

# Life Experiences are Important Factors of Making Stronger SOC (Sense of Coherence) on the Workers in Tsukuba Research Park City (TRPC)

Shinichiro Sasahara, Yusuke Tomotsune, Yuichi Ohi, Shun Suzuki, Akihiro Seki, Junko Sakano, Yoshihiko Yamazaki, Ichiyo Matsuzaki

**Abstract**—Via a large scale cross-sectional study among Japanese white color workers, the authors aimed to elucidate: (1) the distributions of Sense of Coherence (SOC), which reflect stress coping abilities, (2) the distributions of Life experience; (3) and the association between SOC and Life experience. Anonymous self-administered questionnaires were sent to 15,891 in 2001 and 21,922 in 2011 employees at educational and research institutions in Tsukuba Research Park City. A total of 5,868 (36.9%) and 9,528 (43.5%) respectively workers completed and returned the questionnaire; 5,715 and 9,515 respectively workers without missing data were analyzed. SOC scale scores differed by gender, age, and other demographic features in both study years. Among the life experiences, workers who have got over parenting or management position were higher SOC scale scores adjusted by gender and age. The life experiences that workers have got over could develop their stronger SOC in their life course.

**Keywords**—field study, life experience, mental health, SOC (sense of coherence)

## I. INTRODUCTION

**I**n Japan, more than 60% of workers have anxiety, and more than half of all corporations have workers on leave because of mental problems [1]. The annual number of suicides in Japan has exceeded 30,000 for 11 consecutive years, a quarter of which have been workers [2]. Work stress in Japan has been thought to increase since the 1990s because of changes brought by the revolution in information technology, diversification of employment status, and new personnel evaluation systems [3]. As a result, stress-related mental disorders among Japanese workers have become an important social issue.

Most studies on occupational mental health have focused on workers' mental health state and external factors, such as occupational stressors, job control, social support system, and rewards.

S. Sasahara, Y. Tomotsune, Y. Ohi, S. Suzuki, A. Seki and I. Matsuzaki are with the Faculty of medicine, University of Tsukuba, Ibaraki, 305-8575, Japan (corresponding author to provide phone: 29-853-6025; fax: 29-853-6026; e-mail: s-sshara@md.tsukuba.ac.jp).

J. Sakano is with the Faculty of Health and Welfare Science, Okayama Prefectural University, Okayama, 719-1197, Japan. (e-mail: jsakano@fhw.oka-pu.ac.jp).

Y. Yamazaki is with the Faculty of Social Welfare, Nihon Fukushi University, Aichi, 470-3295, Japan (e-mail: yamazaki\_1112@yahoo.co.jp).

These studies are usually conducted to develop measures to “reduce quantity and quality of work stress,” or to “improve accomplishment by work,” although there are usually limitations to adopting the suggested corrective measures in the workplace. Therefore it is also important to focus on internal factors of workers, such as recognizing one's style of dealing with occupational stress [4].

Among internal factors that may affect worker's mental health, a sense of coherence (SOC) is an important concept from the view of the salutogenic theory and stress recognition style [5]. The salutogenic theory, as discussed by Antonovsky, determines “By what methods can we maintain our health?” Antonovsky proposed that the SOC would be strengthened by cumulative life experiences that provide a person with sets of meaningful experiences and coherent life experiences. He called these experiences generalized resistance resources (RSSs) and indicated that they are characterized by “participation in shaping the outcome,” “underload-overload balance [6]”. According to this theory, SOC is comprised of three inter-related components: meaningfulness, comprehensibility, and manageability [7], [8]. Meaningfulness is the feeling that there is a meaning for life. Comprehensibility is the feeling that one can recognize stress as understandable. Manageability is the feeling that one has enough resources to deal with the stress.

