



Antonovsky's Short 13-Items SOC Scale in a Swedish Community Cohort-Considering the Selection of the 13 Items from the Original 29 SOC Scale

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Citation: Mattisson C, Gräsbeck A, Bogren M and Horstmann V. Antonovsky's short 13-items SOC scale in a Swedish community cohort-considering the selection of the 13 items from the original 29 SOC scale (2020) Edelweiss Psyi Open Access 4: 7-14.

Received: Feb 07, 2020

Accepted: Feb 17, 2020

Published: Feb 24, 2020

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Abstract

Background: Antonovsky's Sense of Coherence (SOC) scale, published with 29 items, is considered a social concept, also used in mental health research. A scale using only 13 of the items has been suggested, without explanation as to how these 13 items were selected.

Aim: To compare how total scores based on 29 and 13 and the remaining 16 items could be explained by sociodemographic and mental health factors and to explore how each of the 13 items relates to these factors in comparison to the remaining 16 items. **Methods:** The full SOC questionnaire was completed by 1,164 subjects in the Lundby cohort study in 1997. Using linear regression, socio-demographic factors were evaluated as predictors for the sum-scores of the 29 and 13 items. Relationships to the socio-demographic factors and mental disorders were evaluated for each item; the results for the 13 items were compared to the results for the remaining 16 items. The distributions of the responses for the 13 items were compared to the distributions of the responses for the 16 items. **Results:** The sum-scores related differently to age; generally, positively among the 13 items, but negatively for the 16 excluded items. Differences between the 13 and the remaining 16 items were observed in relations to gender and partnership, somewhat less to socio-economic status, minor differences in relation to mental disorders. The distributions of the responses of the items were highly negatively skewed, more so among the 13 items. **Conclusion:** No obvious explanation for the selection of the 13 items was found. Different results may be obtained regarding associations to socio-demographic factors depending on whether the 13 items or all 29 items are used. The highly skewed distributions of responses indicate that more research would be valuable in order to assess SOC.

Keywords: Sense of Coherence, SOC-13, SOC-29, Sociodemographic factors, Mental disorders, Population-based sample.

Abbreviations: SOC-Sense of Coherence, GAD-General Anxiety Disorder, DSM-Diagnostic and Statistical Manual of Mental Disorders.

Introduction

More than 30 years ago Antonovsky introduced the concept Sense of Coherence (SOC) [1-3]. He defined SOC as "global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that the stimuli derived from one's internal and external environments are structured, predictable and explicable; the resources are available to meet the demands posed by these stimuli and these demands are challenges, worthy of investment and engagement". It was a salutogenic point of view emphasizing a subject's protective resources and factors promoting health.

The original 29-item SOC scale is comprised of three subscales [1,3]:

- **Comprehensibility (11 items):** The extent to which the social world is interpreted as rational, understandable, structured, ordered and predictable; a dimension referring to cognitive controllability of one's environment.
- **Manageability (10 items):** The extent to which individuals consider resources to be personally available to help them cope adequately with demands, stimuli, and problems.

- **Meaningfulness (8 items):** This motivational component assesses whether a situation is appraised as challenging and whether it is worth making commitments and investment to cope with it.

The intention of Antonovsky was to let the total sum-score represent the concept of SOC rather than the subscale sum-scores.

Antonovsky's SOC focuses on the origins of health and well-being rather than disease and as such constitutes the basis of the salutogenic model [1]. People with a strong SOC seem to have the capacity of dealing better with stressors of everyday life and to use available resources to cope with these stressors [4]. This ability of coping may lead to better health for people with a higher SOC. Although the evidence for the effect of SOC on health is yet insufficient, groups with low SOC seem particularly vulnerable to difficulties in life, leading to poorer lifestyle choices, increased disease incidence and increased mortality [5-8]. SOC has been linked to quality of life and perceived health, in particular mental health, in two systematic reviews [9,10].

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SOC seems to have a modifying influence on mental health outcomes. In a study of people who had faced early childhood deprivation during the Holocaust, SOC moderated the association between early life deprivation and post-traumatic stress in old age [11]. A strong SOC could therefore be an important coping resource for remaining healthy [12]. Furthermore, SOC could be modified through intervention programs, [13,14]. A Finnish study compared employees aged 31-51 years with burnout-symptoms with regard to two different interventions with similar aims of reflecting the participants values, goals, beliefs and patterns of behaviour. After 9 months both intervention groups showed a significant increase in SOC compared with the control group [14].

