

# Development of a short version of the sense of coherence scale for population survey

Taisuke Togari, Yoshihiko Yamazaki, Kazuhiro Nakayama, Junichi Shimizu

*J Epidemiol Community Health* 2007;61:921–922. doi: 10.1136/jech.2006.056697

A three-item sense of coherence (SOC) scale was developed, incorporating the definitions of the three subordinate concepts of SOC for use in population surveys. A cross-sectional internet survey was conducted in the latter part of July 2006. Cronbach's  $\alpha$  was 0.84. The correlation coefficient of SOC-13 and the newly devised University of Tokyo Health Sociology version of the SOC Scale (SOC-3-UTHS) was 0.51. As regards correlation with a health index, SOC-3-UTHS had a significant association, although this association was somewhat weaker than that of SOC-13. Therefore, certain levels of convergent and concurrent validities of SOC-3-UTHS have been indicated.

Sense of coherence (SOC) is a concept that reflects the ability to cope with stress, and is at the core of the salutogenesis theory. SOC consists of three subordinate concepts (manageability, meaningfulness and comprehensibility). Its proponent, Antonovsky,<sup>1</sup> developed two kinds of SOC scales: a 29-item version (SOC-29) and a 13-item short version (SOC-13).

However, both versions are too extensive to be used in large-scale multipurpose population surveys; therefore, Lundberg and Nystrom<sup>2</sup> developed a short three-item SOC scale (SOC-3). The Swedish version of SOC-3 was verified with regard to its association with childhood and present socioeconomic status, and its relationship with subjective health.<sup>3</sup> Surtees *et al*<sup>4</sup> clarified the predictability of the total mortality rate and cause-specific mortality (cardiac disease and cancer) by using the English version of SOC-3.

Schumann *et al*<sup>5</sup> created a German version of SOC-3 and examined its association with SOC-29. However, they recommended the use of the Brief Assessment of Sense of Coherence (BASOC), a new three-item version that was adapted from SOC-29, because it has better correlation coefficients than SOC-3, which is somewhat difficult to understand. BASOC consists of one item for meaningfulness, two items for comprehensibility and none for manageability. There are concerns that BASOC diverges from the definitions of SOC and its subordinate concepts. However, even SOC-3 has item content that does not adequately reflect these definitions.

Consequently, the purpose of this research was to develop a three-item SOC scale incorporating the definitions of Antonovsky's three subordinate concepts, so that it can be used in general population surveys.

## METHODS

An anonymous cross-sectional study was conducted via the internet in July 2006. The subjects were 1000 out of 439 814 individuals (253 416 men and 186 398 women) aged between 20 and 59 years, who were residing in the Tokyo metropolitan area and had registered to participate in surveys by the reliable research company that was the major portal site company in Japan. The following extraction procedure was used.

First, the 439 814 individuals were classified into eight groups according to sex and age (10-year intervals). Stratified random sampling was then performed with this classification and 15 060 individuals were selected. These individuals were sent an e-mail containing the URL of the survey website. Of those who accessed the URL and completed the survey, 125 in each group (amounting to a total of 1000) were chosen as subjects.

A new three-item SOC scale (the University of Tokyo Health Sociology version of the SOC Scale (SOC-3-UTHS)) was created, based on Antonovsky's<sup>1</sup> definitions of the subordinate concepts of SOC. Antonovsky defined "manageability" as the sense of freedom to use the resources needed to overcome various problems when faced with future hardships or problems in major life settings. He defined "meaningfulness" as the sense that challenges merit the investment of energy for at least some hardships or problems directly faced in the future. "Comprehensibility", according to Antonovsky, is the sense of being able to predict to some extent the hardships or problems that will be directly faced in the future.<sup>1</sup> These definitions were revised into plain statements and the validity of the content was confirmed by eight researchers. Cronbach's  $\alpha$  was 0.84 in this research.

The 5-point SOC-13 scale was used for the 13-item SOC scale.  $\alpha$  was 0.83 in this research. Health-related indicators were measured on three scales, which express quality of life, mental health and physical health, respectively, and which are important concepts in relation to SOC:<sup>6–7</sup> (1) self-rated health was measured on a 5-point scale ranging from "poor" to "excellent" in response to questions such as "how is your present health?" (2) The CES-D13 is a depression scale with 13 items rated on a 4-point scale. The version used here consisted of 12 items,<sup>8</sup> along with one positive item; a certain degree of reliability and validity have been confirmed for the Japanese version.<sup>9</sup> Here,  $\alpha$  was 0.90. (3) The number of diseases was measured by multiple answers from a list of 46 types of diseases, including acute diseases, injuries and dental problems.

