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# Translation and cross-cultural adaptation of the Brazilian version of the Reading Anxiety Scale: Short version

## *Tradução e adaptação cultural da versão brasileira da Reading Anxiety Scale reduzida*

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### Abstract

Reading anxiety refers to a negative emotional reaction to the reading process that causes the individual to avoid activities involving reading. To date, there are no instruments to evaluate this construct validated for Brazilian children. This study presents the cultural adaptation of the short version of the Reading Anxiety Scale and the study of its psychometric properties. The adaptation was conducted following standardized procedures: translation of the instrument into Brazilian Portuguese; synthesis of translated versions; evaluation by expert referees; evaluation of the instrument by the target audience; back-translation; pilot study with a clinical sample; preparation of the Reading Anxiety Scale short version; pilot study with typically developed children and the instrument psychometric properties. Factor analysis was used to reduce the number of items of the original scale. The studies of internal consistency and convergent validity suggest initial evidence of validity for the use of this instrument to investigate reading anxiety in Brazilian children.

**Keywords:** Anxiety; Children; Neuropsychological assessment; Performance anxiety; Reading.

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## Resumo

*A ansiedade de leitura refere-se a uma reação emocional negativa em relação ao processo de leitura, que motiva o indivíduo a evitar tais atividades. Até o momento, não existem instrumentos para avaliar esse construto na população infantil brasileira. Este estudo apresenta a adaptação cultural da Reading Anxiety Scale na versão breve, bem como o estudo de suas propriedades psicométricas. A adaptação foi conduzida de forma padronizada: tradução do instrumento para o português brasileiro; síntese das versões traduzidas; avaliação por juízes experts; avaliação do instrumento pelo público alvo; retrotradução; estudo piloto com amostra clínica; elaboração da versão breve; estudo piloto com crianças com desenvolvimento típico; e propriedades psicométricas. A análise fatorial foi utilizada para reduzir o instrumento, e os estudos de consistência interna e validade convergente sugeriram que essa ferramenta possui evidências iniciais de validade para a investigação da ansiedade de leitura na população infantil brasileira.*

**Palavras-chave:** Ansiedade; Crianças; Avaliação neuropsicológica; Ansiedade de desempenho; Leitura.

Reading ability is an important indicator for academic achievement in children, being one of the main predictors of school success (Pace, Alper, Burchinal, Golinkof, & Hirsh-Pasek, 2019). The effects of emotional factors on academic performance have been largely described in research (Grills-Taquechel, Fletcher, Vaughn, & Stuebing, 2012; Grills et al., 2014; Hernández et al., 2016; Nachshon & Horowitz-Kraus, 2019). Given the important association between anxiety and academic achievement (Grills-Taquechel et al., 2012; Grills et al., 2014; Steinmayr, Crede, McElvany, & Wirthwein, 2016; Su et al., 2017), specific performance anxieties have been studied, such as math anxiety (Chang & Beilock, 2016; Devine, Hill, Carey, & Szűcs, 2018; Foley et al., 2017; Haase et al., 2012; Wood et al., 2012) and reading anxiety (Zbornik, 1988; Zbornik & Wallbrown, 1991). However, reading anxiety has been less explored than math or overall performance anxiety (Devine et al., 2018; Jalongo & Hirsh, 2010; Ruiz, Urretavizcaya, Rodríguez, & Fernández-Castro, 2018).

Reading anxiety, the focus of this article, is defined as an emotional and/or unpleasant physical reaction when children perform or think about reading activities (Jalongo & Hirsh, 2010; Piccolo et al., 2017). Reading anxiety has been associated but it is distinct from general anxiety (Mogg et al., 2015; Zbornik, 1988). The negative impact of reading anxiety includes (a) cognitive (i.e. individual's ability to concentrate, and retain information, perceptions and beliefs, mainly self-efficacy), (b) affective (i.e. feeling nervous, tense, or fearful), (c) physiological (hyperventilation, sweating and shaking, for example), and (d) behavioral (mainly avoidance) consequences (Sarason, 1988; Spielberger, 2015). Therefore, children's readiness is often inhibited by those factors. Specifically, reading anxiety was then characterized as a phobic reaction which occurs when the contents of reading, letters, words and sentences become associated with the expression of internal emotions that have been associated with negative life circumstances (Piccolo et al., 2017; Zbornik, 1988; Zbornik, 2001; Zbornik & Wallbrown, 1991) which impels an individual to avoid reading materials (Jalongo & Hirsh, 2010).

