ABSTRACT

The aim of this study was to evaluate the psychometric properties of the [redacted] version of Sense of Coherence scale (SOC-13) in schoolchildren. This is a cross-sectional study that included eight to fourteen years-old schoolchildren. The Cronbach's alpha coefficient for SOC-13 measurement presented questionable results (0.63) and the Intra-Class Correlation Coefficient of 0.70 was statistically significant between different time points ($p<0.01$). Regarding the construct validity, significant values were observed between the SOC-13 components scores and the overall scale score. In the Confirmatory Factorial Analysis, the latent variable was related, through the standard factorial loads, to the other items of the questionnaire. We can conclude that the Brazilian version of SOC-13 showed adequate psychometric properties in a school-age population.

RESUMO

O objetivo deste estudo foi avaliar as propriedades psicométricas da versão [redacted] da escala de senso de coerência (SOC-13) em escolares. Trata-se de um estudo transversal que incluiu escolares de oito a quatorze anos. O coeficiente alfa de Cronbach para mensuração da SOC-13 apresentou resultados questionáveis (0,63) e o Coeficiente de Correlação Intraclasse de 0,70 foi estatisticamente significante entre os diferentes momentos ($p <0,01$). Em relação à validade de construto, foram observados valores significativos entre os escores dos componentes do SOC-13 e o escore global da escala. Na Análise Fatorial Confirmatória, a variável latente foi relacionada, através das cargas fatoriais padrão, aos demais itens do questionário. Podemos concluir que a versão brasileira da SOC-13 apresentou propriedades psicométricas adequadas em uma população em idade escolar.

INTRODUCTION

In the last decades, the international health programs have required more complex forms of intersectoral political actions, which must analyze the health determinants and the population well-being (1). In this ways, psychological abilities such as optimism and resilience are correlated with individuals' quality of life; particularly how much a person is able to deal with poor health (2).

The Salutogenic theory, proposed by Antonovsky in 1987, is in agreement with this modern politic paradigm. This theory involves a context that goes beyond the knowledge about pathogenic mechanisms and biological methods of prevention. It emphasizes that, it is necessary think about health to promote health. Accordingly, health must be understood as result of the equilibrium between strengths that conduct people to health or to disease (3). The central point of Salutogenic theory is the Sense of Coherence (SOC). It is seen as a personality trait that introduces comprehension and gives meaning to events, thereby creating a sense of manageability of the environment and promoting healthy behavior. The SOC influences habits that directly affect health and adaptive behavior to stress, and can therefore decrease the severity of illnesses (3,4).

In this context, the sense of coherence has been associated with different aspects of health and disease (5). In relation to oral health, it was demonstrated that individuals with small SOC present more experiences of untreated caries (6,7), dental trauma (8) and toothache (9). The same could be observed in other studies that evaluated the relationship between SOC and subjective measures of oral health, where individuals with high SOC had better oral health related quality of life (10-12).

With the purpose to measure and qualify the SOC in a standardized way, a questionnaire composed by 29 questions was developed by Antonovsky (Sense of Coherence - SOC-29) (3). The same author also proposed a reduced version of this instrument: a questionnaire composed by thirteen questions (Sense of Coherence - SOC-13). Both versions were viable and valid in 14 languages, interviewing individuals of all ages (13). In [redacted], the SOC-13 scale was translated, adapted and validated to be used in mothers of preschool children (14). However, this scale has not been validated to be answered by [redacted] schoolchildren. Considering the fact that individuals' SOC is developed throughout life and influenced by life experiences (3), the SOC of children and adolescents in school age is likely to suffer less influence of their parents (6).

The literature has demonstrated that a better SOC can be an important link to promote effective improvements in population oral health (6,15). It is important to evaluate the applicability and the psychometric properties of SOC-13 scale in [redacted] schoolchildren, in order to better understand the influence of SOC in health outcome, among this group. Therefore, the aim of this study was to evaluate the psychometric properties of the SOC-13 scale in [redacted] schoolchildren. We hypothesized that the SOC-13 scale has adequate psychometric properties to be used in this school-age population.