The SOC is associated with physical and mental well-being [9]-[13]. It also reflects stress-coping abilities in relation to stress recognition. For example, a stronger SOC allows one to cope with life stressors more proactively [14]-[16]. Furthermore, an inverse correlation of supervisors' SOC with subordinates' stress reaction has been reported [17]. Among 2,999 Finnish subjects aged 18-64 years, a weak SOC as well as presence of a chronic illness and experiencing little or no concern from friends is predictive of a depressive episode [18]. SOC and severity of depression are inversely related [19]. A weak SOC during early training among military conscripts predicts suicidal ideation and death [20]. A study of Finnish outpatients with psychiatric disorders showed that SOC could be a good indicator of how people are coping with stress when doing well [21].

These results of previous research lead us to a question that which factors help develop or strengthen SOC. In Japan, however, little is known about workers' SOC. The authors thus decided to determine an SOC scale score by gender and age groups and investigate the association of SOC scale scores and the coping with life experiences in the person's life. For this purpose, the authors conducted a large-scale survey among employees at Tsukuba Research Park City (TRPC). TRPC is the largest research park city in Japan where many educational and scientific research institutions are concentrated according to the policy of the Japanese government.

## II. SUBJECTS AND METHODS

### A. Study Design and Participants

The present studies were conducted in November 2001 and November 2011 respectively. Eighty-nine in 2001 and Sixty-five in 2011 educational and scientific research institutions in Tsukuba Research Park City agreed to participate. A self-administered and anonymous questionnaire was distributed to 15,891 in 2001 and 21,922 in 2011 employees working at these institutions. The authors asked each institution to designate an in-house research liaison to distribute and collect the questionnaires. Participants were instructed to seal the completed questionnaire in the provided envelope and submit it in person to the research liaison.

Of the participants, 5,868 (36.9%) in 2001 and 9,528 (43.5%) in 2011 returned the questionnaire respectively. The authors examined responses from subjects aged 20 to 60 years. Responses that had data missing were excluded from the analysis. As a result, data from 5,715 and 9,515 participants were analyzed respectively. Subjects in 2001 included 4,618 men and 1,097 women with a mean  $\pm$  SD age of  $40.4 \pm 9.6$  years. That in 2011 included 6,033 men and 3,482 women with a mean  $\pm$  SD age of  $42.1 \pm 10.1$  years.

Other demographic characteristics of participants are shown in Table I (in 2001) and Table II (in 2011). Jobs were classified into researchers, technicians, or administrative clerks. Many participants had master's or doctorate degrees. The level of income was also high compared with that of general workers in Japan.

### B. Ethical Considerations

The purpose of the study, the voluntary nature of participation, the anonymity and confidentiality of responses, and secure data management were clearly stated at the beginning of the questionnaire. The protocol of the study was approved in the General Meeting of the Tsukuba Research Park City Network to which participating institutions belong.

### C. Questionnaire

The variables analyzed in this study were age, gender, the Japanese version of the SOC Scale, and the life experience (i.e. Parenting children and Management positions).

The Japanese version of the SOC29 Scale in 2001 consists of 29 items rated on a 7-point scale. The sum of these scores (SOC29 scale score) range from 29 to 203, with higher scores indicating a stronger SOC [7]. The Japanese version of the SOC13 Scale that consists of 13 items rated on a 7-point scale was used in 2011. The reliability and validity of these scales have been confirmed [22], [23]. The Cronbach's alpha coefficient in the present study was 0.91, which is comparable with that reported in previous studies (range, 0.70 to 0.95) [24].

The Life experience consists of 2 items rated on none or all scale. It assesses they have come over the experience of parenting and management positions respectively.

### D. Statistical Analysis

SOC scale scores were compared by gender, age group, and job type, using the t-test and one-way analysis of variance, followed by Tukey's test for multiple comparisons.

Pearson's product-moment correlation coefficient of age with SOC scale scores was calculated. Considering the gender differences, the same analyses were conducted in men and women, respectively. Pearson's product-moment correlation coefficients between SOC scale scores and parenting and management position scores were also determined. Finally, a two-way ANOVA analysis for SOC scale scores was conducted by age groups and the life experiences. The significant level of statistics was set at  $p < 0.05$ . All statistical analyses were performed on SPSS 19.0 for Mac.