In order to assess specific performance anxieties, instruments have been developed in different languages (Alkhateeb, 2014; Baghaei, Hohensinn, & Kubinger, 2014; Hsiao, 2002; Ramirez et al., 2019). Nonetheless, studies evaluating reading anxiety have been focused mostly on specific disorders in second language learners individuals (L2) (Chow, Chiu, & Wong, 2017; Guimba & Alico, 2016; Mohammadpur & Ghafournia, 2015; Zheng & Cheng, 2018). Taking into account the lack of studies and assessment tools to examine reading anxiety in first language learners, this study aims to present the translation and cross-cultural adaptation of the Brazilian version of the Reading Anxiety Scale (RAS) (Zbornik, 1988; Zbornik & Wallbrown, 1991), the short version of RAS and its correlation with general anxiety and math anxiety scores.

We also examined the confirmatory factor analysis, internal consistency of the shorter version of RAS for the Brazilian population and its correlation with instruments that evaluate a similar construct (Cunha, Neto & Stackfleth, 2016). From this investigation, we seek to supply professionals with a valid tool to the assessment, diagnosis, and intervention in Brazilian children who exhibit reading disabilities.

## Method

### The scale

The original scale – Reading Anxiety Scale (Zbornik & Wallbrown, 1991) –, consists of a 45-item questionnaire (in a Likert 5-point scale) that evaluates three domains of anxiety for reading: “fear of curiosity”, “aggression” and “independence”. The original scale was developed for fourth, fifth and sixth grade students (Elementary School, referring to the North American schooling system) – from 9 to 12 years of age, L1. Coefficient alpha reliability estimates for the English language version of the RAS were obtained for the 45 items of the RAS and each 15-item subdomain. The alpha coefficient for the entire scale was 0.88. Alpha coefficients for the RAS sub-domains were 0.72 for fear of curiosity, 0.75 for fear of aggression and 0.78 for fear of independence. A 0.88 alpha indicates that the RAS items are highly intercorrelated (Zbornik 1988; Zbornik & Wallbrown 1991).

### *Procedures for the translation and cultural adaptation of the Reading Anxiety Scale to the Brazilian population*

The author of the original instrument allowed the translation and cultural adaptation of the instrument, as well as psychometric (normative, validity and reliability) studies. The adaptation of the instrument was carried out using the following standardized procedures proposed in the literature (Pasquali, 2017; Borsa, Damásio, & Bandeira, 2012): (1) instrument translation into Brazilian Portuguese by three independent professional translators; (2) synthesis of the three translated versions; (3) review of the scale (including standardized testing procedures) by an expert committee; (4) review of the instrument by the target audience (9-to 12-years-olds); (5) back-translation; (6) first pilot study, (7) development of a brief version in Brazilian Portuguese; (8) second pilot study; and (9) psychometric properties – factorial analysis and internal consistency.

At first, items from the original 45-item scale were independently translated into Portuguese by three professional translators knowledgeable of Psychology and Cognitive Neuropsychology, bilingual (Brazilian Portuguese as their first language and proficient in English) and aware of the objective of this investigation. Then, a synthesis of the forward translation was proposed. One bilingual, native Brazilian, psychologist and researcher in the language development field compared the three translations and summarized it in a consensual translation.

In the third step, three bilingual referees reviewed the synthesis of the translations. The reviewers were Brazilian Portuguese native speakers, proficient in English, with expertise related to the construct measured by the instrument (two investigators in the field of Cognitive Neuropsychology and performance anxiety and one specialist in language development and psychometrics). They evaluated aspects as structure, layout, instrument instructions and scope and adequacy of the items contained in the items. In this step, the reviewers agreed that the instructions, layout, and structure were adequate for the Brazilian population. Modifications were restricted to verbal tense for some verbs which were corrected to facilitate children’s comprehension.

