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## THE STRUCTURE AND PROPERTIES OF THE SENSE OF COHERENCE SCALE

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**Abstract**—Previous work of the author presents a salutogenic theoretical model designed to explain maintenance or improvement of location on a health ease/dis-ease continuum. The model's core construct, the Sense of Coherence (SOC), was consciously formulated in terms which are thought to be applicable crossculturally. The SOC scale which operationalizes the construct is a 29-item semantic differential questionnaire, its design guided by Guttman's facet theory. A 13-item version of the scale has also been used. The purpose of the present paper is to present the extant evidence from studies conducted in 20 countries for the feasibility, reliability and validity of the scale, as well as normative data.

In 26 studies using SOC-29 the Cronbach alpha measure of internal consistency has ranged from 0.82 to 0.95. The alphas of 16 studies using SOC-13 range from 0.74 to 0.91. The relatively few test-retest correlations show considerable stability, e.g. 0.54 over a 2-year period among retirees.

The systematic procedure used in scale construction and examination of the final product by many colleagues points to a high level of content, face and consensual validity. The few data sets available point to a high level of construct validity.

Criterion validity is examined by presenting correlational data between the SOC and measures in four domains: a global orientation to oneself and one's environment (19 r's); stressors (11 r's); health, illness and wellbeing (32 r's); attitudes and behavior (5 r's). The great majority of correlations are statistically significant. All available published normative data on SOC-29 and SOC-13 are presented, data which bear upon validity using the known groups technique. Finally, the factor structure of the scale is considered, pointing to one clear dominant factor.

**Key words**—salutogenic model, Sense of Coherence, facet design, feasibility, reliability, validity

The major purpose of this paper is straightforward: to present the available evidence bearing upon the utility of the Sense of Coherence scale. (In its operational format it is called 'The Orientation to Life Questionnaire'.) Given the widespread interest in the scale, it seems appropriate to do so.

In 1979 I published a volume [1] which presented a theoretical model designed to advance understanding of the relations among stressors, coping and health. It was more thoroughly and systematically developed in a book which appeared in 1987 [2], whose Appendix contained the scale. This model purported to be radically different, in three central respects, from previous research in the stress process. First, its point of departure was to highlight the inadequacy of the *pathogenic* orientation which dominated all biomedical as well as social science disease research, i.e. the search for factors which led to heart disease, cancer, mental illness, etc. or, at its broadest, to 'breakdown', as I had put it in an earlier paper [3]. This orientation, at best, gave attention to coping mechanisms as buffers or moderators. Stressors, however, were so ubiquitous in human existence, I came to see, that the miracle and the mystery were that organisms ever survived for any length of time. A *salutogenic* orientation was proposed. I have in Ref. [2, Chap. 1] and elsewhere discussed in detail the implications of this orientation.

The core implication of salutogenesis led to the second radical departure from assumed wisdom. If adaptive coping is indeed the secret of movement toward the healthy end of the health ease/dis-ease continuum, then primary attention must be paid to what I had earlier called "generalized resistance resources" [4]. What came to concern me more and more, however, was a theoretical understanding of why such resources—wealth, ego strength, cultural stability, social support—promoted health. Or, to put it in other words, what did they have in common? I came to call the answer to this question the *sense of coherence* (henceforth, SOC). Resources were seen as leading to life experiences which promoted the development of a strong SOC, a way of seeing the world which facilitated successful coping with the innumerable, complex stressors confronting us in the course of living. The SOC is defined as follows:

a global orientation that expresses the extent to which one has a pervasive, enduring though 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; (2) the resources are available to one to meet the demands posed by these stimuli; and (3) these demands are challenges, worthy of investment and engagement [2, p. 19].

These three components are called comprehensibility, manageability and meaningfulness.

The third important difference is found in the crosscultural and crosssituational character of the SOC construct. Close consideration of the definition will show that the SOC contrasts to such concepts as self-efficacy, internal locus of control, problem-oriented coping, the challenge component of hardness, and mastery. These are strategies hallowed in particular cultures or subcultures, and may well be appropriate to particulate stressors. The SOC is, hopefully, a construct (and the items which constitute its operationalization) which is universally meaningful, one which cuts across lines of gender, social class, region and culture. It does not refer to a specific type of coping strategy, but to factors which, in all cultures, always are the basis for successful coping with stressors. This, of course, does not mean that different groups will have an equally strong average SOC.

