係を検討し，精神保健の予防介入の手がかりを見出すために企画実行された．2005年1月に北海道内の労働者3057人に対して横断調査を行った．性，年齢，教育歴，生活習慣，仕事に関する各種状況，精神科受診歴，ソーシャルサポート，ストレッサー，認知方策としてLocus of Control（LOC），仕事，職場，家庭および自身の健康の各種満足度，尾関のコーピング尺度，抑うつ症状測定のためにthe Center of Epidemiological Studies-Depression Scale（CES-D）を測定した．不完全回答を除いた合計2132人を解析対象とした（男性1245人，女性887人，平均年齢39.9歳）．多変量ロジスティック回帰分析の結果，男女とも，LOCにおいて外的統制感がより強い者，仕事，職場，家庭および自身の健康に対して不満と答えた者に，有意に抑うつ症状の強い者が多かった．外的統制感が強いこと，満足度が低いことは，労働者において抑うつ症状のリスクを高める可能性があり，認知様式に関する何らかの介入により，抑うつ症状の発現が予防できる可能性がある．