The fourth step was a review of the instrument by the target audience. Twenty typically developed children (Brazilian Portuguese native-speakers) were asked to verify the items, instructions and if the response scale was understandable to them. Their feedback is reported in the “results” section.

Finally, a back-translation was performed by three independent translators, Brazilian Portuguese native-speakers and proficient in English, and different from the previous three, aware of the purpose of the investigation. Subsequently, the back-translations were synthesized and compared with the original

instrument, indicating the semantic equivalence and reconciliation of translated items. To perform the idiomatic equivalence (equivalent expressions) and conceptual equivalence (validity of the concept explored), some terms were replaced by synonyms, because the original items do not fit in the usual language of the Brazilian population. The back-translation was approved by the author of the original scale.

## Data collection

### Participants

Three samples were included in this study. The first sample consisted of 20 typical developed children from nine to twelve years old (five children from each age: 9, 10, 11 and 12 years old), students from public and private schools of *Porto Alegre*, Brazil. The second sample consisted of 12 children with learning disabilities attending a school-clinic in *Belo Horizonte*, Brazil, who exhibited learning disabilities. Those children were 9 to 15 years old ( $M = 11.75$  ;  $SD = 2.45$ ), 75% ( $N = 9$ ), female, attending the 3<sup>rd</sup> to 9<sup>th</sup> grade in public ( $N = 8$ ) and private ( $N = 4$ ) schools.

Finally, the third sample included 88 students, attending 2<sup>nd</sup> to 4<sup>th</sup> grade, 8 to 10 years old ( $M = 8.9$ ;  $SD = 0.72$ ), 57.3% female, attending public ( $N = 60$ ) and private ( $N = 28$ ) schools from two cities in *Rio Grande do Sul*, Brazil. All participants were Brazilian Portuguese native speakers. Exclusion criteria (just for the third sample) were: neurological or psychiatric disorders; uncorrected hearing or visual impairments (reported by parents/guardians) and performance below the 25<sup>th</sup> percentile in the Raven's Colored Progressive Matrices test - Special Raven's Scale. (Angelini, Alves, Custódio, Duarte, & Duarte, 1999). Children were assessed after their parents or guardians signed the Informed Consent Form.

### General procedures - data collection

This study was approved by the Ethics Committee of *Universidade Federal do Rio Grande do Sul* (UFRGS) Institute of Psychology, under protocol 1.632.099/2016. For the three samples, the schools were selected by convenience sampling and the students from each grade were randomly selected. Data collection took place in one individual session for the first sample, and two collective sessions for the second and third samples, with no re-testing or longitudinal follow-up. Children from the third sample responded to Raven's Colored Progressive Matrices test - Special Raven's Scale (Angelini et al., 1999) in the first collective sessions, which lasted approximately 20min. In another 45-min session, children were evaluated using the Multidimensional Anxiety Scale for Children and the Reading Anxiety Scale.

### Instruments and specific data collection procedures

First, non-verbal intelligence was assessed by Raven's Colored Progressive Matrices Test - Special Raven's Scale (Angelini et al., 1999). Then, general anxiety was evaluated by the Multidimensional Anxiety Scale for Children (MASC) (March, Parker, Sullivan, Stallings, & Conners, 1997; March, Sullivan, & Parker, 1999). MASC evaluates four main factors: physical symptoms, social anxiety, avoidance of harm and separation anxiety. It consists of 39 items and its overall score approaches the diagnosis of generalized anxiety disorder. Children were instructed to respond based on how they had been feeling during the past two weeks. The items are rated on a 4-point scale, ranging from zero (it is never true about me) to three (often true about me). The MASC was validated for the Brazilian population by Asbahr (2004). Its total score was calculated by summing

up all the items and each subscale was calculated summing up its relevant items. Afterwards, math anxiety was evaluated using Math Anxiety Questionnaire (MAQ). The MAQ was developed by Thomas and Dowker (2000) and the Brazilian Portuguese version of the Questionnaire was developed and standardized by Wood et al. (2012). The Brazilian version of the MAQ contains 24 items that can be answered by children individually or in groups within 5 to 10 minutes. For the total score, scores of all items of the scale were added up. Each subscale (Affective and Cognitive) was analyzed by adding up its relevant items.

