Sense of Coherence (SOC) may Reduce the Effects of Occupational Stress on Mental Health Status among Japanese Factory Workers

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Abstract: To examine if sense of coherence (SOC) can reduce the adverse effects of job stress on mental health status, self-administered questionnaires were distributed among 740 workers in a manufacturing industry. The questionnaire contained SOC, Job Content Questionnaire (JCQ), and General Health Questionnaire (GHQ-12). Complete answers were recovered from 466 workers (62.8%), consisting of 387 males and 79 females, with ages of 45.1 ± 12.0 yr, and used for the analysis. The logistic regression analysis revealed the followings: Both for males and females, high GHQ was significantly associated with scores on SOC and JCQ job demand subscale, i.e. the mental health status was adversely related to job demand whereas it was positively associated with SOC. Similarly, the mental health status was affected adversely by managerial work in males, whereas was positively by co-workers support in females. Thus, high SOC enables workers to cope with their job demand, which is a potent job stressor, indicating that SOC is an important factor determining their coping ability to job stress for both genders. Male managerial employees may cope with their strong job stress because of high SOC, protecting their mental health status. Social support seems also significant for prevention of mental well-being of female workers from work-related stressors.

Key words: Sense of coherence, Occupational stress, GHQ, JCQ, Susceptibility

Introduction

The sense of coherence (SOC) is a concept developed by Aaron Antonovsky (1923–1994) that represents a personal ability to manage with psychological stressors^{1, 2)}. According to an observation by Antonovsky, people who survived the Jew concentration camp under World War II had the consistent feeling which can decrease a stress loading; he thought that the ability to process appropriately the tension status was essential for their survival. SOC is believed to express the extent to which one has a persistent, enduring but dynamic feeling of confidence that (1) the stimuli deriving from one's internal and external environments in the course of living are structured, predictable, and explicable (comprehensibility), (2) resources

are available to one to meet the demands posed by these stimuli (manageability), and (3) such demands are challenges, worthy of investment and engagement (meaningfulness)^{1, 2)}.

Eriksson and Lindström³⁾ published an important systematic review regarding SOC, which included the salutogenic research published in 1992–2003 (458 publications and 13 doctoral theses). According to this review, SOC is strongly related to perceived health, especially mental health. They concluded that SOC is a health promoting resource that strengthens resilience and develops a positive subjective state of health. For example, there was a significant negative correlation between SOC and perceived stress and psychological symptoms among college students⁴⁾; depressive symptoms were associated with low level of SOC in patients with scleroderma⁵⁾; and SOC was highly correlated with positive affect and optimism among college students⁶⁾. In Japanese, SOC is reported

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to buffer the effects of stressful life events on mental health status⁷⁾. Also, SOC is found to be associated with physical health issues such as the risk of coronary heart disease⁸⁾ and Type 2 diabetes⁹⁾, serum cholesterol levels¹⁰⁾, natural killer cell activities¹¹⁾, and incidence of external cause injuries¹²⁾.

Several studies have examined SOC as a modifier of occupational stress. It is shown that a strong SOC protects from the effects of stressors at work¹³⁾. Health social workers with a strong SOC experience less burnout than those with a weak SOC¹⁴⁾. The high level of SOC and social support reduce the sense of perceived stress and negative psychological health status in employees of uniformed professions¹⁵⁾. A low SOC, in elderly workers, is assumed to be related to poor psychological well-being directly, or via the development of life-style problems such as lack of exercise, obesity or smoking¹⁶⁾. A negative correlation was found between SOC and job demand, whereas a positive correlation with job control was demonstrated in rural males¹⁷⁾, using Job Content Questionnaire (JCQ) developed by Karasek¹⁸⁾. SOC is reported to help public health nurses to cope with family and work juggling as well as occupational stress¹⁹⁾. By contrast, SOC did not moderate the relationships among exposure to stressors, perceived stressors and strain experienced among industrial managers²⁰⁾.

In the present study, relationships of SOC to job stress measured by JCQ^{18, 21)}, and mental health status assessed by General Health Questionnaire (GHQ-12)²²⁾ are investigated in a group of factory workers, to examine if SOC can reduce the adverse effects of job stress on mental health status, as a determinant of their coping ability or susceptibility.

