

The Reinforcement of Local Residents' Sense of Coherence: A Longitudinal Study

Sayuri Tanaka¹⁾, Taeko Masumoto¹⁾, Setsuko Horii²⁾,
Miwa Mitsuhashi²⁾, Atsuko Tokushige¹⁾, Megumi Fukumoto³⁾

ABSTRACT

Key Words:
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We conducted a longitudinal study by distributing self-administered questionnaires in 2003 and 2005 to 3,000 local residents aged 20 years or older, with the aim of clarifying factors affecting the development of Sense of Coherence (SOC). A total of 360 subjects who completed the questionnaires were analyzed. The change in SOC was determined using the Japanese version of the 13-item SOC scale. To examine the association of "the change in SOC" with "gender", "age", "educational achievement", "annual household income", "social interaction", "social support", "early childhood experiences", "adolescent experiences", "financial status up to the age of 20", "stressful life events", and "successful tension management", the Pearson's product-moment correlation coefficient was calculated, and a multiple regression analysis was conducted using items for which a correlation was found. As the results, the "financial status up to the age of 20" and "successful tension management" were extracted as factors related to the development of SOC. A good financial status up to the age of 20 affected the development of a weak SOC, and successful tension management affected the development of a strong SOC.

I. Introduction

Stress is inevitable for most of us living in modern society. However, there are some people who cope well and manage stress while others break down. As the most fundamental factor causing this difference, sense of coherence (SOC), which is a concept regarding one's ability to maintain health, is considered¹⁾. The SOC concept was put forward by the Israeli sociologist Antonovsk to answer the question of how some people manage to maintain health.

SOC can be measured by the SOC scale²⁾. By around 2005, approximately 500 empirical studies had been published in the world. The SOC scale measures an individual's internal strength to cope with difficulties in life³⁾. There are two types of study on SOC: one examines health effects based on the SOC levels, and the other examines how the environment affects these levels²⁾.

In Japan, after the introduction of the concept of SOC by Oda⁴⁾ in 1996, SOC research was developed mainly by Yamazaki et al^[5,6]. Recent SOC studies involved pregnant and breastfeeding women⁷⁾, working people⁸⁾, patients⁹⁾, and visiting nurses¹⁰⁾ to examine the relationships of SOC with stressful events, such as childbirth, work, and illness, and psychological aspects, such as a sense of burden and satisfaction. Despite such challenges, there are still insufficient data on how effective SOC is, whether an individual's SOC changes, and how the buffering effect differs according to dependent variables.

Masumoto³⁾ conducted an empirical study to investigate the physical, psychological, and social health status and the QOL of subjects aged 20 years or older using the Japanese version of the 13-item SOC scale (SOC-13)¹¹⁾, in order to apply the concept of SOC in local nursing activities. As the results, relationships of SOC with the psychological/social health status and the QOL were identified. Her study also revealed that a strong SOC contributes to enhance the psychological/

social health status and QOL, and the age, work, family status, and annual household income are factors associated with SOC. Based on these results, we investigated how an individual's SOC is improved and reinforced. Thus, we conducted a longitudinal study involving local residents aged 20 years or older using the SOC-13 scale, with the aim of clarifying factors affecting the development of a strong SOC. Since few studies have focused on local residents' SOC, this study serves as basic data to maintain and promote health, and contributes to the accumulation of empirical studies on SOC.

II. Methods

A longitudinal study approach which consisted of questionnaire surveys.

1. Conceptual framework

Figure 1 shows the conceptual framework of this study, which was developed based on Antonovsky's salutogenic model partly modified by Yamazaki^[12]. The salutogenic model is composed of two main conceptual models: 1) A strong SOC enables people to successfully manage tension; 2) SOC is shaped by positive life experiences, reinforced by successful tension management, and influenced by generalized resistance resources (GRRs) that affect its formation and development¹⁾. Our conceptual framework is based on the latter model. Successful tension management is a positive experience of overcoming one's stressful life events.