A subsample of the 88 children ( $N = 52$ ) was evaluated on reading skills. The ability to read words was tested using the Isolated Words Reading (*Leitura de Palavras Isoladas* [LPI]) (Salles, Piccolo, & Mina, 2017). In the LPI testing, participants were instructed to read aloud 60 stimuli (40 words and 20 pseudowords). The Reading Words Fluency task (*Tarefa de Fluência de Leitura* [TFL]) (Justi & Roazzi, 2012) consists of 55 regular words, which the participant is instructed to read 30 seconds. The score on this task was calculated by adding up the number of words read correctly during the given period. Finally, textual reading fluency (Basso, Piccolo, Corso, Mina, & Salles, 2018) was tested using AFLeT, a test in which the student is instructed to read a text at his pace, without stopping or interrupting the reading. Subsequently, the number of words in the text, the reading time, the words read correctly, and the reading speed were reviewed using a composite score.

Finally, reading anxiety was evaluated using the Reading Anxiety Scale (RAS) (Zbornik, 1988; Zbornik & Wallbrown, 1991) – short version for Brazilian Portuguese. The examiner first explained to the children that the RAS is a test to investigate how children feel about reading, but that there were no right or wrong answers. Next, the examiner read the statements to the children who answered how they agreed with the statement by circling (strongly agree, agree, not sure, disagree, strongly disagree) an alternative in the sheet provided.

## Data Analysis

Two main analyses were performed for this study, to meet the following objectives: (1) to reduce the number of items of the original RAS, and (2) to obtain evidence of the validity of the short version. In order to reduce the items from the original 45-item scale, we performed an Exploratory Factorial Analysis and Confirmatory Factorial Analysis, using principal axis factoring and Promax and the Kaiser normalization rotation method, in order to verify if the new factorial structure was similar to the original one. Finally, we investigated the psychometric properties of RAS 20-item using (1) alpha coefficients to measure internal consistency; and (2) correlations between the RAS-20 and the MASC and RAS-20 and MAQ for the third sample, and with the reading tasks (LPI, TFL, and AFLeT) in order to test convergent validity of the short version. Analyses were performed using the IBM®SPSS® Software (version 25).

## Results

### *Modifications of items to improve idiomatic and conceptual equivalence*

Modifications were restricted to verbal tense or terms replacement, corrected to facilitate children's comprehension. First, the evaluation of the translations' synthesis by three bilingual referees pointed out that the instructions and structure were adequate for the Brazilian population. However, some verbs had to be modified to obtain more understandable verbal tenses: (1) item (If no one helped me, I would fail reading) "Se ninguém me ajudar, é possível que eu não consiga ler" was changed to "Se ninguém me ajudasse, eu possivelmente não conseguiria ler"; and (2) item (I don't like to look at books) "Eu não gosto de olhar livros" was changed to "Eu não gosto de olhar para livros". Just one aspect of the layout was pointed out: in

the original scale, children were asked to write their first name in the sheet upper right hand corner, but we changed to the upper left corner, since in Brazil the heading is usually placed on the left.

In the review of the 45-item instrument by the target audience (first sample, 20 typically developed children), the respondents agreed that the instructions and the response scale were understandable to them. However, they pointed out the similarity between two of the questions (questions number 5 "*I can read, but I don't understand what I have read*" and 14 "*I can't read, but I don't feel like it*"). Nonetheless, the authors have agreed to keep both questions, given that the items were referring to different aspects of the reading anxiety construct.

After back-translation, in order to produce the idiomatic and conceptual equivalence, some terms in the instructions were replaced by other more frequently used in Brazilian Portuguese: (1) (you disagree) was wrongly translated to "*você não concorda*" and were changed to "*discorda*" to make the expression consistent with the scale; and (2) (while you read it) "*enquanto você a lê no questionário*" the terms "a" and "no" were added because the articles were in the original version, but were not included in the translation.

