








Semantic equivalence of an instrument to assess mothers/caregivers beliefs about early childhood caries

Kethlen Sara Correa de Souza¹ , Juliana Freire-Maia¹ , Luna Chagas Clementino¹ , Matheus de França Perazzo¹ , Brenda Heaton³ , Raul Garcia², Saul Martins Paiva¹ , Paulo Antônio Martins-Júnior^{1*} 

¹ Department of Pediatric Dentistry, Faculty of Dentistry, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil.

² Department of Health Policy & Health Services Research, Boston University Henry M. Goldman School of Dental Medicine, Boston, MA, USA.

³ Department of Epidemiology and Health Services Research, School of Dentistry, University of Utah, Salt Lake City, Utah, USA.

Corresponding author:

Paulo Antônio Martins-Júnior
Department of Pediatric Dentistry,
Faculty of Dentistry, Universidade
Federal de Minas Gerais
Av. Antônio Carlos 6627, Belo
Horizonte, MG, 31270-901, Brazil.
E-mail: pauloa-martinsjunior@ufmg.br

Editor: Dr. Altair A. Del Bel Cury

Received: September 15, 2024

Accepted: March 15, 2025

The knowledge and beliefs can affect the behavior of parents about preventive oral care of their children. **Aim:** This study aimed to perform the semantic equivalence of an instrument that assesses beliefs, knowledge, behaviors and barriers to oral care of mothers/caregivers about early childhood caries in their children aged 0 to 5 years between the original English version and the Brazilian Portuguese language version. **Methods:** Conceptual and item equivalence were initially performed. Following, semantic equivalence was evaluated according to the following steps: (1) translations of the instrument into Brazilian Portuguese, performed by two independent translators (both native in Brazilian Portuguese and fluent in English); (2) unification of the two translations by an expert committee; (3) two back-translations performed by two independent translators (both native in English and fluent in Brazilian Portuguese); (4) unification of the two back-translations by an expert committee; (5) unified back-translated version sent to the authors of the original instrument for evaluation; (6) committee review; (7) pre-test in a group of 20 Brazilian mothers/caregivers of children aged 0 to 5 years; (8) review and final version of the instrument in Brazilian Portuguese. **Results:** All items adequately reflected the Brazilian culture. Small divergences were found during translations and back-translations, and the expert committee chose the versions that would best fit into Brazilian culture. Pre-test also brought important insights to the process. All changes made were presented and approved by the original authors. **Conclusion:** The semantic equivalence allowed the development of a Brazilian Portuguese version of the instrument semantically equivalent to the original version.

Keywords: Knowledge. Mothers. Child. Surveys and questionnaires. Oral health.



Introduction

Early childhood caries (ECC) is a public health problem that has affected infants and preschool children worldwide¹. It is defined as the presence of one or more decayed, missing, or restored teeth due to caries, affecting children up to 71 months of age². Although the progression and development of dental caries has decreased over the years, ECC remains the most common chronic disease in childhood, with a worldwide prevalence of 63% in children 5 years of age³. Still, some less socio-economically advantaged populations are considered at high risk, presenting higher prevalence of dental caries when compared to the general population, in a phenomenon known as polarization⁴.

In this context, some knowledge and beliefs can affect the behavior of parents about preventive oral care of their children, being recognized as important determinants of caries in early childhood^{5,6}. Several studies have shown that the oral health knowledge of mothers is associated with the oral health of their children⁷⁻⁹, that is, mothers who have greater knowledge of oral health have children with less experience of dental caries⁹. On the other hand, the belief that dental caries is inevitable may lead parents to not care about the occurrence of dental caries in their children¹⁰. Moreover, children whose mothers believe that deciduous teeth should be treated only when they are compromised have less dental appointment rates⁷.

In Brazil, studies on beliefs and behaviors of mothers about the oral health of their children are scarce. In 2017, a questionnaire that assesses the beliefs, knowledge, behaviors, and barriers to oral care among mothers/caregivers of children aged 0 to 5 years, based on the Basic Research Factors Questionnaire (BRFQ), was published in English language^{11,12}. This questionnaire has not yet been translated and cross-culturally adapted into Brazilian Portuguese. Cross-cultural adaptation of instruments is considered an internationally recognized procedure^{13,14} and has great relevance in the research environment, since it allows the collection of comparable information in different populations with different cultures and languages^{15,16}. Therefore, the translation and cross-cultural adaptation of this instrument into Brazilian Portuguese may broaden researchers' ability to understand the beliefs, knowledge and behaviors about oral health among mothers/caregivers of children aged 0 to 5 years and what barriers they face in relation to oral care of their children in Brazil. The knowledge gained from these surveys may contribute to the development of prevention programs and improved access to oral health care for this population.

This study aimed to assess the semantic equivalence of an instrument that assesses the beliefs, knowledge, behaviors, and barriers to oral care of mothers/caregivers about early childhood caries in their children aged 0 to 5 years between the original English version and the Brazilian Portuguese language version.

Materials and Methods

Ethical approval

This study was approved by the Research Ethics Committee of the Federal University of Minas Gerais (UFMG), Brazil (CAAE: 02242518.3.0000.5149). The participants read and signed the Informed Consent Form agreeing to participate in the study.

Instrument

The instrument that assesses beliefs, knowledge, behaviors, and barriers is a modification of an instrument that was originally developed by the Early Childhood Caries Collaborating Centers (EC4) supported by the National Institute of Dental and Craniofacial Research (NIDCR)¹². The instrument incorporates constructs from various health behavior theories¹⁷⁻¹⁹ to explain the likelihood of individuals engaging (or not engaging) in positive oral health behaviors.

The questionnaire was developed for use with mothers/caregivers of children aged 0-5 years and has a total of 42 questions, being 25 true/false questions about oral health knowledge and beliefs, 10 yes/no questions about oral health behavior related to early childhood caries, and 07 questions about self-reported barriers to oral health care, including whether mothers/caregivers and/or their child(ren) have access to health insurance that covers dental care. The instrument also assesses which factors influence the mothers/caregivers' ability to attend their children's dental appointments. All questions are multiple choice.

Questionnaire scores are obtained by summing the total number of correctly answered questions for oral health knowledge and beliefs (scores can range from 0 to 25) and oral health behaviors (scores can range from 0 to 10)¹². An additional barrier index score was created to reflect the cumulative burden of self-reported barriers. A dichotomous cut-off point is established for each barrier based on the type of response scale used for the item. The cut-off point for a dichotomous choice barrier item (e.g., Yes/No) is the relatively higher risk response (e.g., "no dental insurance"). For a multipoint response scale (e.g., duration of the child's dental visit measured in 15-minute intervals), the cut-off point is the upper tertile of the scale based on a frequency analysis (e.g., longer dental visit indicates barrier). The barrier index score is created by summing the number of barrier items for each respondent (scores can range from 0 to 7)¹².

Conceptual and item equivalence

The operationalization of the translation and cross-cultural adaptation was developed according to the criteria established in the literature^{15,20,21}. To this end, before the assessment of semantic equivalence, an evaluation of conceptual and item equivalence was carried out.

The conceptual and item equivalence comprises the theoretical basis and the conceptual analysis on the topic. To this end, a committee of experts using a focus group strategy analyzed the theoretical framework of the original instrument, based on a literature review on the topic. The objective of the discussion was to assess

whether the different domains covered by the original instrument were relevant to the new context to which it would be adapted.

