Cooking Skills Index: Development and reliability assessment

Índice de Habilidades Culinárias: desenvolvimento e avaliação de confiabilidade

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A B S T R A C T

Objective

Describe the development and the reliability assessment of an index that evaluates the confidence in performing cooking skills considered relevant in Brazil.

Methods

The development of the Cooking Skills Index was based on the self-efficacy beliefs and its theoretical reference was the Dietary Guidelines for the Brazilian Population. It measures, from zero to 100, the degree of confidence in performing ten cooking skills considered as facilitators for the implementation of Brazilian Dietary Guidelines recommendations. Experts (face validity) evaluated the index. A pilot study (n=10) and a test-retest (n=51) was conducted by telephone interviews and computerized assistance with adults responsible for food preparation

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at home in *São Paulo*. Reliability was assessed by Cronbach's alpha, quadratic weighted kappa and prevalence and bias adjusted kappa.

Results

The Cooking Skills Index was coherent with the adopted theoretical framework according to the experts. It was fast and easy to apply to the participants. It showed a good internal consistency (Cronbach's alpha >0.70) and an acceptable to excellent reproducibility (weighted kappa=0.55, adjusted kappa=0.89).

Conclusion

The Cooking Skills Index has a good reliability and is therefore recommended to evaluate cooking skills confidence in Brazilian studies developed in contexts similar to those of this study.

Keywords: Cooking. Reproducibility of Results. Self-efficacy. Surveys and Questionnaires.

RESUMO

Objetivo

Descrever o desenvolvimento de um instrumento que avalia a confiança no desempenho de habilidades culinárias consideradas relevantes no Brasil, e avaliar sua confiabilidade.

Métodos

O Índice de Habilidades Culinárias foi desenvolvido com base na crença de autoeficácia e tendo como referencial teórico o Guia Alimentar para a População Brasileira. Ele mensura, com uma escala entre zero e 100, o grau de confiança das pessoas quanto ao desempenho de dez habilidades culinárias consideradas facilitadoras da implantação das recomendações do Guia Alimentar brasileiro. O índice passou por apreciação de especialistas (validade de face). E, após, por estudo piloto (n=10) e teste-reteste (n=51), conduzidos com aplicação das questões – via entrevistas telefônicas e com auxílio de sistema informatizado – a adultos responsáveis pela alimentação em casa residentes em São Paulo. Avaliou-se a confiabilidade pelo cálculo do alpha de Cronbach e do kappa ponderado quadrático e kappa ajustado para prevalência e viés.

Resultados

O Índice de Habilidades Culinárias foi considerado coerente com os referenciais adotados pelos especialistas, e de rápida e fácil aplicação pelos participantes; mostrou boa consistência interna (alpha de Cronbach >0,70) e reprodutibilidade aceitável a excelente (kappa ponderado 0,55; kappa ajustado 0,89).

Conclusão

O Índice de Habilidades Culinárias possui boa confiabilidade, podendo ser utilizado em estudos brasileiros que avaliem confiança no desempenho de habilidades culinárias em contextos similares ao deste estudo.

Palavras-chave: Culinária. Reprodutibilidade dos Testes. Autoeficácia. Inquéritos e Questionários.

INTRODUCTION

The replacement of natural or minimally processed foods and the culinary preparations based of these foods for ready-to-eat foods is related to obesity and other correlated chronic diseases [1]. Such changes in eating habits are aggravated by changes that have also been occurring in the pattern and type of skills used to prepare meals, in the time dedicated to preparation, and in the individuals' confidence in using required Cooking Skills (CS) [2-5].

In this perspective, cooking is a practice and an emancipatory competence to promote Adequate and Healthy Eating (AHE). Besides, studies on CS can provide information to professional practices and to directing policies promoting AHE [6-10]. However, most of the few existing instruments [3,4,11-15] are from high-income countries and they differ in the CS definition adopted. Few studies describe the psychometric evaluations performed and they rarely present the theory that supports them.

The Dietary Guidelines for the Brazilian Population (DGBP) [6] was pioneered in stating that the loss of the population's CS is an obstacle for healthy eating to overcome. In addition, by defining CS as 'skills required to select, prepare, season, cook, combine and present food in the form of culinary preparations', it is clear that CS promoting AHE mean skills related to the preparation of meals from the combination of natural or minimally processed foods and seasoned using natural seasonings and culinary ingredients. This is a type of cooking known as "cooking from scratch" [16]. While other studies consider heating up of ready-to-eat/pre-prepared products a type of CS, for the DGBP, the preparation of these types of foods, called Ultra-Processed Foods (UPF), are not considered as part of such CS.

Although the DGBP is the official document of the Brazilian Ministry of Health regulating the principles and reference practices promoting AHE, no existing instrument [3,4,11-15] used DGBP as the base for the definition of CS [6]. Thus, by highlighting the need to instrumentalize research in order to be in line with the DGBP, this article describes the development of the Cooking Skills Index (CSI) and also evaluates CSI reliability. It is a tool for assessing confidence in the performance of cooking skills considered relevant in Brazil according to the DGBP.