#### CONSTRUCTING THE SOC SCALE

The next step, then, was to test the power of the theoretical model empirically. The reader interested in the many complex issues and arguments of the model would do well to refer to Ref. [2], as well as to later papers [5, 6]. The details of construction of the SOC scale are given in [2, chap. 4]. For present purposes, it is important to note that I was strongly influenced in this task by the facet theory of my friend and colleague, the late Louis Guttman [7].

In constructing the SOC scale, I made the conscious, theoretically-guided choice to have each scale item include four facets which describe a stimulus, and a fifth, the SOC facet, which express one of the three components (comprehensibility, manageability or meaningfulness) of the construct. Since the SOC is seen as a generalized orientation, I wanted as wide a variety of stimuli as possible to be represented in the questionnaire. The mapping sentence (the technical procedure which provides the systematic basis for item selection) finally arrived at allows 243 different profiles (combinations of elements of each of the five facets). No two items of the final 29-item scale have an identical facet structure.

After the usual procedures of consulting with colleagues, pretesting and revising, an SOC scale was ready for field testing. The results of the field test with a national sample of Israeli Jewish adults, using, alternatively, multiple choice and semantic differential formats (the latter turned out to be superior), proved promising and were published in 1983 in a local journal [8].

Having what seemed to me to be a sound theory and a good instrument, my own next step was to embark on a large-scale empirical study. This was a longitudinal study of the health consequences of retirement. For present purposes, however, it is far more important to say that the SOC scale appeared as an Appendix in my 1987 book [2]. Gratifyingly, it has attracted the attention of a fair number of

colleagues engaged in empirical research. To my knowledge, at present count, there are 113 persons or teams in 20 countries who have used or are using the SOC scale as a more or less central concept in their research. The present report is based on the published work of these colleagues, and is the first published discussion of the methodological issues with which any scale intended for repeated use must contend. References [8-45], presented in alphabetical order for the convenience of the reader, include the 38 publications which have appeared to date with empirical data relating to the SOC construct, though not all have data relating to the concerns of this paper. Reference will be made to the 23 doctoral dissertations and master's theses which have been completed and to unpublished data which colleagues have made available to me only when appropriate.

In sum, on the basis of a comprehensive theoretical model, a systematic closed questionnaire was developed, useable both for interview and self-completion. The SOC scale consists of 29 five-facet items; respondents are asked to select a response, on a seven-point semantic differential scale with two anchoring phrases. There are 11 comprehensibility, 10 manageability and 8 meaningfulness items. Thirteen of the items are formulated 'negatively' and have to be reversed in scoring, so that a high score always expresses a strong SOC. The published scale allows for the possibility of using a short form of 13 of the 29 items. Unless 'SOC-13' is noted, reference is always to SOC-29.

Though the core of this report will deal with questions of reliability and validity, there are other issues to which I would call attention which are of significance to the researcher and not often mentioned in methodological reports.

#### FEASIBILITY

I would start with a point on which I have no hard data, but which is nonetheless of significance. Interviewers on my own studies and colleagues in Israel and elsewhere have reported that respondents find the SOC scale items interesting and challenging. They provoke thought. This is both a moral issue—we owe a debt to respondents who take the time to cooperate in our research—and a practical issue, if we assume that thought is likely to contribute to lowering random response error.

On the other hand, items which require thought may take up valuable time and lead to non-response. Yet from all reports, completion of SOC-29, whether in interview or self-completion, has taken less than 15–20 min; SOC-13 saves some 5 min, since it takes time to get the hang of the format. The scale has been used at least once in a telephone interview with no apparent difficulty. As to non-response, in our study of retirement, out of 805 retirees and 260 respondents in the kibbutz control group, at most 25 persons failed to answer any given item. (Interestingly, the 'poorest' items in this sense among this group of

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elderly persons were those which asked about 'in the next ten years'. When failure to answer more than 4 of the 29 items was used as the mark of a respondent who could not be scored on the SOC, 1.1% of the retirees and 1.5% of the kibbutz members were so classified.