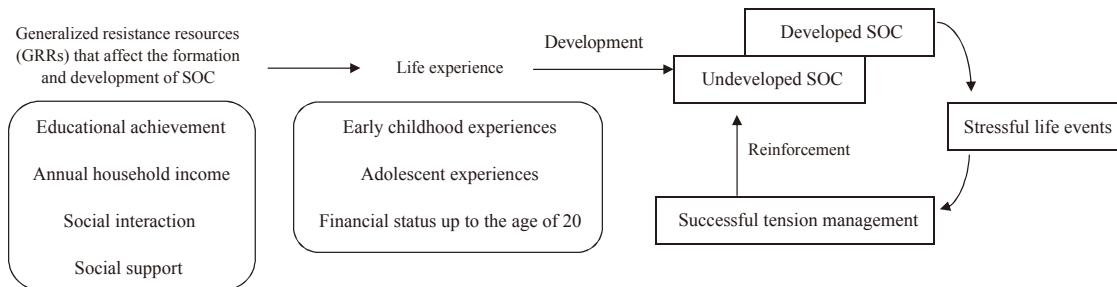
To identify factors affecting the development of a strong SOC, we evaluated the changes in SOC scores based on two surveys, and investigated stressful life events and their successful tension management. We also investigated the relationship between life experiences that shape SOC and GRRs that affect the formation and development of SOC. According to Antonovsky, GRRs can be classified into psychosocial, genetic, and constitutional aspects. Material, knowledge/intelligence, social support/ties, cultural stability, and religion were presented as psychosocial GRRs²⁾. In this study, we investigated educational achievements as knowledge/intelligence, the annual household income as material, and social support as social ties.

1) School of Nursing Science, Meiji University of Integrative Medicine, Kyoto, Japan

2) School of Nursing, Kyoto Prefectural University of Medicine

3) Former School of Nursing, Kyoto Prefectural University of Medicine

Corresponding author. Tel.: +81 771 72 1181; Fax: +81 771 72 0326.
E-mail address: sayutana@meiji-u.ac.jp (S. Tanaka)

**Figure 1. Conceptual framework of this study**

2. Subjects and Methods

One administrative region was selected from each of northern, middle, and southern parts of City A, and a total of 3,000 people aged 20 years or older were randomly selected from among the list of registered voters by obtaining support from a commission on election administration. To select subjects, we followed predetermined procedures based on regulations on access to the list of registered voters.

Prior to conducting surveys, we first sent a letter informing them of the study purpose, methods, and privacy protection, and sought consent with the return of a stamped self-addressed postcard. Self-administered questionnaire surveys were conducted in 2003 (survey 1) and 2005 (survey 2) involving subjects who consented to this study.

3. Ethical considerations

This study was conducted with the approval of the ethics committee of Kyoto Prefectural University of Medicine based on ethics guidelines for epidemiological research (public notice No. 2 announced by the Ministry of Education, Culture, Sports, Science, and Technology, and Ministry of Health, Labour, and Welfare on June 17, 2002). The subjects were informed of the purpose, methods, privacy protection, and publication of the study results in written form at the time the researchers sent their request for study participation. Questionnaires were sent to those who gave consent. Data were coded so as not to identify individuals.

4. Study period

April 2003 - March 2006

5. Variables

Survey items were as follows:

1) Basic attributes (Surveys 1, 2)

The survey included gender, age group (20s, 30s, 40s, 50s, 60s, 70s, and 80s or older), occupation (self-employed, service and sales workers, craft and related trade workers, clerical workers/technicians, owners/managers, professionals/freelance workers/other, full-time housewives, students, and unemployed), educational achievement (elementary school, junior high school, high school, specialty school, junior college/technical college, undergraduate/graduate school, and other), annual household income (¥0-1,000,000, ¥1,000,000-2,000,000, ¥2,000,000-4,000,000, ¥4,000,000-6,000,000,

¥6,000,000-8,000,000, ¥8,000,000-10,000,000, ¥10,000,000-13,000,000, ¥13,000,000-16,000,000, and ¥16,000,000 or over), family status (single elderly household, single non-elderly household, elderly married couple, non-elderly married couple, elderly person(s) and non-elderly married couple, married couple with unmarried children at home, married couple and parents, married couple with unmarried children and parents at home, and single parent household). The elderly are those aged 65 and older.