A 12-month lifestyle intervention program was implemented among persons with psychiatric disabilities aged 22-71 years. Structured activities with sufficient level of challenge contributed significantly to an increase in SOC, compared with the control group [13]. Even if the number of studies is small, the results suggest that interventions can influence SOC levels, also at old age, and that promotion of health might benefit from strengthening of SOC [15]. SOC can also be regarded a social concept that relates to socio-demographic factors [3]. According to Antonovsky's theory, SOC develops along with experiences through childhood, adolescence and adulthood and could in favorable circumstances reach a stable level after the age of 30 years [3]. Volanen, et al., [16] found that SOC increased with age and was most stable among the oldest subjects.

Gender differences have been reported from SOC research. Some earlier studies found stronger SOC among boys and men compared to girls and women [17]. Furthermore, women have been reported to be less happy, less educated, less employed, and more distressed with a lower SOC [18]. However, gender differences in SOC have not been consistently reported [19]. Another study concluded that good social relationships contribute to SOC [20]. Partnerships through cohabitating and marriage may influence SOC and generally, those subjects living with a partner had higher SOC-scores [16]. SOC has been shown to be related to socio-economic factors [20]. A positive but small relationship between income and SOC among women was reported from Canada [21]. According to Geyer, a strong SOC is shared by people who are well educated and have higher socio-economic positions [22].

Consequently, he proposed that high SOC should predominantly be present in higher social classes and suggested that the SOC measures social status [22]. Deprived areas are often associated with low social integration and poor social control. Low social integration may lead to a sense of meaninglessness, which can give rise to poor mental health, suicide and violent death [23]. However, Remes, et al. found that SOC can moderate the association between area deprivation and General Anxiety Disorder (GAD) in women [12]. Mental disorders have been found to be associated with SOC; a strong SOC was negatively associated with anxiety, depression and post-traumatic stress disorder [10]. Similar results were reported by Frenz, et al., (1993) [24] and Henje Blom, et al., (2010) [25].

Furthermore, lasting characteristics such as personality traits have been shown to be involved, influencing both SOC and depression. The same study showed that SOC was strongly negatively correlated with levels of trait anxiety [26]. It has been suggested that depressive symptoms are strongest related to the Meaningfulness factor and anxiety symptoms strongest to the Comprehensibility factor [27]. Furthermore, SOC is related to psychotic disorders and substance use disorders as well [28]. Low SOC has been found to be a predictor of alcohol dependence [29]. However, one study found that a strong SOC was significantly related to not reporting dependence in 4,630 current drinkers [30]. Antonovsky suggested that 13 of the 29 items could serve as a shorter version of the original scale [1]. Thus, the SOC scale exists in at least in two forms; the original 29-item SOC scale (SOC-

29) and the 13-item SOC scale (SOC-13). SOC-13 has five items concerning Comprehensibility, four items concerning Manageability, and four concerning Meaningfulness. To the best of our knowledge Antonovsky himself choose the 13 items but it is unknown why these particular items were chosen. Pallant and Lae (2002) [31] recommended the 13-item scale when time or space limitations prevented use of the full scale. Eriksson and Lindström (2005) [32] showed that the 29-item SOC scale and the 13-item SOC scale version are valid and reliable instruments to assess how people manage stressful situations and stay well. However, Jakobsson (2011) [33] did not find acceptable construct validity for the 13-item SOC and remarked that this version may not be representative of SOC theory.

The aim of this study was to determine if a reasonable explanation could be found why the particular 13 items were selected for the SOC-13 scale. This was done by comparing how well socio-demographic variables and mental disorders related to sum-scores of SOC-13, SOC-29 and sum scores of the excluded 16 items (SOC-16), and how well the sum-scores correlated with each other. Furthermore, we investigated if the single items from SOC-13 related stronger to sociodemographic and mental health variables than the single items from SOC-16. Finally, for each item we investigated the distribution of the responses in order to search for differences between the two sets of items.