### *Analyses of items to obtain a reduced version of the RAS-20 item*

Then, after back-translation and the agreement of the author of the original scale, the provisional forward translated questionnaire was pilot-tested and administered to the first sample ( $N = 12$ ) of this study. After the evaluation, many of the participants (66%) stated that they found it difficult to complete the questionnaire because it was too long and some questions seemed to be repeated. Taking into account that statement, we decided to review the factorial analysis of the original scale (Zbornik, 1988) and develop a short version, based on the original analysis.

Reviewed the original scale factorial analysis of the Zbornik (1988) study, it was noticed that some items were not contributing to the scale adequacy. The sample from the original study (Zbornik, 1988) was composed of 436 children, from 9 to 12 years of age, attending parochial schools, L1, in the U.S. After examining the factorial structure of the original 45-item instrument and excluding items with low loadings in each factor (values below 0.40), a shorter version of the scale (in English) was proposed by the authors. After excluding those items, the RAS short version maintained 20 items. For this proposed shorter version in English, no published psychometric studies are available for RAS so far. Although we have followed the 5 steps to adapt the original RAS, we opted to use the shorter version, considering that a scale with 20 items is more feasible to be used in studies (and in clinics) than a 45-item questionnaire.

The descriptive analyzes for the third sample are reported on Table 1. There were no significant differences in the scores among 2<sup>nd</sup> ( $N = 14$ ), 3<sup>rd</sup> ( $N = 38$ ), and 4<sup>th</sup> ( $N = 36$ ) grades (one-way ANOVA). The results for the total sample are shown below.

For the Brazilian Portuguese version, results from the Exploratory Factorial Analysis (EFA) using the third sample ( $N = 88$ ) – the eigenvalue criteria (higher than 1), screen plot, and parallel analyses – revealed that the three-factor model proposed by Zbornik and Wallbrown (1991) was supported. Nonetheless, the Confirmatory Factorial Analysis (CFA) results showed that the items loaded in the three dimensions were different from those of the original scale (Table 2). CFA showed good model fit indices, according to Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy = 0.75 and the Bartlett's test of sphericity ( $\chi^2 (210) = 626.386, p < 0.001$ ).



Table 1

Descriptive – RAS 20-item (N = 88)

| RAS-20 Items – Brazilian Portuguese version                                          | Range | Mean  | (SD)    |
|--------------------------------------------------------------------------------------|-------|-------|---------|
| 1- Na minha opinião, ler é difícil.                                                  | 1-5   | 4.33  | (1.15)  |
| 2- Tenho dificuldade em compreender o que leio.                                      | 1-5   | 3.84  | (1.06)  |
| 3- Eu preciso de ajuda para ler.                                                     | 1-5   | 4.51  | (0.87)  |
| 4- Eu consigo ler, mas eu não consigo entender o que eu leio.                        | 1-5   | 3.92  | (1.27)  |
| 5- O(a) professor(a) me ajuda quando estamos lendo.                                  | 1-5   | 3.30  | (1.45)  |
| 6- Não importa o quanto eu tente, eu não consigo ler bem.                            | 2-5   | 4.51  | (0.85)  |
| 7- Pessoas que leem bem não são como eu.                                             | 1-5   | 3.66  | (1.30)  |
| 8- Se ninguém me ajudasse, eu não conseguiria ler.                                   | 1-5   | 3.73  | (1.41)  |
| 9- Esqueço rapidamente o que eu li mesmo que eu tenha acabado de ler.                | 1-5   | 3.53  | (1.41)  |
| 10- Eu consigo ler, mas eu não gosto.                                                | 1-5   | 3.91  | (1.28)  |
| 11- Eu não consigo melhorar minha leitura sem ajuda.                                 | 1-5   | 3.83  | (1.39)  |
| 12- Eu não gosto de ler.                                                             | 1-5   | 4.09  | (1.34)  |
| 13- Eu não consigo ler bem sem ajuda de outras pessoas.                              | 1-5   | 4.02  | (1.31)  |
| 14- Se eu fosse uma pessoa melhor, eu provavelmente saberia ler melhor.              | 1-5   | 3.55  | (1.55)  |
| 15- Eu não gosto de olhar para livros.                                               | 1-5   | 4.39  | (1.02)  |
| 16- Eu gosto que alguém me ajude quando estou fazendo os deveres de casa de leitura. | 1-5   | 2.82  | (1.54)  |
| 17- Eu não sou inteligente o suficiente para ler bem.                                | 1-5   | 4.36  | (1.09)  |
| 18- Mesmo que eu pudesse, não gostaria de melhorar a minha leitura.                  | 1-5   | 4.38  | (1.14)  |
| 19- Olhar para os livros me deixa chateado e/ou nervoso.                             | 1-5   | 4.36  | (0.97)  |
| 20- Eu fico chateado quando tem muita coisa para ler.                                | 1-5   | 3.64  | (1.52)  |
| RAS 20 item total score                                                              | 46-99 | 79.15 | (13.10) |