METHODS

The construction and evaluation of the CSI followed the methodology proposed by Rattray & Jones [17], Cummings & Hulley [18] and Bandura [19] (Figure 1).

Development of the CSI

The concept of cooking skills adopted in this research was that of DGBP [6]. The literature review verified a lack of an instrument adapted to the Brazilian reality contemplating such a definition [3,4,11-15].

The theoretical model adopted for the elaboration of CSI was based on DGBP [6] and on self-efficacy [19,20]. The elements of the DGBP [6] that anchored the elaboration of the instrument items were the definition of CS, the golden rule "always prefer natural or minimally processed foods and cooking preparations to ultra-processed foods", and the incentive to improve CS as the greatest domains of culinary techniques. The contents of the DGBP guided the choice of which skills should be assessed, the formulation of new items, and the adaptation of items of existing instruments [4,12,13] (Chart 1).

The guiding reference for structuring the questions and answer options of the CSI was the belief on self-efficacy [19-20]. It means the confidence in the performance of certain skills. Such belief involves judging people about their performance and helps to determine the use of individual knowledge and skills. Based on this reference, the CSI was constructed with questions directed to the behaviors of individuals. It contains answer options in a unipolar scale, without the inclusion of negative numbers. It is gradual with respect to confidence in performing CS considered as facilitators for the implementation of DGBP recommendations [6].

The CSI items comprise ten short and closed items. A score is attributed to each item according to the confidence level on a four-point scale: (0) not confident, (1) little confident, (2) confident, and (3) very confident. An even number of response options was chosen because it avoids central

tendency bias and a possible variability in interpretations of the midpoint ("neutral") in this type of scale [21]. The sum of the obtained scores, ranging from zero to 30, was transformed into a scale from zero to 100. The closer to 100 the score obtained in the CSI, the greater the confidence in performing CS.
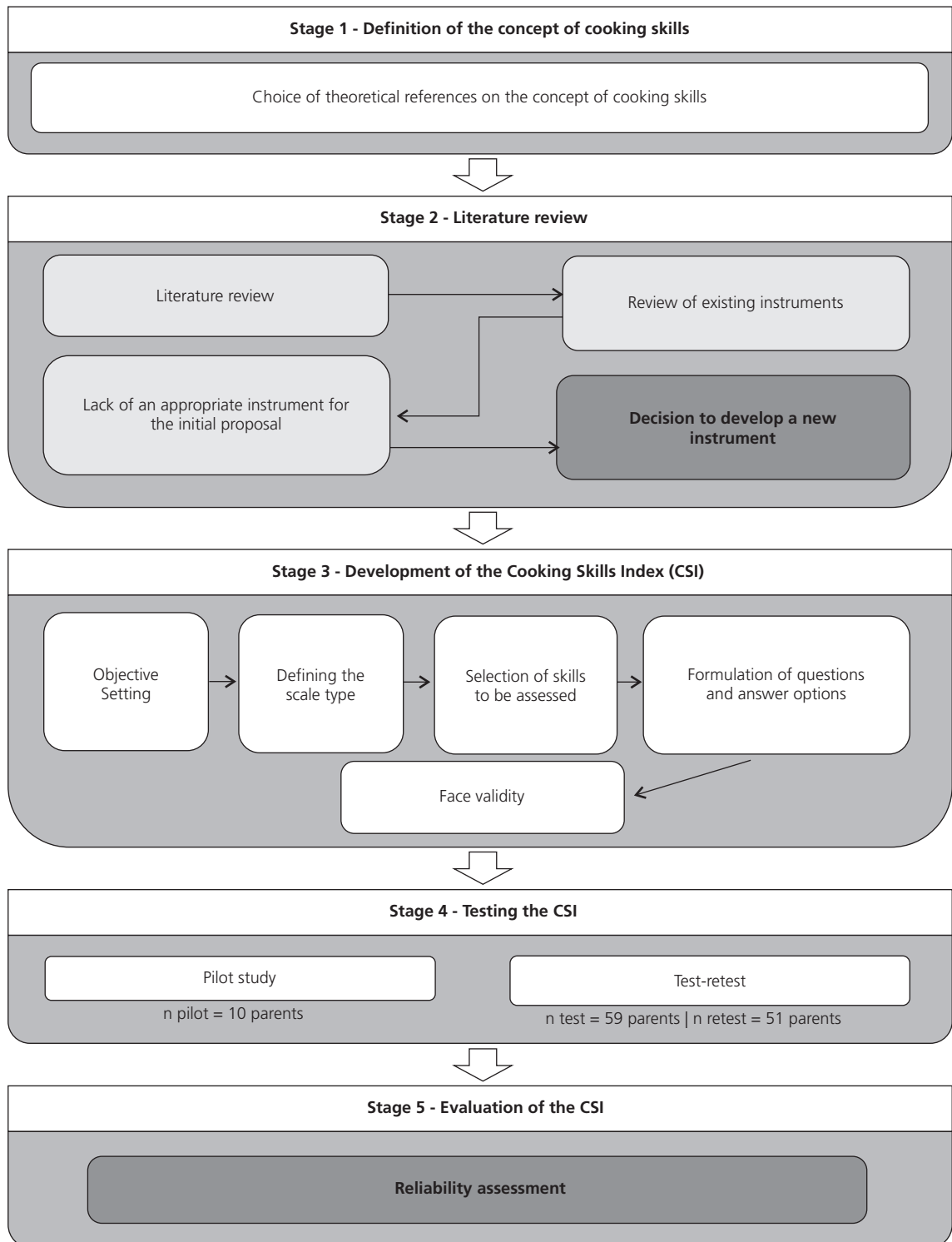
Stage 1 - Definition of the concept of cooking skills

