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Control of Allergic Rhinitis and Asthma Test for Children (CARATKids) Validation in Brazil and cutoff values

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ABSTRACT

Background: The Control of Allergic Rhinitis and Asthma Test for Children (CARATKids) assesses asthma and allergic rhinitis control in children younger than 12 years.

Objective: To validate the Brazilian Portuguese version of the CARATKids and to define the cutoff values for identifying uncontrolled disease.

Methods: Children aged 6 to 12 years with asthma and allergic rhinitis were studied (n = 102). CARATKids, childhood Asthma Control Test (cACT), total nasal symptom score (TNSS), and visual analog scale (VAS) scores were obtained at baseline and after 4 to 6 weeks. Internal consistency, test-retest reliability, responsiveness, and validity of the Brazilian CARATKids were assessed according to the Consensus-based Standards for the Selection of Health Measurements Instruments checklist. The minimal clinically important difference (MCID) was evaluated using distribution and anchor methods. Spearman correlations were used to compare CARATKids scores with external measures of control. Receiver operating characteristic curve analysis was performed to establish cutoff values.

Results: Fifty children completed both visits. The Cronbach α and intraclass correlation coefficient of CARATKids were 0.81 and 0.85, respectively. The Guyatt responsiveness index was -1.34 , and within-patient change in clinically unstable patients (n = 31) was significant ($P = .02$). As for cross-sectional and longitudinal validity, correlation coefficients ranged from 0.58 to 0.77 ($P < .001$) and 0.30 to 0.57 ($P < .05$), respectively. The estimated MCID for CARATKids was 3. The optimal cutoffs (sensitivity and specificity) to exclude uncontrolled and controlled disease were 3 or less (97% and 67%) and 6 or greater (56% and 96%), respectively. **Conclusion:** CARATKids is a reliable and valid tool to assess asthma and allergic rhinitis control in Brazilian children. A score of 6 or higher on CARATKids identifies uncontrolled disease, and a score of 3 or lower excludes poor disease control.

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Introduction

Asthma and allergic rhinitis are frequently associated in children and adolescents.¹ An estimated 60% to 80% of the children with asthma have allergic rhinitis.^{2,3} Recent studies have found that allergic rhinitis has an effect not only on asthma morbidity³ but also on asthma control in children.^{4,5} In Brazil, data obtained by the International Study of Asthma and Allergies in Childhood revealed that the prevalence of allergic rhinitis was 13.3% and 14.6% for children (6–7 years old) and adolescents (13–14 years old),

respectively.⁶ Allergic rhinitis was present among 40.9% of asthmatic children and was significantly associated with a high risk of current asthma and of more severe asthma.⁷

Patient-reported outcome (PRO) measurements have become important tools at all levels of care.^{8,9} Therefore, the children's and their parents' or tutors' perceptions of their symptoms and disease status should be considered when assessing the control of airways diseases.^{10,11}

The Control of Allergic Rhinitis and Asthma Test for Children (CARATKids) was developed to assess asthma and allergic rhinitis control in children (6–12 years old).^{11,12} Evaluation of the original version of CARATKids revealed that the questionnaire has adequate psychometric properties, being a valid and reliable tool used in clinical practice for evaluating asthma and allergic rhinitis control.¹² CARATKids already meets 7 of the 10 quality criteria of

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Consensus-based Standards for the Selection of Health Measurements Instruments (COSMIN) regarding standards for good methodologic properties.^{12,13} To increase the knowledge on the performance of CARATKids, it is important to evaluate its absolute measures, cross-cultural validity, and interpretability of the results.

Cutoff values and minimal clinically important differences (MCIDs) are essential elements for an adequate interpretability of any PRO, a decisive property for use in clinical practice and research.¹⁴ A recent study in the Netherlands¹⁵ established the MCIDs, but the cutoff values for CARATKids have not been clearly defined. This study aimed to validate the Brazilian Portuguese version of the CARATKids in Brazilian children and to establish the cutoff values for identifying uncontrolled asthma and/or rhinitis.

Methods

Cultural Adaptation

The cultural adaptation followed international recommendations¹⁴ and the previous dissemination and cross-cultural adaptation of the adult version of CARAT.¹⁶ The original CARATKids questionnaire, developed in European Portuguese, was adapted to Brazilian Portuguese by 2 Brazilian physicians specialized in allergy. The original authors then compared both versions of the CARATKids until a consensus of the divergences was achieved. Then the questionnaire was pretested among 10 children and their parents to evaluate its intellection and difficulties regarding completion. Few adjustments were made, and the version for the Brazilian population was finished (eFig 1), with 35 differences (14%) in wording compared with the European Portuguese version.

Participants

Children aged 6 to 12 years attending an allergy outpatient service with a previous medical diagnosis of persistent moderate to severe allergic rhinitis and persistent asthma were included (n = 102). Those with psychiatric disorders, cognitive impairment, and other chronic lung diseases were excluded.