One particular problem which merits further investigation has been noted by several researchers: some respondents tend to give only extreme (1 or 7) responses. If indeed this is a problem, it could be handled by clearer instructions, a trial example, or insertion of a middle anchoring phrase.

To date, the SOC scale has been used in 14 languages: Afrikaans, Czech, Dutch (Flemish), English, Finnish, German, Hebrew, Norwegian, Rumanian, Russian, Serbian, Spanish, Swedish and Tswana. A total of almost 10,000 persons have completed SOC-29 and over 4000 SOC-13 (3568 and 1684, respectively, in published studies). These totals do not include respondents reinterviewed in longitudinal studies. More than half of these respondents are women. All social classes are represented. Unlike the experience with many scales, used primarily with the captive audience of college students, respondents have been adults of all ages, though a few studies have been of adolescents and children as young as 10 [46].

#### RELIABILITY

##### *Internal consistency*

The Cronbach alpha measure of internal consistency has been reported to me for 26 studies using SOC-29. The average alpha, unweighted for sample size, in the 8 published studies is 0.91 (range, 0.86–0.95); in the 3 theses/dissertations, 0.85 (range, 0.82–0.86); in the 15 unpublished studies, 0.88 (range, 0.83–0.93). The alpha in those studies which have used SOC-13 is somewhat lower, as expected with fewer items, but still acceptable. The average alpha, unweighted for sample size, in the 5 published studies is 0.82 (range, 0.74–0.91); in the 4 theses/dissertations, 0.81 (range 0.78–0.84); in the 7 unpublished studies, 0.78 (range, 0.74–0.84). Kalimo and Vuori [23], using a method developed by Tarkkonen, reported a reliability coefficient of 0.93 in their Finnish national study of 706 adults aged 31–44.

An instrument can be said to be reliable only with respect to a given population. The fact that consistently high internal consistency has been found in a considerable variety of populations, in different languages and cultures—though all Western—is of significance. It should also be noted that the fact that the scale includes the three SOC components does not lower internal consistency, an issue dealt with below in the section on factor analysis.

##### *Test-retest*

The theoretical model of the SOC construct postulates that a person's SOC is stabilized by the end

of young adulthood, thereafter showing only minor fluctuations, barring major changes in patterns of life experiences. This important theoretical commitment has yet to be tested. There have been relatively few test-retest reports. In our own study of Israeli retirees and a kibbutz control group [41], SOC-29 correlations were, respectively, 0.52 and 0.56 between the first and second interview scores ( $n$ 's = 639 and 228), conducted after one year, and 0.54 and 0.55 after two years ( $n$ 's = 587 and 213). The 6-month test-retest correlations in Coe's study [19] of 189 U.S. male patients at veterans' medical center clinics aged 55 and over were 0.80 for SOC-29 and 0.77 for SOC-13. A study of entering Israeli medical students [18] reported correlations of 0.76 after 1 year and 0.41 after 2 years ( $n$  = 33). Fiorentino [21] reports a one-year test-retest correlation of 0.78 among 71 U.S. factory workers, most of whom were women. In Radmacher's [38] study of 307 U.S. college students, 68% of whom were women, the 2-week test-retest correlation was 0.91. Unpublished data on 53 Serbian teacher training students show a one year test-retest correlation of 0.86; among 98 Dutch psychology students, retested after 6 weeks,  $r$  = 0.80; and among Afrikaaner farmers and businessmen, after five weeks,  $r$  = 0.97.

#### VALIDITY

There is, of course, no 'gold standard' measure of the SOC construct. Having consulted some half dozen texts and not a few methodological papers, I must confess to being confused about the varying definitions of different types of validity which abound in the sociological and psychological literature. The core question is whether the SOC scale measures what it purports to measure. I can, then, only organize the discussion as I understand the types of validity and leave it to the reader to judge the evidence.