Choice of theoretical references on the concept of cooking skills

Stage 2 - Literature review

Literature review → Review of existing instruments

Lack of an appropriate instrument for the initial proposal ← **Decision to develop a new instrument**

Stage 3 - Development of the Cooking Skills Index (CSI)

Objective Setting → Defining the scale type → Selection of skills to be assessed → Formulation of questions and answer options

Face validity

Stage 4 - Testing the CSI

Pilot study
n pilot = 10 parents

Test-retest
n test = 59 parents | n retest = 51 parents

Stage 5 - Evaluation of the CSI

Reliability assessment

Figure 1. Methodological steps adopted for the development and evaluation of the Cooking Skills Index (CSI).

Chart 1. Theoretical bases for the definition of items of the Cooking Skills Index (CSI). *São Paulo* (SP), Brazil, 2015.

Item	Content	Content source
1	Stew a food	Item adapted from the United Kingdom (UK) National Diet and Nutrition Survey (NDNS) instrument [12] and based on the Dietary Guidelines for the Brazilian Population (DGBP) recommendation [6] for preference for healthier cooking techniques (including oven-baking/roasting, grilling or stewing) during food preparation.
2	Oven-baking/roasting	Item adapted from the UK NDNS instrument [12] and based on the DGBP recommendation [6] for preference for healthier cooking techniques (including oven-baking/roasting, grilling or stewing) during food preparation.
3	Seasoning meat using only natural seasonings	Original item developed for this research based on the DGBP recommendation [6] for preference for natural seasonings in variety/abundance when seasoning foods using cooking ingredients in moderation and avoiding ultra-processed seasonings.
4	Follow a simple recipe	Item adapted from Barton *et al.* [13] and based on the DGBP recommendation [6] for development and transmission of cooking skills (CS) through recipes.
5	Make a homemade tomato sauce using only tomatoes and natural seasonings	Original item developed for this research based on the recommendation of the DGBP [6] for preference for preparation and consumption of homemade sauces - especially tomato sauce - to the detriment of using and consuming ultra-processed sauces.
6	Prepare a homemade soup	Item adapted from Hartmann *et al.* [4] and based on the DGBP recommendation [6] to encourage the preparation of homemade soups using various types of food (beans, vegetables, maize, cassava) because they have an easy preparation and quick execution to the detriment of using and consuming ultra-processed soups.
7	Cooking beans in pressure cooker	Original item developed for this research based on the recommendation of the DGBP [6] for preference for using this cooking technique to cook beans in order to decrease/optimize preparation time.
8	Grill a meat	Item adapted from the UK NDNS instrument [12] and based on the DGBP recommendation [6] for preference for healthier cooking techniques (including oven-baking/roasting, grilling or stewing) during food preparation.
9	Prepare a simple homemade cake	Item adapted from Hartmann *et al.* [4] and based on the DGBP recommendation [6] for the preparation of homemade cakes with different types of food, as opposed to the consumption of ultra-processed cakes.
10	Prepare a lunch or dinner by combining foods and spices already existing in the house without a recipe	Original item developed for this research based on the DGBP recommendation [6] for the preparation of meals using a combination of natural or minimally processed foods with natural seasonings and culinary ingredients.

Note: CSI: Cooking Skills Index; UK: United Kingdom; NDNS: National Diet and Nutrition Survey; DGBP: Dietary Guidelines for the Brazilian Population; CS: Cooking Skills.