The expert committee was made up of three researchers (M.F.P., P.A.M.J and S.M.P) with large experience in the development and validation of questionnaires for the health sciences, belonging to the UFMG. These researches have published diverse manuscripts in esteemed international journals about development and validation of health instruments.

Semantic Equivalence

The evaluation of semantic equivalence (Figure 1) is the capacity to transfer the meaning contained in the original instrument to the new version, providing an effect on the respondents which is similar in both cultures.

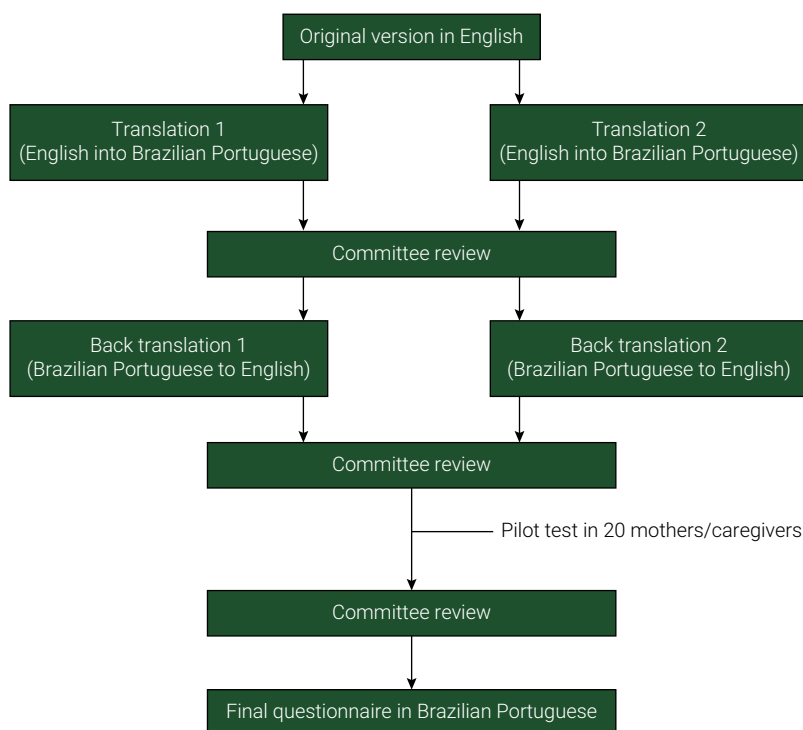


Figure 1. Flowchart of the stages of semantic equivalence evaluation

Translation

The translation of the original English version of the questionnaire into Brazilian Portuguese was carried out by two independent translators, both native in Brazilian Portuguese and fluent in English. One translator was a dentist with experience in epidemiological research and the other was a naive translator with no dental background. The translators received explanations about the theme of the instru-

ment and were instructed to use terms and words that could be easily understood by people with few years of formal schooling.

Unification of the translations and elaboration of the first summarized version

The expert committee compared the two translated versions with each other and with the original English version in order to obtain the first summarized version in Brazilian Portuguese. The expert committee gave special attention to words and sentences, focusing on improving comprehension by the target population.

Back-translation

The Brazilian Portuguese summarized version of the questionnaire was back-translated into English by two independent translators, both native in English and fluent in Brazilian Portuguese. Neither of these translators had training in the health sciences, and neither were informed of the concepts explored in the instrument. In addition, the translators did not receive the original instrument in English for comparison.

Unification of the back-translations and elaboration of the second summarized version

The two back-translated versions were compared to each other and to the original English version by the expert committee to obtain the second summarized version in English. This version was then sent to the authors of the original instrument for evaluation. The suggestions and opinions of the authors of the original instrument were taken into consideration to create a second summarized version in Brazilian Portuguese.

Pre-test

A pre-test was carried out online to obtain evaluations of the instrument from members of the target population. Specifically, the second summarized version in Brazilian Portuguese was administered to a convenience sample of 20 mothers/caregivers of children aged between 0 and 5 years using an online form, hosted on the Google Forms® platform. Mothers/caregivers of children aged 0 to 5 years, who were native in Brazilian Portuguese and literate (self-reported) were included.

First, mothers/caregivers received an explanation about the study and were invited to participate. After agreeing to participate, they signed an online consent form. Then, mothers/caregivers were invited to answer the online version of the instrument. Following completion of the survey instrument, mothers/caregivers were individually interviewed by one of the researchers. They were asked about their understanding of the questions, terms and expressions used in the questionnaire, indicating the need for replacement with easily understood terms.

Final version of the instrument

The expert committee evaluated the results obtained in the pre-test. All suggestions and commentaries of the mothers/caregivers were discussed, and changes were made after consensus of the committee experts. After this stage, the final version of the instrument in Brazilian Portuguese was developed (Tables 1 and 2).

Table 1. Items from the original English version of the questionnaire, results obtained from the summarized translations into Brazilian Portuguese and from the summarized back-translations of the questionnaire, and the final version after the pre-test.

Original	Overview of translations	Overview of back-translations	Final version
PART I: ORAL HEALTH KNOWLEDGE AND BELIEFS	PARTE I: CONHECIMENTOS E CRENÇAS EM SAÚDE BUCAL	PART I: ORAL HEALTH KNOWLEDGE AND BELIEFS	PARTE I: CONHECIMENTOS E CRENÇAS EM SAÚDE BUCAL
01. Which of these behaviors can lead to spreading cavity germs?	01. Quais destes comportamentos podem levar à disseminação de bactérias da cárie?	01. Which of these behaviors can lead to the spreading of bacteria of tooth decay?	01. Quais destes comportamentos podem levar à disseminação de germes da cárie?
a. Cleaning a pacifier in your own mouth after it has fallen on the floor before giving it back to the baby.	a. Limpar a chupeta/bico na sua própria boca depois que ela cai no chão, antes de devolver à criança.	a. Cleaning the pacifier in your own mouth after it falls on the floor before returning it to the child.	a. Limpar a chupeta/bico na sua própria boca depois que ela cai no chão, antes de devolver à criança.
b. Sharing food from the same spoon with a family member.	b. Compartilhar a comida na mesma colher com um membro da família.	b. Sharing food on the same spoon with a family member.	b. Compartilhar a comida na mesma colher com um membro da família.
c. Sharing food from the same spoon with a friend	c. Compartilhar a comida na mesma colher com um amigo.	c. Sharing food on the same spoon with a friend.	c. Compartilhar a comida na mesma colher com um amigo.
d. Sharing a toothbrush with a family member	d. Compartilhar a escova de dentes com um membro da família.	d. Sharing the toothbrush with a family member.	d. Compartilhar a escova de dentes com um membro da família.
e. Sharing a toothbrush with a friend.	e. Compartilhar a escova de dentes com um amigo.	e. Sharing the toothbrush with a friend.	e. Compartilhar a escova de dentes com um amigo.
f. Kissing a baby on the cheek.	f. Beijar um bebê na bochecha.	f. Kissing a baby on the cheek.	f. Beijar um bebê na bochecha.
02. At what age should a child first have his/her teeth checked by a dentist or doctor?	02. Com qual idade a criança deve consultar com um dentista pela primeira vez?	02. At what age should the child see a dentist for the first time?	02. Com qual idade a criança deve consultar com um dentista pela primeira vez?
03. On average, about how many times a year should a child see someone for dental care?	03. Em média, quantas vezes por ano uma criança deveria consultar um dentista?	03. On average, how many times a year should a child see a dentist?	03. Em média, quantas vezes por ano uma criança deveria consultar um dentista?
(Only if child is at least 1 year old)	(Somente se a criança tiver, pelo menos, 1 ano de idade)	(Only if the child is at least one year old)	(Somente se a criança tiver, pelo menos, 1 ano de idade)
04. How many times a day should a child's teeth be brushed?	04. Quantas vezes por dia uma criança deve escovar os dentes?	04. How many times a day should a child's teeth be brushed?	04. Quantas vezes por dia uma criança deve escovar os dentes?
05. If a child has no teeth, how many times a day should gums be wiped?	05. Se a criança não tem dentes, quantas vezes por dia as gengivas dela deveriam ser limpas?	05. If the child has no teeth, how many times a day should the gums be cleaned?	05. Se a criança não tem dentes, quantas vezes por dia as gengivas dela deveriam ser limpas?
Prompt: Fluoride varnish may be brushed on children's teeth to prevent cavities	Dica: O flúor pode ser utilizado nos dentes das crianças para evitar cárie.	Tip: Fluoride can be used on children's teeth to prevent tooth decay.	Dica: O flúor pode ser utilizado nos dentes das crianças para evitar cárie.

