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Validity evidence of the Self-Care of Chronic Illness Inventory: Brazilian version

Evidências de validade do Self-Care of Chronic Illness Inventory: versão Brasileira

Pruebas de validez del Self-Care of Chronic Illness Inventory: versión Brasileña

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ABSTRACT

Objective: To generate evidence regarding the validity of the internal structure and consistency of the Self-Care of Chronic Illness Inventory – Brazilian Version and its relationship with health-related quality of life.

Method: A psychometric study of instrument validation was carried out with 227 adults (female=74.89%; mean age=58.03±13.2 years) with chronic illnesses who answered the instrument adapted for Brazil. Internal structural validity was studied by confirmatory factor analysis, the relationship with health-related quality of life was analyzed by correlation with health-related quality of life, and internal consistency by the omega coefficient.

Results: The theoretical structure of the instrument was confirmed with three domains and good fit indexes and 18 of the 20 items had factorial loadings above 0.3; the omega coefficient was 0.929; and participants with better self-care scores had better quality of life scores.

Conclusion: The Self-Care of Chronic Illness Inventory - Brazilian Version provides good evidence of internal validity and consistency for studying self-care in chronic diseases in Brazil.

Descriptors: Chronic disease; Validation Study; Self-care.

RESUMO

Objetivo: Produzir evidências quanto à validade da estrutura e consistência interna do Self-Care of Chronic Illness Inventory – Brazilian Version e de sua relação com qualidade de vida relacionada à saúde.

Método: Estudo psicométrico realizado com 227 adultos (mulheres=74,89%; idade média=58,03±13,2 anos) com doenças crônicas que responderam ao instrumento adaptado para o Brasil. A validade da estrutura interna foi estudada por análise fatorial confirmatória, a relação com qualidade de vida relacionada à saúde foi analisada por correlação e a consistência interna pelo coeficiente ômega.

Resultados: A estrutura teórica do instrumento foi confirmada com três domínios com bons índices de ajustes e 18 dos 20 itens tiveram cargas fatoriais acima de 0,3. O coeficiente ômega foi de 0,929 e os participantes com melhores escores de autocuidado tinham melhores escores de qualidade de vida.

Conclusão: O Self-Care of Chronic Illness Inventory – Versão Brasileira dispõe de evidências de validade interna e de consistência interna para o estudo do autocuidado nas doenças crônicas no Brasil.

Descritores: Doença crônica; Estudo de Validação; Autocuidado

RESUMEN

Objetivo: Producir evidencias sobre la validez de la estructura y consistencia interna de la versión brasileña del Self-Care of Chronic Illness Inventory y su correlación con la calidad de vida relacionada a la salud.

Método: Estudio psicométrico realizado con 227 adultos (mujeres=74,89%; edad media=58,03±13,2 años) con enfermedades crónicas que respondieron al instrumento adaptado para Brasil. La validez de la estructura interna fue estudiada por análisis factorial confirmatorio, la relación con la calidad de vida relacionada a la salud fue analizada por correlación y la consistencia interna por el coeficiente omega.

Resultados: Se confirmó la estructura teórica del instrumento con tres dominios con índices aceptables de ajustamiento y 18 de los 20 ítems presentaron cargas factoriales superiores a 0,3. El coeficiente omega fue de 0,929 y los participantes con mejores puntuaciones en autocuidado tuvieron mejores puntuaciones en calidad de vida.

Conclusión: El Self-Care of Chronic Illness Inventory – Versión Brasileña tiene evidencia de validez y consistencia interna para el estudio del autocuidado en enfermedades crónicas en Brasil.

Descriptores: Enfermedad Crónica; Estudio de Validación; Autocuidado.

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INTRODUCTION

Chronic non-communicable diseases (CNDs) are the most prevalent group of diseases in Brazil[1], impact quality of life, require daily management and prolonged medical care[2]. It is estimated that CNDs, such as hypertension, heart failure and diabetes, are responsible for 41 million deaths per year, representing more than 70% of all deaths worldwide. In Brazil, CNDs account for 74% of deaths, of which 17% occur in people aged 30-69 years[3].

People affected by NCDs need to adopt a series of behaviors in order to adhere to complex therapies, maintain well-being and quality of life over time, control the risks and symptoms of the disease, and reduce the incidence of complications[2]. People with chronic diseases who engage in self-care improve their clinical outcomes, are hospitalized less often, and improve their quality of life[4].