For face validity, the CSI underwent two evaluations with experts in nutrition and public health (all were experts in DGBP [6]). In addition to the adequacy of the proposed items to the CS concept, the instrument extension, introductory text, introductory question, proposed format, answer options and proposal of application by telephone interviews were also analyzed. The first evaluation was carried out collectively by a group of ten researchers (nutritionists, physicians and biologists) belonging to the research group that supported the preparation of the DGBP. A consensus was reached on the need for adjusting the introductory text so that it was "simpler and friendlier" for interviewees. This consensus approached the proposal of *Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico* (VIGITEL, Surveillance System of Risk and Protection

Factors for Chronic Diseases by Telephone Survey), a Ministry of Health control system also conducted by telephone interviews [22]. Four other experts (two nutrition and culinary specialists from the partner school network and two researchers from the same research group, a nutritional epidemiologist and an anthropologist expert in public health nutrition) evaluated the CSI individually through an open questionnaire sent by e-mail. They exclusively contributed to CSI validation and improvement of the interview application manual.

At the end of this stage, the CSI was finalized and computerized. The computerization comprised the inclusion of the questionnaire into an online system developed for this research. Its purpose was to facilitate the application of interviews and the management of data collection in real time, not excluding the possibility of applying the CSI on paper.

Pilot test and test-retest of CSI

The CSI tests occurred during the second semester of 2014. For the first test, a convenience sample of 127 parents of schoolchildren responsible for food preparation at home was selected in a private school in the city of *São Paulo*. Among them, 61.4% agreed to participate. Ten were randomly selected to participate in the pilot study, and the remainder in the test-retest.

Trained interviewers conducted telephone interviews in a laboratory for research at the *Universidade de São Paulo* (USP, University of *São Paulo*). The standardization of the application occurred by reading the questions directly from the computer screen and automatically recording the answers in electronic data files. The CSI response time was evaluated using a stopwatch during the pilot study interviews and in 10% of the test-retest interviews. Each interview lasted an average of five minutes with a maximum of five contact attempts. The main author of this article supervised data collection.

In the pilot test, the participants were individually asked semi-open questions on question clarity, adequacy and sufficiency of answer options, clarity of instructions provided by the interviewer, and perception of application time. Suggestions for changes in the application of the CSI were also allowed. After the pilot test, the collection manual was adjusted. The introductory question was repeated ("*how confident do you feel in...*") and the answer options "*not confident; little confident; confident; very confident*" were also repeated in the middle of the interview.

In the test-retest study, the final version of the CSI (Chart 2) was applied twice to each participant at an interval of seven to 15 days [23]. Fifty-nine adults completed the original interview (13.2% of losses due to non-contact) and 51 adults completed the repeated interviews (six losses due to non-contact, one refusal, one exclusion for incomplete data). The data were used in reliability analyses. Sociodemographic characteristics of the participants (sex, race, age, marital status, education, employment status, family income per capita and number of residents per household) were collected for sample description.

CSI reliability assessment

Two dimensions of instrument reliability were considered: internal consistency and reproducibility. The internal consistency was evaluated by Cronbach's alpha in relation to the ten

Chart 2. Final version of the Cooking Skills Index (CSI). *São Paulo* (SP), Brazil, 2015.

How confident do you feel in*	Answer option*			
	Not confident (0)	Little confident (1)	Confident (2)	Very confident (3)
1. Stew a food	□	□	□	□
2. Oven-baking/Roasting	□	□	□	□
3. Seasoning meat using only natural seasonings	□	□	□	□
4. Follow a simple recipe	□	□	□	□
5. Make a homemade tomato sauce using only tomatoes and natural seasonings	□	□	□	□
6. Prepare a homemade soup	□	□	□	□
7. Cooking beans in pressure cooker	□	□	□	□
8. Grill a meat	□	□	□	□
9. Prepare a simple homemade cake	□	□	□	□
10. Prepare a lunch or dinner by combining foods and spices already existing in the house without a recipe	□	□	□	□

Note: *Repeat at the beginning and middle of the interview.

items and the successive removal of each item. Values higher than 0.70 indicated a good consistency [23]. Repeatability was calculated by quadratic weighted kappa, with 95% confidence intervals, and also by the Prevalence-Adjusted Bias-Adjusted Kappa (PABAK). Quadratic weighting is proper for analysis of ordinal variables by considering the hierarchical nature of answers and by treating distinctly smaller and larger disagreements. The PABAK analysis allows verifying possible influences of prevalence and bias related to frequency and marginal distribution of responses on the magnitude of the kappa in the studied context [23,24]. Values of kappa above 0.80 indicate an almost perfect agreement, values between 0.61 and 0.80 indicate substantial agreement, values between 0.41 and 0.60 indicate moderate agreement, values between 0.21 and 0.40 indicate regular agreement and values below 0.21 indicate weak agreement [25]. The software Stata® (Stata Corporation, College Station, Texas, United States) version 14.1 SE (Standard Edition) was used for the calculation of Cronbach's alpha and the WinPepi (Hebrew University, Jerusalem, Israel) version 11.65 for the kappa.

Ethical issues

The Research Ethics Committee approved this research (CAAE: 25962213.9.0000.542). The participation of the subjects was conditioned to the signing of an informed consent according to Resolution No.466 of December 12, 2012.