##### *Content, face and consensual validity*

Given the facet approach to construction of the scale, I would submit that it indeed constitutes a reasonably representative sample of the theoretical aspects of the SOC construct. An item was only included after three colleagues, familiar with the theory, had independently concurred that it indeed referred cleanly to one and only one of the three SOC components. Each item, as noted above, also was constructed to express one and only one element of each of the four stimulus facets. Finally, each item was intentionally chosen to represent a distinct profile. Thus deductively, the construction of the scale promoted content validity. Inductively, *post hoc* examination of the scale suggested face validity in that it was adequately representative of the theoretical construct.

Consensual validity, estimated by the reaction of colleagues to the published scale, seems high. To the best of my knowledge, there have been only a few cases in which SOC items have been modified. Thus,

Table 1. Correlations of the SOC with measures serving as tests of criterion validity (from published studies)

1st author	Ref. No.	Sample	N	Variable	r
<i>A. Generalized perceptions of self and environment</i>					
Dahlin	20	Swedish hi-risk childhood adults	148	Internal Locus of Control	0.44
Nyamathi (SOC-13) <sup>a</sup>	35	U.S. minority homeless women	581	Self-esteem	0.63
Petrie <sup>b</sup>	37	New Zealand pain patients	107	Self-esteem	0.49
Williams	45	U.S. nurses	162	Hardiness	0.50
Antonovsky <sup>c</sup>	11	Israeli adolesc.	418	Anxiety: trait state (routine) state (exam)	-0.61 NS -0.31
Carmel	18	Israeli medical students	93	Anxiety: trait	-0.69
Hart (SOC-13)	22	U.S. undergrads.	59	Anxiety: trait	-0.75
Radmacher	38	U.S. undergrads.	307	Anxiety (MAACL-R)	-0.47
Margalit (SOC-13)	34	12-16 year old Israelis	742	Eysenck personality: neuroticism psychoticism extraversion	-0.36 -0.17 0.23
Margalit (SOC-13)	34	12-16 year old Israelis	742	Fam. Env. Scale: relationship personal growth system maint.	0.26 0.22 0.20
Margalit	33	Kibbutz mothers, fathers of disabled, control group	127	Fam. Env. Scale: relationship personal growth system maint.	0.32 0.11-0.51 NS-0.24
<i>B. Perceived stressors</i>					
Carmel	18	Israeli medical students	93	Stressor perception: at entry	-0.32
			68	end of 2nd year	NS
Carmel (SOC-13)	16	Kibbutz members	230	Recent life events	-0.22
Larsson <sup>d</sup>	26	Swedish factory supervisors	217	Work load	-0.33
Radmacher	38	U.S. undergrads.	307	Work control	0.28
Ryland (SOC-13)	39	U.S. faculty	284	Perceived stressors: life events	-0.24
				Global Inventory	-0.67
Williams	45	U.S. nurses	162	Perceived stressors: life stress	-0.24
				work stress	-0.40
				Perceived stressors: life events	-0.27
				Global Inventory	-0.56
<i>C. Health and wellbeing</i>					
Coe	19	U.S. male patients, 55+	240	6 months predict to perceived health	0.47
Dahlin	20	Swedish hi-risk childhood adults	148	Global health eval.	0.46
Fiorentino	21	U.S. prod. workers	118	Health status	0.19
Ryland (SOC-13)	39	U.S. faculty	284	General wellbeing	0.62
Sagy	41	Older Israelis: retirees kibbutz control	805	Global health index	0.42
			260	Global health index	0.32
Carmel (SOC-13)	16	Kibbutz members	230	Physical wellbeing	0.21
Carmel (SOC-13)	16	Kibbutz members	230	Functional ability	0.12
Coe	19	U.S. male patients, 55+	240	6 months predict to: disability days	-0.35
				bed days	-0.31
				doctor visits	-0.22
				hospt., ER contact	NS
				Physical symptoms	-0.26
Larsson <sup>d</sup>	26	Swedish factory supervisors	217	Syst. blood pressure	-0.31
				Diast. blood pressure	-0.17
				Cholest., triglyc., and glucose	NS
				Serious. of illness	-0.39
Williams	45	U.S. nurses	162	Psychol. wellbeing	0.23
Carmel (SOC-13)	16	Kibbutz members	230	6 mos. predict to: morale (ment. health)	0.71
Coe	19	U.S. male patients, 55+	240	Psychosom. (SCL-90)	-0.70
Dahlin	20	Swedish hi-risk childhood adults	148	Psych. symptoms	-0.59
Larsson <sup>d</sup>	26	Swedish factory supervisors	217	Subj. wellbeing	0.40
				Subj. health status	0.25
Nyamathi (SOC-13) <sup>e</sup>	35	U.S. minority, homeless women	581	Health measures: emot. distress somatic complaints	-0.63 -0.46
Petrie <sup>b</sup>	37	New Zealand pain patients	107	Millon Inventory: wellbeing	0.64
				distress	-0.50
Dahlin	20	Swedish hi-risk childhood adults	148	Quality of life	0.76
Sagy	42	Israeli retirees	805	Life satisfaction	0.54