Continue

Continuation

06. How many times during a year should fluoride varnish be applied to a child's teeth? (<i>Interviewer may prompt about where FV may be applied [Head Start, community, school, WIC center, or dental or medical clinic]</i>)	06. Quantas vezes durante o ano o flúor deveria ser aplicado nos dentes da criança? (O entrevistador pode perguntar sobre onde o verniz de flúor pode ser aplicado [escola, posto de saúde ou consultório do dentista]).	06. How many times during the year should fluoride be applied to a child's teeth? (The interviewer may ask about where fluoride can be applied [school, health unit or dentist's office])	06. Quantas vezes durante o ano o flúor deve ser aplicado pelo dentista nos dentes da criança? (O entrevistador pode perguntar sobre onde o verniz de flúor pode ser aplicado [escola, posto de saúde ou consultório do dentista]).
Directions: The following questions ask about dental health. Please tell us whether you think the following statements are True or False.	Instruções: As questões a seguir perguntam sobre saúde bucal. Por favor, conte-nos se você acha que as frases a seguir são Verdadeiras ou Falsas.	Instructions: The following questions ask about oral health. Please, tell us if you think that the following statements are True or False.	Instruções: As questões a seguir perguntam sobre saúde bucal. Por favor, conte-nos se você acha que as frases a seguir são Verdadeiras ou Falsas.
07. Cavities are caused by germs in the mouth	07. Cárie é causada por germes na boca.	07. Tooth decay is caused by germs in the mouth.	07. Cárie é causada por germes na boca.
08. It is best to use toothpaste with fluoride when brushing a child's teeth.	08. É melhor usar pasta de dentes com flúor quando escovar os dentes de uma criança.	08. It is best to use toothpaste with fluoride when brushing a child's teeth.	08. É melhor usar pasta de dentes com flúor quando escovar os dentes de uma criança.
09. Going to bed with a sippy cup or bottle with anything in it but water can hurt a child's teeth	09. Ir dormir com um copo ou mamadeira com qualquer líquido que não seja água pode prejudicar os dentes de uma criança.	09. Going to sleep with a glass or sucking bottle with anything other than water can harm a child's teeth.	09. Ir dormir com um copo ou mamadeira com qualquer líquido que não seja água pode prejudicar os dentes de uma criança.
10. Because they do not stay in your child's mouth very long, baby teeth are not that important	10. Por não ficarem na boca da sua criança por muito tempo, os dentes de leite não são importantes.	10. Because they do not remain in the child's mouth for very long, baby teeth are not important.	10. Por não ficarem na boca da sua criança por muito tempo, os dentes de leite não são importantes.
11. There is no need to go to the dentist unless children have a problem with their teeth.	11. Não há necessidade de ir ao dentista, a não ser que a criança tenha algum problema nos seus dentes.	11. There is no need to go to the dentist unless the child has a problem with his/her teeth.	11. Não há necessidade de ir ao dentista, a não ser que a criança tenha algum problema nos seus dentes.
Directions: This section asks about your opinions of how certain behaviors affect your child's teeth. Please tell us whether you think the following behaviors are Good for your child's teeth, Do not affect your child's teeth, or Bad for your child's teeth	Instruções: Esta seção pergunta sobre suas opiniões de como certos comportamentos afetam os dentes da sua criança. Por favor, diga-nos se você acha que os comportamentos a seguir são Bons para os dentes da sua criança, Não afetam os dentes da sua criança, ou Ruins para os dentes da sua criança.	Instructions: This section asks about your opinions of how certain behaviors affect your child's teeth. Please, tell us if you think that the following behaviors are Good for your child's teeth, Do not affect your child's teeth, or Bad for your child's teeth.	Instruções: Esta seção pergunta sobre suas opiniões de como certos comportamentos afetam os dentes da sua criança. Por favor, diga-nos se você acha que os comportamentos a seguir são Bons para os dentes da sua criança, Não afetam os dentes da sua criança, ou Ruins para os dentes da sua criança.
12. Eating something after brushing teeth but before going to bed	12. Comer alguma coisa depois de escovar os dentes e antes de ir dormir.	12. Eating something after brushing the teeth and before going to bed.	12. Comer alguma coisa depois de escovar os dentes e antes de ir dormir.
13. Drinking soda or pop.	13. Beber refrigerante	13. Drinking soda pop.	13. Beber refrigerante.
14. Eating sweet or sugary foods	14. Comer doces ou comidas com açúcar.	14. Eating sweets or foods with sugar.	14. Comer doces ou comidas com açúcar.
15. Sharing a toothbrush with your child	15. Compartilhar uma escova de dentes com sua criança.	15. Sharing a toothbrush with your child.	15. Compartilhar uma escova de dentes com sua criança.