Data Collection

All patients and their parents answered the version adapted for the Brazilian population of CARATKids,¹² which has 13 questions with yes or no answers regarding airways symptoms on the previous 4 weeks that were answered by children (the first 8 questions) and their caregivers (remaining 5) separately. The score could range from 0 (total control) to 13 points (worst control).

Patients also underwent the childhood Asthma Control Test (cACT)¹⁷ and the visual analog scale (VAS) of asthma and rhinitis. According to cACT, controlled asthma was defined as a score of 20 or higher.¹⁷ The VAS scores were self-assessed regarding asthma and rhinitis symptoms, with scores ranging from 0 cm (very severe) to 10 cm (absence), whereas disease control was defined if the score was 6 cm or higher according to previous studies.^{18–20} Children graded between 5.0 and 6.0 cm in the second visit's variation of the VAS for asthma and rhinitis were considered to be clinically stable.^{12,15} In addition, asthma control was classified according to the Global Initiative for Asthma (GINA).²¹

Children self-assessed their total nasal symptom score (TNSS), which rates daily symptom severity for nasal obstruction, ocular pruritus, sneezing, rhinorrhea, and postnasal drip on a scale of 0 (absent) to 3 (severe).^{22,23} Then, patients were divided into mild (<6) and moderate to severe (≥6) groups, according to previous studies.^{24,25} Patients rating less than 3 points on the cACT and/or TNSS between visits were considered stable^{26,27}; patients with improved or deteriorating control were classified as clinically unstable.

In addition, peak nasal inspiratory flow (PNIF) and peak expiratory flow (PEF) were obtained using an inspiratory flow meter and a peak flow meter, respectively (Clement Clarke, Harlow, England). Standard procedures were followed, and at least 3 reproducible measurements were performed, with the highest value recorded for analysis.^{28,29} Moreover, self-reported comorbidities, daily medication, and medical decision regarding change in therapy (reduce, maintain, or increase treatment) were registered. Treatment decision for all children followed GINA recommendations.²¹

The study was approved by the Research Ethics Committee of the São Paulo Federal University, and written informed consent was obtained from all participants and their parents or guardians.

Statistical Analysis

The statistical analysis was performed with SPSS statistical software, version 23.0 (SPSS Inc, Chicago, Illinois), and the level of significance was set at $P < .05$. The Mann-Whitney or Kruskal-Wallis tests were used to compare patients according to cACT, GINA, and VAS scores, and the Wilcoxon t test to compare mean changes in CARATKids scores between visits. The validation was according to the COSMIN checklist¹³ focusing on the following items: cross-cultural validity, measurement error, and interpretability. No missing data were reported on the CARATKids, cACT, GINA, VAS, or TNSS.

The sample size calculation for both visits was based on COSMIN recommendations¹³ and other questionnaire validation studies.^{15,30} Therefore, a sample of 50 to 100 children was considered sufficient. Thus, considering the worst case scenario of variability (0.5) in the total CARATKids score between visits and $P = .05$, a sample size of 50 children would obtain a margin of error of $\pm 14\%$.

The concurrent and longitudinal validity of the Brazilian version of CARATKids was analyzed by comparing with external measures of control (cACT, TNSS, and VAS-asthma and VAS-rhinitis) using the Spearman correlation coefficient. For hypothesis testing, a priori predictions were based on the CARATKids original study¹² for concurrent validity (0.45–0.69) and longitudinal validity (0.34–0.47). Responsiveness was evaluated by within-patient change and with the Guyatt responsiveness index (GRI).³¹

The MCID for CARATKids was established using distribution-based and anchor-based methods.³² For the distributional method, the criterion of $1.96 \times \text{SEM}$ was used.³² For the anchor method, we used the anchors cACT and GINA for asthma control and TNSS for rhinitis control.^{18,27,33} Patients were divided according to changes in these measures (eTable 1), and for each category, the mean difference in CARATKids score between visit 1 and 2 was calculated. The outcome corresponding to the minimal change was considered the MCID.

To establish the optimal cutoff of the CARATKids, scores were plotted against external assessment tools for asthma and rhinitis and the area under the receiver operating characteristic curve (AUC) was obtained. Sensitivity and specificity were calculated for different cutoff points of CARATKids when compared with cACT and TNSS for uncontrolled asthma and rhinitis, respectively, and when uncontrolled was defined as uncontrolled asthma or uncontrolled rhinitis. Then, cutoff points were selected based on (1) balance between sensitivity and specificity, (2) high sensitivity for adequate accuracy in identifying those patients who are uncontrolled (fewer false-negative results), and (3) high specificity to identify patients who are uncontrolled (fewer false-positive results).