R E S U L T S

The experts considered the CSI as appropriate and consistent with the theoretical framework used. Pilot participants reported ease of understanding the content of questions and answer options,

in addition to convenience of application time.

Women (94.1%), white (67.4%), aged between 30 and 39 years (64.7%), worker (80.4%), married (84.3%), with complete or upper secondary education (82.4%), family income *per capita* between one and three minimum wages/month (57.8%) and belonging to families composed of up to four people (83.7%) participated in the test-retest (n=51).

The mean score and range of CSI were similar in both interviews (71.3, 46.7-93.3; and 71.8 50-96.7, respectively). The absolute difference between the mean score assigned to each of the ten skills in the first and second interview ranged from zero to 5.9 (Table 1).

Table 1. Average score reached for each item and the ten items of the Cooking Skills Index (CSI) in two successive telephone interviews (test-retest), and results of internal consistency evaluation (Cronbach's alpha) and of the instrument's reproducibility (kappa). Adults responsible for food preparation at home in the city of *São Paulo* (SP), Brazil, 2015 (n=51).

Cooking Skills Index item (CSI)	Average score (SD)		Cronbach's alpha		Weighted quadratic Kappa (CI95%)	Adjusted Kappa (PABAK)
	Test	Retest	Test	Retest		
1. Stew a food	72.5 (25.6)	78.4 (21.9)	0.75*		0.41 (0.24-0.58)	0.86
2. Oven-baking/ roasting	78.4 (21.9)	73.9 (20.3)	0.70*		0.54 (0.30-0.78)	0.92
3. Seasoning meat using only natural seasonings	81.0 (21.3)	81.0 (21.3)	0.70*		0.37 (0.13-0.61)	0.75
4. Follow a simple recipe	36.6 (19.2)	39.2 (18.5)	0.76*		0.32 (0.08-0.56)	0.78
5. Make a homemade tomato sauce using only tomatoes and natural seasonings	57.5 (29.9)	57.5 (29.9)	0.76*		0.48 (0.23-0.73)	0.82
6. Prepare a homemade soup	80.4 (17.9)	79.1 (17.6)	0.73*		0.29 (0.06-0.53)	0.80
7. Cooking beans in pressure cooker	79.7 (21.1)	80.4 (20.2)	0.72*		0.61 (0.42-0.80)	0.85
8. Grill a meat	71.9 (23.4)	75.8 (22.2)	0.71*		0.41 (0.12-0.70)	0.88
9. Prepare a simple homemade cake	78.4 (20.9)	78.4 (19.8)	0.72*		0.41 (0.24-0.58)	0.78
10. Prepare a lunch or dinner by combining foods and spices already existing in the house without a recipe	76.5 (20.3)	74.5 (23.7)	0.71*		0.52 (0.34-0.70)	0.91
CSI (all items)	71.3 (12.4)	71.8 (12.6)	0.75	0.78	0.55 (0.38-0.72)	0.89

Note: *Cronbach's Alpha of the instrument after removal of the item.

CSI: Cooking Skills Index; SD: Standard Deviation; CI95%: 95% Confidence Interval; PABAK: Prevalence and Bias Adjusted Kappa.

The instrument had a good internal consistency (Cronbach's alpha=0.75). The small magnitude of variations with the individual removal of items recommended the maintenance of all items. Instrument reproducibility was moderated by quadratic weighted kappa (0.55) and almost perfect by PABAK (0.89). The reproducibility of each item ranged from regular to moderate by weighted kappa. After adjustment for prevalence and bias, it increased to good and very good (>0.80) in six of the ten items.

DISCUSSION

The CSI is the first instrument that adopted the DGBP as a theoretical reference in the definition of CS [6]. It was developed for use in researches that investigate confidence in the performance of CS used to "cook from scratch".

In this first evaluation, the CSI showed a good internal consistency and an acceptable reproducibility. These results approximate CSI to instruments developed to evaluate CS in high-income countries [4,13]. In the Latin American context, similar results were found for a Chilean instrument [15] that found acceptable internal consistency and reproducibility in adolescents, though using other methods. A Brazilian instrument [14] evaluated the CS of university students and presented a good internal consistency in scales evaluating confidence in basic cooking activities and cooking techniques, but its reproducibility was not tested.

The good internal consistency of the CSI denoted coherence in the set of proposed items. Its acceptable reproducibility indicated that the index, if repeated under the same conditions, would generate consistent answers by respondents. The standardized application of the CSI and the easy understanding of the questions by interviewees are important premises for achieving a good reproducibility. The decrease in random error due to reaching such premises may have contributed to this good result [17,23]. Although there was variation in answers given in the first and second interviews, such variation did not affect the index mean values, which were very close in both interviews.