This study was conducted at Rakuten Research, Tokyo, Japan, and was approved by the Japan Information Processing Development Corporation for privacy and security policy reasons. Respondents were informed that participation was entirely voluntary, and that data obtained from the survey would be analysed only in a depersonalised format. There is no competing interest in this study, as it is purely academic research.

## RESULTS

The SOC-13 score was somewhat lower than the score in the survey results for a Japanese national sample (37.9 (7.4), vs the Japanese standardised score (age 20–74 years) of 44.1 (8.9)).<sup>10</sup> Table 1 shows the coefficients of partial correlation between SOC-13 and SOC-3-UTHS, and a comparison of the association between health indicators and SOC scales.

**Abbreviations:** BASOC, Brief Assessment of Sense of Coherence; SOC, sense of coherence

**Table 1** Comparison of the association between health indicators and Sense of Coherence scales<sup>‡</sup>

	SOC-13	SOC-3-UTHS	SOC-3 manageability	SOC-3 meaningfulness	SOC-3 comprehensibility
SOC-13		0.514†	0.521†	0.424†	0.396†
SOC-13 manageability		0.337†	0.366†	0.248†	0.265†
SOC-13 meaningfulness		0.531†	0.494†	0.491†	0.398†
SOC-13 comprehensibility		0.408†	0.432†	0.312†	0.318†
SRH	0.365†	0.245†			
CES-D-13	-0.627†	-0.380†			
Number of diseases	-0.209†	-0.087*			

SOC, sense of coherence; SOC-3-UTHS, University of Tokyo Health Sociology version of the SOC scale; SRH, self-rated health.

\* $p < 0.01$ , † $p < 0.001$ .

‡Partial correlation coefficients controlled for sex and age.

## DISCUSSION

The SOC-13 score in this research is lower than the standard value nationwide, owing to a sampling error, because the present sample included a larger number of temporary workers or unemployed individuals than there were in the general population.<sup>11</sup> Moreover, the problem of measurement error in a survey method requiring web-based personal computer use, as opposed to a self-administered survey, cannot be negated.<sup>12</sup> Therefore, caution should be exercised with regard to the general application of the scores in this survey.

In this research, the values for correlation between subscales of SOC-13 and each SOC-3-UTHS item were clearly high, indicating a certain level of convergent validity.<sup>5</sup>

SOC-3-UTHS was less associated with CES-D and the number of ailments than SOC13. The existence of too strong an association between SOC and mental health has been mentioned in the past. However, association with SOC-3-UTHS remained at  $-0.38$ . One reason for this could be the techniques used for formats in devising the SOC-3-UTHS items.

This study had the following limitations: it was conducted via the internet, it was cross-sectional and the sample was limited to a local area in Japan. It would be preferable for future studies to use self-administered questionnaires, target randomly selected citizens and have a representative Japanese sample. Moreover, it is important to study the reproducibility, the predictability of health-related indicators from the perspective of construct validity and the stress-buffering effects by way of

longitudinal research. The semantic contents of this scale could have applicability in other countries as well as in Japan. Research on this SOC-3-UTHS measure is also expected to be conducted in other countries.

## ACKNOWLEDGEMENTS

This research was supported by a partial grant from the JSPS Grants-in-Aid for scientific research 2006 (no 18203028).

## Authors' affiliations

**Taisuke Togari**, Department of Health Sociology, Division of Health Science & Nursing, Graduate School of Medicine, The University of Tokyo, Tokyo, Japan and Japan Society for the Promotion of Science, Tokyo, Japan

**Yoshihiko Yamazaki**, Department of Health Sociology, Division of Health Science, Nursing, Graduate School of Medicine, The University of Tokyo, Tokyo, Japan

**Kazuhiro Nakayama**, St Luke's College of Nursing, Tokyo, Japan

**Junichi Shimizu**, Division of Nursing Sciences, Faculty of Health Sciences, Tokyo Metropolitan University, Tokyo, Japan

Competing interests: None declared.

Correspondence to: Mr T Togari, Department of Health Sociology, Division of Health Science, Nursing, Graduate School of Medicine, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan; ttogari-ty@umin.ac.jp

Accepted 5 January 2007

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## What this paper adds

- A short version of the Sense of Coherence (SOC) scale, which was sufficiently examined for reliability and validity for use in population surveys, could not be developed. SOC-3-UTHS, which was developed in this study, will be available for such surveys.

## Policy implications

- The SOC-3-UTHS scale will enable the verification of sense of coherence and the salutogenesis theory in large-scale and multipurpose population surveys. Discovery of new salutogenic resources for health promotion policy is expected.