Results

We included 102 children with a mean (SD) age of 9.1 (1.8) years, of whom 56% were boys. Table 1 summarizes the baseline characteristics of participants. Thirteen children had uncontrolled asthma using cACT, and similar results were obtained using the GINA

Table 1

Baseline Characteristics of the Participants and Respective Measurements of Asthma and Rhinitis Control

Characteristic	Findings (N = 102) ^a
Male sex	57 (56)
Age, mean (SD), y	9.1 (1.8)
Asthma control	
GINA	
Uncontrolled	12 (12)
Partly controlled	32 (31)
Controlled	58 (57)
cACT score, median (IQR)	25 (23–26)
Uncontrolled	13 (13)
Controlled	84 (87)
VAS-asthma score, median (IQR)	8 (7–10)
Uncontrolled	17 (17)
Controlled	85 (83)
Rhinitis severity	
TNSS, median (IQR)	3 (1–7)
Moderate to severe	32 (32)
Mild	69 (68)
VAS-rhinitis score, median (IQR)	7 (5.8–9)
Uncontrolled	38 (37)
Controlled	64 (63)
Self-reported comorbidities	
Atopic dermatitis	39 (38)
Allergic conjunctivitis	20 (20)
Usual medication	
Antihistamine	20 (20)
Nasal corticosteroids	100 (97)
Inhaled corticosteroids	96 (94)
Long-acting β_2 -agonist	49 (48)
Leukotriene receptor antagonist	9 (9)
Treatment decision for asthma	
Reduce	20 (20)
Maintain	70 (69)
Increase	11 (11)
Treatment decision for rhinitis	
Reduce	5 (5)
Maintain	68 (67)
Increase	29 (28)

Abbreviations: cACT, childhood Asthma Control Test; GINA, Global Initiative for Asthma; IQR, interquartile range; TNSS, total nasal symptom score; VAS, visual analog scale.

^aData are presented as number (percentage) of patients unless otherwise indicated.

criteria (12%) and VAS-asthma (17%). Regarding allergic rhinitis, 37% of the children had poor control using VAS-rhinitis, and according to the TNSS, 32% had moderate to severe symptoms (Table 1). Most of the children were under persistent treatment with nasal and inhaled corticosteroids (97% and 94%, respectively).

For longitudinal analysis, 50 patients (49%) attended both visits, with a minimum and maximum period of 4 and 6 weeks, respectively. Nineteen children (38%) were classified as having clinical stable asthma and rhinitis. The unstable group included 8 (16%) with unstable asthma only, 12 (24%) with unstable rhinitis only, and 11 (22%) with both unstable asthma and rhinitis.

Properties of CARATKids

CARATKids had a median (P25–P75) score of 3 (range, 1–5) at the baseline and 3 (range, 1–6) in the second visit. At both visits,

Table 2

Correlation Coefficients Between CARATKids With External Measures of Control and Variation Between Visits of CARATKids Scores and External Measures of Control

Validity ^a	cACT	TNSS	VAS-asthma	VAS-rhinitis
Concurrent validity				
CARATKids	–0.76 (–0.85 to –0.65)	0.77 (0.65 to 0.86)	–0.51 (–0.66 to –0.33)	–0.58 (–0.71 to –0.41)
Longitudinal validity				
Δ CARATKids	–0.57 (–0.78 to –0.29)	0.49 (0.23 to 0.73)	–0.30 (–0.52 to –0.04)	–0.51 (–0.72 to –0.24)

Abbreviations: cACT, childhood Asthma Control Test; CARATKids, Control of Allergic Rhinitis and Asthma Test for Children; TNSS, total nasal symptom score; VAS, visual analog scale.

^aData are presented as Spearman correlation coefficients (95% confidence intervals). The confidence intervals for correlation were calculated using bootstrap method. All *P* values were significant at $<.001$, except for Δ VAS-asthma, which was significant for $P < .05$.

CARATKids scores differed significantly between control groups defined by cACT, GINA, and VAS-asthma (eTable 2). In addition, significant differences were observed when comparing children with moderate to severe rhinitis and those with mild disease ($P < .001$ and $P = .001$ at baseline and visit 2, respectively).

The internal consistency measured as the Cronbach α was 0.81. All correlation coefficients between CARATKids and external measures of control (cACT, TNSS, and symptoms VAS) met a priori predictions and were statistically significant ($P < .001$) (Table 2).

In the test-retest reliability, the intraclass coefficient was 0.85 in the stable group. Clinically unstable patients had significant within-patient change of the CARATKids score, with a mean (SD) change of -1.45 (3.19) ($P = .02$). As for the stable patients, we observed a nonsignificant ($P = .51$) difference and a mean (SD) change of -0.26 (1.63). The obtained GRI in patients with both unstable conditions was -1.34 .

The correlation coefficients of CARATKids with the PNIF and PEF at visit 1 were significant ($P < .05$) but weak ($r = -0.31$ and $r = -0.22$, respectively) (eFig 2).

Longitudinal analysis revealed that variation of the CARATKids scores between visits indicated a significant correlation with the variation of the all external measurements ($P < .05$), also meeting a priori predictions (Table 2).

The distribution-based method gave MCID estimates for the CARATKids score of 2.54; therefore, the SEM was 1.30. For the anchor-based method, the mean change in CARATKids corresponding to a minimal change in cACT and GINA were 2.23 and 2.63, respectively. Anchoring the CARATKids against the TNSS produced an MCID of 2.88. Overall, these results determine an MCID of 3.