Note: M: Mean; RAS: Reading Anxiety Scale; SD: Standard Deviation

Table 2

Factor structure of the Brazilian Portuguese 20-item scale version

| Original factor | New factor | RAS-20 Items – Brazilian Portuguese version                                          | Factor       |              |              |
|-----------------|------------|--------------------------------------------------------------------------------------|--------------|--------------|--------------|
|                 |            |                                                                                      | 1            | 2            | 3            |
| i               | in         | 14- Eu não consigo ler bem sem ajuda de outras pessoas.                              | <b>0.874</b> | 0.187        | 0.293        |
| i               | in         | 12- Eu não consigo melhorar minha leitura sem ajuda.                                 | <b>0.788</b> | 0.422        | 0.405        |
| i               | in         | 9- Se ninguém me ajudasse, eu não conseguiria ler.                                   | <b>0.549</b> | 0.303        | 0.376        |
| c               | in         | 7- Não importa o quanto eu tente, eu não consigo ler bem.                            | <b>0.499</b> | 0.319        | 0.453        |
| i               | in         | 3- Eu preciso de ajuda para ler.                                                     | <b>0.473</b> | 0.319        | 0.293        |
| i               | in         | 17- Eu gosto que alguém me ajude quando estou fazendo os deveres de casa de leitura. | <b>0.457</b> | 0.308        | 0.436        |
| i               | in         | 6- O(a) professor(a) me ajuda quando estamos lendo.                                  | <b>0.404</b> | 0.206        | 0.375        |
| a               | e          | 11- Eu consigo ler, mas eu não gosto.                                                | 0.455        | <b>0.715</b> | 0.279        |
| c               | e          | 13- Eu não gosto de ler.                                                             | 0.234        | <b>0.657</b> | 0.303        |
| c               | e          | 16- Eu não gosto de olhar para livros.                                               | 0.278        | <b>0.628</b> | 0.448        |
| i               | e          | 21- Eu fico chateado quando tem muita coisa para ler.                                | 0.241        | <b>0.591</b> | 0.293        |
| c               | e          | 20- Olhar para os livros me deixa chateado e/ou nervoso.                             | 0.223        | <b>0.584</b> | 0.237        |
| a               | e          | 19- Mesmo que eu pudesse, não gostaria de melhorar a minha leitura.                  | 0.277        | <b>0.495</b> | 0.424        |
| a               | d          | 5- Eu consigo ler, mas eu não consigo entender o que eu leio.                        | 0.318        | 0.32         | <b>0.685</b> |
| a               | d          | 10- Eu esqueço rapidamente o que eu li mesmo que eu tenha acabado de ler.            | 0.29         | 0.487        | <b>0.62</b>  |
| a               | d          | 2- Tenho dificuldade em compreender o que leio.                                      | 0.232        | 0.315        | <b>0.606</b> |
| a               | d          | 15- Se eu fosse uma pessoa melhor, eu provavelmente saberia ler melhor.              | 0.272        | 0.106        | <b>0.556</b> |
| c               | d          | 1- Na minha opinião, ler é difícil.                                                  | 0.392        | 0.474        | <b>0.487</b> |
| a               | d          | 8- Pessoas que leem bem não são como eu.                                             | 0.36         | 0.292        | <b>0.421</b> |
| c               | d          | 18- Eu não sou inteligente o suficiente para ler bem.                                | 0.176        | 0.234        | <b>0.397</b> |

