









Translation and Cultural Adaptation of the Modified Child Dental Anxiety Scale - Faces (MCDASf) into Brazilian Portuguese

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ABSTRACT

Objective: To translate and culturally adapt the Modified Child Dental Anxiety Scale - Faces (MCDASf) into Brazilian Portuguese. **Material and Methods:** The MCDASf consists of eight questions about anxiety toward dental procedures that are answered on a five-point Likert scale ranging from “not worried” (1 point) to “very worried” (5 points). The answers correspond to a scale of face drawings ranging from extremely negative to extremely positive. The process consisted of initial translation, back-translation, expert committee review, and pretesting. **Results:** The first revised version was applied to 32 children aged 5 to 12 years, 16 from the city of Governador Valadares, Brazil (southeastern region) and 16 from the city of Pelotas, Brazil (southern region). In the first pretest, Item 5 was misunderstood by 6.25% of children in the southern region; Item 6 by 6.25% in both regions; Items 7 and 8 by 87.5% and 100% of those from the southeastern region, respectively, and by 12.5% and 25% of those from the southern region, respectively. Items 7 and 8 were modified by the expert committee, and the second revised version was applied to 32 children, 16 from each region. The only misunderstood items were 4 and 5, both by a 7-year-old boy in Governador Valadares. **Conclusion:** The Brazilian Portuguese version of the MCDASf was well understood by the sample of children.

Keywords: Dental Anxiety; Surveys and Questionnaires; Translating.

Introduction

Dental anxiety is defined as a state of apprehension that occurs prior to a dental visit and involves negative thoughts about what might happen [1-4], resulting in physiological changes in response to anticipation of the event [5,6]. Fear is described as an unpleasant emotional reaction common to threatening stimuli [4]. The main stimuli related to dental anxiety include local anesthesia and drilling. Due to the difficulty in discriminating between fear and anxiety during clinical situations, the term “dental fear/anxiety” has been used to describe negative feelings associated with dental treatment [2]. Dental fear/anxiety has a multifactorial etiology, being associated with exogenous (e.g., traumatic experience) and endogenous (e.g., vulnerability, personality traits, etc.) factors. Rachman [7] proposed a model in which the child’s initial acquisition of dental fear/anxiety is related to social processes, i.e., through negative information from parents, family, colleagues, teachers, television, and social media [8]. In Rachman’s model [7], social learning theory [9] explains that children also acquire anxiety by observing and imitating the anxious behavior of another person (modeling), usually that of their mother, who is their main caregiver [10].

A systematic review on the prevalence of dental fear/anxiety found results ranging from 6 to 19% [2]. However, different measures were involved, and when only the child’s responses were considered, the prevalence ranged from 12 to 17%. Several tools can be used to assess dental fear/anxiety in children, the most common of which are the Dental Subscale of the Children’s Fear Survey Schedule [11-13], the modified Venham Picture Test [14-15], the modified Venham Anxiety Scale [14], the Facial Image Scale [16], the Modified Child Dental Anxiety Scale (MCDAS) [17] and the MCDASf, a version of MCDAS that employs face drawings [18]. Having different scales and tools to choose from can be both advantageous and disadvantageous. For example, the prevalence of dental anxiety/fear varies greatly depending on the instrument [19]. Among the scales available for children, the MCDASf has been adapted and tested in various languages and cultures [20-23], showing valid reliable results. However, no version of the MCDASf has been produced for Brazil.

The MCDASf is a version of the MCDAS whose answers are a series of face drawings. This MCDAS is a modified version of the Dental Anxiety Scale, originally developed for adults [24,25], but considered too complex for children. The MCDAS consists of eight questions assessing dental anxiety about specific dental procedures in individuals aged 8 to 15 years. The scale has shown good internal consistency and validity [17,26,27] and is easy to apply, given that it is a relatively short self-report instrument. However, the instrument’s numerical scale, however, proved difficult for children to understand because of reduced cognitive capacity stemming from anxiety about the dental environment [28]. The scale was also difficult for younger children or children with cognitive alterations to understand [18,27]. Thus, Howard and Freeman [18] proposed the MCDASf, which associates a face drawing with each of the five response options. This proved to be a valid way of assessing dental anxiety in children ≥ 5 years of age, which led to broad use in the pediatric population [18].

In the Brazilian population, such a scale could be important both for research and everyday dental practice, helping determine the patient’s anxiety level and helping prepare for reactions that could occur during treatment by reducing the dental fear/anxiety level prior to care. Thus, the objectives of this study were to translate and culturally adapt the MCDASf to Brazilian Portuguese.

Material and Methods

The project was approved by the Research Ethics Committees (Protocol No.: 87773718.1.0000.5318) of the Departments of Dentistry of the Federal University of Juiz de Fora, campus Governador Valadares (UFJF-GV), and the Federal University of Pelotas (UFPel). The parents/guardians of the children were invited and, after the objectives of the study were described, those who agreed to participate provided written informed consent. Before beginning the study, the authors of the original scale were consulted and authorized it.