TABLE I  
COMPARISON OF SOC SCORES BY AGE GROUP AND THE LIFE EXPERIENCES (I.E. MANAGEMENT POSITION AND PARENTING) IN 2001

Management Status	Age Group (years)	Number of Subjects	Values SOC29 (mean $\pm$ S.D.)	Parenting Status	Age Group (years)	Number of Subjects	Values SOC29 (mean $\pm$ S.D.)
Manager	20-29	6	132.7 $\pm$ 12.6	Child (+)	20-29	77	127.4 $\pm$ 24.1
	30-39	222	133.2 $\pm$ 20.7		30-39	900	131.6 $\pm$ 21.1
	40-49	583	130.6 $\pm$ 20.1*		40-49	1240	128.5 $\pm$ 20.6*
	50-59	723	134.9 $\pm$ 20.7*		50-59	1052	133.2 $\pm$ 21.5*
	60-69	79	144.7 $\pm$ 21.8		60-69	118	143.4 $\pm$ 21.5*
	Total	1613	133.6 $\pm$ 20.7		Total	3387	131.3 $\pm$ 21.3
Non-Manager	20-29	892	124.5 $\pm$ 23.3	Child (-)	20-29	821	124.2 $\pm$ 23.2
	30-39	1752	126.2 $\pm$ 22.2*		30-39	1074	123.0 $\pm$ 22.2
	40-49	966	125.1 $\pm$ 21.3*		40-49	309	121.6 $\pm$ 21.9
	50-59	435	129.0 $\pm$ 22.6*		50-59	106	128.0 $\pm$ 21.4*
	60-69	57	140.5 $\pm$ 21.6*		60-69	18	139.6 $\pm$ 23.2*
	Total	4102	126.0 $\pm$ 22.4		Total	2328	123.6 $\pm$ 22.6

Statistical analysis of difference was performed by two-way ANOVA. Statistical significance as compared with the value of age 20-29 by post-hoc, \* $p < 0.05$ .

### III. RESULTS

#### A. SOC Scale Scores in 2001

As shown in Table I, the mean SOC scale score of participants was  $128.3 \pm 22.3$ . The score in men was significantly higher than that in women ( $128.9 \pm 22.3$  vs.  $125.6 \pm 21.9$ ;  $p < 0.01$ ). A weak but significant positive correlation was observed between SOC scale score and age. The score in manager was significantly higher than that in non-manager ( $133.6 \pm 20.7$  vs.  $126.0 \pm 22.4$ ;  $p < 0.01$ ). The score in parenting child was significantly higher than that in non-parenting child ( $131.3 \pm 21.3$  vs.  $123.6 \pm 22.6$ ;  $p < 0.01$ ).

#### B. SOC Scale Scores in 2011

As shown in Table II, the mean SOC scale score of participants was  $55.4 \pm 11.9$ . The score in men was significantly higher than that in women ( $56.3 \pm 12.0$  vs.  $53.9 \pm 11.5$ ;  $p < 0.01$ ). A weak but significant positive correlation was observed between SOC scale score and age. The score in manager was significantly higher than that in non-manager ( $58.4 \pm 11.6$  vs.  $54.7 \pm 11.9$ ;  $p < 0.01$ ). The score in parenting child was significantly higher than that in non-parenting child ( $57.1 \pm 11.7$  vs.  $53.3 \pm 11.9$ ;  $p < 0.01$ ).

#### C. A Two-Way ANOVA Analysis for SOC Scale Scores by Age Groups and the Life Experiences

Table I and II shows the results of a two-way ANOVA analysis for SOC scale score. Age groups and the life experiences were compared as covariates. All life experiences subscale scores were independently associated with SOC scale scores, taking the association of age groups into account. Those who had come over the management position and parenting show stronger SOC scale scores than those who had no life experiences in each age group in both study year.

### IV. DISCUSSION

This study demonstrated the distribution and characteristics of SOC scale scores among workers in Tsukuba Research Park City. The mean SOC scale scores among participants didn't differ so much from those reported by Ogawa et al. [25]; they reported that the mean ( $\pm$  S.D.)