*[continued]*

Table 1—*continued*

<i>r</i>	1st author	Ref. No.	Sample	<i>N</i>	Variable	<i>r</i>
<i>D. Attitudes and behaviors</i>						
0.44	Hart (SOC-13)	22	U.S. undergrads.	59	Interpers. support	NS
0.63	Margalit (SOC-13)	34	12-16 year old Israelis	742	Social skills	0.27
0.49	Nyamathi (SOC-13) <sup>c</sup>	35	U.S. minority, homeless women	581	Soc. support avail.	0.14
0.50	Antonovsky	9	Israeli retirees	805	Attit. to ret. losses	-0.39
-0.61	Larsson <sup>d</sup>	26	Swedish factory supervisors	217	Attit. to ret. gains	NS
NS					Prob. focus coping	0.29
-0.31					Emot. focus coping	-0.53
-0.69	Nyamathi (SOC-13) <sup>c</sup>	35	U.S. minority, homeless women	581	Hi-risk behaviors	-0.24
-0.75	Sagy	42	Israeli retirees	805	Activity level	0.26
-0.47	Notes					

<sup>a</sup>Used a language simplified, 5 point version of SOC-13.

<sup>b</sup>Used 5 point version of SOC-29.

<sup>c</sup>Used an early 17-item version of the SOC.

<sup>d</sup>Used a 19-item version of the SOC.

for example, Nyamathi [35], in her study of homeless, minority women, found it appropriate to use SOC-13, to simplify some of the wording, and to use five rather than seven alternatives. Strumpfer (unpublished) took the same approach in his study of South African coloured farm workers. I should also note that a few colleagues have taken issue, in correspondence, with two items (nos 10 and 17), both of which refer to changes in life. They were troubled, on theoretical grounds, by the fact that the less one reported changes, the higher one scored. Given the considerable variety of populations studied and the number of researchers engaged in using the published scale, it seems reasonable to conclude that the scale as it stands has content validity. This does not, of course, mean that there will be no eventual modifications of the scale.

#### *Construct (convergent and discriminant) validity*

Prior to my publication of the SOC scale, two independent attempts were made to build scales designed to measure the construct, based on its presentation in my earlier book [1]. The researchers, being North Americans, were, I believe, influenced by a cultural emphasis on control and mastery. Rumbaut and his colleagues at the University of California, San Diego, developed a 22-item scale. In unpublished data, they report a correlation of 0.64 between their scale and SOC-29 in a study of 336 undergraduates. Dana [47] found a correlation of 0.72 between the two measures among 179 undergraduates. Dana's study also reported a significant though much lower correlation of 0.39 with the 40-item scale developed by Payne [48].

In this context, one further study should be mentioned. Colby, an anthropologist at the University of California, Irvine, and his colleagues have developed the construct of 'Adaptive Potential', consisting of three components: adaptivity in the ecological world, altruism in the social world, and creativity in the interpretive world. The construct is measured by a 104-item scale. In an unpublished paper, Colby carefully discusses the conceptual congruence and difference between adaptive potential

and the SOC. In a study of 488 undergraduates, he found a correlation between the two measures of 0.75 (using five item-response alternatives on both measures).

I should further note that I have explicitly emphasized [2, pp. 63–64] that a closed questionnaire is only one legitimate method of measuring the SOC. I noted that I would welcome structured interviews, ethnomethodological descriptions or projective tests to measure the SOC. Nonetheless, to date only one such attempt, using a sentence completion approach, is being made in Germany.