Material and Methods

The Lundby Study

The Lundby Study is a prospective study of mental health in an unselected population consisting of subjects living in the south of Sweden. It started 1947, comprising 2,550 subjects living in a geographically defined area. In (1957) 1,013 subjects who had moved into the area were added to the cohort; subsequently the cohort comprised 3,563 subjects. Since then, no subjects have been added [34]. All subjects were followed in later field-investigations, regardless of domicile. In the follow-up in 1997, the last field-investigation, the population included 1,797 living subjects aged 40-96 years.

All subjects were investigated by a semi-structured interview. In 1997, introductory letters were sent to the subjects in the cohort. Subjects were contacted by telephone, and appointments were scheduled with participants. Experienced psychiatrists conducted the interviews at home, starting with questions about the individual's physical and mental health and contact with healthcare providers. Mental health assessment included substance abuse disorder, also alcohol use disorder. Additional information was obtained through relatives or other key informants, such as general practitioners and from official registers including hospital case notes (psychiatric and non-psychiatric) [35].

Sociodemographic Assessment

Gender and age were registered. Civil status is here categorized into living alone or living with a partner. The subjects were categorized into three socio-economic levels: blue-collar workers (unskilled, semiskilled and skilled workers); white-collar workers (assistant non-manual employees, employed and self-employed professionals, higher civil servant and executives) and self-employed workers (other than professionals).

Diagnostic Assessment

The subjects were classified according to the Diagnostic and Statistical Manual of Mental Disorders, (DSM-IV) and according to the Lundby diagnostic system, a diagnostic system adapted to fieldwork [35,36]. In the present study, the diagnoses were grouped into the following categories: depressive disorders, anxiety disorders, somatoform disorders, organic disorders, psychotic disorders, dementia, alcohol use disorders and personality disorders.

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Depressive disorders correspond roughly to the diagnosis of major depression in the DSM-IV and anxiety disorders comprised of generalized anxiety disorders, panic disorders, and social phobia. Somatoform disorders included undifferentiated somatoform disorder and pain disorders. Organic disorders included syndromes with cognitive deficits, such as memory difficulties, slow or delayed reactions, and concentration difficulties (e.g. cognitive disorder NOS). Psychotic disorders in the Lundby Study included schizophrenia and other psychotic disorders including manic states. Dementia included multi-infarct dementia, Alzheimer's disease and other varieties of dementia. Alcohol use disorders were comprised of alcohol use disorder and alcohol dependence. Personality disorders correspond to personality disorders according to the DSM-IV.

SOC Assessment

The Antonovsky SOC scale has been translated into many languages and has been in use worldwide [10]. A Swedish version of the original 29-item SOC and the 13-item scale has been in use since 1990 and was utilized in the present study [37]. Each item in the SOC questionnaire is scored from 1 to 7, the total score ranges from 29 to 203; higher scores indicate stronger SOC. The questionnaire was given to participants after the interview with a request for it to be completed later and returned by mail [35]. Thus, the psychiatrist was not present when the participant completed the questionnaire.

Statistics

The socio-demographic variables in the sample were described using medians and quartiles, as well as with absolute and relative frequencies. Sum-scores for SOC-13, SOC-16 and SOC-29 were calculated. Linear regression models were used to investigate how demographic factors could explain the variations in the sum-scores of the SOC-13 and SOC-29. The relationships between the sum-scores for SOC-13, SOC-16 and SOC-29 and age were calculated using Spearman's correlation. The relationships between the sum-scores for SOC-13, SOC-16 and SOC-29 and socio-demographic variables other than age were analyzed using the Mann-Whitney U-test and the Kruskal-Wallis test. Spearman's correlations were used to evaluate the relationships between age and the individual items.

The Mann-Whitney U-test and the Kruskal-Wallis test were used to investigate the relationships between the individual items in the SOC questionnaire and socio-demographic factors and mental disorders. We calculated mean, standard deviation, and skewness of the responses for each item and compared the means of these characteristics for the items in SOC-13 with the means of the characteristics for the items in SOC-16. This was done for individuals without and with a mental diagnose, and for all individuals together. We investigated the prevalence of missing answers on the SOC-13, SOC-16 and SOC-29 in relation to socio-demographic factors. P-values<0.05 were considered significant.