Continue

Continuation

16. Using the same spoon to taste the food and feed the child	16. Usar a mesma colher para provar a comida e alimentar a criança.	16. Using the same spoon to taste the food and feed the child.	16. Usar a mesma colher para provar a comida e alimentar a criança.
17. Drinking milk from a sippy cup at bedtime.	17. Beber leite de um copo usando canudinho na hora de dormir.	17. Drinking milk from a sippy cup at bedtime.	17. Beber leite de um copo usando canudinho na hora de dormir.
18. Getting fluoride varnish put on your child's teeth.	18. Aplicar flúor nos dentes da sua criança.	18. Applying fluoride to your child's teeth.	18. Aplicar flúor nos dentes da sua criança. (Flúor aplicado pelo dentista).
19. Brushing and flossing your own teeth.	19. Escovar e passar fio dental nos seus próprios dentes.	19. Brushing and using dental floss on your own teeth.	19. Você responsável, acredita que escovar e passar fio dental nos seus próprios dentes são:
20. Brushing child's teeth or wiping gums (if child has no teeth).	20. Escovar os dentes ou limpar as gengivas (se a criança não tem dentes).	20. Brushing the teeth or cleaning the gums (if the child has no teeth).	20. Escovar os dentes ou limpar as gengivas (se a criança não tem dentes).
PART II: ORAL HEALTH BEHAVIOR	PARTE II: COMPORTAMENTO DE SAÚDE BUCAL	PART II: ORAL HEALTH BEHAVIOR	PARTE II: COMPORTAMENTO DE SAÚDE BUCAL
01. During the past year, has your child been to a dentist or dental clinic for a routine checkup or cleaning?	01. Durante o ano passado, a sua criança foi ao dentista ou clínica odontológica para uma consulta de rotina ou limpeza?	01. During the past year, did your child go to the dentist or dental clinic for a routine appointment or cleaning?	01. Durante o ano passado, a sua criança foi ao dentista ou clínica odontológica para uma consulta de rotina ou limpeza?
(Only if child is younger than 1 year old) 02. How often are your child's teeth and gums brushed or wiped?	(Somente se a criança tiver menos de 1 ano de idade) 02. Com que frequência os dentes ou gengivas da sua criança são escovados ou limpos?	(Only if the child is less than one year old) 02. How often are your child's teeth or gums brushed or cleaned?	(Somente se a criança tiver menos de 1 ano de idade) 02. Com que frequência os dentes ou gengivas da sua criança são escovados ou limpos?
03. When your child's teeth are brushed, is fluoride toothpaste usually used?	03. Quando os dentes da sua criança são escovados, geralmente é usada pasta de dentes com flúor?	03. When your child's teeth are brushed, is toothpaste with fluoride usually used?	03. Quando os dentes da sua criança são escovados, geralmente é usada pasta de dentes com flúor?
04. How often does your child eat sweet or sugary foods (for example, candy, cookies, donuts, ice cream)?	04. Com que frequência sua criança come alimentos doces ou comidas com açúcar (por exemplo, balas, bolachas/biscoitos, pão doce, sorvete)?	04. How often does your child eat sweet or sugary foods (for example, candy, cookies, sweet bread, ice cream)?	04. Com que frequência sua criança come alimentos doces ou comidas com açúcar (por exemplo, balas, bolachas/biscoitos, pão doce, sorvete)?
05. How often does your child drink sweet or sugary drinks (for example, juice, soda, pop, lemonade, Coke, Pepsi, Mountain Dew, Kool-Aid, Gatorade)? Exclude any diet drinks	05. Com que frequência sua criança bebe bebidas doces ou com açúcar (por exemplo, suco, refrigerante, limonada, Gatorade)? Excluir alguma bebida diet.	05. How often does your child drink sweet or sugary beverages (for example, juice, soda, pop, lemonade, Gatorade)? Excluded any diet drinks.	05. Com que frequência sua criança bebe bebidas doces ou com açúcar (por exemplo, suco, refrigerante, limonada, Gatorade)? Excluir alguma bebida diet.
06. In the past week, how often did your child eat or drink something other than water after brushing and before going to sleep?	06. Na semana passada, com que frequência sua criança comeu ou bebeu alguma coisa que não fosse água depois de escovar os dentes e antes de ir dormir?	06. In the past week, how often did your child eat or drink something other than water after brushing the teeth and before going to sleep?	06. Na semana passada, com que frequência sua criança comeu ou bebeu alguma coisa que não fosse água depois de escovar os dentes e antes de ir dormir?

Continue

Continuation

07. How often does your child put anything in his/her mouth that has just been in someone else's mouth?	07. Com que frequência a sua criança coloca alguma coisa, que tinha acabado de sair da boca de outra pessoa, na boca dela?	07. How often does your child put anything that has just come out of someone else's mouth into his/her mouth?	07. Com que frequência a sua criança coloca alguma coisa, que tinha acabado de sair da boca de outra pessoa, na boca dela?
08. During the past year, has your child had fluoride varnish put on his/her teeth?	08. Durante o ano passado foi aplicado, pelo dentista, flúor nos dentes da sua criança?	08. During the past year, was fluoride applied to your child's teeth?	08. Durante o ano passado foi aplicado, pelo dentista, flúor nos dentes da sua criança?
09. How many times during the past year has your child had fluoride varnish put on his/her teeth?	09. Quantas vezes durante o ano passado foi aplicado flúor nos dentes da sua criança?	09. How many times during the past year was fluoride applied to your child's teeth?	09. Quantas vezes durante o ano passado foi aplicado, pelo dentista, flúor nos dentes da sua criança?
10. How often do you brush your own teeth?	10. Com que frequência você escova os seus dentes?	10. How often do you brush your teeth?	10. Com que frequência você escova os seus próprios dentes?
PART III: ACCESS TO CARE	PARTE III: ACESSO AO CUIDADO MÉDICO E ODONTOLÓGICO	PART III: ACCESS TO CARE	PARTE III: ACESSO AO CUIDADO MÉDICO E ODONTOLÓGICO
01. Do you now have any type of insurance that pays for all or part of your child's health care?	01. Você tem algum tipo de plano de saúde ou convênio que cubra totalmente ou parcialmente a assistência médica da sua criança?	01. Do you have any type of health plan or insurance that covers all or part of your child's medical care?	01. Você tem algum tipo de plano de saúde ou convênio que cubra totalmente ou parcialmente a assistência à saúde da sua criança?
02. Do you now have dental insurance for yourself?	02. Você tem plano de saúde ou convênio odontológico para você?	02. Do you have a dental plan or insurance for yourself?	02. Você tem plano de saúde ou convênio odontológico para você?
03. During the past 12 months, was there a time when (child) needed dental care, but you couldn't get it at the time?	03. Durante os últimos 12 meses, aconteceu de (sua criança) precisar de atendimento odontológico, mas você não conseguir o atendimento a tempo?	03. During the past 12 months, did your child need dental care, but you were not able to get care in time?	03. Durante os últimos 12 meses, aconteceu de (sua criança) precisar de atendimento odontológico, mas você não conseguir o atendimento a tempo?
04. How long does a dental visit usually take from the time you arrive until the time you leave?	04. Quanto tempo geralmente dura a consulta odontológica desde o momento que você chega ao consultório até ir embora?	04. How long does a dental appointment usually last from the moment you arrive at the office until you leave?	04. Quanto tempo geralmente dura a consulta odontológica desde o momento que você chega ao consultório até ir embora?
05. During the past year, how many times did you miss work to take your child for dental care?	05. Durante o ano passado, quantas vezes você faltou ao trabalho para levar sua criança ao dentista?	05. During the past year, how many times did you miss work to take your child to the dentist?	05. Durante o ano passado, quantas vezes você faltou ao trabalho para levar sua criança ao dentista?
06. How much time would it take you and your child to travel to the dental office or clinic?	06. Quanto tempo você e sua criança levariam para chegar até o consultório ou clínica odontológica?	06. How long would it take you and your child to arrive at the dental office or clinic?	06. Quanto tempo você e sua criança levariam para chegar até o consultório ou clínica odontológica?
07. How do you think you would get to the dental office or clinic?	07. Como você acha que iria ao consultório ou clínica odontológica?	07. How do you think you would get to the dental office or clinic?	07. Como você acha que iria ao consultório ou clínica odontológica?

Table 2. Response options from the original English version of the questionnaire, results obtained from the summarized translations into Brazilian Portuguese and from the summarized back-translations of the questionnaire, and the final version after the pre-test.