To the best of my knowledge, no data are available which bear on the question of discriminant validity, which would test whether the SOC is unrelated to constructs with which it has no theoretical affinity. Hart, however, commenting on the lack of a relationship between SOC and an interpersonal support measure, writes that this "may be interpreted as evidence to support the discriminant validity of the SOC scale", i.e. the SOC "functions independently of socially based stress resistance resources" [22, p. 144].

#### *Criterion validity*

As noted, there is no 'gold standard' for the SOC. The crucial question is whether the SOC scale does correlate (preferably predictably) with phenomena, external to the SOC, with which the theory argues it should be correlated. Table 1 presents information from *published* studies which bear on the question of the relation between the SOC and other measures with which there are theoretical grounds to expect that they would be correlated. In order not to drown the reader in data, I have given only the essential details about each study. Thus, for example, details about the measures used are omitted; levels of significance are not presented, except for non-significance. Nor do I present data where statistical techniques other than zero-order correlations, e.g. multiple regressions, are used to report the relations between the SOC and other variables. Readers are urged to consult the original publications for precise information (and, of course, to learn about the studies,

few of which were conducted in order to study the criterion validity of the SOC).

As is well known, editors have an unfortunate bias against publishing papers with negative results. This should be kept in mind. Nonetheless, reviewing the data from theses, dissertations and correspondence about as yet unpublished studies which have reached me, my sense is that the picture presented by the published data is not misleading.

Table 1 is organized in four parts, though it was not always clear that a given datum should be placed in one or the other. Part A refers to those measures which express a global orientation to oneself and one's environment, as does the SOC. Of the 19 correlations between these measures and the SOC, only two are not statistically significant: those with the state anxiety and the family environment system maintenance scales. The consistently high correlations with trait anxiety are striking, as is the correlation of 0.50 with hardiness, the construct which perhaps has greatest affinity with the SOC.

Part B refers to perceived stressors. All but one (medical school stressors at the end of the second year of studies) of the 11 correlations are significant. Of particular note are the high correlations with Sheridan's Global Inventory of Stress. As Williams [45, p. 183] points out, the GIS and SOC "encompass many of the same things ... [the GIS] may also be picking up the antitheses of those qualities or characteristics found in people with personality characteristics which mediate between stress and illness ... these two instruments appear to be measuring similar phenomena in a 'mirror image'."

The SOC construct, as noted, emerged out of a salutogenic orientation. It was designed to predict and explain movement toward the health end of the health ease/dis-ease continuum. Part C of Table 1 includes all published data which bear upon the

correlation between the SOC and some measure of health, illness and wellbeing. Of the 32 correlations, only those for emergency room contacts and hospitalization in one study, and for levels of cholesterol, triglycerides and glucose in another are not significant. The large majority of measures are based on self-report, which raises the question of possible contamination, an issue of great import but which cannot be discussed here. It should also be noted that though the salutogenic model assigns a primary causal role to the SOC (though it rejects a simplistic linear mode of thought and considers feedback), the present paper excludes consideration of the issue of causality.

Finally, Part D presents data from five studies relating to attitudes and behavior. It is of interest that the two correlations with a social support measure are very low. It would take us too far afield to discuss the theoretical issue raised, but one brief point may be in place. In our discussion of the strong negative relationship between the SOC and perceiving losses in retirement [9], we noted that a person with a strong SOC adopts attitudes and behaviors which are functional for coping. She or he activates those resources which are seen as appropriate when the need arises. We may also note the correlations with problem (positive) and emotion (negative)-focused coping, which surely need exploring.

#### *Known groups*

The primary purpose of Tables 2 and 3 is to provide readers with normative data. They present the SOC means and standard deviations of a variety of samples which have appeared in published studies. But the data also allow us to relate briefly to the idea that a valid scale should produce differences on mean scores among samples that would be expected, on theoretical grounds, to differ.