2) SOC (surveys 1, 2)

The Japanese version of the 13-item SOC scale was used in the surveys. The content, construct, and criterion validity of the SOC scale were confirmed by Antonovsky¹³⁾. The factorial and concurrent validity the Japanese version of the SOC scale was confirmed by Yamazaki et al¹⁴⁾. Scale items were rated on a 7-point scale, ranging from "Strongly agree" (7 points) to "Strongly disagree" (1 point), with higher scores (total score range: 13-91) indicating a higher level of SOC, i.e., greater ability to maintain one's health.

The concept of SOC consists of 3 key components: comprehensibility, manageability, and meaningfulness²⁾. Other studies examined each element separately⁸⁾; however, in this study, we supported the idea of Antonovsky: "Theoretically, three components can be separated, but they are dynamically interrelated."²⁾.

3) Other variables

Subscales other than basic attributes are as follows:

(1) Social interaction

Antonovsky reported that social interactions at work have a strong impact on SOC during adulthood²⁾. We, therefore, investigated the interaction between individuals and society. However, because there was no scale designed for local residents, the 18-item social interaction scale which was designed to investigate social well-being of people aged 60 or older was used¹⁵⁾. The total score was calculated as the sum of all yes=1/no=0 scores.

(2) Social support

Active and effective stress-coping and the presence of emotional support, i.e., social support, are closely related¹⁶⁾. Antonovsky also mentioned social support as one of the psychosocial GRRs that affects the formation and development of a strong and weak SOC. To examine subjects'

social support, the following 5 items on instrumental support were also included other than the 10 items of the emotional support network scale: "Is there anyone who financially supports you when you have money problems?", "Is there anyone who takes care of you when you are sick?", "Is there anyone who helps you moving?", "Is there anyone who gives you advice?", and "Is there anyone who helps you with your housework?"¹⁶⁾. The total score was calculated as the sum of all yes=1/no=0 scores.

(3) Life experience

The basis of a strong SOC is fostered up to the age of 20 by good life experiences¹¹⁾. We, therefore, investigated [early childhood experiences], [adolescent experiences], and the [financial status up to the age of 20] based on the process of building up SOC²⁾, which was proposed by Antonovsky, in order to understand people's lives before the age of 20. [Early childhood experiences] refer to those from infancy to early elementary school. The following 6 questions were developed and rated on a 5-point scale: "Did you think that you could rely on people around you?", "Do you think that you were loved by your parents and friends?", "When you wished to start something: did your parents help shape your future/did your parents motivate you/did your parents disregard you/did your parents reject you?". [Adolescent experiences] refer to those around the age of 20. The following 7 questions were developed and rated on a 5-point scale: "Did you have a clear vision about your future when you were 20 years old?", "Did you find it easy to solve problems when you faced difficulties?", "Did you have a favorable environment or the means to improve your job, academic performance, or everyday chores?", "Did you have anyone who could help you with your work, housework, or studies?", "Did you come across a person or book that has influenced your philosophy or sense of value?", "Have you ever felt joy or pride in your work, housework, or studies?", and "Do you think that your thoughts were respected in your work, housework, and studies?". Concerning the [financial status up to the age of 20], financial affluence before the age of 20 was rated on a 5-point scale.

(4) Stressful life events

The life event scale¹⁶⁾ was used in survey 2 to investigate stressful life events over the past 1 year. The total score was calculated as the sum of all yes=1/no=0 scores.

(5) Successful tension management

The level of satisfaction with stress management was rated on a 5-point rating scale.

6. Methods of analysis

The social interaction, social support, early childhood experiences, adolescent experiences, and financial status up to the age of 20 were scored, and their mean score was calculated by the subjects' basic attributes. The characteristics of the subjects were subsequently examined using either the t-test or ANOVA.

To extract factors affecting the development of a strong SOC, the change in SOC scores was calculated based on the

two surveys, and Pearson's product-moment correlation coefficient between the survey items was calculated. To examine the levels of impact of the survey items on the development of SOC, a multiple regression analysis was conducted using items for which correlations were found as independent variables, and the change in SOC scores as a dependent variable. Statistical analyses were performed using SPSS 15.0J for Windows.