Self-care has received attention and is increasingly recognized as an important element in the management of chronic diseases[1]. In 2012, a group of nurses developed the Theory of Self-Care in Chronic Disease, which addresses the self-care process focused on the individual and their chronic diseases, providing health professionals with the opportunity to develop personalized interventions with better results[5]. This theory describes self-care as a naturalistic decision-making process that involves health promotion practices and management of the disease process[5-6].

The core concepts of self-care theory in chronic illness are self-care maintenance, self-care monitoring, and self-care management [5]. Self-care maintenance is defined as behaviors performed by people with chronic illness to maintain physical and emotional stability; these behaviors may be self-determined or reflect recommendations mutually defined by the person and the health care provider[5]. Self-care monitoring refers to the process of observing changes in signs and symptoms[5]. And self-care management is defined as responding to signs and symptoms when they occur[5] .

Based on the Theory of Self-Care in Chronic Illness[5] the Self-Care of Chronic Illness Inventory (SC-CII) was developed in the United States of America to investigate the self-care process in people with multiple chronic conditions [6]. Other instruments address specific self-care behaviors in chronic diseases, such as adherence to therapeutic recommendations or level of physical activity. The SC-CII was proposed as an instrument capable of assessing self-care behaviors in general, considering that several behaviors required by different chronic conditions are similar[6].

The Theory of Self-Care in Chronic Illness[5] and the review of existing adherence assessment instruments guided the construction and revision of items for the SC-CII [6]. The 20-item instrument was submitted to five experts for content evaluation. The content validity indexes of each item ranged from 0.8 to 1; the content validity index of the health maintenance self-care scale was 0.89, that of the self-care monitoring scale was 0.88 and that of the self-care management scale was 0.96[6].

The psychometric evaluation of the SC-CII was performed with data collected between 2015 and 2016 from a sample of 407 adults with chronic disease living in the United States of America. Confirmatory factor analysis was performed, as indicated for theory-derived instruments, and the model's fit indices, as well as the reliability coefficients, were considered adequate[6]. Comparative Fit Index was 0.93, Tucker and Lewis Index was 0.91, Root Mean Square Error Approximation was 0.044 (90% CI 0.031-0.056) and Standardized Root Mean Square Residual was 0.051. The factor loadings ranged from 0.289 to 0.85[6].

Other studies that sought evidence of the validity of versions of the SC-CII obtained satisfactory adjustment and reliability results and will be addressed in the discussion section of this report.

This study aimed to make the adapted SC-CII available, with known psychometric properties, for use in Brazil. The process of adapting instruments is a complex process that requires methodological rigor. In addition, evidence must be obtained that its psychometric properties are equivalent to those of the original instrument so that it can be admitted that both address the same phenomenon.

Having an instrument for assessing self-care in chronic diseases to identify people who need interventions to promote self-care and especially to customize standardized interventions that have been developed and evaluated is valuable. For example, a person with a chronic disease may have appropriate behaviors to maintain health and know how to correctly identify and interpret signs of disease decompensation but fail to decide what to do when such signs occur. An

educational intervention can focus on self-care management, optimizing the use of existing resources to deliver the intervention and the time of the person receiving it.

Knowing the psychometric properties of adapted instruments is relevant for advancing knowledge about the construct in question and consequently refining the instrument itself. If theoretical assumptions about the construct underlying the instrument are not confirmed by empirical data from psychometric studies, the theory will need to be revised. With the revision, new propositions can be formulated and will need to be tested empirically, creating an iterative process between theory and empirical data.

The SC-CII was adapted for use in Brazil through translation, back-translation, and verification of content validity and was named Self-Care of Chronic Illness Inventory – Brazilian Version (SC-CII – Brazilian Version)[7]. This adaptation involved content assessment by experts and item comprehensibility by 18 people with chronic non- communicable diseases[7,] The SC-CII – Brazilian Version obtained good evidence of content validity and comprehensibility of statements[7] .