Table 2. Normative data from published studies using the SOC-29

Sample	N	Mean	SD	CVA*	Ref. No.
Swedish hi-risk childhood, 41-56	148	152.6	22.0	0.144	20
Kibbutz fathers (controls)	67	152.5	14.5	0.095	33
Israeli retirees: men, age 65	428	152.2	22.8	0.187	41
Kibbutz men, age 65	130	152.2	22.8	0.150	41
Kibbutz mothers (controls)	67	151.0	15.3	0.101	33
Israeli medical students at entry	93	150.2	16.5	0.110	18
Finnish grp. adult sample, men	340	150.2	21.9	0.146	24
Kibbutz fathers, disabled children	67	146.3	19.4	0.133	33
Finnish grp. adult sample, women	329	146.1	22.7	0.155	24
Kibbutz women, age 60	130	145.7	20.2	0.139	41
Israeli retirees: women, age 60	368	145.0	23.4	0.161	41
Czech controls in cancer study	153	145.0	—	—	25
Kibbutz mothers, disabled children	67	140.1	22.6	0.161	31
U.S. male pts. at VA clinics, 55+	240	139.6	36.4	0.260	19
Finnish univ. students, 52% women	117	138.6 <sup>b</sup>	23.1	0.167	43
New Zeal. chronic pain, 78% women	107	138.6 <sup>b</sup>	14.9	—	37
Israeli Jewish national sample	297	136.5	19.8	0.145	2
U.S. production workers, 76% women	111	133.0	26.5	0.199	21
Israeli cerebral palsy, 18-33	34	131.1 <sup>c</sup>	0.8	—	30
U.S. undergraduates, 68% women	307	129.5	24.5	0.189	38
Czech cancer patients	17	117.0	—	—	25

\*CVA: coefficient of variation (standard deviation/mean), a measure of heterogeneity of responses in a sample [49, p. 88].

<sup>b</sup>Used 5 alternatives. Here multiplied by 7/5.

<sup>c</sup>Item mean and SD given in original. Here former multiplied by 29.

Table 3. Normative data from published studies using the SOC-13

Sample	N	Mean	SD	CVA <sup>a</sup>	Ref. No.
Kibbutz (religious), mean age 46	105	68.7	10.0	0.146	16
U.S. university faculty, men	145	66.7	9.8	0.147	39
U.S. university faculty, women	157	66.4	10.6	0.160	39
Kibbutz (secular), mean age 43	125	66.4	9.9	0.149	16
U.S. male pts at VA clinics, 55+	240	61.9	17.8	0.288	19
Israeli adolescent girls	371	59.2	11.0	0.186	34
Israeli adolescent boys	371	58.6	10.4	0.177	34
U.S. undergraduates	59	58.5	12.1	0.207	22
U.S. minority homeless women	581	55.0 <sup>b</sup>	0.7	—	35

<sup>a</sup>CVA: coefficient of variation (standard deviation/mean), a measure of heterogeneity of responses in a sample [49, p. 88].

<sup>b</sup>Used wording simplification and 5 point scale. Item mean and SD given in original. Here former multiplied by 13 and by 7/5 to be comparable to other means.

It is striking that the large sample of minority homeless women, many of whom are also addicted to drugs, have the lowest SOC-13 score. (An unpublished thesis on a similar population [50] reports an even lower SOC.) At or near the bottom of the SOC-29 scores are Czech cancer patients, Israeli young adults with cerebral palsy, New Zealand chronic pain patients and older American patients in V.A. clinics. At the other extreme, scoring high, we find kibbutz members, American university faculty, and Israelis who have reached on-time retirement age. Undergraduates, it might be noted, tend to score on the low side.

While the picture presented by these data must be considered as preliminary, it does, I believe, tend to support the validity of the scale.

#### FACTOR STRUCTURE OF THE SOC SCALE

In the detailed discussion of the construction of the SOC scale, I wrote [2, p. 87] "The reader is duly warned, then, that the present version of the SOC scale is not wisely used to study component interrelations." In light of the facet-theoretical design of the measure, there is no basis for deriving distinguishable subscores for comprehensibility, manageability and meaningfulness. This point was noted above in the discussion of internal consistency. To check this contention, I had conducted a smallest space analysis [7] and a factor analysis on the original Israeli national sample data. Both demonstrated that no separate meaningful factors could be identified using the present version of the scale.