MATERIAL AND METHODS

Study design and Data collection

The data used in this research came from a cross-sectional study, aligned with an intervention study, involving students from the city of [redacted]. The city has an estimated population of 261,031 inhabitants, including 26,477 children aged between 8 and 14 years (16). For this study, children from five schools, in the western

zone of the city, with similar characteristics, composed our convenience sample. All children enrolled, in the 4th and 5th grades of the selected schools, were invited to participate in the research, totaling 356 participants.

Sense of Coherence Scale

The reduced version of the Sense of Coherence Scale was developed to understand how individuals deal with stressful events in their lives. The scale comprises 13 questions, in the three dimensions of SOC: Comprehensibility, Management and Meaning. Comprehensibility is the global orientation, expressed in the capacity of confidence that the stimuli deriving from one's internal and external environments, trough of the structure, predictability and explication throughout life. Management is the credibility in their ability to lead and exert a positive impact on life, using available resources. Lastly, meaning is the realization that life has a meaning and a purpose (13). The [redacted] version of the scale presents five points' likert responses, which vary according to the questionnaire item. The first items of the scale are asked through questions: 1) "What you do daily is"; and 2) "Until today your life has been". The possible responses vary from one to five, being: "an enormous suffering and annoyance" to "a great pleasure and satisfaction", for the first question and, "with no aim" to "full of aims", to the second question, respectively. The next items are: 3) "Do you have interest in what happens around you?"; 4) "Do you think that you are treated with injustice?"; 5) "Do you have confused ideas and feelings?"; 6) "Do you think that the things you do in your life make no sense?"; 7) "Have you already felt disappointed with people you trusted?"; 8) "Do you have feelings you would not wish to have?"; 9) "Do you have doubts if you can control your feelings?"; 10) "Have you ever felt surprised with the behavior of someone you knew well?"; 11) "In some situations, people feel like they've failed. Have you ever felt that you failed?"; and, 12) "Do you feel that you are in an unusual situation and you do not know what to do?". The answers can also vary from one to five, varying from "never" to "always". The last item of the scale is asked through the question: 13) "Sometimes things happen in our lives and later we think we did not give the deserved importance to it. When something happens in your life, you think you gave the importance:". The answers can vary from "totally wrong" to "totally right". The scale was applied by trained interviewers during a face-to-face interview. The answers to questions 1 and 13 were reversed, thus they would have the same meaning as the others. The final score is obtained through the sum of the items, ranging from 13 to 65. Higher scores represent a greater SOC (14).

SOC-13 scale was applied twice in the same group of people after an average period of one month to evaluate its reproducibility.

Statistical analysis

Data were analyzed using the statistical software STATA 14.0 (Stata Corporation, College Station, TX, USA) and Mplus 6.12 version. The internal consistency of the SOC-13 was assessed using the Cronbach's Alpha Coefficient. The replicability of the scale was evaluated using a test-retest analysis to verify if the scale always measures equally, through Intra-Class Correlation Coefficient (ICC) calculation. For both, Cronbach's Alpha Coefficient and ICC, values higher than 0.7 are considered acceptable (17).

The construct validity was verified by correlations between the scores of each component of SOC-13 with the overall score using Spearman's Correlation Coefficient ($p<0.05$). Finally, the Confirmatory Factorial Analysis (CFA) was performed to verify

the relationships between the 13 items of the scale with the latent variable SOC. The CFA was evaluated using the estimator ML. The global model adjustments were analyzed using the following parameters: Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA). CFI and TLI ≥ 0.90, and RMSEA and SRMR ≤ 0.08, can be considered as indicative of a good model (18).

Ethical considerations

This study was approved by the Ethics Committee of the [redacted] (CAAE:43675415.4.0000.5346). The permissions were obtained from the Education Coordination and from the schools involved in this study. Data were collected only after obtaining signed informed consent from the parents and participants' agreement consent.

RESULTS

We assessed 356 8-14-years-old children in the study. In the sample, 52% were female and 76% were from race/ethnicity white. Most of the children had a low socioeconomic level, with mothers that had not completed high school (60%) and household income lower than a [redacted] minimum wage (51%).

Table 1 presents a description of the mean distribution of SOC-13 overall and its components scores. SOC-13 scores ranged from 32 to 62, with a mean of 50.67 (SE: 6.22). The scores of the components of the questionnaire showed similar variations, and the "comprehensibility" component presented the greatest variation (range of 8 to 25).