The obtained AUCs ranged from 0.757 to 0.966 (Fig 1). Sensitivity and specificity of the CARATKids for different cutoff points to define asthma and rhinitis control are given in Table 3. Score levels below 2 and greater than 8 are not given because of poor diagnostic results.

Overall, the cutoff point of 3 or less indicated a high sensitivity (range, 97%–100%) and a low but adequate specificity (range, 51%–67%) to exclude uncontrolled cases. A score of 6 or higher had a high specificity (range, 88%–96%) with adequate sensitivity (range, 51%–92%), suggesting an optimal cutoff to exclude controlled disease. Figure 2 presents the distribution of CARATKids scores in both visits according to cACT, GINA, and TNSS.

Discussion

The present study found good reliability and validity of the Brazilian version of the CARATKids for assessment of asthma and allergic rhinitis control in children younger than 12 years. Moreover, in this study, we established the cutoff values of CARATKids. A score of 3 or less excludes uncontrolled disease, and a score of 6 or more identifies poor disease control. In addition, we confirmed the MCID (a change of 3 points), recently established for the Dutch version of the questionnaire.¹⁵ The determination of these findings is essential to implement CARATKids questionnaire as a PRO instrument in clinical practice.

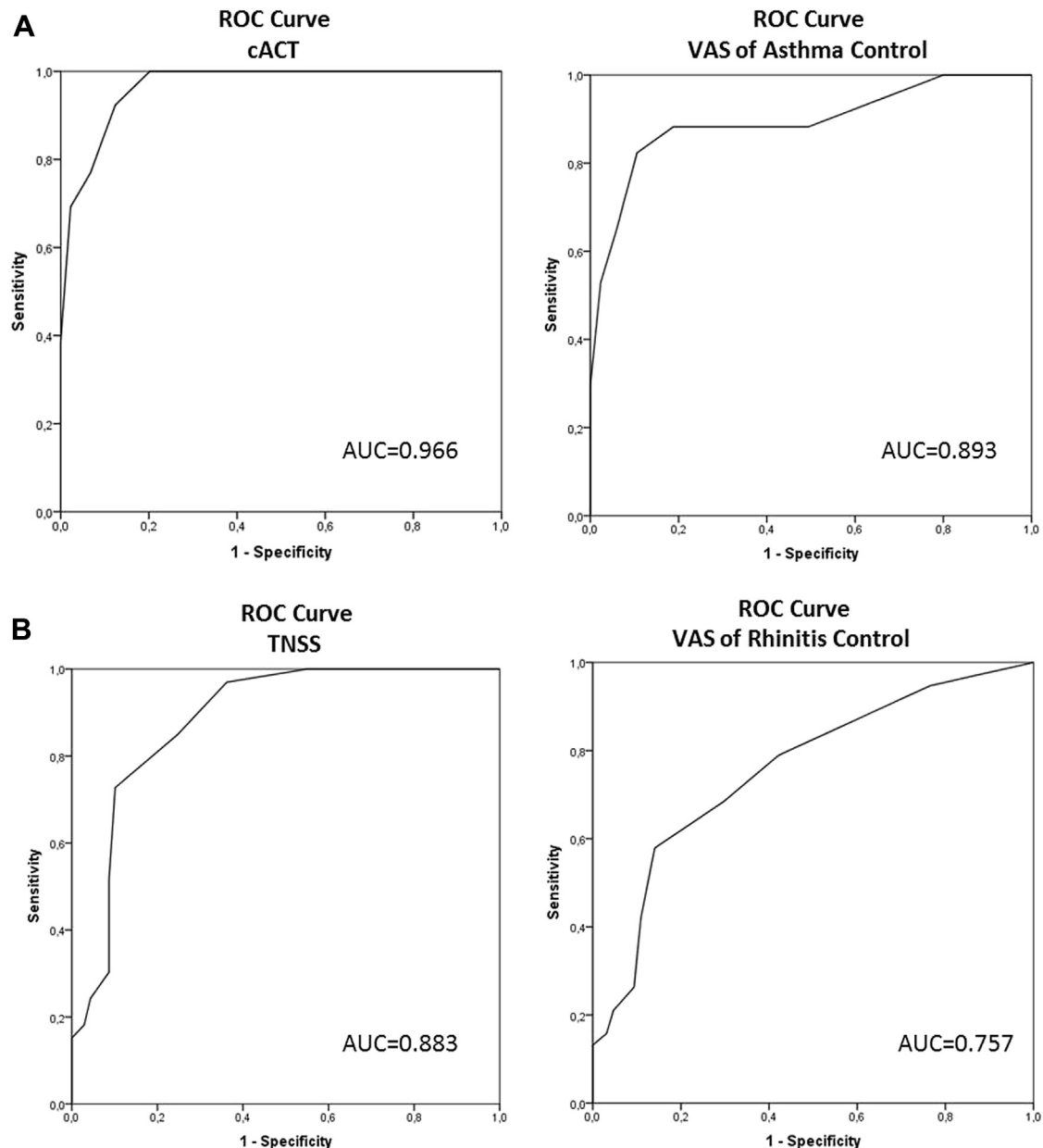


Figure 1. Area under the receiver operating characteristic curves (AUCs) of the Control of Allergic Rhinitis and Asthma Test for Children (CARATKids) for asthma control by the childhood Asthma Control Test (cACT) (95% confidence interval [CI], 0.93–1.00) and by visual analog scale (VAS) for asthma control (95% CI, 0.79–0.99) (A) and rhinitis control by the total nasal symptom score (TNSS) (95% CI, 0.82–0.95) and by VAS for rhinitis control (95% CI, 0.66–0.86) (B).

Table 3

Summary of the Performance of the CARATKids' Score for Each Scoring Option at Different Cut Points in Predicting Uncontrolled Disease^a

Uncontrolled	Cutoff values					
	2	3	4	5	6	7
Asthma OR Rhinitis						
Sensitivity	1	0.97	0.86	0.75	0.56	0.36
Specificity	0.47	0.67	0.79	0.94	0.96	0.96
Asthma by cACT						
Sensitivity	1	1	1	1	0.92	0.77