None of the published studies report a factor analysis of the SOC scale. Given the significance of the issue, mention will be made of several unpublished data sets [51]. Coe [19] reports the results of a factor analysis on the responses of 189 U.S. veterans. On the original baseline survey data, a principal components analysis produced one true factor (eigenvalue 12.45, 42.9% of variance). All 29 items loaded on this factor at 0.40 or above. "An oblique (oblimax) rotation produced somewhat different results (but the same interpretation). . . . We conclude that content of items can be sorted into separate factors, but the MA, ME and C dimensions are present in each of them" (Coe, personal communication).

Pottie's [52] methodological thesis was devoted to the SOC scale, and particularly to its factor analysis. She used a Flemish sample of 297 adult education students, 84% women. The English summary by K. Haepers notes that "Inspection of the principal factor solution showed that all the SOC-items—except two (item 10 and 17)—are loading high on the first factor. The eigenvalue of this factor is . . . 7.06." The report concludes that "The Flemish SOC questionnaire is an internal consistent instrument to measure the SOC as a global construct in which certain 'accents' can be highlighted."

In a paper based on a study of 488 American undergraduates submitted for publication, Colby *et al.* write "Principal component factor analysis also did not help identify the latent factors of these two scales" (the SOC and another scale). In a paper which has just come to my attention, Flannery and Flannery [53, p. 418] factor analyzed the data from 95 adult education students. The analysis "suggests that a single factor solution may be the most parsimonious explanation." Frenz, Carey and Jorgensen factor analyzed the data from a heterogeneous population ( $n = 373$ ). "The initial analysis," they write, "identified five factors, which were highly correlated with each other. Subsequent analysis of the factor scores suggested the scale has one core factor . . . [and] appears to be a unidimensional instrument measuring SOC." Holm *et al.*, using data from 545 American undergraduates, write "Although it is possible to separate the SOC inventory into two highly correlated factors, it appears that the best solution consists of one global factor."

#### CONCLUSION

The sense of coherence construct, the core of a complex theoretical model, refers to a global orientation to one's inner and outer environments which is hypothesized to be a significant determinant of location and movement on the health ease/dis-ease continuum. The SOC scale was developed, using a facet-theoretical design, to operationalize this construct and provide one way of testing this hypothesis. Its use to date in scores of studies in many cultures and with reference to a great variety of problems in the area of health and wellbeing is, of course, gratifying to me. It expresses the sense of colleagues that the

tool is a useful one. But of more importance, this use has provided a substantial set of data which bears upon the feasibility, reliability and validity of the scale.

It has been the purpose of this paper to share with the reader the evidence to date which, I believe, leads to the reasonable conclusion that the scale is indeed one that can and should be used. Provided, of course, that the researcher is persuaded that the construct is *theoretically* appropriate to studying the problem of concern.

Having said this, four concluding remarks are in place. First, there is no doubt in my mind that in 5 years or so, sufficient evidence will have accumulated to provide the basis for a second generation SOC scale. For the time being, however, I would strongly urge researchers to use the scale as it stands, to allow comparability, rather than for individuals to make this or that change to 'improve' the questionnaire.

Second, as I have noted above, a closed questionnaire is only one legitimate tool. Much as advances have been made in the Type A Behavior Pattern construct by using a standard interview and a closed questionnaire, it would be useful to have alternative techniques to study the SOC.

Third, the SOC scale was developed to measure the construct as a global orientation, and explicitly not to measure the components of comprehensibility, manageability and meaningfulness. Some researchers, attracted on theoretical grounds by one or another of these components, have calculated scores on subscales. As the evidence indicates, this is impermissible on technical grounds. It would indeed be a contribution were separate measures of the components to be developed, with relatively low intercorrelations. (For a theoretical discussion of the dynamics of component interrelations, see [2, pp. 19-22].)

Finally, interested readers might wish to know that a SOC international network has been established which includes colleagues actively engaged in empirical research using the SOC. These contacts have been the source for the data presented in this paper. A periodic newsletter is issued, designed to share data and ideas, establish subnetworks of colleagues working in the same area, call attention to publication, etc.

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