Subjects and Methods

Self-administered questionnaires were distributed among 740 workers in a manufacturing industry; they were asked to answer anonymously. Complete answers were recovered from 466 workers (62.8%), consisting of 387 males and 79 females, with average age of 45.1 with SD of 12.0 yr, and used for the analysis. The survey was conducted during the period between July and October 2007.

The questionnaires contained the Japanese version of SOC, JCQ and GHQ-12 and questions regarding demographic and lifestyle characteristics. The SOC consisted of 29 items measuring global sense of coherence and three components, viz. comprehensibility, manageability and meaningfulness^{1, 2)}. Each item was scored at 1 to 7 points by the subjects; a total of the scores were calculated. The JCQ, composed of 22 questions, was used to assess job demand, decision latitude, supervisors support, and co-

workers support^{18, 21)}. GHQ-12 contained 12 items used in the identification of current nonorganic non-psychotic morbidity; each item was scored on a 4-point scale (0-0-1-1) and the scores were summed up to give a total score ranging from 0 to 12²²⁾.

Relationships between SOC scores and demographic variables were calculated by *t*-test, χ^2 test or simple correlation analysis. The subjects were divided into two groups by the total GHQ-12 scores, i.e. those with 3 points or above (high GHQ group) and less than 3 (low GHQ group), respectively. Fukunishi reported that cut-off point of 2/3 yielded the lowest miss classification rate when healthy subjects and psychiatric patients were differentiated by GHQ-12²³⁾. Differences in SOC and JCQ scores as well as demographic variables between the two groups were analyzed by *t*-test or χ^2 test; using those variables which were significantly different between the two groups and their first-order interactions with SOC as independent variables, their effects on GHQ (high vs. low) was assessed by a multiple logistic regression analysis (stepwise method). The analyses were performed with SPSS version 11.0 for windows.

The study design had been reviewed and approved by the Research Ethics Committee of Mie University School of Medicine.

Results

SOC scores were 126.56 ± 22.08 (mean $\pm$ SD) among all 466 subjects. The internal reliability of the SOC scale expressed as Cronbach's α was 0.91. SOC scores were significantly correlated with ages ($r=0.132$, $p<0.01$), and were higher in married (129.38 ± 20.90) than in unmarried (121.46 ± 23.60) ($p<0.01$), and in managers (130.27 ± 20.74) than in non-managerial employees (124.50 ± 22.38) ($p<0.01$). GHQ-12 scores were averaged at 1.91 (SD 2.73) and correlated negatively with SOC ($r=-0.548$, $p<0.001$). No significant differences were found in SOC or GHQ-12 scores between males and females ($p>0.05$).

SOC, JCQ and demographic variables between high and low GHQ groups are shown in Tables 1 and 2 for males and females, respectively. Both in males and females, SOC scores were significantly smaller (approximately 20 points on average) in high GHQ group than in low GHQ group. Similarly, for both genders, JCQ scores on job demand were significantly larger and on supervisors support were significantly smaller in high GHQ group as compared with low GHQ group. In high GHQ group, JCQ scores on decision latitude for males and those on co-workers support for females were significantly smaller. High GHQ group also had significantly lower frequency of exercise and 6–8 h of sleep,

Table 1. Differences in SOC and JCQ scores and demographic characteristics between high and low GHQ groups (105 and 282 males, respectively)

	High GHQ	Low GHQ	Differences (<i>p</i>) ^a
	Mean (SD)	Mean (SD)	
Age (yr)	45.3 (10.7)	48.2 (11.3)	<0.05
Duration of work (yr)	22.1 (13.0)	24.0 (13.2)	NS
Body Mass Index	23.0 (2.8)	23.0 (2.7)	NS
SOC (scores)	110.3 (20.1)	133.2 (19.3)	<0.001
JCQ (scores):			
Job demand	34.5 (5.0)	32.1 (5.2)	<0.05
Decision latitude	67.9 (10.8)	70.5 (11.1)	<0.001
Supervisors support	10.5 (2.8)	11.3 (2.6)	<0.05
Co-workers support	11.1 (2.1)	11.5 (1.9)	NS
	Number (%)	Number (%)	
Living with family	15 (14.3)	40 (14.2)	NS
Married	74 (71.2)	242 (85.8)	NS
Education (high school or above)	30 (28.6)	66 (23.4)	NS
Managers	52 (50.5)	98 (35.8)	<0.05
Sleep (6–8 h/d)	77 (73.3)	242 (85.8)	<0.05
Smokers	48 (45.7)	123 (43.6)	NS
Drinking (regularly)	45 (42.9)	93 (33.0)	NS
Breakfast (every day)	14 (13.3)	34 (12.1)	NS
Eating between meals	63 (60.0)	180 (63.8)	NS
Exercise:			
Every day	11 (10.5)	44 (15.6)	
Sometimes	34 (32.4)	127 (45.0)	
None	60 (57.1)	111 (39.4)	<0.01