Specificity	0.35	0.51	0.64	0.80	0.88	0.93
Rhinitis by TNSS						
Sensitivity	1	0.97	0.85	0.73	0.51	0.30
Specificity	0.45	0.64	0.75	0.90	0.91	0.91

Abbreviations: cACT, childhood Asthma Control Test; TNSS, total nasal symptom score.

^aThe cutoff points chosen are shown in bold. Specificity and sensitivity of asthma or rhinitis was computed when uncontrolled was defined as uncontrolled asthma by cACT or uncontrolled rhinitis by TNSS.

This study also contributes to improvement of the knowledge on the performance of CARATKids because it meets more COSMIN criteria¹³ regarding cross-cultural validity, interpretability, and generalizability because CARATKids was only been used in Europe.

The Brazilian version of CARATKids found similar properties as both the original Portuguese CARATKids¹² and the Dutch CARATKids¹⁵ versions (Table 4).

Internal consistency and test-retest reliability were slightly better than other validated tools to assess asthma control in children (cACT¹⁷ and ACQ in children³³), showing an item's coherence of the CARATKids questionnaire. The AUCs were also higher than those previously observed in cACT, demonstrating the good ability in discriminate the disease control. A large responsiveness was observed, and the GRI was similar to the CARAT³⁴ and CARATKids¹² original studies.

Concerning testing the validity of CARATKids, it was essential to find an established questionnaire with similar purposes (gold

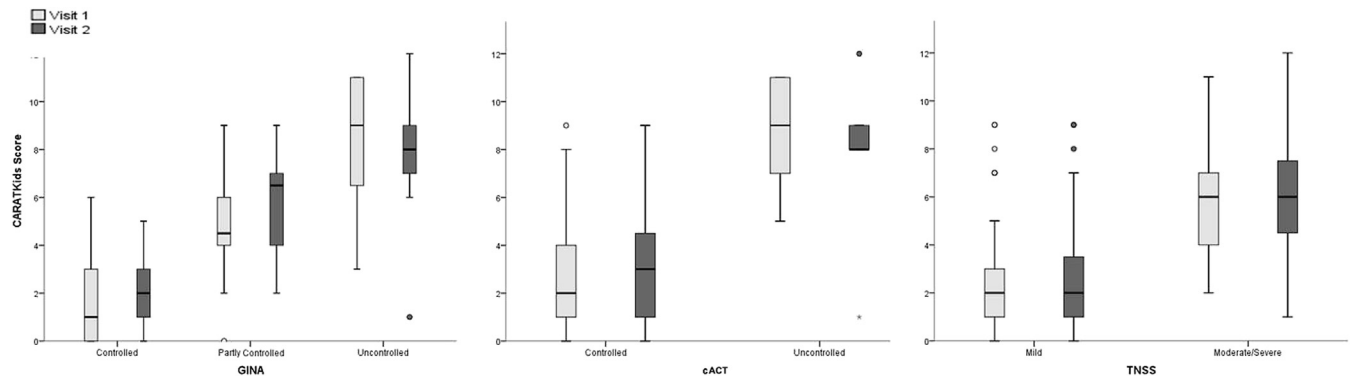


Figure 2. Boxplot of the Control of Allergic Rhinitis and Asthma Test for Children (CARATKids) scores at both visits with asthma control classified by childhood Asthma Control Test (cACT), Global Initiative for Asthma (GINA) classification of asthma control, and total nasal symptom score (TNSS).

standard). We chose to use 2 instruments to comprise the 2 domains (asthma and allergic rhinitis) of the CARATKids. We therefore selected the cACT and TNSS classification as our standard to identify the level of asthma and allergic rhinitis control, respectively, both being well established at clinical and research settings^{24,33,35} and also used on validation of questionnaires in the Brazilian Portuguese version.^{25,36}