The development of new instruments of evaluation, because it is not an easy task, is only encouraged in the absence of another instrument adequate to the practices and the reality under study [13,18,19,23], a situation which was observed in this study [3,4,11-15]. As an advantage, the CSI is short, easy to apply and standardized. It innovates in synthesizing CS in a scale from zero to 100, which facilitates result interpretations. It also specifies in its items the evaluation of CS related to the preparation of home-cooked meals made 'from scratch', thus minimizing misinterpretation of the type of CS investigated, a recurring problem in international instruments [3,11]. Finally, its computerization minimized possible mistakes by the interviewer. The application of telephone interviews was advantageous due to its low cost and ease of access, offering data similar to those collected in person [18,26]. However, its presentation also allows the application on paper and by face-to-face interviews.

Among the limitations of this study, the low number of people studied and the non-randomized sample design can be highlighted. The low number of people studied could compromise the power of the statistical test. However, pilot studies can be conducted using small samples (n<100) provided that the sample size does not compromise the performance of analyses [17]. The tests performed in this study took into account the sample size. The choice of individuals by convenience compromises the generalization of results. However, it is a simplified and accessible option for the operationalization of preliminary studies. Finally, the evaluation of CS by self-efficacy could be considered a limitation if it only predicted the occurrence of the practice and did not determine it [19]. However, the self-efficacy judgment considers the individual performance, which is practice-dependent and malleable depending on the task to be performed. Thus, the use of self-efficacy is recommended as an excellent predictor of behavior, helping to determine what individuals do with their skills [19,20].

C O N C L U S I O N

The good reliability of CSI allows its use in Brazilian studies evaluating confidence in the performance of CS in contexts similar to those of this study, enabling the conduction of new research and future population diagnosis. As future steps, studies should further the evaluation, complementing the psychometric analyses and examining the applicability in population strata involving different Brazilian regions and age groups.

C O N T R I B U T O R S

CA MARTINS and CA MONTEIRO were responsible for the conception and design of the study; drafting and writing a critical review of the article. All authors contributed to the design of the article; analysis and interpretation of data; writing and critical review. All the authors approved the final version.

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ERRATUM

In article "Cooking Skills Index: Development and reliability assessment" with DOI: 10.1590/1678-9865201932e180124 published in Revista de Nutrição, 2019;32:e180124, on page 5:

Where is read

Chart 1. Theoretical bases for the definition of items of the Cooking Skills Index (CSI). *São Paulo* (SP), Brazil, 2015.

Item	Content	Content source
1	Stew a food	Item adapted from the United Kingdom (UK) National Diet and Nutrition Survey (NDNS) instrument [12] and based on the Dietary Guidelines for the Brazilian Population (DGBP) recommendation [6] for preference for healthier cooking techniques (including oven-baking/roasting, grilling or stewing) during food preparation.
2	Oven-baking/roasting	Item adapted from the UK NDNS instrument [12] and based on the DGBP recommendation [6] for preference for healthier cooking techniques (including oven-baking/roasting, grilling or stewing) during food preparation.
3	Seasoning meat using only natural seasonings	Original item developed for this research based on the DGBP recommendation [6] for preference for natural seasonings in variety/abundance when seasoning foods using cooking ingredients in moderation and avoiding ultra-processed seasonings.
4	Follow a simple recipe	Item adapted from Barton *et al.* [13] and based on the DGBP recommendation [6] for development and transmission of cooking skills (CS) through recipes.
5	Make a homemade tomato sauce using only tomatoes and natural seasonings	Original item developed for this research based on the recommendation of the DGBP [6] for preference for preparation and consumption of homemade sauces - especially tomato sauce - to the detriment of using and consuming ultra-processed sauces.
6	Prepare a homemade soup	Item adapted from Hartmann *et al.* [4] and based on the DGBP recommendation [6] to encourage the preparation of homemade soups using various types of food (beans, vegetables, maize, cassava) because they have an easy preparation and quick execution to the detriment of using and consuming ultra-processed soups.
7	Cooking beans in pressure cooker	Original item developed for this research based on the recommendation of the DGBP [6] for preference for using this cooking technique to cook beans in order to decrease/optimize preparation time.
8	Grill a meat	Item adapted from the UK NDNS instrument [12] and based on the DGBP recommendation [6] for preference for healthier cooking techniques (including oven-baking/roasting, grilling or stewing) during food preparation.
9	Prepare a simple homemade cake	Item adapted from Hartmann *et al.* [4] and based on the DGBP recommendation [6] for the preparation of homemade cakes with different types of food, as opposed to the consumption of ultra-processed cakes.
10	Prepare a lunch or dinner by combining foods and spices already existing in the house without a recipe	Original item developed for this research based on the DGBP recommendation [6] for the preparation of meals using a combination of natural or minimally processed foods with natural seasonings and culinary ingredients.

Note: CSI: Cooking Skills Index; UK: United Kingdom; NDNS: National Diet and Nutrition Survey; DGBP: Dietary Guidelines for the Brazilian Population; CS: Cooking Skills.