^a*t*-test or χ^2 test.**Table 2. Differences in SOC and JCQ scores and demographic characteristics between high and low GHQ groups (24 and 55 females, respectively)**

	High GHQ	Low GHQ	Differences (<i>p</i>)
	Mean (SD)	Mean (SD)	
Age (yr)	34.6 (7.8)	32.9 (8.6)	NS
Duration of work (yr)	10.5 (8.2)	8.1 (6.3)	NS
Body Mass Index	20.7 (3.2)	21.0 (3.0)	NS
SOC (scores)	108.9 (21.6)	131.6 (19.2)	<0.001
JCQ (scores):			
Job demand	33.2 (6.6)	28.2 (6.8)	<0.01
Decision latitude	61.8 (10.4)	62.0 (9.2)	NS
Supervisors support	9.3 (2.7)	11.3 (2.6)	<0.01
Co-workers support	10.2 (1.9)	12.0 (1.5)	<0.001
	Number (%)	Number (%)	
Living with family	17 (70.8)	50 (90.9)	<0.05
Married	14 (60.9)	16 (29.1)	NS
Education (high school or above)	17 (70.8)	33 (60.0)	NS
Managers	0 (0.0)	3 (5.5)	NS
Sleep (6–8 h/d)	17 (70.8)	41 (74.5)	NS
Smokers	3 (12.5)	5 (9.1)	NS
Drinking (regularly)	45 (42.9)	93 (33.0)	NS
Breakfast (every day)	6 (25.0)	8 (14.5)	NS
Eating between meals	23 (95.8)	50 (90.9)	NS
Exercise:			
Every day	0 (0.0)	7 (12.7)	
Sometimes	8 (33.3)	24 (43.6)	
None	16 (66.7)	24 (43.6)	NS

^a*t*-test or χ^2 test.

Table 3. Effects of SOC and JCQ scores and demographic characteristics on mental illness assessed by GHQ-12^a for 387 males and 79 females: multiple logistic regression analysis (odd's ratio with 95% confidence interval)^b

	Males	Females
Age	0.971 (0.945–0.997)	-
Managers	4.722 (2.241–7.711)	-
SOC	0.927 (0.909–0.945)	0.952 (0.919–0.986)
JCQ:		
Job demand	1.087 (1.025–1.152)	1.138 (1.031–1.255)
Co-workers support	-	0.565 (0.370–0.864)

^aDependent variable=0 (low GHQ group) or 1 (high GHQ group).

^bVariables significantly different between high and low GHQ groups (Tables 1 and 2) as well as the interaction between SOC and each of the remaining variables were used for the analysis (stepwise method, variables were entered and removed at $p < 0.05$).

- = Not included in the analysis.

and larger percentage of managers, for males; this group showed higher frequency of living with family for females.

The results of the logistic regression analysis are shown in Table 3. Both for males and females, high GHQ was significantly associated with scores on SOC and JCQ job demand subscale, i.e. the mental health status assessed by GHQ-12 was adversely related to job demand whereas it was positively related to SOC scores. Similarly, the mental health status was affected adversely by managing work in males whereas was positively by co-workers support in females. None of the interactions of SOC with other variables were significantly related to high GHQ ($p > 0.05$).

Discussion

SOC scores were 126.56 ± 22.08 in the present study, agreeing with the report³⁾ that SOC-29 showed a range of the means from 100.50 points (SD 28.5) to 164.50 points (SD 17.10). SOC and mental health are reported to be two independent but correlated constructs; SOC is believed as a mediator between stress and mental health status²⁴⁾. This coincides with the observation in the present study that SOC scores were higher in subjects with better mental health status (lower GHQ scores) in both genders, and were inversely correlated with GHQ scores in all subjects combined. It was also found in the present study that SOC scores were higher in elder and married subjects as well as in those engaged in managerial positions. This may indicate that subjects with a wealth of experience, such as managers, have higher stress-coping ability. Thus, SOC seems an ability of people which are acquired through life experience. It is appeared that this finding is in line with the observation from the National Population Study in Canada that high SOC is

associated positively with age and social support²⁵⁾.