Table 1. Descriptive Distribution of Overall and Components of SOC-13 Scores. Santa Maria, 2016.

	Number of Items	Mean of SOC-13 Scores (SE)*	Possible Range	Observed Range
SOC-13 (Overall Scale)	13	50.67 (6.22)	13 – 65	32 – 62
Components				
Comprehensibility	5	19.55 (3.48)	5 – 25	8 – 25
Manageability	4	16.92 (2.80)	4 – 20	5 – 20
Meaningfulness	4	14.21 (2.66)	4 – 20	6 – 20

Abbreviations: SOC, Sense of coherence; SE, Standard error.
*Taking into account the sampling weight.

The internal consistency of the Sense of Coherence scale was 0.63, showing a moderate correlation between the different items in the same test. The ICC was statistically significant, indicating a good reproducibility (ICC = 0.70, p = 0.01). The construct validity of SOC-13 questionnaire was assessed through the correlation between the scores of its components (comprehensibility, management and meaning) and the total score. The results showed a positive correlation for all components ($p < 0.001$). The components comprehensibility and management presented a strong and positive correlation with SOC-13 overall score (R = 0.78 and 0.72, respectively). These results are shown in Table 2.

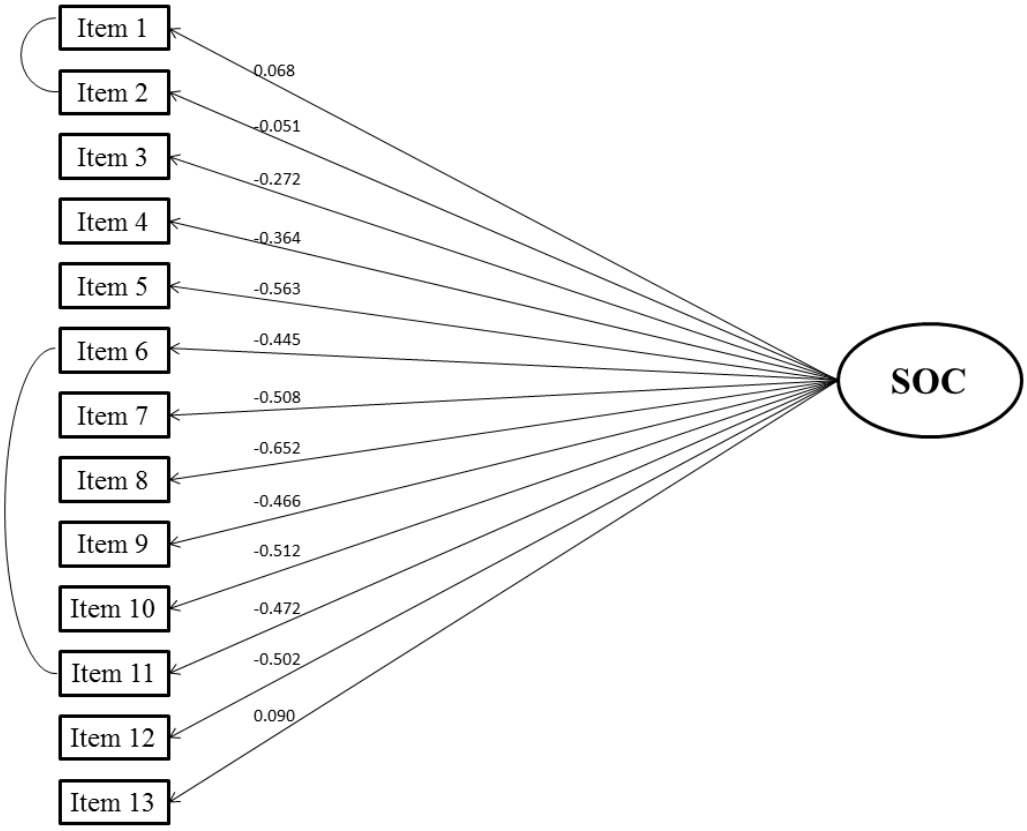
Table 2. Internal consistency, reproducibility and construct validity of the SOC-13 questionnaire. Santa Maria, 2016.