III. Results

Of the 3,000 people aged 20 years or older, 530 people responded to the survey 1 (response rate: 17.7%). In survey 2, questionnaires were sent to subjects who responded to survey 1, and 422 subjects responded to survey 2 (response rate: 14.1%). This study analyzed data of 360 subjects (12.0%) who completed the SOC scale. The subjects' basic attributes, results of SOC scores and other variables, and factors affecting the development of a strong and weak SOC are as follows:

1. Summary of the subjects

The subjects included 167 males (46.4%) and 193 females (53.6%). Their mean age was 55.4 ± 15.3 years old (range: 20-91, male: 59.2 ± 14.5 , female: 52.2 ± 15.3 years old). The number of subjects in their 60s (27.8%) was the highest, followed by those in their 50s (20.3%). Subjects aged 60 or older accounted for 45.3% of the total subjects. Concerning the occupation, the number of "unemployed" subjects (n=69, 19.9%) was the highest, followed by "clerical workers/technicians" (n=64, 18.4%), and "full-time housewives" (n=63, 18.2%). Concerning the educational achievement, subjects who graduated "high school" (n=139, 39.4%) were the largest group, followed by "undergraduate/graduate school" (n=93, 26.3%), and "junior college" (n=38, 10.8%). Concerning the annual household income, subjects with "¥2,000,000-4,000,000" (n=94, 29.1%) were the largest group, followed by "¥4,000,000-6,000,000" (n=67, 20.7%). Concerning the family status, subjects who responded "married couple with unmarried children at home" (n=117, 32.8%) were the largest group, followed by "elderly married couple" (n=52, 14.6%, and "non-elderly married couple" (n=44, 12.3%).

The mean SOC scores of surveys 1 and 2 were 63.6 ± 12.1 (range: 27-91, male: 63.5 ± 11.6 , female: 63.6 ± 12.5) and 63.8 ± 12.7 (range: 28-90), respectively (Table 1). Although no significant differences were observed in SOC scores among the age groups, the score increased with age. Higher SOC scores were observed in owners/managers and professionals/freelance workers, as well as in elderly married couples. No order regularity was observed in the educational achievement and annual household income. Cronbach's α was 0.839 in survey 1 and 0.866 in survey 2. The mean social interaction score, which was investigated using the social interaction scale, was 14.4 ± 2.7 (range: 3-18), with Cronbach's α of 0.697.

Concerning social support, 10 (2.8%) and 55 (15.3%) subjects answered 0 and all questions, respectively. The mean social support score was 8.5 ± 4.7 . Cronbach's α of the emotional support network scale and instrumental support items was 0.897.

The results of the questions about life experiences showed that 43.5-82.2 and 45.1-66.4% of the subjects had favorable impressions about their [early childhood experiences] and