Should read

Chart 1. Theoretical bases for the definition of items of the Cooking Skills Index (CSI). *São Paulo* (SP), Brazil, 2015.

Item	Content	Content source
1	Sauteing food	Item adapted from the United Kingdom (UK) National Diet and Nutrition Survey (NDNS) instrument [12] and based on the Dietary Guidelines for the Brazilian Population (DGBP) recommendation [6] for preference for healthier cooking techniques (including oven-baking/roasting, grilling or sauteing) during food preparation.
2	Oven-baking/Roasting	Item adapted from the UK NDNS instrument [12] and based on the DGBP recommendation [6] for preference for healthier cooking techniques (including oven-baking/roasting, grilling or sauteing) during food preparation.
3	Seasoning meat using only natural seasonings	Original item developed for this research based on the DGBP recommendation [6] for preference for natural seasonings in variety/abundance when seasoning foods using cooking ingredients in moderation and avoiding ultra-processed seasonings.
4	Following a simple recipe	Item adapted from Barton *et al.* [13] and based on the DGBP recommendation [6] for development and transmission of cooking skills (CS) through recipes.
5	Making a homemade tomato sauce using only tomatoes and natural seasonings	Original item developed for this research based on the recommendation of the DGBP [6] for preference for preparation and consumption of homemade sauces - especially tomato sauce - to the detriment of using and consuming ultra-processed sauces.
6	Preparing a homemade soup	Item adapted from Hartmann *et al.* [4] and based on the DGBP recommendation [6] to encourage the preparation of homemade soups using various types of food (beans, vegetables, maize, cassava) because they have an easy preparation and quick execution to the detriment of using and consuming ultra-processed soups.
7	Cooking beans in pressure cooker	Original item developed for this research based on the recommendation of the DGBP [6] for preference for using this cooking technique to cook beans in order to decrease/optimize preparation time.
8	Grilling meat	Item adapted from the UK NDNS instrument [12] and based on the DGBP recommendation [6] for preference for healthier cooking techniques (including oven-baking/roasting, grilling or sauteing) during food preparation.
9	Preparing a simple homemade cake	Item adapted from Hartmann *et al.* [4] and based on the DGBP recommendation [6] for the preparation of homemade cakes with different types of food, as opposed to the consumption of ultra-processed cakes.
10	Preparing lunch or dinner by combining foods and spices already existing in the house without a recipe	Original item developed for this research based on the DGBP recommendation [6] for the preparation of meals using a combination of natural or minimally processed foods with natural seasonings and culinary ingredients.

Note: CSI: Cooking Skills Index; UK: United Kingdom; NDNS: National Diet and Nutrition Survey; DGBP: Dietary Guidelines for the Brazilian Population; CS: Cooking Skills.

On page 7:

Where is read

Chart 2. Final version of the Cooking Skills Index (CSI). *São Paulo* (SP), Brazil, 2015.

Cooking Skills Index (CSI)				
How confident do you feel in	Answer option[*]			
	Not confident (0)	Little confident (1)	Confident (2)	Very confident (3)
1. Stew a food	□	□	□	□
2. Oven-baking/Roasting	□	□	□	□
3. Seasoning meat using only natural seasonings	□	□	□	□
4. Follow a simple recipe	□	□	□	□
5. Make a homemade tomato sauce using only tomatoes and natural seasonings	□	□	□	□
6. Prepare a homemade soup	□	□	□	□
7. Cooking beans in pressure cooker	□	□	□	□
8. Grill a meat	□	□	□	□
9. Prepare a simple homemade cake	□	□	□	□
10. Prepare a lunch or dinner by combining foods and spices already existing in the house without a recipe	□	□	□	□

Note: [*]Repeat at the beginning and middle of the interview.

Should read

Chart 2. Final version of the Cooking Skills Index (CSI). *São Paulo* (SP), Brazil, 2015.

Cooking Skills Index (CSI)				
How confident do you feel about[*]	Answer options[*]			
	Not confident (0)	Little confident (1)	Confident (2)	Very confident (3)
1. Sauteing food	□	□	□	□
2. Oven-baking/Roasting	□	□	□	□
3. Seasoning meat using only natural seasonings	□	□	□	□
4. Following a simple recipe	□	□	□	□
5. Making a homemade tomato sauce using only tomatoes and natural seasonings	□	□	□	□
6. Preparing a homemade soup	□	□	□	□
7. Cooking beans in pressure cooker	□	□	□	□
8. Grilling meat	□	□	□	□
9. Preparing a simple homemade cake	□	□	□	□
10. Preparing lunch or dinner by combining foods and spices already existing in the house without a recipe	□	□	□	□

Note: [*]Repeat at the beginning and middle of the interview.