Results

Participants

In 1997, 1,559 of 1,779 (87.6%) participants were interviewed and 1,164 (65.4%) completed the SOC questionnaire. The sociodemographic factors and the point prevalence of mental disorders are presented in **Table 1**. Median age was 60 years (inter quartile range, 51-69 years). Most participants were living with a partner (72.7%). Less than 10% were self-employed, around 40 % were white-collar and around 50% were blue-collar workers. The most common prevalent mental disorders were personality disorder (6.0%), alcohol use disorder (5.4%), anxiety disorder (5.0%) and depressive disorder (3.2%). More women were living alone and suffered more from depressive, anxiety and somatoform disorders compared to men. On the other hand, alcohol use disorder was more prevalent among men. The questionnaire was not completed for 395 persons, who were considered as drop-outs.

The drop-outs were often males, unmarried and blue-collar workers. Slightly fewer subjects among the dropouts in comparison to those that filled in the SOC were diagnosed with a mental disorder; however, the prevalence of alcohol use disorder was somewhat higher among dropouts compared to participants (6.8% vs. 5.4%).

	Males (n=539)	Females (n=625)	Total (n=1164)
Age, Years,	60	61	60
Median (q1-q3)	(51-69)	(51-69)	(51-69)
Partnership, n (%)			
Living alone	101 (18.7)	217 (34.7)	318 (27.3)
Living with a partner	438 (81.3)	408 (65.6)	846 (72.7)
Socio-economic classification, n (%)			
Self-employed	67 (12.4)	37 (5.9)	104 (8.9)
White-collar	208 (38.6)	263 (42.1)	471 (40.5)
Blue-collar	264 (49.0)	325 (52.0)	589 (50.6)
Clinical diagnoses, n (%)			
Depressive disorders	8 (1.5)	29 (4.6)	37 (3.2)
Anxiety disorders	19 (3.5)	39 (6.2)	58 (5.0)
Somatoform disorder	8 (1.5)	17 (2.7)	25 (2.1)
Organic disorder	10 (1.9)	2 (0.3)	12 (1.0)
Psychotic disorder	9 (1.7)	6 (1.0)	15 (1.3)
Dementia	5 (0.9)	2 (0.3)	7 (0.6)
Alcohol use disorder	56 (10.4)	7 (1.1)	63 (5.4)
Personality disorder	30 (5.6)	40 (7.4)	70 (6.0)

Table 1: Sociodemographic factors and point prevalence of mental disorders (n=1164) in the 1997 investigation.

Relationships between SOC Sum-Scores, Socio-Demographic Factors and Mental Disorders

Relations between socio-demographic factors and mental disorders on the one hand and sum-scores on SOC-13, SOC-16 and SOC-29 on the other are presented in **Table 2**.

	SOC-13	SOC-16	SOC-29
Age^a			
Correlation	0.054	-0.058	-0.01
(p-values)	-0.066	-0.052	-0.968
Gender^b			
Males	74	88	162
Females	74	87	161
(p-values)	-0.086	-0.031	-0.145
Partnership^b			
Living alone	74	85	160
Living with a partner	75	88	163
(p-values)	-0.197	(<0.001)	-0.003
Socio-economic classification			
Self-employed ^c	75	88	165
White-collar	74	87	162
Blue-collar	74	87	161
(p-values)	-0.393	-0.048	-0.125
Clinical diagnoses^b			
Depressive disorders	66	76	139.5
Anxiety disorders	69	81	150
Somatoform disorder	65	76.5	138
Organic disorder	59	71	132.5
Psychotic disorder	67	80.5	152
Dementia	55	71	133.5
Alcohol use disorder	69	83	152
Personality disorder	67.5	81.5	152

Note: a-Spearman correlation, b-The Mann-Whitney U-test, c-Kruskal-Wallis test. Individuals with a clinical disorder had significantly lower scores for all three scales.

Table 2: Spearman's correlations between the sum-scores on SOC-13, SOC-16, SOC-29 and age. Median sum-scores of SOC-13, SOC-16 and SOC-29 for gender, partnership, socio-economic classification and mental diagnoses.