The assessment of the psychometric properties of the adapted instrument is necessary so that researchers have parameters to affirm the degree to which the interpretations of its results are valid and reliable[8]. The present study aimed to produce evidence regarding the validity of the internal structure and internal consistency of the SC-CII – Brazilian Version[7] and its relationship with health-related quality of life. For this relationship, the hypothesis that better quality of life would be associated with better self-care was considered, since studies have shown that people with adequate self-care report better quality of life, shorter hospital stays, and longer survival[9].

METHOD

This is a psychometric study in which the SC-CII (Version 3.1) adapted for Brazil[7] was applied to obtain empirical evidence of the validity of its internal structure and its relationship with health-related quality of life.

The study was carried out in three locations: in a private preventive medicine service, in Basic Health Units in the inland of the state of São Paulo, and an outpatient clinic of a university hospital in the city of São Paulo.

Data was collected from March to October 2021, but collection had to be interrupted several times due to the coronavirus pandemic. Inclusion criteria were being a user of the service, aged 18 or older, with a confirmed medical diagnosis of at least one chronic disease, and being able to understand and express ideas, according to the researcher's judgment. There were no exclusion criteria.

The sample size was established considering a ratio of 10 people for each item of the instrument[10]. The instrument consists of 20 items, so the minimum sample size should be 200 participants. The convenience sample consisted of 227 people.

Data collection was carried out from March to October 2021, but was interrupted in June and July 2021 due to the worsening of the pandemic scenario at the study sites. At the preventive medicine unit, the researcher consulted the list of people registered in the program and contacted them by phone to participate in the study. As soon as the invitation was accepted, the collection dates and procedures were arranged with the potential participants. At the other locations, on each collection day, the researcher checked the day's schedule to identify users eligible for the study and, as they arrived, they were invited to participate in the study. Users who arrived at the services without an appointment and who reported having at least one chronic disease were also invited to participate. Those who agreed to participate were informed about the details of the study, signed the Free and Informed Consent Form, and then the data were collected.

The instruments used in data collection were Self-Care of Chronic Illness Inventory – Brazilian Version (SC-CII – Brazilian Version)[7] (Version 3.1); the World Health Organization Quality of Life Instrument – abbreviated (WHOQOL- bref), to assess quality of life[11] and a form developed to collect sociodemographic and clinical data from participants. It should be stressed that the SC-CII – Brazilian Version used in this study is the version of the Self-Care of Chronic Illness Inventory Version 3.1[12]. During this study, some changes were made to the structure and scoring method in version 3.1 of the original SC-CII (in English)[13] resulting in version 4 of the instrument.

The SC-CII – Brazilian Version[7], which corresponds to the original version 3.1, consists of 20 items distributed across three scales: self-care maintenance,

self-care monitoring, and self-care management. Each section is scored separately and standardized into scores from 0 to 100, with higher scores indicating better self-care[6]. Adequate self-care corresponds to scores greater than or equal to 70 points on the corresponding subscales[6,12]. The WHOQOL-bref, an abbreviated version of the WHOQOL-100[11], is a quality-of-life assessment questionnaire consisting of 26 items, in which the first two questions are general questions related to the individual's quality of life and the others represent the facets that make up the original instrument. The higher the score, the better the quality of life[11]. The Brazilian version of the WHOQOL-bref obtained a reliability estimate with Cronbach's alpha equal to 0.91 and significant negative correlations with hopelessness, ranging from -0.42 to -0.66, and with depression, ranging from -0.31 to -0.52.

Estimates of structural validity were obtained through confirmatory factor analysis (CFA); estimates of construct validity were obtained through testing the hypothesis that the better the self-care, the better the quality of life; and estimates of internal consistency were obtained through the Omega coefficient. The model estimation technique was weighted least Squares (WLS) [14] and the minimum criterion for factor loadings adopted was values ≥ 0.3. The model was specified and its adjustments were assessed in its analysis. To assess the model adjustment indices, the following reference values were considered for the adjustment measures[10]: comparative adjustment index (CFI): >0.90; root mean square error of approximation (RMSEA): below 0.10; Tucker Lewis index (TLI): >0.90; and standardized root mean residual (SRMR): between -4.0 and 4.0, with lower values representing a better fit.