On page 8:

Where is read

Table 1. Average score reached for each item and the ten items of the Cooking Skills Index (CSI) in two successive telephone interviews (test-retest), and results of internal consistency evaluation (Cronbach's alpha) and of the instrument's reproducibility (kappa). Adults responsible for food preparation at home in the city of *São Paulo* (SP), Brazil, 2015 (n=51).

Cooking Skills Index item (CSI)	Average score (SD)		Cronbach's alpha		Weighted quadratic Kappa (CI95%)	Adjusted Kappa (PABAK)
	Test	Retest	Test	Retest		
1. Stew a food	72.5 (25.6)	78.4 (21.9)	0.75*		0.41 (0.24-0.58)	0.86
2. Oven-baking/ roasting	78.4 (21.9)	73.9 (20.3)	0.70*		0.54 (0.30-0.78)	0.92
3. Seasoning meat using only natural seasonings	81.0 (21.3)	81.0 (21.3)	0.70*		0.37 (0.13-0.61)	0.75
4. Follow a simple recipe	36.6 (19.2)	39.2 (18.5)	0.76*		0.32 (0.08-0.56)	0.78
5. Make a homemade tomato sauce using only tomatoes and natural seasonings	57.5 (29.9)	57.5 (29.9)	0.76*		0.48 (0.23-0.73)	0.82
6. Prepare a homemade soup	80.4 (17.9)	79.1 (17.6)	0.73*		0.29 (0.06-0.53)	0.80
7. Cooking beans in pressure cooker	79.7 (21.1)	80.4 (20.2)	0.72*		0.61 (0.42-0.80)	0.85
8. Grill a meat	71.9 (23.4)	75.8 (22.2)	0.71*		0.41 (0.12-0.70)	0.88
9. Prepare a simple homemade cake	78.4 (20.9)	78.4 (19.8)	0.72*		0.41 (0.24-0.58)	0.78
10. Prepare a lunch or dinner by combining foods and spices already existing in the house without a recipe	76.5 (20.3)	74.5 (23.7)	0.71*		0.52 (0.34-0.70)	0.91
CSI (all items)	71.3 (12.4)	71.8 (12.6)	0.75	0.78	0.55 (0.38-0.72)	0.89

Note: *Cronbach's Alpha of the instrument after removal of the item.

CSI: Cooking Skills Index; SD: Standard Deviation; CI95%: 95% Confidence Interval; PABAK: Prevalence and Bias Adjusted Kappa.

Should read

Table 1. Mean score reached for each item and the ten items of the Cooking Skills Index (CSI) in two successive telephone interviews (test-retest), and results of internal consistency evaluation (Cronbach's alpha) and of the instrument's reproducibility (kappa). Adults responsible for food preparation at home in the city of *São Paulo* (SP), Brazil, 2015 (n=51).

Cooking Skills Index item (CSI)	Mean score (SD)		Cronbach's alpha		Weighted quadratic Kappa (95%CI)	Adjusted Kappa (PABAK)
	Test	Retest	Test	Retest		
1. Sauteing food	72.5 (25.6)	78.4 (21.9)	0.75[*]		0.41 (0.24-0.58)	0.86
2. Oven-baking/ roasting	78.4 (21.9)	73.9 (20.3)	0.70[*]		0.54 (0.30-0.78)	0.92
3. Seasoning meat using only natural seasonings	81.0 (21.3)	81.0 (21.3)	0.70[*]		0.37 (0.13-0.61)	0.75
4. Following a simple recipe	36.6 (19.2)	39.2 (18.5)	0.76[*]		0.32 (0.08-0.56)	0.78
5. Making a homemade tomato sauce using only tomatoes and natural seasonings	57.5 (29.9)	57.5 (29.9)	0.76[*]		0.48 (0.23-0.73)	0.82
6. Preparing a homemade soup	80.4 (17.9)	79.1 (17.6)	0.73[*]		0.29 (0.06-0.53)	0.80
7. Cooking beans in pressure cooker	79.7 (21.1)	80.4 (20.2)	0.72[*]		0.61 (0.42-0.80)	0.85
8. Grilling a meat	71.9 (23.4)	75.8 (22.2)	0.71[*]		0.41 (0.12-0.70)	0.88
9. Preparing a simple homemade cake	78.4 (20.9)	78.4 (19.8)	0.72[*]		0.41 (0.24-0.58)	0.78
10. Preparing lunch or dinner by combining foods and spices already existing in the house without a recipe	76.5 (20.3)	74.5 (23.7)	0.71[*]		0.52 (0.34-0.70)	0.91
CSI (all items)	71.3 (12.4)	71.8 (12.6)	0.75	0.78	0.55 (0.38-0.72)	0.89

Note: [*]Cronbach's Alpha of the instrument after removal of the item.

CSI: Cooking Skills Index; SD: Standard Deviation; 95%CI: 95% Confidence Interval; PABAK: Prevalence and Bias Adjusted Kappa.