Table 1. SOC scores according to basic attributes

		n	(%)	Survey 1 (A)	Survey 2 (B)	Difference (B-A)	P-value
				M±SD	M±SD	M±SD	
	Total SOC scale	360		63.6±12.1	63.8±12.7	0.3± 8.6	
Gender	Male	167	(46.4)	63.5±11.6	64.6±12.1	1.1± 9.3	.089
	Female	193	(53.6)	63.6±12.5	63.1±13.1	-0.5± 8.0	
Age group	20s	22	(6.1)	56.4±13.0	55.8±15.6	-0.6± 9.6	
	30s	50	(13.9)	58.3±11.6	57.0±10.1	-1.3± 7.4	
	40s	52	(14.4)	61.7±10.1	61.9±12.2	0.2± 8.3	
	50s	73	(20.3)	61.2±11.6	62.0±11.7	0.9± 8.9	.850
	60s	100	(27.8)	66.6±10.9	67.2±11.1	0.6± 8.7	
	70s	57	(15.8)	69.8±12.2	70.3±12.8	0.5± 9.5	
	80s or older	6	(1.7)	69.2±11.4	71.7±11.6	2.5± 5.2	
Occupation	Self-employed	43	(12.4)	61.4±10.6	63.0±10.7	1.6± 8.9	
	Service and sales workers	33	(9.5)	61.3±12.2	61.5±13.1	0.2± 8.0	
	Craft and related trade workers	29	(8.4)	60.0±14.0	60.1±13.0	0.0± 7.5	
	Clerical workers/technicians	64	(18.4)	61.6±10.9	60.2±11.9	-1.4± 8.9	
	Owners/managers	13	(3.7)	68.7±12.1	71.6±10.3	2.9±14.9	.431
	Professionals/freelance workers/other	27	(7.8)	67.0±11.9	69.6±13.3	2.6± 6.5	
	Full-time housewives	63	(18.2)	65.3±11.4	64.6±12.3	-0.7± 7.3	
	Students	6	(1.7)	52.5±10.9	49.7±11.0	-2.8± 8.5	
Family status	Unemployed	69	(19.9)	66.1±12.4	66.2±12.3	0.1± 9.2	
	Single elderly household	14	(3.9)	65.6±17.5	64.3±15.0	-1.4±10.6	
	Single non-elderly household	23	(6.4)	54.7±12.7	56.0±15.3	1.4±10.3	
	Elderly married couple	52	(14.6)	69.8±11.2	69.8±12.3	0.0± 9.7	
	Elderly person(s) and non-elderly married couple	15	(4.2)	62.9±10.3	66.6±10.9	3.7± 6.2	
	Non-elderly married couple	44	(12.3)	64.1±11.7	63.9±10.0	-0.2± 6.7	
	Married couple with unmarried children at home	117	(32.8)	62.6±11.0	62.9±12.0	0.3± 8.4	.257
	Married couple and parents	17	(4.8)	65.0± 9.7	62.7±12.0	-2.3± 8.3	
Educational achievement	Married couple with unmarried children and parents at home	42	(11.8)	63.9±12.0	63.1±14.1	-0.8± 8.7	
	Single parent household	24	(6.7)	61.0±14.0	62.1±12.5	1.1± 7.9	
	Other	9	(2.5)	60.8± 8.9	67.8±12.7	7.0± 9.7	
	Elementary school	5	(1.4)	64.8±18.0	59.2±20.8	-5.6±10.7	
	Junior high school	41	(11.6)	62.9±11.9	64.2±13.0	1.4± 7.7	
	High school	139	(39.4)	64.2±12.1	64.3±12.4	0.1± 8.0	
	Specialty school	36	(10.2)	61.0±12.8	63.0±12.4	2.0±10.1	.543
	Junior college	38	(10.8)	62.8±11.1	63.1±12.6	0.3± 9.4	
Annual household income	Undergraduate/graduate school	93	(26.3)	64.0±12.0	63.6±13.0	-0.4± 9.1	
	Other	1	(0.3)	67.0± -	68.0± -	1.0± -	
	¥ 0-1,000,000	5	(1.5)	66.0±10.8	63.2±15.1	-2.8± 5.3	
	¥ 1,000,000-2,000,000	23	(7.1)	55.2±13.4	55.7±15.6	0.5±12.3	
	¥ 2,000,000-4,000,000	94	(29.1)	64.4±11.1	65.6±11.8	1.2± 9.0	
	¥ 4,000,000-6,000,000	67	(20.7)	64.7±12.0	64.9±12.1	0.2± 7.7	
	¥ 6,000,000-8,000,000	50	(15.5)	62.6±12.3	61.6±12.6	-1.0± 9.2	.841
	¥ 8,000,000-10,000,000	29	(9.0)	65.1±11.3	65.7±11.7	0.6± 6.5	
	¥ 10,000,000-13,000,000	28	(8.7)	64.1±11.1	63.4±12.8	-0.7± 6.5	
	¥ 13,000,000-16,000,000	14	(4.3)	63.0±14.1	63.8±13.9	0.8±10.0	
	¥ 16,000,000 or over	13	(4.0)	62.5±11.7	65.3±13.8	2.8±11.0	

[adolescent experiences], respectively. Cronbach's α of [early childhood experiences] and [adolescent experiences] was 0.781 and 0.792, respectively.

The mean score for [financial status up to the age of 20] was 2.7 ± 0.9 . One-hundred and sixty-eight subjects (46.7%) classified their financial status up to the age of 20 as "Average" and 65 subjects (18.1%) classified it as "Very wealthy/wealthy". The number of subjects who classified it as "wealthy" was greater in those in their 20s than male subjects ($p=0.000$) and those in their 50s. Subjects who have completed education beyond high school also classified it as "wealthy" compared with those who only completed elementary ($p<0.05$) or junior high school ($p<0.001$).

The mean number of stressful life events identified using the life event scale was 1.7 ± 1.8 . One-hundred and seven subjects experienced no stressful life events, and 1 subject experienced 9 stressful life events. The number of subjects who were "Very satisfied/satisfied" and "Very dissatisfied/dissatisfied" with their stress-coping behaviors was 190 (52.8%) and 36 (10.0%), respectively.