We observed a higher correlation with cACT than the one found in the original CARATKids for concurrent validity and longitudinal validity. In addition, we found a good correlation with TNSS, which was higher than the one observed in adults in the Rhinitis Control Assessment Test.²⁴ A low correlation between CARATKids and PNIF was otherwise similar to the Rhinitis Control Assessment Test²⁴; however, no studies were found regarding assessment of only rhinitis control in children who used PNIF. Both VAS-asthma and VAS-rhinitis had low correlation with CARATKids in validity assessments; however, it was similar to the findings in the original version.¹² Finally, there was a weak correlation between CARATKids and PEF as in the study by Chan et al.³⁷

Regarding CARATKids' diagnostic test accuracy, a preliminary proposal of cutoffs was discussed in the original CARATKids¹²: less than 4 (controlled), 4 to 5 (insufficiently controlled), and greater than 5 (uncontrolled). In this study, we proved the optimal threshold for excluding uncontrolled disease was a score of 3 or less and a score of 6 or greater for excluding controlled disease for the overall group. These scores provided fewer false-negative results (maximize sensitivity) and false-positives result (maximize specificity), respectively, and were otherwise similar to those found in other asthma and rhinitis control questionnaires.^{17,24,33} Depending on the specific objectives regarding the use of the manuscript, either of the cutoff points could be considered.

Moreover, the determination of CARATKids' MCID allowed the confirmation of 3 points as the one obtained in the recent CARATKids study.¹⁵ The anchors categorization was the same used in other studies when determining the respective MCIDs.^{26,33,38} Despite a score of 2 points obtained when using cACT as anchor, overall there was consistency among the values obtained by using both the distribution- and anchor-based methods. Thus, a change in

Table 4
Properties of All Versions of the CARATKids Questionnaire Described According to the Consensus-based Standards for the Selection of Health Measurements Instruments¹ Checklist

Item	CARATKids Portuguese (original) version ²	CARATKids Dutch version ³	CARATKids Brazilian version
Internal consistency	Cronbach α : 0.80	Cronbach α : 0.80	Cronbach α : 0.81
Reliability	ICC: 0.80 (3–6 weeks)	ICC: 0.70 (3–6 months)	ICC: 0.85 (4–6 weeks)
Measurement error	NA	SEM: 1.43	SEM: 1.30
Content validity	Thorough development process ⁴	NA	NA
Structural validity	Exploratory factor analysis	NA	NA
Hypothesis testing	Met a priori predictions: –0.5 to 0.7 with cACT –0.4 to 0.7 with patient's VAS –0.4 to 0.6 with physician's assessment	Met a priori predictions: –0.5 to 0.7 with ACT –0.4 to 0.7 with patient's VAS	Met a priori predictions: –0.5 to 0.7 with cACT –0.4 to 0.7 with patient's VAS –0.4 to 0.6 with NTSS
Cross-cultural validity	NA	Similar results with those of the original version	Similar results with those of the original version
Criterion validity	AUC: 0.76–0.83	AUC: NA	AUC: 0.76–0.97
Construct validity	r_s : 0.4–0.7 ($P < .001$)	r_s : 0.5–0.7 ($P < .001$)	r_s : 0.5–0.8 ($P < .001$)
Longitudinal validity	r_s : 0.3–0.4 ($P < .05$)	r_s : 0.5–0.6 ($P < .001$)	r_s : 0.3–0.6 ($P < .05$)
Responsiveness	Significant ($P < .001$) within-patient change	Significant ($P < .001$) within-patient change	Significant ($P = .023$) within-patient change
Interpretability	GRI: –1.51 NA ^a	GRI: 1.72 MCID: 3	GRI: –1.34 MCID: 3 Cut-offs: ≤ 3 (excludes uncontrolled diseases); ≥ 6 (excludes controlled diseases)

Abbreviations: AUC, area under the curve; cACT, childhood Asthma Control Test; CARATKids, Control of Allergic Rhinitis and Asthma Test for Children; GRI, Guyatt responsiveness index; ICC, intraclass correlation coefficient for test-retest; MCID, minimal clinical important difference; NA, not applicable; r_s , Spearman correlation coefficient; TNSS, total nasal symptom score; VAS, visual analog scale.

^aA preliminary proposal of cutoffs was discussed: less than 4 (controlled), 4 to 5 (insufficiently controlled), and greater than 5 (uncontrolled).

CARATKids score of 3 from baseline indicates the smallest clinically significant difference.

The main strength of this study was the adjustment of the cutoff values previously discussed on the original CARATKids version.¹² In addition, this was the first study to report the CARATKids' properties outside Europe, proving to be a valid and reliable tool in Brazilian children. This study used objective tools regarding monitoring asthma and allergic rhinitis, and was the first to compare results with the NTSS, a measurement widely used in rhinitis randomized clinical trials.^{22,26,39}

This study has some limitations. The main limitation is the inclusion of a relative small number of patients with both asthma and rhinitis from a single center. However, the number of participants fulfilled the minimal criteria specified in COSMIN.¹³ Nevertheless, because Brazil is widely socioeconomically and culturally diverse, the generalizability of the results would improve if the study included other centers and settings.