CFA is a statistical approach to condense existing information on several original variables into a smaller set of statistical variables, common inherent dimensions, with minimal loss of information. The challenge of this analysis is to define the fundamental constructs, finding the statistical and practical significance of the results[10]. CFA deals with models of the relationship between observations (items or scores on tests or in observations of behaviors) and latent variables (factors)[14]. It is a hypothesis testing approach, used when one has some idea of the items that belong to each factor, and is very useful for comparing two different versions of a scale[15], as was the case in this study. CFA was therefore used to verify whether the items of the Brazilian version of the SC-CII[7] would load on the same factors as the items in the original instrument.

The structure analyzed in this study was that of an instrument with three factors (self-care maintenance, self-care monitoring and self-care management). Adopting the original structure of the instrument[6], self-care maintenance was further subdivided into 'Health Promoting Behaviors' (items 1, 3, 7 and 8) and 'Illness-Related Behaviors' (items 2, 4, 5, and 6). The self-care monitoring factor was not subdivided, consisting of items 9 to 14. The self-care management factor was subdivided into 'Autonomous Behaviors' (items 15, 16, 17 and 20) and 'Consultative Behaviors' (items 18 and 19). Publications on the structural validity of the SC-CII have reported CFA results on three models, one for each of the three self-care scales[13,16]. However, considering that self-care, according to the theory that supports it, is a whole that cannot be explained by any of its dimensions in isolation, it is not reasonable to conduct the CFA based on three models.

The relationship between self-care and health-related quality of life was tested through correlations between the SC-CII scores and quality of life, assessed by the WHOQOL-bref[11], with the hypothesis that better quality of life would be associated with better self-care. These analyses were performed using correlation tests, assuming normal distribution of the data. A p-value ≤ 0.05 was adopted for the significance of the statistical tests and to interpret the Pearson correlation coefficients, the following criteria were used[17]: 0 to 0.19 - very weak; 0.20 to 0.39 - weak; 0.40 to 0.69 - moderate; 0.70 to 0.89 - strong; 0.90 to 1 - very strong. All analyses were performed by a statistician using *R* Version 4.1.2.

The study project, registered on Plataforma Brasil (CAAE No. 32633320.5.0000.5392), was approved by two ethics committees under Protocols No. 4,252,384 and No. 4,302,364 and all recommendations of Resolution No. 466, of December 12, 2012, of the National Health Council, were followed.

RESULTS

The ages of the 227 participants ranged from 19 to 90 years, with a mean of 58±13.2 years; education ranged from 1 to 23 years, with a mean of 8.9±5.1 years; and 170 (74.9%) were women. Table 1 shows the descriptive

analyses of the other sociodemographic characteristics of the participants.

The most frequent diseases reported by participants were cardiovascular (62.6%); endocrine (43.2%); and osteoarticular (29.5%) and the average number of chronic conditions was 1.8. The Charlson Comorbidity Index was low for 144 (63.4%) participants, medium for 72 (31.7%), and high for 11 (4.8%). Most (202; 88.99%) reported not receiving support for self-care and having used the health service in the last year (214; 94.27%). Of the total participants, 39 (17.19%) needed to go to the emergency room or be hospitalized in the last year, and 213 (93.8%) used medications continuously.

The Comparative Fit Index (CFI) was 0.978, and the Tucker-Lewis Index (TLI) was 0.974. The root mean square error of approximation (RMSEA) was 0.055 (90% CI: 0.042–0.067), and the standardized root mean residual (SRMR) was 0.071 (Figure 1). The instrument's CFA confirmed a solution with 18 items. According to Table 2, only items 1 (Do you try to get enough sleep?) and 17 (Do you take medication to reduce or eliminate the symptom?) obtained a factor loading below the expected value (0.3). Item 1 obtained a factor loading of 0.29, very close to the expected value, and the analysis without item 17 resulted in a model with basically the same qualities as the full model (with item 17), which is why we chose to keep these two items in subsequent analyses. The Omega coefficient for all items was 0.929.

Table 3 presents the results on the relationship between self-care (SC-CII Brazilian Version) and health-related quality of life (WHOQOL- bref).

Data on self-care for chronic disease among study participants are shown in Table 4.

Those interested in using the Self-Care of Chronic Illness Inventory - Brazilian Version in its final form may request it from the authors. The self-care measures website[12] makes the instrument available in several languages.

Table 1 - Sociodemographic characteristics of the sample (N=227). São Paulo, São Paulo, Brazil, 2021.