Variables	Measure	Cronbach's Alpha Coefficient	Intra-class Correlation Coefficient	Spearman's Correlation Coefficient
		T1	T1 to T2	T1
Sense of coherence (SOC)	SOC-13 (Overall Scale)	0.63	0.70*	-
Components				
Comprehensibility	Items 5, 8, 10, 12 and 13 of SOC-13	-	-	0.78**
Manageability	Items 4, 7, 9 and 11 of SOC-13	-	-	0.72**
Meaningfulness	Items 1, 2, 3 and 6 of SOC-13	-	-	0.47**

Abbreviations: SOC, Sense of coherence; T1, baseline; T2, one-month follow-up.
* The correlation coefficient is significant in the p value of 0.01 (two-tailed).
**p-value < 0.001.

The Confirmatory Factorial Analysis (CFA) is shown in Figure 1. The latent variable (SOC) was related, through standardized factor loads, to the other items of the questionnaire. Furthermore, items 1 and 2, and 6 and 11 were correlated. The global adjustments of the model were: CFI= 0.90; TLI= 0.87; RMSEA = 0.049; and SRMR= 0.047.

Figure 1. Confirmatory Factorial Analysis (CFA) of the SOC-13 questionnaire.



DISCUSSION

This study evaluated the psychometric properties of the reduced version of Sense of Coherence Scale in students from [redacted].

As previously stated, the reproducibility value of SOC-13 scale was acceptable (ICC 0.70). The same was seen in a previous study (19), showing a good correlation when SOC-13 is reapplied. In the analysis of construct validity, the Spearman's Correlation Coefficient showed statistically significant data. All scores of the components of SOC-13 questionnaire showed positive and strong relationships with the total questionnaire score. In addition, our values were higher than those obtained in another study, conducted in Sweden with a group of physically active elderly individuals (20), demonstrating highly significant correlations for all the questions proposed in this article.

The Cronbach's Alpha Coefficient, found in our study, reproduced a moderate value (0.63). This measure has been largely used to evaluate the consistency of the answers of a question group in a measurement instrument; with values of 0.65-0.70 being commonly used as "acceptable". However, a high α value does not always represent a good internal consistency of an instrument (21). Notwithstanding, some authors show that the Cronbach's Alpha Coefficient, when solely interpreted, is not a reliable measure to reproduce the reliability of the data (22,23). The statistical critics commented that alpha values should be interpreted with caution, because the internal consistency of an instrument should be based on different statistical tests. Thus, only alpha values can conduct to an ambiguity of interpretation, being that very low or very high values would tend to a unidimensionality or multidimensionality of the data (22).

With the intention to complete the gaps left by the internal consistency test, we used a Confirmatory Factorial Analysis (CFA). This analysis allowed us to verify the relationship between the 13 items of the SOC-13 with the global scale variable. The latent variable (SOC) was related to the other variables (items), confirming the use of this scale for the concept of sense of coherence. The factorial loads presented negative values, except for items 1 and 13, probably due to the negative factor expressed in these items. The overall values of the model were acceptable, which demonstrates the validity of the factorial structure for the sample of schoolchildren studied.

A convenience sample was selected in this study, limiting the generalization of the findings for this population. Besides that, the participants involved in this research have a high social vulnerability, which may have influenced the response to the items of the questionnaire. Nonetheless, this is a study that evaluated the psychometric properties of an instrument, and we believe that these factors do not interfere in the findings. Presently, other researches should be carried out to investigate and determine the importance of SOC and its influence on clinical and psychosocial outcomes in this population.

Working with sense of coherence would be a useful strategy to provide effective improvements in schoolchildren's health status. Unhealthy factors are part of the environment, and a healthy state is more related to the perception and the way of dealing with these factors than to its presence (24). Thus, it becomes necessary to measure and qualify the SOC in a standardized way in different population. The results of this study bring relevant information about the use of SOC-13 scale among schoolchildren. It demonstrated acceptable values of validity and reproducibility to the scale.

CONCLUSION

In conclusion, the [redacted] version of the reduced sense of coherence scale (SOC-13) showed adequate validation properties in a school-aged population. These findings are important because subjective measures can be allied in promoting oral health of populations. Validated questionnaires and scales allow reliable findings and, therefore, more accurate public planning can be undertaken in order to reduce health inequalities.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest relevant to this article to disclose. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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