Moreover, ideally physician assessment of disease control regarding asthma and allergic rhinitis should be fully standardized, particularly in children. However, we included other validated tools commonly used in clinical practice and in research settings, and recently a study by Devillier et al.⁴⁰ found that the instruments used with adults (such as VAS scores) can also be used in children with allergic rhinitis, even in a real-life setting. The benefit of using CARATKids in clinical practice at different levels of care requires further evaluation in multiple countries and within secondary/tertiary care.

In conclusion, CARATKids is a reliable and valid tool to assess both asthma and allergic rhinitis control in Brazilian children. The interpretability of CARATKids was established: a score of 6 or more identifies uncontrolled disease, scores of 4 to 5 indicate possible insufficiently controlled disease, and a score of 3 or less excludes poor control. The MCID is a change in 3 points.

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Supplementary Data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.anai.2017.02.007>.

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CARAT

Controle da Asma e Rinite Alérgica para Crianças

1 de 2

(Preenchido pela criança)

Por favor, marque com um "x" a resposta que **melhor** descreve a forma como você se sente em relação à alergia respiratória: asma/rinite nas 2 últimas semanas.

Nome: _____
Data: ____/____/____

Por causa da sua alergia respiratória: asma/rinite, nas últimas 2 semanas:

1. Seu nariz anda entupido?

Sim ☐ Não ☐

2. Tem tido (muitos) espirros?

Sim ☐ Não ☐

3. Tem tido muco / catarro ou o nariz (nariz escorrendo)?

Sim ☐ Não ☐

4. Tem sentido falta de ar?

Sim ☐ Não ☐

5. Tem sentido chiado no peito?

Sim ☐ Não ☐

6. Tem tido tosse?

Sim ☐ Não ☐








7. Tem tido tosse, chiado ou aperto no peito durante exercício físico ou quando ri muito?

Sim ☐ Não ☐

8. Tem tido falta de ar / dificuldade para fazer suas atividades por causa da sua alergia respiratória: asma/rinite?

Sim ☐ Não ☐

Agora é a vez dos pais!

Preenchido pelos pais ou responsáveis

Por favor, assinale com um "x" a resposta que melhor descreve a forma como o seu filho / a sua filha se sentiu da alergia respiratória: asma/rinite, nas últimas 2 semanas