Variable	n	%
Ethnicity		
White	186	81.9
Black or brown	40	17.6
Yellow	1	0.4
Marital cohabitation (Yes)	140	61.7
Employment status		
Retired	90	39.6
Employed and working	50	22.0
Unemployed/Student	46	20.3
Informal work or employed and away	41	18.1
Residence		
Inland of São Paulo	202	89.0

Table 1 - Cont.

Variable	n	%
Metropolitan region of São Paulo	25	11.0
Income		
Insufficient	33	14.6
Enough to survive	159	70.4
Comfortable	34	15.0
Caregiver support (Yes)	25	11.0
Medications for continuous use (Yes)	213	93.8

Source: the authors.

Table 2 - Factor loadings of the SC-CII items - Brazilian version according to confirmatory factor analysis (N=227). São Paulo, São Paulo, Brazil, 2021.

Items / Sections		Factor loading	p-value
	Self-Care Maintenance (Section A)		
#1	(Sleep) Make sure to get enough sleep?	0.29	0.001
#2	(Prevention) Try to avoid getting sick (e.g., flu shot, wash your hands)?	0.44	< 0.001
#3	(Physical activity) Do physical activity (e.g. take a brisk walk, use the stairs)?	0.61	< 0.001
#4	(Special diet) Eat a special diet?	0.60	< 0.001
#5	(Routine Care) See your healthcare provider for routine health care?	0.64	< 0.001
#6	(Medications) Take prescribed medicines without missing a dose?	0.45	< 0.001
#7	(Stress) Do something to relieve stress (e.g., medication, yoga, music)?	0.54	< 0.001
#8	(Tobacco) Do you avoid smoking and being around people who are smoking?	0.50	< 0.001
	Monitoring Self-Care (Section B)		

Table 2 - Cont.

Items / Sections		Factor loading	p-value
#9	(Illness) Monitor your condition?	0.82	< 0.001
#10	(Side effects) Monitor for medication side-effects?	0.79	< 0.001
#11	(Changes) Pay attention to changes in how you feel?	0.95	< 0.001
#12	(Fatigue) Monitor whether you tire more than usual doing normal activities?	0.82	< 0.001
#13	(Watch for symptoms) Monitor for symptoms?	0.87	< 0.001
#14	(Recognizes symptoms) How quickly did you recognize it as a symptom of your illness?	0.44	< 0.001
	Self-care management (Section C)		
#15	(Change food) Change what you eat or drink to make your symptom decrease or go away?	0.59	< 0.001
#16	(Change activity) Change your activity level (e.g., slow down, rest)?	0.42	< 0.001
#17	(Take medicine) Take a medicine to make the symptom decrease or go away?	0.15	0.031
#18	(Report in consultation) Tell your healthcare provider about the symptom at the next office visit?	0.84	< 0.001
#19	(Professional Contact) Call your healthcare provider for guidance?	0.74	< 0.001
#20	(Evaluate action) Did the treatment you used make you feel better?	0.51	< 0.001

Source: the authors.