The MCDASf consists of eight questions that assess the intensity of dental anxiety regarding the following dental procedures: “having your teeth looked at”, “going to the dentist”, “having your teeth scraped and polished”, “having a mixture of ‘gas and air’ which will help you feel comfortable for treatment but cannot put you to sleep”, “having a filling”, “being put to sleep to have treatment”, “having a tooth taken out”, and “having an injection in the gum” [18]. The five-point Likert scale responses range from “relaxed/not worried” (scoring 1) to “very worried” (scoring 5). Total scores range from 8 to 40 points: the higher the score, the greater the dental anxiety. A scale of 5 facial drawings corresponding to each Likert point was added to the response options, showing affective characteristics ranging from “extremely negative” to “extremely positive”. The children are asked to select which image corresponds to how they feel about each of the eight questions.

The translation and cultural adaptation process of the MCDASf followed the method of Guillemin et al. [29] and Beaton et al. [30]: initial translation, back-translation, expert committee review, and cultural adaptation (Figure 1).

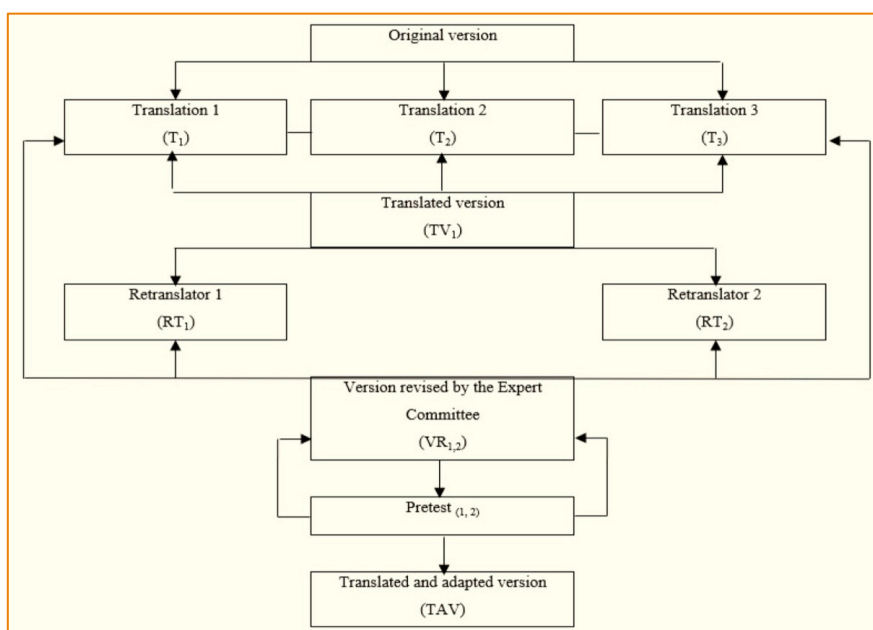


Figure 1. Translation and cultural adaptation process of the MCDASf.

Initial Translation

The original English version was translated into Brazilian Portuguese independently by three Brazilian dentists fluent in English who were unaware of the purpose of this study. Therefore, a conceptual, rather than a literal, translation was emphasized (translation drafts T₁, T₂ and T₃).

Retranslation

The researchers, all professors of pediatric dentistry, combined the three independent drafts (T₁, T₂ and T₃) into the first translated version (TV₁). In addition, TV₁ was back-translated to English independently

by two English teachers (RT1 and RT2) who did not participate in the first translation stage and did not have access to the original instrument. The purpose of the back-translation was to verify the accuracy of TV₁ according to the original scale.

Expert Review Committee

The original Brazilian Portuguese drafts (T₁, T₂ and T₃), the retranslated drafts (RT₁ and RT₂), the first translated version (TV₁), and the original English scale were compared by an expert review committee, which consisted of 2 English teachers, 3 pediatric dentistry professors, and 1 psychology professor. The committee members, experienced in the area and fluent in English, were invited (by email or telephone) by the researchers. The instrument's items were analyzed collectively and qualitatively, and adaptations were made to the following aspects [30]:

- Semantic equivalence: refers to the meaning of words; for words that could not be translated literally, Brazilian Portuguese terms with an equivalent meaning were substituted;
- Idiomatic equivalence: the use of colloquial expressions parallel to those of the source language;
- Cultural equivalence: issues affected by the society's cultural context.

Thus, the first revised translated version was obtained (TV_{R1}).

Cultural Equivalence (Pretest)

Finally, to assess the scale's cultural equivalence, TV_{R1} was applied in two Brazilian cities, one in the southeastern region (Governador Valadares, MG) and one in the southern region (Pelotas, RS). In each city, 16 children of both sexes, aged between 5 and 12 years, were interviewed. All participants were patients of UFJF-GV and UFPel Integrated Children's Clinics. To identify questions that were not properly understood, "I don't understand" was added as an answer option for all questions. Questions misunderstood by more than 15% of the participants were considered to be culturally maladapted and were revised by the expert committee, which performed the necessary adaptations, resulting in a new revised version (TV_{R2}). TV_{R2} was then applied to a new group of 32 children who did not participate in the first pretest [31]. The MCDASf was considered culturally adapted when all of the questions were understood by at least 85% of the participants, resulting in the translated and adapted version.

Results

Translation, Retranslation, and Expert Review Committee

Box 1 shows a summary of the modifications suggested by the expert review committee after evaluating the original English version, the original Brazilian Portuguese drafts (T₁, T₂ and T₃), the first translated version (TV₁) and the retranslations (RT₁ and RT₂).