Nome (filho(a)): _____
Idade: ____ Sexo: ____
Data: ____/____/____

Nas últimas 2 semanas, o seu filho / a sua filha

1. Acordou durante a noite por causa da alergia respiratória: asma/ rinite?

Sim ☐ Não ☐

2. Tem tido queixas /sintomas ao acordar pela manhã por causa da alergia respiratória: asma/rinite?

Sim ☐ Não ☐

3. Precizou faltar a escola ou em outras atividades por causa da alergia respiratória: asma/rinite?

Sim ☐ Não ☐

4. Precizou tomar medicamentos ou usar mais medicamentos por estar pior da alergia respiratória: asma/rinite?

Sim ☐ Não ☐

5. Precizou ir ao médico por ter piorado da alergia respiratória: asma/rinite?

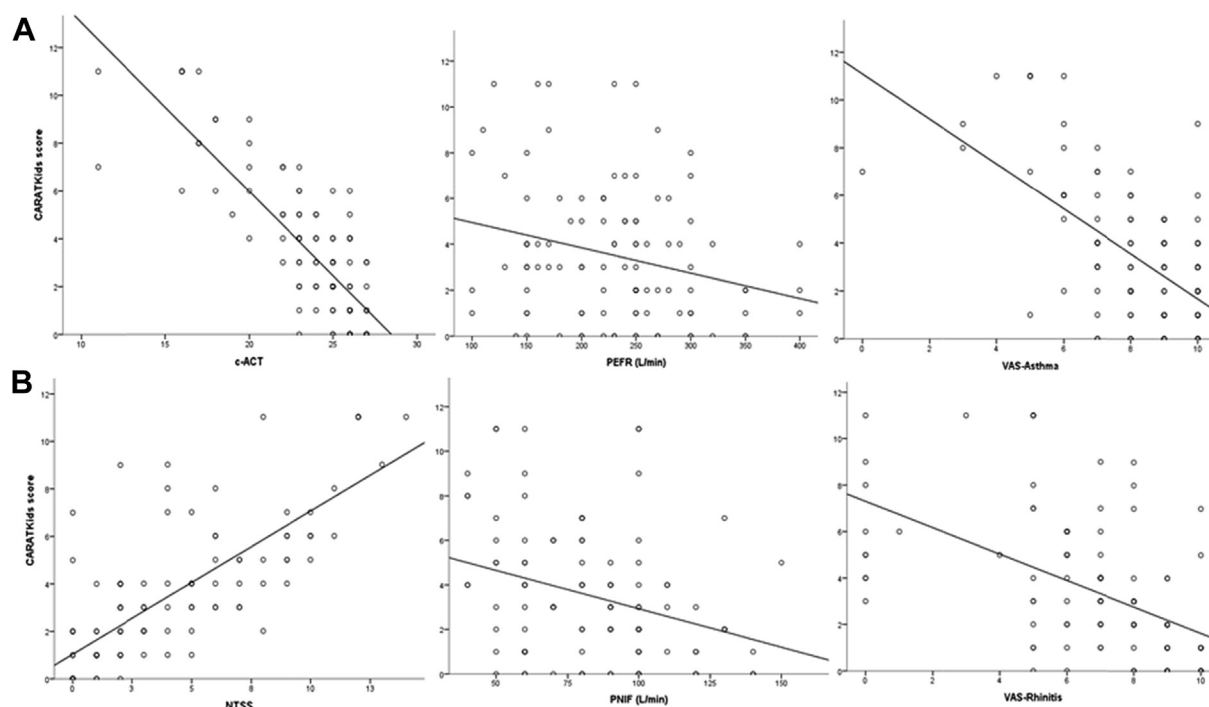
Sim ☐ Não ☐







eFigure 1. Final version of the CARATKids questionnaire adapted to Brazilian culture.



eFigure 2. Scatterplot showing the correlation between CARATKids scores and external measurements of (A) asthma: cACT, PEFR and VAS-asthma; and (B) rhinitis: NTSS, PNIF and VAS-rhinitis.

eTable 1

Minimal Important Difference (MCID) of the CARATKids

	n	ΔCARATKids score mean (SD)
ΔGINA		
No improvement/worsening	28	1.54 (1.87)
Mild improvement/worsening	19	2.63 (1.98)
Significant improvement/worsening	3	4.33 (0.58)
ΔcACT		
No change (−1/0/1)	25	1.32 (1.28)
Minimal change (−3/−2/2/3)	13	2.23 (2.62)
Moderate change (≤−4/≥4)	12	3.67 (2.61)
ΔNTSS		
No change (−2/−1/0/1/2)	26	1.42 (1.6)
Clinical relevant change (≤−3/≥3)	24	2.88 (2.13)

Bolded values indicate the MCID of CARATKids using GINA, cACT and NTSS as “anchor.”

Abbreviations: cACT, childhood Asthma Control Test; CARATKids, Control of Allergic Rhinitis and Asthma Test for Children; GINA, Global Initiative for Asthma; NTSS, Nasal Total Symptom Score.

eTable 2

CARATKids Scores in Visit 1 and 2 by Sex, Physician Treatment Decision and by GINA and cACT Classifications

	Visit 1			Visit 2		
	n	Median (min–max)	P value ^a	n	Median (min–max)	P value ^a
All	102	3 (0–11)		50	3 (0–12)	
Sex						
Male	57	3 (0–11)	.352	25	3 (0–12)	.784
Female	45	4 (0–11)		25	3 (0–9)	
Asthma Control						
GINA						
Uncontrolled	12	8 (3–11)	.001	7	8 (1–12)	<.001
Partly Controlled	32	4.5 (0–9)		12	6.5 (2–9)	
Controlled	58	1 (0–6)		31	2 (0–5)	
cACT						
Uncontrolled	13	9 (5–11)	<.001	6	8 (1–12)	.004
Controlled	84	2 (0–9)		44	3 (0–9)	
VAS Asthma						
Uncontrolled	17	8 (1–11)	<.001	9	8 (1–12)	.002
Controlled	85	2 (0–9)		41	3 (0–9)	
Rhinitis severity						
NTSS						
Mild	69	2 (0–9)	<.001	35	2 (0–9)	.001
Moderate/severe	33	6 (2–11)		15	6 (1–12)	
VAS Rhinitis						
Uncontrolled	38	5 (0–11)	<.001	18	4.5 (1–12)	.001
Controlled	64	2 (0–9)		32	2 (0–9)	
Treatment Decision						
Asthma						
Reduce	20	2 (0–4)	.002	10	3 (0–4)	.016
Maintain	70	3 (0–11)		32	2 (0–9)	
Increase	11	5 (3–11)		8	8 (1–12)	
Treatment Decision						
Rhinitis						
Reduce	5	0 (0–1)		3	1 (0–1)	
Maintain	68	2 (0–11)	<.001	33	3 (0–9)	.002
Increase	29	5 (1–11)		14	5.5 (2–12)	

Results are presented as median (min–max).

Bolded values indicate significant P values (< .05).

Abbreviations: cACT, childhood Asthma Control Test; CARATKids, Control of Allergic Rhinitis and Asthma Test for Children; GINA, Global Initiative for Asthma; NTSS, Nasal Total Symptom Score; VAS, Visual analogue scale.

^aAppropriate nonparametric independent sample t-test: Mann-Whitney or Kruskal-Wallis test.