SOC score among clerical workers was  $126.0 \pm 26.9$  in 289 men (mean age  $39.7 \pm 11.8$  years) and  $128.9 \pm 21.0$  in 80 women (mean age  $32.8 \pm 10.4$  years). But their result was only for clerical workers.

In the present study, SOC scale scores were significantly higher in men than in women, and age was positively correlated with SOC scale scores. These results agree with the results of Antnovsky [5], [26] and Matsui et al. [27]. On the other hand, inconsistent results have been reported in other studies. Takayama et al. [23] found no significant correlation of SOC scale scores with age, gender, occupation, marital status, or parental status among 410 community-dwelling persons in Tokyo. Bengtsson-Tops and Hansson [28] also found no significant correlation of SOC scale scores with age among patients with schizophrenia. Ogawa et al. [25] reported that there was no gender differences in SOC scale scores, and that an inverse correlation between SOC scale scores and age was found only in women. In the present study, the gender difference was less than 4 points in both of SOC29 and SOC13 and then the correlation coefficient between SOC scale scores and age was only 0.15 in SOC29 and only 0.16 in SOC13. It is possible that these values were statistically significant because of our large sample size. Thus, the association of SOC scale scores with gender and age found in our study should not be over-emphasized.

Results of comparisons in SOC scale scores by age groups and the life experiences groups indicated that socioeconomic status is important in relation to SOC. This finding is inconsistent with the report by Takayama et al. [23]. In our samples, the experience of being a manager and parenting children showed significant difference in SOC scale scores. There are several possible reasons for these differences. Experiences of working as a manager and parenting children would also give workers various experiences. Parents aim to reveal their children's power something unknown, in general, and tend to experience much success. It is probable that socioeconomic status, which influences life experience in the long term, also affects the development of SOC. Our results are partially consistent with previous reports that showed that the influence of socioeconomic status on SOC was important [29], [30].

TABLE II  
 COMPARISON OF SOC SCORES BY AGE GROUP AND THE LIFE EXPERIENCES (I.E. MANAGEMENT POSITION AND PARENTING) IN 2011

Management Status	Age Group (years)	Number of Subjects	Values SOC13 (mean $\pm$ S.D.)	Parenting Status	Age Group (years)	Number of Subjects	Values SOC13 (mean $\pm$ S.D.)
Manager	20-29	12	$53.8 \pm 14.6$	Child (+)	20-29	61	$54.9 \pm 13.5$
	30-39	166	$56.5 \pm 10.8^*$		30-39	1197	$56.2 \pm 12.1^*$
	40-49	710	$57.2 \pm 12.0^*$		40-49	1926	$56.3 \pm 11.9^*$
	50-59	906	$59.1 \pm 11.2^*$		50-59	1657	$57.7 \pm 11.0^*$
	60-69	106	$63.6 \pm 10.9$		60-69	388	$61.6 \pm 10.4^*$
	Total	1900	$58.4 \pm 11.6$		Total	5229	$57.1 \pm 11.7$
Non-Manager	20-29	1049	$52.8 \pm 11.8$	Child (-)	20-29	1000	$52.7 \pm 11.7$
	30-39	2946	$54.2 \pm 12.0^*$		30-39	1915	$53.2 \pm 11.8^*$
	40-49	2194	$54.6 \pm 12.0^*$		40-49	978	$53.1 \pm 12.1^*$
	50-59	1105	$56.0 \pm 11.3^*$		50-59	354	$56.1 \pm 12.5^*$
	60-69	321	$60.4 \pm 10.1^*$		60-69	39	$57.1 \pm 9.66^*$
	Total	7615	$54.7 \pm 11.9$		Total	4286	$53.3 \pm 11.9$

Statistical analysis of difference was performed by two-way ANOVA. Statistical significance as compared with the value of age 20-29 by post-hoc, \* $p < 0.05$ .