We chose to use the terms "calm (*tranquilo*)" and "worried (*preocupado*)" instead of "relaxed (*relaxado*)" or "serene (*descontraído*)" for the former, and "apprehensive (*apreensivo*)" for the latter, aiming at better understanding by the children. In the response options, the term "no worries (*sem preocupação*)" was replaced by "unworried (*despreocupado*)" for the first response option (ie, 1 point). The items were rewritten as "How do you feel about (*Como você se sente sobre*)", beginning the questions in the affirmative regarding the respective verbs (eg, Item 1: "going to the dentist in general [*ir ao dentista de um modo geral*]" to decrease the number of words in each question and to make the questions easier to read.

Box 1. Modifications suggested by the Expert Review Committee.

Original Version		Translation			Retranslation		First Translated Version	Expert Review Committee	
Item	Sentence	T ₁	T ₂	T ₃	RT ₁	RT ₂		TV ₁	First Revised Translated Version
Statement 1 (Enunciado 1)	Eight questions	<i>Oito perguntas</i>	<i>8 questões</i>	<i>8 perguntas</i>	8 questions	Questions	<i>8 perguntas</i>	<i>Oito perguntas</i>	-
	How relaxed or worried	<i>Como se sente</i>	<i>Quão descontraído ou preocupado (apreensivo)</i>	<i>Se você está relaxado ou preocupado</i>	How relaxed or anxious	How calm or worried	<i>O quão tranquilo ou preocupado</i>	<i>O quanto você fica tranquilo ou preocupado</i>	-
	You get about the dentist	<i>Sobre o dentista</i>	<i>Você fica com o dentista</i>	<i>Sobre ir ao dentista</i>	When going to the dentist	When you visit the dentist office	<i>Sobre ir ao dentista</i>	<i>Sobre o dentista</i>	-
	What happens at the dentist	<i>O que acontece quando vai ao dentista</i>	<i>O que acontece quando vai ao dentista</i>	<i>Sobre os trabalhos do dentista</i>	When at appointment	During the appointment	<i>O que acontece na consulta com o dentista</i>	<i>O que acontece no consultório do dentista</i>	-
Statement 2 (Enunciado 2)	How relaxed or worried	<i>Quão relaxado ou quão preocupado</i>	<i>Quão descontraído ou preocupado</i>	<i>O quanto relaxado ou preocupado</i>	How relaxed or anxious	How comfortable or concerned	<i>O quão tranquilo ou preocupado</i>	-	-
	Simple scale below	<i>Escala simples abaixo</i>	<i>Simple escala abaixo</i>	<i>Escala abaixo</i>	Scale found below	Scale found below	<i>Escala abaixo</i>	-	-
	you are relaxed	<i>Você se sente relaxado/ tranquilo</i>	<i>Que significa descontraído</i>	<i>Você está relaxado</i>	Calm	You are calm	<i>Você se sente/sentiria tranquilo</i>	<i>Você se sente ou sentiria tranquilo</i>	-
	you are worried	<i>Você se sente muitíssimo preocupado</i>	<i>Que significa preocupado</i>	<i>Você está preocupado</i>	Anxious	You are extremely worried	<i>Você se sente/sentiria preocupado</i>	<i>Você se sente ou sentiria preocupado</i>	-
Answer Options (Opções de Resposta)	1 – would mean: relaxed/not worried	<i>Quer dizer que você se sente relaxado/ tranquilo/não preocupado</i>	<i>Significa: descontraído</i>	<i>Significa: relaxado/sem preocupação</i>	Indicates: calm/not anxious	Easy/no worries	<i>Significa: tranquilo/sem preocupação</i>	<i>Significa: tranquilo/despreocupado</i>	-
	2 – would mean: very slightly worried	<i>Quer dizer que você se sente bem pouco preocupado</i>	<i>Significa: bem pouco preocupado</i>	<i>Significa: ligeiramente/preocupado</i>	Indicates: somewhat anxious	A little concerned	<i>Significa: pouco preocupado</i>	<i>Significa: um pouco preocupado</i>	-
	3- would mean:	<i>Quer dizer que</i>	<i>Significa:</i>	<i>Significa: preocupado</i>	Indicates:	Worried	<i>Significa:</i>	-	-