2. Factors affecting the development of SOC

To identify factors affecting the development of SOC, we calculated the change in SOC scores (0.3 ± 8.6) based on the two surveys. We subsequently calculated Pearson's product-moment correlation coefficient of "the change in SOC" with "gender", "age", "educational achievement", "annual household income", "social interaction", "social support", "early childhood experiences", "adolescent experiences", "financial status up to the age of 20", "stressful life events", and "successful tension management" (Table 2). A significant difference with "the change in SOC" was observed in "financial status up to the age of 20" (-0.115 , $p=0.013$) and "successful tension management" (0.146 , $p=0.007$). To examine the levels of impact on the development of SOC, multiple regression analysis was conducted using the "financial status up to the age of 20" and "successful tension management" as independent variables, and "the change in SOC" as a dependent variable. As shown in Table 3, a significant difference was observed in both the "financial status up to the age of 20" ($\beta=-0.134$, $p=0.013$) and "successful tension management" ($\beta=0.160$, $p=0.003$) ($R^2=0.039$, adjusted $R^2=0.033$).

IV. Discussion

We conducted a longitudinal study involving local residents using the SOC-13 scale, with the aim of clarifying factors affecting the development of SOC. The total number of respondents was 422 (14.1%) out of the 3,000 randomly-selected subjects aged 20 years or older. Since a bias would be expected in responses of subjects with health concerns, this was taken into account in the discussion.

1. Characteristics of the study subjects

A total of 360 subjects were analyzed (male: 46.4%, female: 53.6%). Their age distribution was: 20s (6.1%), 30s (13.9%), 40s (14.4%), 50s (20.3%), 60s (27.8%), 70s (15.8%), and 80s or older (1.7%). The male-female ratio and percentage of subjects in their 30s and 40s were similar to those of Japan¹⁷ and A City¹⁸. However, the percentage of subjects in their 20s accounted for only 6.1%, which is approximately 50% lower

than the mean percentage, and that of those aged 50 or older was 1.6 times higher than those younger than 49 years old, indicating that the survey results reflect the characteristics of the elderly population.

The mean SOC score of survey 1 was 63.6 ± 12.1 (male: 63.5 ± 11.6 , female: 63.6 ± 12.5), and that investigated in another SOC study⁹ involving postal workers (ranged in age from 10s to 70s) was 57.4 ± 11.2 (male: 57.3 ± 11.1 , female: 57.2 ± 11.4), showing that the mean SOC score for total subjects, both sexes, and employed subjects was higher in our study, meaning that our subjects had a greater ability to maintain health.

Although no significant difference was observed in SOC scores among age groups, the score increased with age. Another study stated that "life experiences build up SOC"¹⁹, and our results support this. However, a finding of Masumoto³: "the higher the annual household income, the stronger the SOC", was not seen in our study, necessitating further examinations.

The social interaction scale was designed to investigate people aged 60 or older. Since there was no scale designed for local residents at the time of our surveys, we employed this scale which was developed under the concept of: "Social interaction should be measured by the presence or absence of interpersonal relationships and the frequency of social involvements within the community"¹⁵. However, further examinations must be conducted with an appropriate scale.

2. Examination of factors affecting the development of SOC

The "financial status up to the age of 20" ($\beta=-0.134$, $p=0.013$) and "successful tension management" ($\beta=0.160$, $p=0.003$) were extracted as factors affecting the development of SOC, and "successful tension management" had a stronger impact on the changes in SOC. As SOC has been reported to be reinforced by "successful tension management"¹¹, our study also supports the theory of Antonovsky. In a study by Masumoto, "satisfaction with one's own health status" and "satisfaction with one's own life status" were identified as factors reinforcing SOC²⁰. She stated that people who are satisfied with their own health and life status have high self-esteem, which shapes a strong SOC. Similar to a sense of satisfaction, we speculated that experiences of successful stress coping, i.e., positive ways of thinking, may be an important factor affecting the development of a strong SOC.