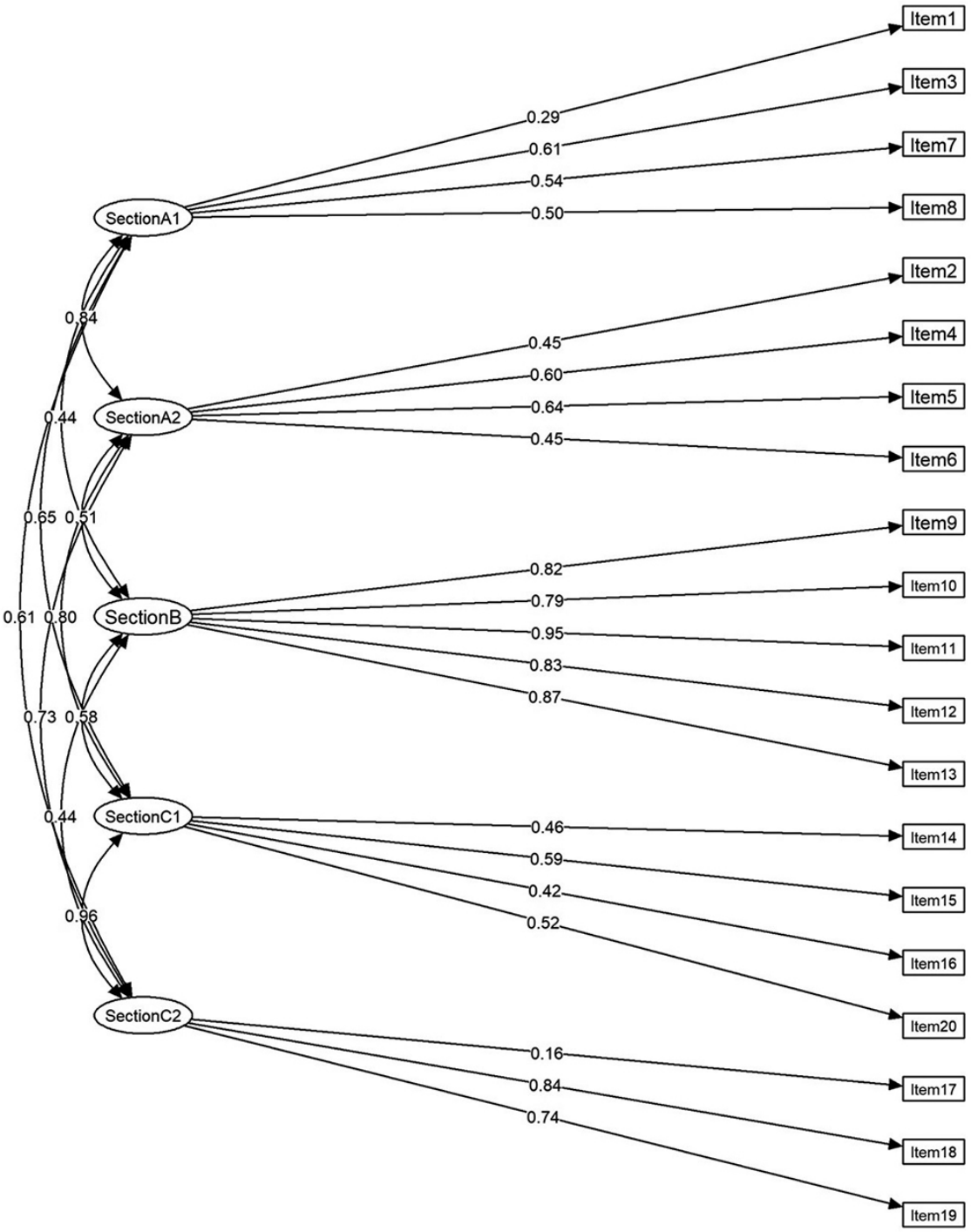

Figure 1 - Structure of the SC-CII – Brazilian Version according to Confirmatory Factor Analysis.
Source: the authors.
Legend**:** Section A1 – Health Promoting Behaviors; Section A2 – Illness-Related Behaviors; Section B – Self-Care Monitoring; Section C1 – Autonomous Behaviors; Section C2 – Consultative Behaviors.

Table 3 - Pearson correlation coefficients between self-care and quality of life scores (N=227). São Paulo, São Paulo, Brazil, 2021.

WHOQOL- bref * Domains	Self-care		
	Maintenance	Monitoring	Management
Physical	0.45 †	0.03 §	0.14 ‡
Psychological	0.53 †	0.18 ‡	0.23 †
Social relations	0.44 †	0.10 §	0.20 ‡
Environment	0.56 †	0.24 †	0.38 †
General	0.58 †	0.15 ‡	0.26 †

Source: the authors.
*WHOQOL- brief: World Health Organization Quality of Life Instrument – abbreviated, † p-value <0.001, ‡ p-value <0.05 §, p-value ≥0.05.

Table 4 - Descriptive statistics of mean scores on the SC-CII – Brazilian Version and frequency of adequate/inadequate self-care (N=227). São Paulo, São Paulo, Brazil, 2021.