	fairly worried	<i>you feel quite worried</i>	<i>reasonably worried</i>		anxious		<i>worried</i>		
	4- would mean: worried a lot	<i>Want to say that you feel very worried</i>	<i>Significa: muito preocupado</i>	<i>Significa: muito preocupado</i>	Indicates: very anxious	Very worried	<i>Significa: muito preocupado</i>	-	-
	5- would mean: very worried	<i>Want to say that you feel extremely worried</i>	<i>Significa: extremamente preocupado</i>	<i>Significa: extremamente preocupado</i>	Indicates: extremely anxious	Extremely worried	<i>Significa: muitíssimo preocupado</i>	-	-
Statement 3 (Enunciado 3)	You feel about	<i>You feel about the relationship to</i>	<i>You feel about the relationship to</i>	<i>You feel</i>	You feel	You feel when	<i>You feel</i>	<i>How do you feel about</i>	-
Question 1 (Questão 1)	Going to the dentist generally	<i>Usually when you go to the dentist</i>	<i>Go to the dentist in a general way</i>	<i>When you go to the dentist</i>	During a visit to the dentist	Going to the dentist	<i>When you go to the dentist</i>	<i>Go to the dentist in a general way</i>	-
Question 2 (Questão 2)	Having your teeth looked at (check-up)	<i>When you look at your teeth (make an assessment)</i>	<i>Examine your teeth</i>	<i>When being examined by the dentist? When sitting in the dentist's chair for an exam?</i>	During an examination of your teeth	Examine your teeth	<i>When you examine your teeth</i>	<i>Examine your teeth</i>	-
Question 3 (Questão 3)	Having teeth cleaned and polished	<i>When you clean and polish your teeth</i>	<i>Clean and polish your teeth</i>	<i>When doing dental cleaning and polishing</i>	During a teeth cleaning	Cleaning your teeth	<i>When you clean your teeth</i>	<i>Clean your teeth</i>	-
Question 4 (Questão 4)	Having an injection in the gum to freeze a tooth	<i>When they give you an injection in the gum to make your tooth numb</i>	<i>Give an injection in the gum to numb the tooth</i>	<i>When taking anesthesia in the gum to numb the tooth? Or taking anesthesia in the mouth to numb the cheek?</i>	-	Giving anesthesia in your mouth/teeth	<i>When you give an injection in the gum to numb the tooth</i>	<i>Give an injection in the gum to numb the tooth</i>	-
Question 5 (Questão 5)	Having a tooth drilled	<i>When you use a drill on your tooth</i>	<i>Use a drill to fix the tooth</i>	<i>When the dentist uses the handpiece on the tooth</i>	When a motorized dental tool is used on your teeth	When using the cavity motor	<i>When you use a drill (handpiece) on your tooth</i>	<i>Use a drill (handpiece) on your tooth</i>	-
Question 6 (Questão 6)	Having a tooth taken out	<i>When you pull a tooth</i>	<i>Remove a tooth</i>	<i>When pulling/removing a tooth</i>	During a tooth extraction	Pull a tooth	<i>When you pull your tooth</i>	<i>Remove your tooth</i>	

Question 7 (Questão 7)	Being put to sleep to have treatment	<i>Quando te fazem dormir para receber um tratamento</i>	<i>Ser induzido a dormir para que o tratamento seja feito</i>	<i>Ao tomar um remédio para “dormir” e receber o tratamento</i>	When given a sleep inducing medication during dental treatment	Talking a medication that makes you sleepy to receive treatment	<i>Ao usar um remédio que faça você dormir para receber o tratamento</i>	<i>Usarem um remédio que faça você dormir para receber o tratamento</i>	<i>Darem um remédio para você tomar que o faça dormir durante o tratamento</i>
Question 8 (Questão 8)	Having a mixture of gas and air to help you relax but which not put you to sleep	<i>Quando usam uma mistura de gás e ar para te ajudar e relaxar, mas sem te fazer dormir</i>	<i>Usarem uma mistura de gás e ar que lhe ajudará a relaxar mas não lhe fará dormir</i>	<i>Ao cheirar uma mistura de gás e oxigênio para deixá-lo relaxado, mas sem dormir</i>	When given laughing gas to relax, but not sleep	When smelling a mixture of gas and air to help you relax but not sleep	<i>Ao cheirar uma mistura de gás e ar para ajudar você a relaxar, mas sem dormir</i>	<i>Usarem uma mistura de gás e ar para você cheirar e relaxar, mas sem dormir</i>	<i>Usarem uma máscara com cheirinho para você relaxar, mas sem dormir?</i>

In Item 5, we shortened the term “little dental motor (*motorzinho do dentista*)” to “little motor (*motorzinho*)” to avoid redundancy. In Item 8, the explanation “for you to breathe in and relax (*para você cheirar e relaxar*)” was added to clarify how the gas-air mixture is applied.

In question seven, we changed in the expression “Use a medicine that makes you sleep (*Usarem um remédio que faça você dormir*)” to “Give you a medicine to take that makes you sleep (*Darem um remédio para você tomar que o faça dormir*)”. In addition, the term “to receive treatment (*para receber o tratamento*)” was replaced with “during the treatment (*durante o tratamento*)”, resulting in the following: “Give you a medication to take that makes you sleep during the treatment (*Darem um remédio para você tomar que o faça dormir durante o tratamento*)”. In Item 8, the term “mixture of gas and air” was replaced with “a scented mask (*máscara com cheirinho*)”. In addition, the verb “smell” was replaced with “relax” to avoid redundancy. Thus, the question was rewritten as “Use a scented mask so you can relax, but not sleep (*Usarem uma máscara com cheirinho para você relaxar, mas sem dormir*).”

Cultural Adaptation (First Pretest)

Table 1 shows the characteristics of the 32 children who participated in the first pretest, 16 from each region.

Table 1. Distribution of children according to sex and age in the first and second pretests in the southeastern and southern regions.