On the other hand, the "financial status up to the age of 20" was extracted as a negative factor, and it was indicated that good financial status up to the age of 20 affects the development of a weak SOC. Approximately 50 and 18% of the subjects responded "Average" and "Very wealthy/wealthy", respectively, regarding their "financial status up to the age of 20". The number of subjects who responded "wealthy" was greater in subjects in their 20s and those who had completed education beyond high school than male subjects in their 50s, and those who had only completed elementary or junior high school. The results suggest a close association of the gender, age, and educational achievement with the "financial status up to the age of 20" that affects the development of SOC. However, the social background of the subjects that affects their "financial status up to the age of 20" was not consistent because it varies from the period of World War II, to rapid postwar growth, to the economic bubble. The historical background must be taken into account so that the "financial status up to the age of 20" can be more clearly identified as a

Table 2. Matrix of Pearson's product-moment correlation coefficients for factors related to the change in SOC (n=360)

	Change in SOC	Gender	Age	Educational achievement	Annual household income	Social interaction	Social support	Early childhood experiences	Adolescent experiences	Financial status up to the age of 20	Stressful life events	Successful tension management
Change in SOC	1.000											
Gender	-.091	1.000										
Age	.070	-.233 ***	1.000									
Educational achievement	-.023	-.016	-.275 ***	1.000								
Annual household income	.000	.149 **	-.163 **	.214 ***	1.000							
Social interaction	.006	.073	.116 *	.048	.072	1.000						
Social support	.079	.233 ***	-.187 ***	.020	.204 ***	.357 ***	1.000					
Early childhood experiences	-.074	.174 **	.001	.192 ***	.144 **	.235 ***	.299 ***	1.000				
Adolescent experiences	-.025	.143 **	-.103	.312 ***	.218 ***	.302 ***	.338 ***	.510 ***	1.000			
Financial status up to the age of 20	-.115 *	.192 ***	-.123 *	.288 ***	.171 *	.160 ***	.234 ***	.376 ***	.429 ***	1.000		
Stressful life events	-.050	.034	-.264 ***	.019	.049	-.074	.021	-.053	.019	-.002	1.000	
Successful tension management	.146 **	.020	.064	.012	.067	.354 ***	.390 ***	.183 **	.243 ***	.122 *	.153 **	1.000

* p<.05 **p<.01 ***p<.001

Table 3. The results of multiple regression analysis of factors related to the change in SOC (n=305)

Item	Standardized partial regression coefficient β	t-value ¹⁾ F-value ²⁾	P-value
Financial status up to the age of 20 (→ high)	-.134	-2.48 ¹⁾	.013
Successful tension management (→ high)	.160	2.96 ¹⁾	.003
<i>Adjusted R²</i>	.033	6.68 ²⁾	.001

factor affecting the development of SOC.

The results of multiple regression analysis showed R^2 and adjusted R^2 values of 0.039 and 0.033, respectively, indicating that approximately 4% of the variance in the change in SOC scores can be explained by the two independent variables "financial status up to the age of 20" and "successful tension management". However, it was also verified that survey items used in this study were not sufficient. A sampling of the subjects (aged 20 years or older) is considered one of the reasons.

Concerning the judgment of a low coefficient of determination, a value lower than 0.5 has been reported to be tolerable on comparing the levels of impact of independent variables on a dependent variable without using predictive values²¹⁾. However, the values obtained in this study were not satisfactory. Although Antonovsky presented some examples of GRRs that were stated in the conceptual framework section in this study, he did not specifically define them²⁾, suggesting that SOC is built upon multifactorial elements. Based on the results of the present study, further investigations must be conducted to establish a new framework that can be used to analyze relevant factors more objectively.

V. Conclusion

We conducted a longitudinal study involving local residents aged 20 years or older using self-administered questionnaires, with the aim of clarifying factors affecting the development of SOC, the ability to maintain health. As the results, the "financial status up to the age of 20" and "successful tension management" were extracted as factors related to the development of SOC. A good financial status up to the age of 20 affected the development of a weak SOC, and successful tension management affected the development of a strong SOC.

Community nursing activities involve not only individuals or families, but also groups and the entire community. Therefore, it can be said that this study, which involved community residents aged 20 years or older, suited the purposes of everyday nursing activities. Not only the elimination of factors impeding health promotion, but also reinforcement of the ability to maintain health is effective in nursing activities aiming at the promotion and maintenance of health. An effective method must be developed with further investigations.

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