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No significant relationships were obtained between SOC-13 and the socio-demographic factors, except for age, where there was an almost significant ($p=0.066$) positive correlation. In contrast, the sum-score for SOC-16 was negatively and almost significantly correlated with age ($p=0.052$); but SOC-16 was also significantly correlated with the remaining three sociodemographic factors, giving higher values to men, those living with a partner and self-employees. Partnership was the only factor significantly correlated with SOC-29, giving those with a partner higher value. Individuals with a diagnosis of a mental disorder had significantly lower scores on all three SOC scales. The diagnoses with the lowest SOC scores were organic disorder, dementia, somatoform disorder and depressive disorder. Linear regression models relating the sociodemographic variables to SOC-13 and SOC-29 sum-scores as dependent variables were analysed. The regression coefficients for age and partnership were significant (0.07, $p=0.022$ and 1.62, $p=0.040$, respectively) for the SOC-13 sum-score. Only partnership was significantly associated with the SOC-29 sum-score (regression coefficient 5.16, $p=0.001$), whereas age was not significantly related to the SOC-29 sum-score after controlling for partnership.

Relationships between Sociodemographic Variables and Each of the 29-Items

The significances of the associations between the items in the questionnaire and the socio-demographic variables are presented in **Table 3**, separated into the three subscales. Much strong significances were found in the relationships to age for both SOC-13 and SOC-16, within all three subscales.

	Age ^a	Gender ^b	Partnership ^a	SES ^c
Comprehensibility SOC-13				
Item 5	*** (+)			*
Item 12				
Item 19	** (+)			*
Item 21	* (+)			*
Item 26				
Comprehensibility SOC-16				
Item 1	*** (+)	* (F)		*
Item 3	** (+)			*
Item 10	** (+)	*** (M)	***	
Item 15	* (-)	*** (M)	***	
Item 17	* (-)	*** (M)	*	
Item 24	* (-)		**	
Manageability SOC-13				
Item 6	*** (+)			
Item 9	*** (+)	* (F)		
Item 25	*** (+)	*** (M)		
Item 29				
Manageability SOC-16				
Item 2	* (-)	** (F)		
Item 13				
Item 18	*** (+)	*** (M)		*
Item 20				
Item 23	** (-)	* (F)		
Item 27	* (-)			
Meaningfulness SOC-13				
Item 4		*** (F)		
Item 8	*** (-)	* (F)	*	
Item 16	*** (+)	* (F)		
Item 28			**	
Meaningfulness SOC-16				
Item 7				
Item 11	*** (-)			
Item 14			***	
Item 22	*** (-)			

Note: F-females have larger values; M-males have larger values. Participants living with a partner or self-employed have higher values for all items. The sign of the correlations with age are given within the parenthesis. a: Spearman's correlation, b: Mann-Whitney U-test, c: Kruskal-Wallis test; * p -value<0.05, ** p -value<0.01, *** p -value<0.001.

Table 3: Significant relationships between each item from SOC-29 and sociodemographic variables. SOC-13 items are presented before SOC-16 items for each subscale.

However, the directions of the relationships differed, among SOC-16 most items with negative correlations appeared. Gender significances were observed in the comprehensibility subscale only for some items from SOC-16, mainly giving males higher values. For items from the manageability subscale, no clear difference was found between SOC-13 and SOC-16 in relations to gender. Finally, females generally scored higher on items in the SOC-13 for the meaningfulness subscale. There were significances for partnership on SOC-16 items in comprehensibility; and in both the SOC-13 and SOC-16 for meaningfulness. No strong significances for socio-economic status were detected, neither for SOC-13 nor SOC-16. Some weak associations were found in the comprehensibility scale, where blue-collar workers had higher values both on SOC-13 and SOC-16.

Relationships between Mental Disorder Diagnoses and Each of the 29 Items

The majority of the items related significantly to a mental disorder with no clear distinction between SOC-13 and SOC-16 items. For depressive disorder, anxiety disorders or somatoform disorder there were no substantial distinctions in correlations to SOC-13 and SOC-16 items. Depressive disorder in the manageability subscale was slightly more correlated to SOC-16 items than to SOC-13 items. Organic disorders showed stronger correlations in SOC-16 items from the meaningfulness subscale.

Psychotic disorders correlated more often to SOC-13 items in the meaningfulness subscale than to SOC-16 items. Few significant correlations were found for dementia, whereas personality disorders correlated higher to items in SOC-13 from the manageability subscale (**Table 4**). Pearson's correlation coefficient between sum-scores for SOC-13 and SOC-16 was 0.817. SOC-13 had a somewhat lower correlation (0.576) to SOC-16 for the comprehensibility subscale. The correlation between SOC-13 and SOC-16 was 0.593 for the manageability subscale, and 0.717 for the meaningfulness subscale.