Variables	Southeast (n=16)		South (n=16)		Southeast (n=16)		South (n=16)	
	N	%	N	%	N	%	N	%
Sex								
Male	9	56.25	7	43.75	7	43.75	8	50.0
Female	7	43.75	9	56.25	9	56.35	8	50.0
Age								
5 to 7 years	3	18.75	7	43.75	8	50.0	7	43.75
8 to 12 years	13	81.25	9	56.25	8	50.0	9	56.25

Table 2 shows the results of the first pretest. Of the 8 MCDASf items, Item 5 (“Use the bit [little motor] on your tooth” [Usarem a broca (motorzinho) no seu dente]) was misunderstood by 6.25% ($\delta=100\%$) of the children in the southern region. The same percentage misunderstood Item 6 (“Take out your tooth” [Tirarem seu dente]) in both regions. Item 7 (“Use a medicine that makes you sleep to receive treatment” [Usarem um remédio que faça você dormir para receber o tratamento]) was misunderstood by 87.5% of the children in the southeastern region ($\delta=50\%$; 8–12 years of age = 78.7%). In the southern region, Item 7 was misunderstood by 12.5% ($\delta=50\%$; 5–7 years of age = 100%). Item 8 was misunderstood by 100% and 25% of the participants from the southeastern and southern regions, respectively ($\delta=50\%$; 5–7 years of age = 75%). Thus, Items 7 and 8 were returned to the expert review committee for readaptation to the population’s cultural parameters.

Table 2. Synopsis of the first pretest: distribution of misunderstood items according to sex and age (n=32).

Variables	Item 5		Item 6		Item 7		Item 8	
	Southeast (n=16)	South (n=16)	Southeast (n=16)	South (n=16)	Southeast (n=16)	South (n=16)	Southeast (n=16)	South (n=16)
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
N (%)	-	1 (6.25)	1 (6.25)	1 (6.25)	14 (87.5)	2 (12.5)	16 (100.0)	4 (25.0)
Sex								
Male	-	1 (100.0)	-	1 (100.0)	7 (50.0)	1 (50.0)	9 (56.25)	2 (50.0)
Female	-	-	1 (100.0)	-	7 (50.0)	1 (50.0)	7 (43.75)	2 (50.0)
Age (Years)								
5–7	-	1 (100.0)	1 (100.0)	1 (100.0)	3 (21.43)	2 (100.0)	3 (18.75)	3 (75.0)
8–12	-	-	-	-	11 (78.57)	-	13 (81.25)	1 (25.0)

Expert Review Committee (Second Step)

To adjust the terms misunderstood by more than 15% of the sample in each city, Items 7 and 8 were returned to the expert review committee (which consisted of the same members as in the previous step). These questions were reformulated to better clarify them for children (Box 1).

Item 7 was changed from “Use a medicine that makes you sleep (Usarem um remédio que faça você dormir)” to “Give you a medicine to take that makes you sleep” (Darem um remédio para você tomar que o faça dormir). In addition, the term “to receive treatment (para receber o tratamento)” was replaced by “during the treatment (durante o tratamento)”. Thus, the item became: “Give you a medicine to take that makes you sleep during the treatment”. Item 8, which previously used the term “mixture of gas and air (mistura de gás e ar)”, was

replaced with “scented mask (*máscara com cheirinho*)”. This change was also accompanied by replacing the verb “smell” with “relax” to avoid redundancy. Thus, the item became “Use a scented mask so you can relax, but not sleep”.

Second Pretest

The second revised translated version (TV_{R2}) was applied to another sample of 32 children with similar sex and age characteristics in the same two cities (Table 1). Two items were misunderstood by the same respondent (6.25%), a 7-year-old boy in Governador Valadares, MG. No item was misunderstood by the new group of children from Pelotas, RS. The misunderstood items were 4 (“Give an injection in the gum to make your tooth sleep [*Darem uma injeção na gengiva para fazer o seu dente dormir*]”) and 5 (“Use the bit [little motor] on your tooth [*Usarem a broca [motorzinho] no seu dente*]”), which were not modified since they were understood by at least 85% of the sample.

Thus, the translated and culturally adapted Brazilian Portuguese MCDASf was obtained (Box 2).

Box 2. Translated and culturally adapted version of the MCDASf.

Versão final da Escala Modificada de Ansiedade Odontológica Infantil-Faces (MCDASf) adaptada para o Português Brasileiro					
<p>Nas próximas oito perguntas, eu gostaria que você me mostrasse o quanto você fica tranquilo ou preocupado sobre o dentista e sobre o que acontece no consultório do dentista. Para me mostrar o quão tranquilo ou preocupado você se sente, use a escala abaixo. A escala é como uma régua, que vai de 1 a 5, onde 1 quer dizer que você se sente ou sentiria tranquilo e 5 quer dizer que você se sente ou sentiria preocupado.</p> <p>1 – significa: tranquilo/despreocupado 2 – significa: um pouco preocupado 3 – significa: preocupado 4 – significa: muito preocupado 5 – significa: muitíssimo preocupado</p>					
	Como você se sente sobre:				
		1	2	3	4
1	<i>Ir ao dentista de um modo geral?</i>	1	2	3	4
2	<i>Examinarem os seus dentes?</i>	1	2	3	4
3	<i>Limparem os seus dentes?</i>	1	2	3	4
4	<i>Darem uma injeção na gengiva para fazer o seu dente dormir?</i>	1	2	3	4
5	<i>Usarem a broca (motorzinho) no seu dente?</i>	1	2	3	4
6	<i>Tirarem seu dente?</i>	1	2	3	4
7	<i>Darem um remédio para você tomar que o faça dormir durante o tratamento?</i>	1	2	3	4
8	<i>Usarem uma máscara com cheirinho para você relaxar, mas sem dormir?</i>	1	2	3	4