Questions	Original	Overview of translations	Overview of back-translations	Final version
PART I: ORAL HEALTH KNOWLEDGE AND BELIEFS				
Question 1, from a to f	<input type="checkbox"/> 1 = Yes <input type="checkbox"/> 2 = No <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 1 = Sim <input type="checkbox"/> 2 = Não <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> 1 = Yes <input type="checkbox"/> 2 = No <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 1 = Sim <input type="checkbox"/> 2 = Não <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder
Question 2	<input type="checkbox"/> = 1 year old <input type="checkbox"/> 2 = 2 years old <input type="checkbox"/> 3 = 3 years old <input type="checkbox"/> 4 = 4 years old <input type="checkbox"/> 5 = 5 years old <input type="checkbox"/> 6 = 6 years old or older <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> = 1 ano <input type="checkbox"/> 2 = 2 anos <input type="checkbox"/> 3 = 3 anos <input type="checkbox"/> 4 = 4 anos <input type="checkbox"/> 5 = 5 anos <input type="checkbox"/> 6 = 6 anos <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> = 1 year <input type="checkbox"/> 2 = 2 years <input type="checkbox"/> 3 = 3 years <input type="checkbox"/> 4 = 4 years <input type="checkbox"/> 5 = 5 years old <input type="checkbox"/> 6 = 6 years or more <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> = 1 ano <input type="checkbox"/> 2 = 2 anos <input type="checkbox"/> 3 = 3 anos <input type="checkbox"/> 4 = 4 anos <input type="checkbox"/> 5 = 5 anos <input type="checkbox"/> 6 = 6 anos <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder
Questions 3 a 6	<input type="checkbox"/> 0 times <input type="checkbox"/> 1 time <input type="checkbox"/> 2 times <input type="checkbox"/> 3 times or more <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> Nenhuma vez <input type="checkbox"/> 1 vez <input type="checkbox"/> 2 vezes <input type="checkbox"/> 3 vezes ou mais <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> 0 times <input type="checkbox"/> 1 time <input type="checkbox"/> 2 times <input type="checkbox"/> 3 times or more <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> Nenhuma vez <input type="checkbox"/> 1 vez <input type="checkbox"/> 2 vezes <input type="checkbox"/> 3 vezes ou mais <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder
Questions from 7 to 11	<input type="checkbox"/> 1 = True <input type="checkbox"/> 2 = False <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> = Verdadeiro <input type="checkbox"/> 2 = Falso <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> 1 = True <input type="checkbox"/> 2 = False <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> = Verdadeiro <input type="checkbox"/> 2 = Falso <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder
Questions from 12 to 20	<input type="checkbox"/> 1 = Good for your child's teeth <input type="checkbox"/> 2 = Does not affect your child's teeth <input type="checkbox"/> 3 = Bad for your child's teeth <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 1 = Bons para os dentes da sua criança <input type="checkbox"/> 2 = Não afetam os dentes da sua criança <input type="checkbox"/> 3 = Ruins para os dentes da sua criança <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> 1 = Good for your child's teeth <input type="checkbox"/> 2 = Do not affect your child's teeth <input type="checkbox"/> 3 = Bad for your child's teeth <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 1 = Bons para os dentes da sua criança <input type="checkbox"/> 2 = Não afetam os dentes da sua criança <input type="checkbox"/> 3 = Ruins para os dentes da sua criança <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder
PART II: ORAL HEALTH BEHAVIOUR				
Questions 1, 3 e 8	<input type="checkbox"/> 1 = Yes <input type="checkbox"/> 2 = No <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 1 = Sim <input type="checkbox"/> 2 = Não <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> 1 = Yes <input type="checkbox"/> 2 = No <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 1 = Sim <input type="checkbox"/> 2 = Não <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder
Questions 2 e 10	<input type="checkbox"/> 0 = Never <input type="checkbox"/> 1 = Sometimes, but not every day <input type="checkbox"/> 2 = Once a day <input type="checkbox"/> 3 = Twice a day <input type="checkbox"/> 4 = More than twice a day <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 0 = Nunca <input type="checkbox"/> 1 = Às vezes, mas não todo dia <input type="checkbox"/> 2 = Uma vez por dia <input type="checkbox"/> 3 = Duas vezes por dia <input type="checkbox"/> 4 = Mais de duas vezes por dia <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> 0 = Never <input type="checkbox"/> 1 = Sometimes, but not every day <input type="checkbox"/> 2 = Once a day <input type="checkbox"/> 3 = Twice a day <input type="checkbox"/> 4 = More than twice a day <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 0 = Nunca <input type="checkbox"/> 1 = Às vezes, mas não todo dia <input type="checkbox"/> 2 = Uma vez por dia <input type="checkbox"/> 3 = Duas vezes por dia <input type="checkbox"/> 4 = Mais de duas vezes por dia <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder

Continue

Continuation

Questions 4 e 5	<input type="checkbox"/> 0 = Rarely or never <input type="checkbox"/> 1 = At least once a week, but not every day <input type="checkbox"/> 2 = Once a day <input type="checkbox"/> 3 = Twice a day <input type="checkbox"/> 4 = Three times a day <input type="checkbox"/> 5 = Four times a day <input type="checkbox"/> 6 = Five or more times a day <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 0 = Raramente ou nunca <input type="checkbox"/> 1 = Pelo menos uma vez na semana, mas não todos os dias <input type="checkbox"/> 2 = Uma vez por dia <input type="checkbox"/> 3 = Duas vezes por dia <input type="checkbox"/> 4 = Três vezes por dia <input type="checkbox"/> 5 = Quatro vezes por dia <input type="checkbox"/> 6 = Cinco ou mais vezes por dia <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> 0 = Rarely or never <input type="checkbox"/> 1 = At least once a week, but not every day <input type="checkbox"/> 2 = Once a day <input type="checkbox"/> 3 = Twice a day <input type="checkbox"/> 4 = Three times a day <input type="checkbox"/> 5 = Four times a day <input type="checkbox"/> 6 = Five or more times a day <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 0 = Raramente ou nunca <input type="checkbox"/> 1 = Pelo menos uma vez na semana, mas não todos os dias <input type="checkbox"/> 2 = Uma vez por dia <input type="checkbox"/> 3 = Duas vezes por dia <input type="checkbox"/> 4 = Três vezes por dia <input type="checkbox"/> 5 = Quatro vezes por dia <input type="checkbox"/> 6 = Cinco ou mais vezes por dia <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder
Question 6	<input type="checkbox"/> 0 = 0 times (never) <input type="checkbox"/> 1 = 1-3 times <input type="checkbox"/> 2 = 4-6 times <input type="checkbox"/> 3 = 7 times (every day) <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 0 = Nunca <input type="checkbox"/> 1 = 1-3 vezes <input type="checkbox"/> 2 = 4-6 vezes <input type="checkbox"/> 3 = 7 vezes (todos os dias) <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> 0 = 0 times (never) <input type="checkbox"/> 1 = 1-3 times <input type="checkbox"/> 2 = 4-6 times <input type="checkbox"/> 3 = 7 times (every day) <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 0 = Nunca <input type="checkbox"/> 1 = 1-3 vezes <input type="checkbox"/> 2 = 4-6 vezes <input type="checkbox"/> 3 = 7 vezes (todos os dias) <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder
Question 7	<input type="checkbox"/> 0 = Never <input type="checkbox"/> 1 = Not very often <input type="checkbox"/> 2 = Sometimes <input type="checkbox"/> 3 = Frequently <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 0 = Nunca <input type="checkbox"/> 1 = 1-3 vezes <input type="checkbox"/> 2 = 4-6 vezes <input type="checkbox"/> 3 = 7 vezes (todos os dias) <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> 0 = Never <input type="checkbox"/> 1 = Not very often <input type="checkbox"/> 2 = Sometimes <input type="checkbox"/> 3 = Frequently <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 0 = Nunca <input type="checkbox"/> 1 = 1-3 vezes <input type="checkbox"/> 2 = 4-6 vezes <input type="checkbox"/> 3 = 7 vezes (todos os dias) <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder
Question 9	<input type="checkbox"/> 0 = 0 (Never) <input type="checkbox"/> 1 = 1 <input type="checkbox"/> 2 = 2 <input type="checkbox"/> 10 = 10 <input type="checkbox"/> 11 = More than 10 (specify): _____ <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 0 = 0 (Nunca) <input type="checkbox"/> 1 = 1 <input type="checkbox"/> 2 = 2 <input type="checkbox"/> 10 = 10 <input type="checkbox"/> 11 = Mais de 10 (especificar): _____ <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> 0 = 0 (Never) <input type="checkbox"/> 1 = 1 <input type="checkbox"/> 2 = 2 <input type="checkbox"/> 10 = 10 <input type="checkbox"/> 11 = More than 10 (specify): _____ <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 0 = 0 (Nunca) <input type="checkbox"/> 1 = 1 <input type="checkbox"/> 2 = 2 <input type="checkbox"/> 10 = 10 <input type="checkbox"/> 11 = Mais de 10 (especificar): _____ <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder
PART III: ACCESS TO MEDICAL AND DENTAL CARE				
Questions 1, 2 e 3	<input type="checkbox"/> 1 = Yes <input type="checkbox"/> 2 = No <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 1 = Sim <input type="checkbox"/> 2 = Não <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> 1 = Yes <input type="checkbox"/> 2 = No <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 1 = Sim <input type="checkbox"/> 2 = Não <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder
Questions 4 e 6	<input type="checkbox"/> = 0-15 min <input type="checkbox"/> = 16-30 min <input type="checkbox"/> = 31-60 min <input type="checkbox"/> = 61-90 min <input type="checkbox"/> (>1 -1 1/2 hrs) <input type="checkbox"/> = 91-120 min <input type="checkbox"/> (>1 1/2 - 2 hrs) <input type="checkbox"/> = More than 120 minutes (> 2 hours) <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> = 0-15 min <input type="checkbox"/> = 16-30 min <input type="checkbox"/> = 31-60 min <input type="checkbox"/> = 61-90 min <input type="checkbox"/> (>1 -1 1/2 hrs) <input type="checkbox"/> = 91-120 min <input type="checkbox"/> (>1 1/2 - 2 hrs) <input type="checkbox"/> = Mais de 120 minutos (> 2 horas) <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> = 0-15 min <input type="checkbox"/> = 16-30 min <input type="checkbox"/> = 31-60 min <input type="checkbox"/> = 61-90 min <input type="checkbox"/> (>1 -1 1/2 hrs) <input type="checkbox"/> = 91-120 min <input type="checkbox"/> (>1 1/2 - 2 hrs) <input type="checkbox"/> = More than 120 minutes (> 2 hours) <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> = 0-15 min <input type="checkbox"/> = 16-30 min <input type="checkbox"/> = 31-60 min <input type="checkbox"/> = 61-90 min <input type="checkbox"/> (>1 -1 1/2 hrs) <input type="checkbox"/> = 91-120 min <input type="checkbox"/> (>1 1/2 - 2 hrs) <input type="checkbox"/> = Mais de 120 minutos (> 2 horas) <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder

Continue

Continuation

Question 5	<input type="checkbox"/> 0 = 0 (Never) <input type="checkbox"/> 1 = 1 <input type="checkbox"/> 2 = 2 <input type="checkbox"/> 10 = 10 <input type="checkbox"/> 11 = More than 10 (specify): _____ <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 0 = 0 (Nunca) <input type="checkbox"/> 1 = 1 <input type="checkbox"/> 2 = 2 <input type="checkbox"/> 10 = 10 <input type="checkbox"/> 11 = Mais de 10 (especificar): _____ <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> 0 = 0 (Never) <input type="checkbox"/> 1 = 1 <input type="checkbox"/> 2 = 2 <input type="checkbox"/> 10 = 10 <input type="checkbox"/> 11 = More than 10 (specify): _____ <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 0 = 0 (Nunca) <input type="checkbox"/> 1 = 1 <input type="checkbox"/> 2 = 2 <input type="checkbox"/> 10 = 10 <input type="checkbox"/> 11 = Mais de 10 (especificar): _____ <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder
Question 7	<input type="checkbox"/> 1 = Drive <input type="checkbox"/> 2 = Would be driven <input type="checkbox"/> 3 = Bus, train, other public transportation <input type="checkbox"/> 4 = Taxi <input type="checkbox"/> 5 = Walk <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 1 = Carro (dirigindo) <input type="checkbox"/> 2 = Carro (mas de carona) <input type="checkbox"/> 3 = Ônibus, trem/ metrô, ou outro meio de transporte público <input type="checkbox"/> 4 = Táxi <input type="checkbox"/> 5 = Caminhando <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder	<input type="checkbox"/> 1 = Car (driving) <input type="checkbox"/> 2 = Car (but a ride) <input type="checkbox"/> 3 = Bus, train/subway or other means of public transportation <input type="checkbox"/> 4 = Taxi <input type="checkbox"/> 5 = Walking <input type="checkbox"/> 77 = Don't know <input type="checkbox"/> 98 = Prefer not to answer	<input type="checkbox"/> 1 = Carro (dirigindo) <input type="checkbox"/> 2 = Carro (mas de carona) <input type="checkbox"/> 3 = Ônibus, trem/ metrô, ou outro meio de transporte público <input type="checkbox"/> 4 = Táxi <input type="checkbox"/> 5 = Caminhando <input type="checkbox"/> 77 = Não sei <input type="checkbox"/> 98 = Prefiro não responder

Result

Conceptual and item equivalence

In relation to the relevance and pertinence of the questionnaire items, the expert committee concluded that all items adequately reflected the Brazilian culture. There was no need to question the authors of the original instrument about the terms, neither to add or remove any question from the instrument.

Translation

It was observed that both translations were similar by keeping the same sense of the sentences. However, small divergences were observed in the choice of some words and expressions by translators 1 and 2, as in question 1 “Which of these behaviors can lead to spreading cavity germs?”, in which translator 1 translated it as “Which of these behaviors can lead to spreading cavity germs?” while translator 2 translated it as “Which of these behaviors can lead to spreading caries bacteria?”. In question 3 “On average, about how many times a year should a child see someone for dental care?” translator 1 translated to “On average, about how many times a year should a child visit someone for dental care?” and translator 2 translated to “On average, about how many times a year should a child see a dentist?”. These discrepancies were solved by the expert committee and the terms that could provide greater ease of understanding to the respondents were selected for use. In both cases, the committee opted for the version suggested by translator 2. In some cases, such as in the questions containing the term “fluoride varnish”, although both translators translated it as “fluoride varnish”, the committee deemed it more appropriate to use only “fluoride” to facilitate the mothers/ caregivers’ understanding.

Back-translation

Small discrepancies were observed in the use of some terms, for instance, in question 7 “Caries is caused by germs in the mouth” translator 1 translated to “Tooth decay is caused by germs in the mouth” and translator 2 translated to “Caries is caused by germs in the mouth”. The expert committee opted for translator 1 suggestion. After the unification of these back-translations, a summarized version was sent to the original authors for evaluation. At this stage, the original authors were consulted about the modification of the expression “anything in it but water” used in question 9 “Going to bed with a sippy cup or bottle with anything in it but water can hurt a child’s teeth” to “Going to bed with a sippy cup or bottle with any liquid in it but water can hurt a child’s teeth”. The authors understood and agreed with the change and considered the back-translation similar to the original and therefore did not suggest any further changes.