In **table 5** we compare the mean values of the statistical characteristics mean, standard deviation and skewness of responses for items belonging to SOC-13 and to SOC-16 for individuals with and without a mental diagnose, and for all individuals together. In general, the means of items belonging to SOC-13 were higher than the means for items belonging to SOC-16; the standard deviations were more or less equal. The skewness values revealed that the distributions were generally more negatively skewed for items in SOC-13. Mean values were in general lower and the distributions of the items were less skewed for those with a mental illness. The number of missing values was low. A tendency towards more missing values for items in SOC-13 compared to items in SOC-16 was found (result not shown). In total, 1,090 subjects had no missing values, 63 had 1 missing value, 5 had 2, 3 had 3, and 3 individuals had 4 missing values.

There were in total 94 (0.28%) missing values. The occurrence of missing values was not related to gender, partnership, or socioeconomic status. However, a significant positive correlation was observed between age and the number of missing values; those with no missing values had a mean age of 59.9 years, while those with 1-4 missing values had a mean age of 66.2 years ($p<0.001$).

Discussion

The aim of the present study was to explore why the specific 13 items were selected for the shorter version of the SOC. According to the theory, SOC could be seen as a way of viewing life leading to the development of coping strategies in stressful situations. Subjects with good generalized resilience resources could be expected to frame the world as organized and understandable and could be fit to meet stressful conditions. SOC could be considered a social concept used in the field of mental health.



	Depressive disorder	Anxiety disorder	Somatoform disorder	Organic disorder	Psychotic disorder	Dementia	Alcohol use disorder	Personality disorder
Comprehensibility SOC-13								
Item 5				*				**
Item 12	**			*				**
Item 19	***				*			
Item 21	*	***	**		**	*		**
Item 26								
Comprehensibility SOC-16								
Item 1			*		*		*	*
Item 3	*							
Item 10	**							*
Item 15	*	*		*				
Item 17								
Item 24	*	*	*					**
Manageability SOC-13								
Item 6	*			*			*	**
Item 9	*				**			***
Item 25	*	***	**					***
Item 29		**		**	**		*	
Manageability SOC-16								
Item 2							*	
Item 13	*	**						*
Item 18	**				**		*	
Item 20	**	*	*					**
Item 23	*				**			
Item 27	*		**	*	*			*
Meaningfulness SOC-13								
Item 4				**		*	*	
Item 8	*	**			**			
Item 16	*	***	**	**	***		*	
Item 28	*	*			**	*		*
Meaningfulness SOC-16								
Item 7	*	**	*	*	*		*	
Item 11				**		*		
Item 14	***	***		***	**		**	**
Item 22	*	**		**	*	**		

Note: Mann-Whitney U-test, Subjects with a mental disorder had significantly lower scores compared to healthy subjects, except for item 18 where subjects with alcohol use disorder scored higher than healthy subjects, * p-value<0.05, ** p-value<0.01, *** p-value<0.001.

Table 4: Significant relationships between each item from SOC-29 and mental disorder diagnoses. SOC-13 items are presented before SOC-16 items for each subscale.

	SOC-13	SOC-16
No mental diagnosis, n=957		
Means	56,736	51,742
Standard deviation	13,855	13,899
Skewness	-12,978	-8,959
At least one mental diagnosis, n=207		
Means	51,218	47,693
Standard deviation	17,117	17,006
Skewness	-7,613	-5,091
All, n=1164		
Means	55,747	51,024
Standard deviation	14,659	14,667
Skewness	-12,108	-10,148

Table 5: Means of the statistical characteristics mean, standard deviation, and skewness for responses of items in SOC-13 and in SOC-16, for persons without and with mental illness as well as for all individuals.

Socio-demographic factors and mental health have been shown to be related to SOC scales [12,20]. Therefore, it was important to determine if the 13 items selected for the shorter SOC were more sensitive to variations in socio-demographic factors and mental health compared to the remaining 16 items.