Discussion

The Brazilian Portuguese version of the MCDASf was considered culturally adapted for the population of children evaluated in this study. Using scales to measure dental fear/anxiety in children is important due to the impact of unexpected behavior by anxious patients during clinical procedures [23]. Such instruments help detect the presence and severity of this phenomenon, enabling specific treatments to be planned for each patient based on their anxieties and fears [20]. The MCDASf is a simple, quick scale that can be easily integrated into public and private practice [17] and research [32]. This scale can provide an opportunity to for empathetic conversation about young patients’ feelings toward dental treatment, thus valuing their opinion by recognizing the emotions expressed by the images.

The MCDASf, originally developed in English [18], has been translated and culturally adapted into several languages [20-23], including Brazilian Portuguese. According to Herdman et al. [33], cultural adaptation is an essential step to guarantee the validity of collected data. An instrument is considered valid when it can adequately characterize the underlying event or concept [34]. Thus, if validity is difficult to achieve for instruments developed in the original linguistic context, it is much harder when translating them into a foreign language.

To minimize bias and biased results, the present study was based on the guidelines of Guillemin et al. [29] and Beaton et al. [30], who suggest four essential steps: translation, back-translation, expert committee evaluation, and pretesting. In this process, to produce a high-quality translation, three translators (T_1 , T_2 , T_3) and two independent retranslators (RT_1 , RT_2) were used. The versions were compared, errors were identified, and the most appropriate terms were selected. By using more than one translation, items from different versions could be combined, providing a new phrase if none of the three translations proved adequate. This process resulted in the first translated version (TV_1).

According to Guillemin et al. [29], this step is extremely important since it enables a better-adapted instrument in terms of idiomatic expression than one produced by/for highly educated people. In addition, it allows problems to be detected earlier in the study, allowing the reexamination of decisions that might otherwise have been unsatisfactory. At this stage, semantic, idiomatic, and cultural equivalence was assessed and, based on the committee's discussion, the necessary adaptations were made until a consensus was reached, resulting in the first version in Brazilian Portuguese with an equivalent meaning (TV_{R1}).

When culturally adapting the MCDASf to the Brazilian context, it was decided to assess populations from two regions of the country, the southeast and the south, considering that different cultural contexts have different definitions, beliefs, and behaviors. The pretest aims to detect errors and deviations in the translation stage by applying the translated and revised version to the target population, thus ensuring that the final items have an equivalent meaning to the source text. In the present study, the sample size and characterization were adequate according to the methodological criteria of Castro et al. [35] for culturally adapting questionnaires.

In the first pretest, of the four items (5-8) that were answered "I don't know" by at least 1 participant from each region (6.25%), 2 exceeded the recommended 15% misunderstanding limit. Item 7 was misunderstood by 87.5% of the children in Governador Valadares, Brazil, while Item 8 was misunderstood by 100% of these children and 25% of those in Pelotas, Brazil. Although both populations consist of patients treated at the pediatric dental clinics of higher education institutions, who generally have a low socioeconomic status, educational differences may have been determinant in the lower misunderstanding rate in Pelotas than in Governador Valadares (municipal illiteracy rate at age $\geq 15 = 4.1$ vs. 7.6, respectively) [36].

Considering the content of the aforementioned items, the lack of comprehension about using a "medicine that makes you sleep (*remédio que faça você dormir*)" (Item 7) in the dental environment may have been due to the fact that the children had never experienced such a procedure. Neither of the involved university clinics uses drug therapy to manage behavior; this technique is used in some private clinics, to which these patients do not have access. Sedation with nitrous oxide ("mixture of gas and air [*mistura de gás e ar*]") is still less known by our sample (or people from any social level) due to the specialized training required for the technique. These items were reviewed by the expert committee and difficult expressions were replaced. In Item 7, the expression "Use a medicine that makes you sleep (*Usarem um remédio que faça você dormir*)" was replaced with "Give you a medicine to take that makes you sleep (*Darem um remédio para você tomar que o faça dormir*)"; and the term "to receive treatment (*para receber o tratamento*)" was replaced with "during treatment (*durante o*

tratamento). In Item 8, the term “mixture of gas and air (*mistura de gás e ar*)” was replaced with “a scented mask (*máscara com cheirinho*)”, and “smell (*cheirar*)” was replaced with “relax (*relaxar*)” to avoid redundancy. When testing the Malaysian version of this scale, Esa et al. [23] found that these 2 items were also misunderstood in interviews administered three weeks apart: 48.3% and 55.2% had difficulty understanding the item about general anesthesia, and 97.7% and 100% had difficulty with the item about nitrous oxide sedation. Thus, both items were removed from the scale for children aged 5–6 years, but were retained for those aged 9–12.

In the second pretest, the second revised translated version (TV_{R2}) was well understood by the population of both regions, who did not participate in the first pretest: only two items were misunderstood by the same respondent from Governador Valadares, Brazil. Items 4 and 5, which address the “injection in the gums (*injeção na gengiva*)” and the “bit (little motor)(*broca [motorzinho]*)”, common procedures in pediatric dental care, which demonstrated this child's lack of experience with such procedures or refusal to accept such aversive stimuli during treatment. Thus, the level of misunderstanding was 6.25%, which did not warrant modifying these items in the translated and culturally adapted version of the MCDASf.