The previous study on workers in the age range of 50–69 yr revealed that high GHQ-12 scores are associated with low SOC scores, low frequency of exercise, high smoking frequency and high BMI¹⁶⁾. The logistic regression analysis in the present study showed that the effects of SOC on GHQ-12 scores were more prominent than those of life style characteristics, except for managerial work which showed high risk (OR=4.580) of the bad state of mental health. This finding, together with the observation of higher SOC scores, suggests that managerial employees can cope with their job because of high SOC, protecting their mental health status. The logistic regression analysis also demonstrated that high job demand is a potent risk of high GHQ scores both in males and females. Thus, high SOC enables workers to cope with their job demand, indicating that SOC is an important factor determining their susceptibility to job stress; this essentially agrees with a bulk of previous observations^{13–17, 19)}. In addition, it was observed in the present study that co-workers support reduced the adverse effects of job demand as shown in the previous study by Stansfeld *et al*²⁶⁾. Social support is also significant for prevention of mental well-being of workers from work-related stressors. In the regression analysis, none of the interactions of JCQ subscales, exercise, sleep time or managerial work with SOC scores were related to high GHQ scores. Thus, SOC can associate directly with the mental health status rather than by modifying the effects of those factors.

SOC has been believed to be a health-promoting resource^{1, 3)}. Individual differences in SOC are associated with healthy life choices independently of social class and education, and may aid the design of future health promotion interventions²⁷⁾. Attempt has been made to enhance SOC in the workplace¹¹⁾, despite the fact that SOC is generally regarded as a stable personal factor which develops during the childhood and adolescence, and gradually reaches stability in early adulthood^{1, 28)}. However, as evidence has been given that SOC considerably changes over a 4-yr period among a representative sample of Canadian labor force²⁹⁾, SOC can be increased by an appropriate intervention to improve stress-coping ability in the workplace. Further studies should be done from this view point. Also, as the present study is of cross-sectional one, a longitudinal study is necessary to confirm that high SOC can prevent development of the adverse effects of occupational stress.