This was accomplished by comparing the relationships between the socio-demographic factors and the total scores on the SOC-29, SOC-13 and SOC-16 and by studying the relationships between the socio-demographic factors and individual items within the three subscales manageability, comprehensibility and meaningfulness. The relationships between SOC and mental disorders were investigated in a similar way. Finally, it was interesting to see if the distributions of the responses for the 13 items differed from those for the responses on items in SOC-16. We found different relationships between the sociodemographic factors (gender, partnership, socioeconomic status and age) and total SOC scores.

SOC-13 did not relate significantly to any of the factors, SOC-29 related to age, whereas the total scores constructed by SOC-16 showed significant relationships with all factors considered. The study of the individual items clarified where the differences occurred. The values of items belonging to SOC-13 were in general higher than the values of items belonging to SOC-16 and the distributions were more negatively skewed for items in SOC-13. Researchers have found different results regarding associations between age and SOC. It has been suggested that the second and third decade of life are crucial formative years for the development of SOC [38].

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However, it has been debated whether SOC remains stable. Some has found that SOC tends to increase with age over the lifespan [32]. However, on the other hand older age can be associated with losses, loneliness and deteriorating health, suggesting SOC could decrease; no significant association was found between age and the SOC-29 sum-score. In our study, several items were highly significantly related to age; SOC-13 was generally increasing with age, whereas SOC-16 was decreasing with age. Accordingly, when these two sum-scores were added no significant correlation remained between age and the sum-score for SOC-29. Due to the differences in the relationship to age found here for the specific items in the questionnaire, it appears that the association between age and SOC is not well captured by the sum-scores.

Higher SOC-scores were detected for males in comparison to females among Swedish adults aged 60 and 70 years [4]. We found no significant relationships between gender and the SOC-13 and SOC-29 sum-scores; however, males had slightly, but significantly higher sum scores than females using the SOC-16 (see table 2). The reason for the lack of significance was understood by looking at the specific items. Males scored higher on some items but females higher on other items; by creating the sum-scores these differences vanished. The gender differences appeared particularly within the subscales; males had higher values than females on the comprehensibility subscale, but not on the manageability subscale; males had lower scores on the meaningfulness subscale (see table 3). It is not easy to explain these differences.

A Finnish study found that psycho-emotional resources rather than socio-economic circumstances associated with SOC in both men and women [16]. Thus, neither sum-scores of SOC-13, SOC-16 nor SOC-29 were suitable to address gender differences; the sub-scales or possibly specific items should be investigated to understand the relationship between gender and SOC. Partnership seems to influence SOC. A study based on SOC-13, concluded that good social relationships and high SOC are influencing each other [16]. Furthermore, a study using SOC-29 reported that family-related variables contributed to the explanation of SOC [39]. This is in line with our results; partnership gave higher values on most items in the questionnaire. The manner in which relationships are perceived can in particular influence the way the comprehensibility subscale is answered.

However, the strongest statistical associations were found in this study for items belonging to SOC-16; indicating that SOC-16 is probably better than SOC-13 to study the influence of partnership on SOC. SOC was thought to be stronger for people raised in a stable home with clearly defined cultural norms [1]. However, earlier findings from the Lundby Study showed that subjects with what was considered a high-risk childhood had SOC scores comparable to the scores of those from the middle class [37]. It is possible that the strength of SOC is shaped by life experiences in childhood and adolescence but can be modified by environment such as working conditions [38].

An earlier study suggested that the stability of an individual's SOC might be open to the influence of position in the occupational hierarchy, even after the age of 30 years [40]. Clear associations have been reported between SOC scores and social classes, in particular occupation. Prospective population studies have shown that lower socio-economic position is leading to poorer health among people compared to those at higher socio-economic levels [41]. Unskilled occupational positions have been shown to increase the risk for lower SOC scores relative to professional and semi-professional occupations [17]. SOC scores are highest among those with a high social position and good education [22]. There exists evidence that stabilization of SOC associates with stabilization of the labour market position, moreover, the fluctuations of SOC seem to depend on the type of trajectory throughout adult life [42].

Thus, a more favorable development of SOC could be seen among those whose trajectories were directed upward. The associations of poor SOC with unemployment were evident, whereas the effects of fixed-term employment seemed to be neutral or even positive. In the present study, we found weak relationships to socioeconomic status and no profound differences between sum scores for SOC-13 and SOC-29. However, as the sum-score for the SOC-16 was significantly related to socioeconomic status it is not obvious that SOC-13 or SOC-29 are more informative than SOC-16. Sweden is a fairly equal society at the time of the study, which may explain the weak correlations found here.