Pre-test

During the follow-up interview, some mothers/caregivers showed difficulties in understanding specific words and phrases. For example, in the questions about fluoride, mothers/caregivers reported not knowing if the fluoride mentioned was the one contained in toothpastes. Therefore, the questions that addressed this topic were the ones that presented the highest percentage of “don’t know” answers. To circumvent this misunderstanding, the expert committee opted to add to these questions the expressions “by the dentist” and “fluoride applied by the dentist”, as an example, in question 18 “Getting fluoride varnish put on your child’s teeth” was changed to “Apply fluoride to your child’s teeth (Fluoride applied by the dentist)”.

Furthermore, mothers/caregivers had difficult to understand some questions related to themselves. To facilitate understanding by the target population, question 19 “Brushing and flossing your own teeth”, for example, was changed to “You, mother/caregiver, believe that brushing and flossing your own teeth are:”. All changes made at this stage were presented and approved by the original authors.

Discussion

Parental knowledge, beliefs and behaviors about children’s oral health are generally recognized as influencing oral health behaviors and as important determinants of ECC^{5,6,12}. A study showed that lower caregiver literacy was associated with deleterious oral health behaviors, including nighttime bottle use and absence of daily brushing/cleaning⁹. Although health knowledge and beliefs are known to predict behavior¹⁸, a study has shown that some parents report accurate oral health knowledge and beliefs; however, these are not consistently translated into appropriate behaviors concerning their children’s oral health²². Given this, the development of interventions aimed at addressing these gaps in knowledge may serve as an important avenue for preventing ECC. Therefore, collection of this information in preliminary studies is essential.

Questionnaires are standardized tools composed of a set of items that allow for quantification of subjective information that is not always observable²³. Their use

allows for greater detail? in data collection while also being practical for use in large samples²³. For these reasons, questionnaire-based studies are common in epidemiological research. Therefore, based on this study and the future assessment of the psychometric properties of the instrument, it will be possible to carry out large-scale research studies that allow for important comparisons related to these aspects among Brazilian Portuguese-speaking populations.

The process of translation and adaptation requires a rigorous methodology^{15,21,23,24} which is essential to achieve equivalence between the original version and the new version of the instrument, thereby allowing for direct comparisons across populations. The first stage of the methodology consisted of assessing the conceptual and item equivalence, which is important to assess the relevance of the instrument in this new context to which it will be adapted. In this study, as well as in the semantic equivalence of the Brazilian Portuguese version of the Early Childhood Oral Health Impact Scale¹⁴, the group of experts concluded that the instruments were adequate for the Brazilian culture. Additionally, according to Beaton et al.¹⁵ (2000) the two translators should have different profiles or backgrounds. In our study, one translator (translator 2) possessed expert knowledge of the concepts being examined in the questionnaire while the other translator (translator 1) did not. Importantly, according to Beaton et al.¹⁵ (2000), the latter will be less influenced by an academic objective and will offer a translation that reflects the language used by this population. This statement was observed in this work, as in question 1, for example, the expression "cavity germs" was translated by translator 1 as "cavity germs" and translator 2 as "caries bacteria". Only minor divergences such as these were observed, and all of them were solved in the phase of reconciliation of the versions to produce the first synthesis version, aiming at using the expressions that would provide better understanding by the target audience. The same process was followed by other studies as in the Chinese version of the Caries Impacts and Experiences Questionnaire for Children (CARIES-QC)²⁵ and the Brazilian versions of the Scale of Oral Health Outcomes for 5 years old (SOHO-5)²⁶, and the Early Childhood Oral Health Impact Scale (ECOHIS)²⁷.

From this summarized version, two independent translators, whose mother tongue is American English, back-translated the questionnaire into the original language, as was done in the SOHO-5²⁶, Child-OIDP²⁸ and ECOHIS²⁷ instruments during the validations for Brazilian Portuguese language. This validity verification process ensures that the translated version reflects the same item content as the original versions¹⁵. In addition, back-translation can also be used as a practical tool for the researcher who is adapting the instrument to communicate with the author of the original instrument²¹. This step was essential for the final version of the questionnaire to be completed. Only one modification was presented to the original authors, who agreed with the change and considered the back-translation similar to the original version and, therefore, did not suggest any additional changes.

Pilot testing among a small sample (10 to 30 people) that is representative of the population for which the instrument is intended²³ will provide a check of whether the items, instructions and response options are readily understood by the respondents^{15,23}. It should be noted that, during the assessment of the target population,

the appropriateness of the item and the structure of the instrument as a whole is verified, whether the terms are clear, adequate and well written²¹. The pre-test performed in this study proved to be efficient in identifying the main difficulties of understanding by the target population and allowing for relevant changes to be made. These findings highlight the importance of the work of the expert committee and pilot-testing in cross-cultural adaptations²⁹.

This study has some limitations that should be acknowledged. This study was carried out during the COVID-19 pandemic, therefore pre-testing was conducted entirely online. It has been stated that web-based surveys may present selection bias since the sample may not be representative^{30,31}. However, when the topic is of interest to the target population, this method can be used^{30,31}. Once the semantic equivalence stage is completed, the instrument should be tested for its psychometric properties to determine its validity and reliability following the CONsensus-based Standards for the selection of health Measurement INstruments (COSMIN) checklist³², ensuring an effective use in research and cross-cultural comparisons^{16,27}. Therefore, future studies will be conducted to check whether the Brazilian Portuguese version of the questionnaire is valid and reliable for use in research and clinical practice in Brazil.

The translations and back-translations assessed by expert committee and the incorporation of suggestions from the target population allowed the development of a Brazilian Portuguese version of the instrument that was semantically equivalent to the original English version.

Declaration of competing interest

The authors declare no conflict of interest.

Data Availability

Datasets related to this article will be available upon request to the corresponding author.

Author Contribution

Kathleen Sara Correa de Souza: material preparation, data collection and analysis. **Juliana Freire-Maia:** material preparation, data collection and analysis. **Luna Chagas Clementino:** material preparation, data collection and analysis. **Matheus de França Perazzo:** participated in the writing, review and commented on previous versions of the manuscript. **Brenda Heaton:** participated in the writing, review and commented on previous versions of the manuscript. **Raul Garcia:** participated in the writing, review and commented on previous versions of the manuscript. **Saul Martins de Paiva:** participated in the writing, review and commented on previous versions of the manuscript. **Paulo Antônio Martins-Júnior:** material preparation, data collection and analysis. All authors meet the International Committee of Medical Journal Editors (ICMJE) authorship criteria e read and approved the final manuscript.