This study also examined the distribution of the life experiences among workers and the association of SOC scale scores with the life experiences. It was interesting to see that the life experiences are important factors of making stronger SOC among workers. This finding means that the life experiences that workers have got over could develop their stronger SOC in their life course. This finding agrees with the report by Lazarus [31], which suggested that young workers are more flexible and challenging for stress.

In terms of the life experiences, "Management position" and "Parenting children" were positively associated with SOC, whereas "No experience of those" was inversely associated with SOC. These results were observed in both men and women and confirmed by two-way ANOVA analysis. These results suggest that a problem-focused coping profile [31]-[35], such as "Active solution for problems" and "Seeking help for solution," are positively associated with SOC. Taking this into consideration, the results in the present study appear to explain why strong SOC helps reduce strain among workers. Namely, a stronger SOC allows one to cope with life stressors more appropriately [14]-[16].

On the other hand, another relationship should be considered. It is probable that SOC influences how one copes with stressors. Because SOC represents not a specific coping profile but the ability to choose an appropriate coping with the life experiences in each stressful situation [5], [26], the coping profile chosen in a particular situation probably depends not only on SOC but also on situation itself as well as the person's mental health status and various other factors [32]. It is difficult to determine which factor influences coping with the life experiences more because this study was based on the cross-sectional data. It is possible that multiple factors are involved and that SOC and coping with the life experiences of a worker develop interactively. These discussions may be important for the so-called secondary appraisal in stress process model [31]. It is also possible that SOC can be great resource for primary appraisal whether a worker perceives a situation is stressful [31]. This hypothesis should also be examined in future studies.

Controlling their workload, giving workers a sense of fulfillment, and providing a feeling of job-control are important to improve workers' mental health, in general. However, it is difficult to attain these goals using external resources because human resources are limited and work/employment status is changing in Japan. However, SOC can be a great internal resource to modify stress recognition and to an adequate way of coping with stress. Considering not only external resources but also SOC as an internal resource is important in the field of occupational health. Based on the results of the present study, the background and experiences that influence SOC should be clarified and examined in more detail, particularly by longitudinal studies.

The limitations of the present study also should be considered. This study was conducted in Tsukuba Research Park City in Japan, where educational and research institutions are concentrated at a particularly high rate.

Thus, there is sampling bias compared with subjects working on other environments in Japan. In particular, participants in this study were more likely to work as researchers and have masters or doctorate degrees. As a result, they would be better educated and earn a higher income. Furthermore, there is a discrepancy of the number of participants between genders (4,618 men and 1,097 women in 2001, 6,033 men and 3,482 women in 2011). These biases may limit the ability to generalize our results to all workers in Japan. Although the authors might have been able to weight our results to counter the differences in gender, the authors did not perform this type of analysis. However, the association between SOC and the life experiences did not differ between men and women. Thus, it is possible that the difference in sample sizes between genders did not affect the power of the study. Because the present study was an ecologic study in Tsukuba Research Park City and had a large sample size, the authors avoided including missing samples and were thus able to describe participants' backgrounds precisely. In terms of SOC, the authors analyzed men and women separately. These analyses would be very useful. Finally, because this survey was conducted as a part of mental health research in Tsukuba Research Park City, the authors cannot rule out the possibility of sampling bias, as workers who are interested in mental health are more likely respond to a survey.

The characteristics of SOC and the life experiences among Japanese workers in Tsukuba Research Park City were examined. SOC was stronger in men than in women, and increased with age, although these correlations were not strong. Participants who had experience working as a manager and parenting tended to be among group with strong SOC scale scores. In terms of the association between SOC and the life experiences, participants with strong SOC scale scores exhibited over coming difficulty in each life course. Although it is difficult to determine the causal relationship between SOC and the life experiences, it is possible that SOC and the life experience of coping profile develop interactively. These results may partially explain why a strong SOC contributes to reduce strain among workers.

It seems important to consider SOC as an internal resource for managing job stress in the field of occupational health. The background and experiences that influence SOC should be examined in more detail.

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