The improved understanding over the two pretest stages demonstrates that translation alone does not guarantee equivalence with the original questionnaire, thus confirming the importance of using systematic guidelines for the translation and cultural adaptation process [29,30]. Failure to use an adequate methodology for the translation and cultural adaptation of research questionnaires can lead to bias and problems, such as using an improperly tested questionnaire, which could differ from the original version. Therefore, researchers must report all stages of the process, detailing the results of the validity tests, so that other researchers can make informed decisions about the instrument that will best address their objectives.

Considering the limitations of this study, the MCDASf should be tested in other regions of Brazil so that it can be considered validated for Brazilian Portuguese. In addition, the instrument should be applied in non-clinical contexts, such as the school environment, where not all children have had previous experience with dental care, which would provide different perceptions of the construct in question. Finally, new studies with representative samples should be conducted to test the validity and reliability of the culturally adapted MCDASf.

Conclusion

Since the Brazilian Portuguese version of the MCDASf was well understood by the children who participated in this study, it was considered culturally adapted. However, future studies are needed to test the scale's validity and reliability.

Authors' Contributions

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Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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References

- [1] Folyan MO, Idehen EE, Ojo OO. The modulating effect of culture on the expression of dental anxiety in children: a literature review. *Int J Paediatr Dent* 2004; 14(4):241-5. <https://doi.org/10.1111/j.1365-263X.2004.00563.x>
- [2] Klingberg G, Broberg AG. Dental fear/anxiety and dental behaviour management problems in children and adolescents: a review of prevalence and concomitant psychological factors. *Int J Paediatr Dent* 2007; 17(6):391-406. <https://doi.org/10.1111/j.1365-263X.2007.00872.x>
- [3] American Academy of Child & Adolescent Psychiatry. Glossary of Symptoms and Illnesses. 2016. Available from: http://www.aacap.org/aacap/families_and_youth/Glossary_of_Symptoms_and_Illnesses/Anxiety.aspx. [Accessed on Mar 24, 2019].
- [4] Cianetti S, Lombardo G, Lupatelli E, Pagano S, Abraha I, Montedori A, et al. Dental fear/anxiety among children and adolescents. A systematic review. *Eur J Paediatr Dent* 2017; 18(2):121-30. <https://doi.org/10.23804/ejpd.2017.18.02.07>
- [5] Furlan NF, Gavião MB, Barbosa TS, Nicolau J, Castelo PM. Salivary cortisol, alpha-amylase and heart rate variation in response to dental treatment in children. *J Clin Pediatr Dent* 2012; 37(1):83-7. <https://doi.org/10.17796/jcpd.37.1.n32m21n08417v363>
- [6] Salas Huamani JR, Barbosa TS, de Freitas CN, de Sousa KG, Gavião MBD, Leal SC, et al. Assessment of anxiety and stress markers in children submitted to educational strategies and ART-restoration: A randomized clinical trial. *Arch Oral Biol* 2019; 97:191-7. <https://doi.org/10.1016/j.archoralbio.2018.10.032>
- [7] Rachman S. The conditioning theory of fear-acquisition: a critical examination. *Behav Res Ther* 1977; 15(5):375-87. [https://doi.org/10.1016/0005-7967\(77\)90041-9](https://doi.org/10.1016/0005-7967(77)90041-9)
- [8] Townend E, Dimigen G, Fung D. A clinical study of child dental anxiety. *Behav Res Ther* 2000; 38(1):31-46. [https://doi.org/10.1016/s0005-7967\(98\)00205-8](https://doi.org/10.1016/s0005-7967(98)00205-8)
- [9] Bandura A. Social learning through imitation. *Nebraska Symposium on Motivation*, 1962. Oxford, England: Univer. Nebraska Press; 1962. p. 211-74.
- [10] Themessl-Huber M, Freeman R, Humphris G, MacGillivray S, Terzi N. Empirical evidence of the relationship between parental and child dental fear: a structured review and meta-analysis. *Int J Paediatr Dent* 2010; 20(2):83-101. <https://doi.org/10.1111/j.1365-263X.2009.00998.x>
- [11] Cuthbert MI, Melamed BG. A screening device: children at risk for dental fears and management problems. *ASDC J Dent Child* 1982; 49(6):432-6.
- [12] Aartman IH, van Everdingen T, Hoogstraten J, Schuur AH. Self report measurements of dental anxiety and fear in children: a critical assessment. *ASDC J Dent Child* 1998; 65(4):252-8, 229-30.
- [13] Cademartori MG, Cara G, Pinto GDS, da Costa VPP. Validity of the Brazilian version of the Dental Subscale of Children's Fear Survey Schedule. *Int J Paediatr Dent* 2019; 29(6):736-47. <https://doi.org/10.1111/ipd.12543>
- [14] Venham LL, Gaulin-Kremer E. A self-report measure of situational anxiety for young children. *Pediatr Dent* 1979; 1(2):91-6.
- [15] Ramos-Jorge ML, Pordeus IA. Por que e como medir a ansiedade infantil no ambiente odontológico. Apresentação do teste VPT modificado. *JBP Rev Ibero-am Odontopediatr Odontolo Bebê* 2004; 7(37):282-90. [In Portuguese].
- [16] Buchanan H, Niven N. Validation of a Facial Image Scale to assess child dental anxiety. *Int J Paediatr Dent* 2002; 12(1):47-52. <https://doi.org/10.1046/j.0960-7439.2001.00322.x>
- [17] Wong HM, Humphris GM, Lee GT. Preliminary validation and reliability of the Modified Child Dental Anxiety Scale. *Psychol Rep* 1998; 83(3 Pt 2):1179-86. <https://doi.org/10.2466/pr0.1998.83.3f.1179>
- [18] Howard KE, Freeman R. Reliability and validity of a faces version of the Modified Child Dental Anxiety Scale. *Int J Paediatr Dent* 2007; 17(4):281-8. <https://doi.org/10.1111/j.1365-263X.2007.00830.x>
- [19] Locker D, Shapiro D, Liddell A. Who is dentally anxious? Concordance between measures of dental anxiety. *Community Dent Oral Epidemiol* 1996; 24(5):346-50. <https://doi.org/10.1111/j.1600-0528.1996.tb00874.x>