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References

- Antonovsky A (1987) Unraveling the mystery of health, how people manage stress and stay well, Jossey-Bass Publishers, San Francisco. [Translated into Japanese by Yamazaki Y and Yoshii K (2001), Yushindo, Tokyo]
- Yamazaki Y (1999) SOC, a theory on salutogenesis and health promoting ability from newly developed view points for health. *Quality Nursing* **5**, 824–32 (in Japanese).
- Eriksson M, Lindström B (2006) Antonovsky's sense of coherence scale and the relation with health: a systematic review. *J Epidemiol Community Health* **60**, 376–81.
- Skirka N (2000) The relationship of hardiness, sense of coherence, sports participation, and gender to perceived stress and psychological symptoms among college students. *J Sports Med Phys Fitness* **40**, 63–70.
- Matsuura E, Ohta A, Kanegae F, Haruda Y, Ushiyama O, Koarada S, Togashi R, Tada Y, Suzuki N, Nagasawa K (2003) Frequency and analysis of factors closely associated with the development of depressive symptoms in patients with scleroderma. *J Rheumatol* **30**, 1782–7.
- Bothmer MIK, Fridlund B (2003) Self-rated health among university students in relation to sense of coherence and other personality traits. *Scand J Caring Sci* **17**, 347–57.
- Takayama T, Asano Y, Yamazaki Y, Yoshii K, Nagasaka Y, Fukada J, Furusawa Y, Takahashi S, Seki Y (1999) Sense of coherence, stressful life events and psychological health. *Jpn J Public Health* **11**, 965–75 (in Japanese).
- Poppius E, Tenkanen L, Kalimo R, Heinsalmi P (1999) The sense of coherence, occupation and the risk of coronary heart disease in the Helsinki heart study. *Soc Sci Med* **49**, 109–20.
- Agardh E, Grill V, Ahlbom A, Hallqvist J, Andersson T, Norman A, Efendic S, Ostenson CG (2003) Work stress and low sense of coherence is associated with type 2 diabetes in middle-aged Swedish women. *Diabetes Care* **26**, 719–24.
- Ogawa Y, Nakamura H, Nagase H, Ogino K, Ooshita Y, Tsukahara S (2001) Structural analysis for psychosocial factors including health locus of control (HLC) and sense of coherence (SOC) associated with lifestyle-related diseases. *Jpn J Hyg* **55**, 597–606 (in Japanese).
- Nakamura H, Matsuzaki I, Sasahara S, Hatta K, Nagase H, Oshita Y, Ogawa Y, Nobukuni Y, Kambayashi Y, Ogino K (2003) Enhancement of a sense of coherence and natural killer cell activity which occurred in subjects who improved their exercise habits through health education in the workplace. *J Occup Health* **45**, 278–85.
- Poppius E, Virkkunen H, Hakama M, Tenkanen L (2008) The sense of coherence and risk of injuries: role of alcohol consumption and occupation. *J Epidemiol Community Health* **62**, 35–41.
- Feldt T (1997) The role of sense of coherence in well-being at work: analysis of main and moderator effects. *Work Stress* **11**, 134–47.
- Gilbar O (1998) Relationship between burnout and sense of coherence in health social workers. *Soc Work Health Care* **26**, 39–49.
- Oginska-Bulik N (2005) The role of personal and social resources in preventing adverse health outcomes in employees of uniformed professions. *Int J Occup Med Environ Health* **5**, 233–40.
- Matsuzaki I, Sagara T, Ohshita Y, Nagase H, Ogino K, Eboshida A, Sasahara S, Nakamura H (2007) Psychological factors including sense of coherence and some lifestyles are related to general health questionnaire-12 (GHQ-12) in elderly workers in Japan. *Environmental Health and Preventive Medicine* **12**, 71–7.
- Holmberg S, Thelin A, Stiernstrom EL (2004) Relationship of sense of coherence other psychosocial indices. *Eur J Psychol Assess* **20**, 227–36.
- Karasek R (1985) Job Content Questionnaire. Department of Industrial and Systems Engineering, University of Southern California, Los Angeles.
- Shiu A T-Y (1998) The significance of sense of coherence for the perceptions of task characteristics and stress during interruptions amongst a sample of public health nurses in Hong Kong: implications for nursing management. *Public Health Nurs* **15**, 273–80.
- Kivimäki M, Kalimo R, Toppinen S (1998) Sense of coherence as a modifier of occupational stress exposure, stress perception, and experienced strain: a study of industrial managers. *Psychol Rep* **83**, 971–81.
- Kawakami N, Kobayashi F, Araki S, Haratani T, Furui H (1995) Assessment of job stress dimensions based on the job demand-control model of employees of telecommunication and electric power companies in Japan: reliability and validity of the Japanese version of the Job Content Questionnaire. *Int J Behav Med* **2**, 358–75.
- Doi Y, Minowa M (2003) Factor structure of the 12-item General Health Questionnaire in the Japanese general adult population. *Psychiatry Clin Neurosci* **17**, 379–83.
- Fukunishi I (1990) The assessment of cut-off point of the General Health Questionnaire (GHQ) in the Japanese version. *J Jpn Clin Psychol* **3**, 228–34 (in Japanese).
- Cohen O, Savaya R (2003) Sense of coherence and adjustment to divorce among muslim Arab citizens in Israel. *Eur J Per* **17**, 309–26.
- Stephens T, Culberg C, Joubert N (1999) Mental health of the Canadian population: a comprehensive analysis. *Chronic Dis Can* **20**, 118–26.
- Stansfeld SA, Fuhrer R, Head J, Ferrie J, Shipley M (1997) Work and psychiatric disorder in the Whitehall II Study. *J Psychosomat Res* **43**, 73–81.

- 27) Wainwright NWJ, Surtees PG, Welch AA, Luben RN, Khaw K-T, Bingham SA (2007) healthy lifestyle choices: could sense of coherence aid health promotion? *J Epidemiol Community Health* **61**, 871–6.
- 28) Hendrik T, Nilsson M, Westman G (2008) Sense of coherence in three cross-sectional studies in Northern Sweden 1994, 1999 and 2004 - patterns among men and women. *Scand J Public Health* **36**, 340–5.
- 29) Smith PM, Breslin FC, Beaton DE (2008) Questioning the stability of sense of coherence: the impact of socioeconomic status and working conditions in the Canadian population. *Soc Psychiatr Epidemiol* **38**, 475–84.