Self-care	Average	SD †	95% CI		Adequate ‡		Inappropriate §	
			Lower	Higher	n	%	n	%
Maintenance	66.74	15.42	64.72	68.73	108	47.6	119	52.4
Monitoring	68.51	18.73	66.03	70.90	125	55.1	102	44.9
Management*	57.42	17.24	55.15	59.67	59	26.1	167	73.9

Source: the authors.
*One missing answer, †Standard deviation, ‡ Score ≥70 points, § Score <70 points

DISCUSSION

The SC-CII – Brazilian Version[7] had acceptable model adjustment indices[14] according to the criteria presented in the method section, indicating that it has a similar structure to the original instrument. Likewise, the internal consistency coefficient reached an adequate value (omega coefficient = 0.929), considering that this coefficient expresses the proportion of variance of the total scores due to all factors[18]. However, it is important to highlight the differences in results between the two studies in order to favor the refinement of the SC-CII and so that the use of its Brazilian version considers possible reasons for such differences.

In the study of the psychometric properties of the SC-II in its original version[6], the authors tested a general model with all items in the three scales and three independent models (self-care maintenance, self-care monitoring, and self-care management). In our study, only the general model was tested because it corresponds to the theory that gave rise to the instrument[7]. Notwithstanding, recent studies of adaptation and validation of the SC-CII for different cultures have tested models for three separate scales[19-24].

Given that the theoretical model of the structure of the SC-CII - Brazilian Version[7] had a good fit with the data obtained, the differences in results between this study and the study with the original scale[6] that deserve to be highlighted concern the items that proved to be problematic in one or other of the two studies.

In this Brazilian study, the problematic items were item 1 (Do you try to get enough sleep?) and item 17 (Do you take medication to reduce or eliminate the symptom?). These items had loadings below 0.3

(0.268 and 0.147, respectively). Despite these results, these items were maintained so that they can be analyzed in future studies. Problems with item 1 (sleep) were observed in other studies of adaptation of the instrument[21-22,24]. In one of them, adapting it to Spain, the self-care maintenance model obtained a better fit without the item on sleep, and the authors considered that cultural factors that influence attitudes about sleep may have led to these results[22]. However, in another study that also adapted the SC-CII to Spain, no problems were observed with the item on sleep[23]. It is possible that differences between the two adaptations in the wording of this item contributed to the poor fit of the model in one of the studies. In the adaptation study for Thailand[21] the item on sleep had a low factor loading (0.28) and in the adaptation study for China[24] the item had to be changed from promoting behaviors to illness-related behaviors, both related to self-care maintenance. These problems were attributed to possible different conceptions about the role of sleep in health [21,24]. For example, it is possible that the idea of ensuring sufficient sleep periods is not part of what some samples consider to be health care. This is, therefore, an aspect that deserves further study.

Given the results obtained in this study, two alternatives should be considered: reviewing the wording of the Brazilian version of the item[7] or eliminating it from the instrument. During the adaptation phase of the instrument, participants demonstrated that they adequately understood the meaning of "Do you try to get enough sleep?" and the experts considered this item relevant to the health maintenance domain[7]. Despite this, other studies may obtain elements to refine this wording, especially considering that the adaptation study[7] was conducted with a sample different from the sample of the present study. Eliminating this item from the instrument would mean that "trying to get enough sleep" is not part of the behaviors necessary to maintain the health of people with heart failure, with subsequent review of the substantive theory[5] on which the instrument is anchored.

In the present study, the analysis of the data without item 17 (Taking medication to reduce or eliminate the symptom?) resulted in a model with the same qualities as the full model (with item 17), although it obtained a low loading (0.147). Low factor loadings may indicate the need to exclude the item. However, as discussed in the case of item 1, in the case of item 17 it is also necessary to consider the possibility of improving the wording since it deals with relevant self-care management behavior. Item 17 had a marginal loading (0.32) in the study that used with the original instrument, being allocated as consultative behavior in the self-care management factor[6], which was reproduced in the present study.

In the study with the original instrument there were problems with item 8 (Do you avoid tobacco smoke?) and with item 14 (How quickly did you recognize it as a symptom of your illness?)[6]. The item on smoking had a factor loading of less than 0.3 and low correlations with the other self-care maintenance items, and the authors decided not to include this item in the general model, which therefore had 19 items[6]. In the present study, however, the item on smoking was included without prejudice to the model, with a factor loading of 0.455 ($p<0.001$), in the self-care maintenance dimension, together with the other items comprising health promotion behaviors.