Furthermore, with the median age of 60 in this study many participants were above the retirement age and thus out of occupation and enjoying a fairly generous retire system. It has been suggested that SOC does not capture a salutogenic construct but could rather be used as a measure of emotionality [43]. SOC has been found to have an inverse relation to mood and anxiety disorders [25]. The findings are in accordance with studies reporting that strong SOC is associated with a reduced risk of psychiatric disorders [8]. In the present study we found strong associations between mental disorders and all three SOC-scales considered here. No clear distinction could be seen between SOC-13 and SOC-16.

The distributions of the responses for the 13 items differed from the responses for the items in SOC-16 in such a way that the responses of the items were generally higher for items in SOC-13 and the distributions of responses more negatively skewed. It is noteworthy that the means were generally very high and close to the maximal value of 7, for instance 5.57 and 5.10 among all individuals for SOC-13 and SOC-16, respectively. This implies that most individuals use only the highest values and not the full range from 1 to 7, and in particular so for items in SOC-13. Further analysis showed that in 6 of the 13 items more than 70% answered 6 or 7; while in 5 of 16 items more than 70% answered 6 or 7 (see Figure 1).

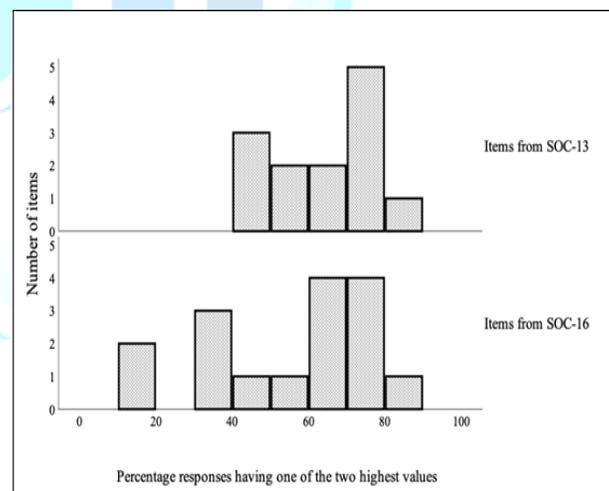


Figure 1: Percentage of responses with values in one of the two highest categories out of seven possible, 13 items from SOC-13 and 16 items from SOC-16.

The question arises if the skewness depends on how the response possibilities were formulated. No explicit words describe the alternatives except for the endpoints, leading to difficulties choosing values other than the extremes. Expectations from the social environment may also influence the tendency of giving higher values on the items. There is also the possibility of psychological mechanisms such as wishful thinking influencing the answers.



Conclusions

SOC has been considered a social concept, also used in mental health; therefore, SOC sum-scores would be expected to relate to socio-demographic factors and mental diagnosis. However, in the present study different results were obtained, depending on which of the three scales (29,13,16) were used. In particular, the SOC-16 appeared to be sensitive to differences in socio-demographic factors. In general, the individual items related similarly to partnership and to some extent to socio-economic status, but strong inconsistencies were found for the relationships to age and gender. It was not possible to find a clear distinction regarding how the items in SOC-13 and SOC-16 related to mental disorders.

Thus, we found nothing suggesting that the items in SOC-13 were more informative than the 16 excluded items. The responses for the items were concentrated on the highest values for many items, and relatively more so for the SOC-13. The question arises if this depends on how the items were formulated, and if expectations from the social environment play a role. It is important to consider what scale to use in studies of socio-demographic factors. One could, depending on the aim, choose items, in particular those where respondents use the full scale. More research is needed concerning the operationalization of the SOC concept.

Strength and Limitations

The cohort was comprised of an unselected, geographically defined population. There were few dropouts in the follow-up, diminishing selection bias. There were few missing values in the SOC-questionnaire. SOC-13 was not applied on its own but was inherent in the SOC-29.

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Citation: Mattisson C, Gräsbeck A, Bogren M and Horstmann V. Antonovsky's short 13-items SOC scale in a Swedish community cohort-considering the selection of the 13 items from the original 29 SOC scale (2020) *Edelweiss Psy Open Access* 4: 7-14.



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