- [20] Javadinejad S, Farajzadegan Z, Madahain M. Iranian version of a face version of the Modified Child Dental Anxiety Scale: Transcultural adaptation and reliability analysis. *J Res Med Sci* 2011; 16(7):872-7.
- [21] Zhang HM, Xia B, Wang JH, Xie P, Huang Q, Ge LH. [Chinese version of a face version of the modified child dental anxiety scale: transcultural adaptation and evaluation]. *Zhonghua Kou Qiang Yi Xue Za Zhi* 2013; 48(7):403-8. [In Chinese].
- [22] Honkala S, Al-Yahya H, Honkala E, Freeman R, Humphris G. Validating a measure of the prevalence of dental anxiety as applied to Kuwaiti adolescents. *Community Dent Health* 2014; 31(4):251-6. https://doi.org/10.1922/CDH_3425Honkala06
- [23] Esa R, Hashim NA, Ayob Y, Yusof ZY. Psychometric properties of the faces version of the Malay-modified child dental anxiety scale. *BMC Oral Health* 2015; 15:28. <https://doi.org/10.1186/s12903-015-0013-y>
- [24] Corah NL, Gale EN, Illig SJ. Assessment of a dental anxiety scale. *J Am Dent Assoc* 1978; 97(5):816-19. <https://doi.org/10.14219/jada.archive.1978.0394>
- [25] Hu LW, Gorenstein C, Fuentes D. Portuguese version of Corah's Dental Anxiety Scale: transcultural adaptation and reliability analysis. *Depress Anxiety* 2007; 24(7):467-71. <https://doi.org/10.1002/da.20258>
- [26] Christophorou S, Lee GTR, Humphris GM. The reliability and validity of the modified child dental anxiety scale: a study of Greek Cypriot school children. *Eur J Paediatr Dent* 2000; 1(2):75-81.
- [27] Buchanan H. Development of a computerised dental anxiety scale for children: validation and reliability. *Br Dent J* 2005; 199(6):359-62. <https://doi.org/10.1038/sj.bdj.4812694>
- [28] Freud A. *Normality and Pathology in Childhood*. London: Karnac Books; 1989.
- [29] 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; 46(12):1417-32. [https://doi.org/10.1016/0895-4356\(93\)90142-n](https://doi.org/10.1016/0895-4356(93)90142-n)
- [30] Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine* 2000; 25(24):3186-91. <https://doi.org/10.1097/00007632-200012150-00014>
- [31] Ciconelli RM, Ferraz MB, Santos W, Meinão I, Quaresma MR. Tradução para a língua portuguesa e validação do questionário genérico de avaliação de qualidade de vida SF-36 (Brasil SF-36). *Rev Bras Reumatol* 1999; 39(3):143-50. [In Portuguese].
- [32] Jones L. Validation and randomized control trial of the e-SAID, a computerized paediatric dental patient request form, to intervene in dental anxiety. *Child Care Health Dev* 2015; 41(4):620-5. <https://doi.org/10.1111/cch.12200>
- [33] Herdman M, Fox-Rushby J, Badia X. 'Equivalence' and the translation and adaptation of health-related quality of life questionnaires. *Qual Life Res* 1997; 6(3):237-247. <https://doi.org/10.1023/a:1026410721664>
- [34] Reichenheim ME, Moraes CL, Hasselmann MH. Equivalência semântica da versão em português do instrumento Abuse Assessment Screen para rastrear a violência contra a mulher grávida. *Rev Saude Publica* 2000; 34(6):610-616. <https://doi.org/10.1590/S0034-89102000000600008> [In Portuguese].
- [35] Castro RAL, Portela MC, Leão AT. Adaptação transcultural de índices de qualidade de vida relacionada à saúde bucal. *Cad Saude Publica* 2007; 23(10):2275-2284. <https://doi.org/10.1590/S0102-311X2007001000003> [In Portuguese].
- [36] Instituto Brasileiro de Geografia e Estatística (IBGE). Censo 2010 – Taxa de analfabetismo da população de 15 anos ou mais de idade; 2010. [In Portuguese].