In the original instrument, the item is presented as "Do you avoid tobacco smoke?"[6]. During the adaptation of the instrument, this item seemed strange to us, and the author of the instrument clarified that the question dealt with two behaviors (being a smoker and being exposed to cigarette smoke), which motivated us to adapt the translation to "Avoid smoking and staying close to those who are smoking". Although the two behaviors are expressed in the same item, it is possible that it was more easily understood by the participants of this Brazilian study than by the participants of the American study. In a literal translation into Portuguese, the item about smoking would be "Você evita fumaça de cigarros?", which perhaps would have caused a similar strangeness to that identified in the initial tests of the original instrument[6].

In the study with the original instrument, item 14 (How quickly did you recognize it as a symptom of your illness?) was not adequate in self-care monitoring, as predicted by theory, and the authors decided to test it as belonging to self-care management, where it adjusted well to the autonomous behavior set[6]. In the case of the present study, however, this item was adequate in self-care monitoring (factor loading of 0.437), which was the theoretically defined factor. In psychometric tests with the original instrument, the

item on how quickly the symptom is identified as a symptom of the disease (item 14) did not load on self-care monitoring, but rather on autonomous behavior in self-care management[13]. For this reason, symptom recognition has been studied independently of the other dimensions of self-care[20-21,24-25] or as a mediator between self-care monitoring and autonomous behaviors in self-care management[26].

The results of this study showed evidence of validity of the internal structure of the SC-CII. There were positive correlations between the SC-CII and WHOQOL-bref scores, reproducing, in whole or in part, results observed in other studies with patients with heart failure[9,13,26]. In the present study, the dimensions of quality of life had moderate positive correlations with self-care maintenance (*r* ranging from 0.44 to 0.58); very weak to moderate with self-care management (*r* from 0.14 to 0.38) and were null, very weak or weak with self-care monitoring (*r* not statistically significant or from 0.15 to 0.24). The results of studies analyzing the relationships between self-care and quality of life are still contradictory, particularly in patients with heart failure[24,26]. Further studies on the relationship between self-care and health-related quality of life are needed, as this is an important outcome in studies testing interventions to improve self-care.

The mean scores for self-care in chronic disease in this study were below 70 points, a score above which is interpreted as adequate self-care. This result is similar to those of other studies[24,27-28]. The participants in this study performed better in self-care maintenance (66.74±15.42) and self-care monitoring (68.51±18.73) than in self-care management (57.42±17.24). The low score in self-care management may reflect the fact that the participants reported an average of 1.77 chronic conditions. These results are also similar to those of other studies[21-24]. Self-care management is particularly challenging when the person has more than one chronic condition; clinical manifestations may overlap, which requires mastery of problem-solving and decision-making skills[5].

This study provides evidence of internal structure validity, internal consistency, and relationship with health-related quality of life of the Self-Care of Chronic Illness Inventory – Brazilian Version[7]. This availability favors the clinical practice of the health team in assessing self-care and guiding interventions aimed at the individual needs of people with chronic diseases, a relevant issue for public health, especially as people's longevity increases.

Furthermore, the results of this study will contribute to expanding knowledge about self-care in chronic diseases because they can be added to the results of studies in countries with different cultures, for cross-cultural analyses, as in a study already carried out[16]. These analyses will allow us to identify the concepts of self-care theory shared by different cultures.

One limitation of this study is the fact that the interviewer was a nurse from one of the three services where data collection was carried out. It is necessary to recognize the possibility that participants provided answers that they believed were those expected by the researcher. Another limitation to be considered is that the sample size was defined according to a general rule of at least 10 respondents per item. Parameters such as the estimator adopted and the number of indicators per factor were not considered.

CONCLUSION

The Self-Care of Chronic Illness Inventory – Brazilian Version had acceptable indexes in CFA (structural validity), and Omega index (internal consistency), and its scores had positive correlations with health quality of life scores (construct validity). The instrument will be useful in clinical practice for the assessment of care needs related to self-care for the control of chronic diseases and will contribute to advancing knowledge about self-care in chronic diseases.

Studies with samples of Brazilians from different regions are necessary to confirm or refute the results obtained here. This instrument will contribute to understanding the self-care needs of people with chronic diseases, a fundamental step in proposing public policies to meet them.

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Availability of data and material

Access to the dataset may be granted upon request to the corresponding author.

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