References

1. Uribe SE, Innes N, Maldupa I. The global prevalence of early childhood caries: a systematic review with meta-analysis using the WHO diagnostic criteria. *Int J Paediatr Dent*. 2021 Nov;31(6):817-30. doi: 10.1111/ipd.12783.
2. American Academy of Pediatric Dentistry. Guideline on caries-risk assessment and management for infants, children, and adolescents. Reference Manual. *Clinical Practice Guidelines*. *Pediatr Dent*. 2016;38(6):142-9.
3. Tinanoff N, Baez RJ, Diaz Guillory C, Donly KJ, Feldens CA, McGrath C, et al. Early childhood caries epidemiology, aetiology, risk assessment, societal burden, management, education, and policy: global perspective. *Int J Paediatr Dent*. 2019 May;29(3):238-48. doi: 10.1111/ipd.12484.
4. Stona P, Kramer PF, Vargas-Ferreira F, Amorim LM, Coelho EMRB, Feldens CA. Socioeconomic and intraoral polarization of untreated caries and tooth loss among male adolescents. *Braz Oral Res*. 2021 Mar 15;35:e031. doi: 10.1590/1807-3107bor-2021.vol35.0031.
5. Ismail AI. Prevention of early childhood caries. *Community Dent Oral Epidemiol*. 1998;26(1 Suppl):49-61. doi: 10.1111/j.1600-0528.1998.tb02094.x.
6. Garcia R, Borrelli B, Dhar V, Douglass J, Gomez FR, Hieftje K, et al. Progress in early childhood caries and opportunities in research, policy, and clinical management. *Pediatr Dent*. 2015 May-Jun;37(3):294-9.
7. Milgrom P, Mancl L, King B, Weinstein P, Wells N, Jeffcott E. An explanatory model of the dental care utilization of low-income children. *Med Care*. 1998 Apr;36(4):554-66. doi: 10.1097/00005650-199804000-00011.
8. Vann WF Jr, Lee JY, Baker D, Divaris K. Oral health literacy among female caregivers: impact on oral health outcomes in early childhood. *J Dent Res*. 2010 Dec;89(12):1395-400. doi: 10.1177/0022034510379601.
9. Divaris K, Lee JY, Baker AD, Vann WF Jr. Caregivers' oral health literacy and their young children's oral health-related quality-of-life. *Acta Odontol Scand*. 2012 Sep;70(5):390-7. doi: 10.3109/00016357.2011.629627. Epub 2011 Dec 8.
10. Huntington NL, Spetter D, Jones JA, Rich SE, Garcia RI, Spiro A 3rd. Development and validation of a measure of pediatric oral health-related quality of life: the POQL. *J Public Health Dent*. 2011 Summer;71(3):185-93.
11. Albino J, Tiwari T, Gansky SA, Henshaw MM, Barker JC, Brega AG, et al. The basic research factors questionnaire for studying early childhood caries. *BMC Oral Health*. 2017 May 19;17(1):83. doi: 10.1186/s12903-017-0374-5.
12. Heaton B, Crawford A, Garcia RI, Henshaw M, Riedy CA, Barker JC, et al. Oral health beliefs, knowledge, and behaviors in Northern California American Indian and Alaska Native mothers regarding early childhood caries. *J Public Health Dent*. 2017 Sep;77(4):350-9. doi: 10.1111/jphd.12217.
13. Maneesriwongul W, Dixon JK. Instrument translation process: a methods review. *J Adv Nurs*. 2004 Oct;48(2):175-86. doi: 10.1111/j.1365-2648.2004.03185.x.
14. Tesch FC, Oliveira BH, Leão A. [Semantic equivalence of the Brazilian version of the early childhood oral health impact scale]. *Cad Saude Publica*. 2008 Aug;24(8):1897-909. Portuguese. doi: 10.1590/s0102-311x2008000800018.
15. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine (Phila Pa 1976)*. 2000 Dec;25(24):3186-91. doi: 10.1097/00007632-200012150-00014.

16. Lee H, Kwak Y. Development and initial validation of a trait emotional intelligence scale for Korean adults. *Asia Pacific Educ Rev*. 2012;13(2):209-17. doi: 10.1007/s12564-011-9175-8.
17. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev*. 1977 Mar;84(2):191-215. doi: 10.1037//0033-295x.84.2.191.
18. Ajzen I. The theory of planned behaviour. *Organ Behav Hum Decis Process*. 1991;50(2):179-211. doi: 10.1016/0749-5978(91)90020-T.
19. Tedesco LA, Keffer MA, Fleck-Kandath C. Self-efficacy, reasoned action, and oral health behavior reports: a social cognitive approach to compliance. *J Behav Med*. 1991 Aug;14(4):341-55. doi: 10.1007/BF00845111.
20. Herdman M, Fox-Rushby J, Badia X. A model of equivalence in the cultural adaptation of HRQoL instruments: the universalist approach. *Qual Life Res*. 1998 May;7(4):323-35. doi: 10.1023/a:1024985930536.
21. Borsa JC, Damásio BF, Bandeira DR. Cross-cultural adaptation and validation of psychological instruments: some considerations. *Paidéia (Ribeirão Preto)*. 2012 Sep;22(53):423-32. doi: 10.1590/S0103-863X2012000300014.
22. Salama F, Alwohaibi A, Alabdullatif A, Alnasser A, Hafiz Z. Knowledge, behaviours and beliefs of parents regarding the oral health of their children. *Eur J Paediatr Dent*. 2020 Jun;21(2):103-9. doi: 10.23804/ejpd.2020.21.02.03.
23. Paiva SM, Firmino RT, Abreu LG. [Validation of instruments for dental research]. In: Estrela C, organizer. [Scientific methodology: science, teaching and research]. 3. ed. Porto Alegre: Artes Médicas; 2018. Chap.20, p.315-23. Portuguese.
24. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. *J Clin Epidemiol*. 1993 Dec;46(12):1417-32. doi: 10.1016/0895-4356(93)90142-n.
25. He S, Wang J. Validation of the Chinese version of the Caries Impacts and Experiences Questionnaire for Children (CARIES-QC). *Int J Paediatr Dent*. 2020 Jan;30(1):50-56. doi: 10.1111/ipd.12576. Epub 2019 Sep 24.
26. Abanto J, Tsakos G, Paiva SM, Goursand D, Raggio DP, Bönecker M. Cross-cultural adaptation and psychometric properties of the Brazilian version of the scale of oral health outcomes for 5-year-old children (SOHO-5). *Health Qual Life Outcomes*. 2013 Feb 9;11:16. doi: 10.1186/1477-7525-11-16.
27. Martins-Júnior PA, Ramos-Jorge J, Paiva SM, Marques LS, Ramos-Jorge ML. Validations of the Brazilian version of the Early Childhood Oral Health Impact Scale (ECHOIS). *Cad Saude Publica*. 2012 Feb;28(2):367-74. doi: 10.1590/s0102-311x2012000200015.
28. Castro RA, Cortes MI, Leão AT, Portela MC, Souza IP, Tsakos G, et al. Child-OIDP index in Brazil: cross-cultural adaptation and validation. *Health Qual Life Outcomes*. 2008 Sep 15;6:68. doi: 10.1186/1477-7525-6-68.
29. Streiner DL, Norman GR, Cairney J. Health measurement scales: a practical guide to their development and use. 5. ed. Oxford: Oxford University Press; 2015. doi: 10.1093/med/9780199685219.001.0001.
30. Eysenbach G, Wyatt J. Using the internet for surveys and health research. *J Med Internet Res*. 2002 Apr-Nov;4(2):E13. doi: 10.2196/jmir.4.2.e13.
31. Gatti-Reis L, Alvarenga RN, Abreu LG, Paiva SM. Semantic equivalence of the Brazilian version of the Patient Satisfaction Questionnaire (B-PSQ). *Braz Dent J*. 2023 Jan-Feb;34(1):107-22. doi: 10.1590/0103-6440202305074.
32. Terwee CB. COSMIN checklist with 4-point scale [cited 2024 Sep 12]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK299299/bin/Appendix_7.pdf.