Note: Extraction Method: Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization. a: fear of aggression; c: fear of curiosity; d: difficulty; e: enjoyment; i: fear of independence; in: independence.



### Internal consistency

The alpha coefficient for the entire scale was 0.86. Alpha coefficients for the sub-domains were 0.77 for the first dimension – “independence” –, 0.77 for the second dimension – “enjoyment” (i.e. how much the child likes reading) –, and 0.75 for the third dimension – “difficulty” (i.e. the feeling that reading can be a hard activity). Taking all together, the analyses confirmed the reliability of the three-factor scale for the short version of the RAS.

### Correlation between RAS-20 and MASC and MAQ (convergent validity)

In order to evaluate convergent validity of the shorter instrument, we have correlated the performance of 31 students who answered both RAS-20 and MASC. In this analysis, we identified that all subscales of the RAS-20 showed no statistical significant correlations with most of the MASC scores. However, RAS-20 total and its subscales “enjoyment” and “difficulty” were moderately correlated with MASC measure of physical symptoms. On the other hand, the total score, as well as two dimensions of RAS-20 (independence and difficulty), correlated with MAQ total score, showing moderate and small magnitudes. We also observed small and moderate correlations between MAQ “CD” and RAS-20 independence and total score, as well as between MAQ subscales AB (Affective) and CD (Cognitive) and RAS-20 enjoyment factor. Correlation's coefficients are shown in Table 3.

Table 3

Correlations (Pearson *r*) between RAS-20, MASC and MAQ – total and subscales (*N* = 31)

| RAS-20       | MASC              |                |                |                    |       | MAQ       |           |         |
|--------------|-------------------|----------------|----------------|--------------------|-------|-----------|-----------|---------|
|              | Physical symptoms | Social anxiety | Harm avoidance | Separation anxiety | Total | Affective | Cognitive | Total   |
| Independence | -0.28             | 0.05           | 0.06           | 0.08               | 0.02  | -0.35     | -0.37*    | -0.38*  |
| Enjoyment    | -0.42*            | -0.07          | 0.17           | -0.01              | -0.10 | -0.50*    | -0.66**   | -0.62** |
| Difficulty   | -0.33*            | -0.20          | 0.31           | 0.11               | -0.01 | -0.21     | -0.37*    | -0.34   |
| Total        | -0.41*            | -0.09          | 0.21           | 0.10               | -0.10 | -0.45*    | -0.57*    | -0.56** |

Note. \**p* < 0.05 level; \*\**p* < 0.01 level. MASC: Multidimensional Anxiety Scale for Children; MAQ: Math Anxiety Questionnaire.

### Correlation between RAS-20 and reading tasks

RAS-20 was positively associated with the reading words task (*r* = 0.32; *p* = 0.024) and words (TFL) (*r* = 0.40; *p* = 0.004) and textual fluency (AFLeT) (*r* = 0.37; *p* = 0.008), controlling for age. Considering that lower scores of RAS-20 mean higher reading anxiety, the association is in accordance with the expected trend.

## Discussion

This study presented the translation and cross-cultural adaptation of the Brazilian version of the RAS (Zbornik, 1988; Zbornik & Wallbrown, 1991), the short version of RAS and its psychometric properties. The factorial structure of the short version is very similar to the original structure. In addition, the internal consistency was similar to the original RAS 45-item. Taking into account the evidence of validity presented in this study, the RAS-20 seems to be adequate to evaluate reading anxiety in Brazilian children.

Factorial analyses reinforced the assumption that the full version of RAS had an excessive quantity of items. Based on the original 45-item version, we proposed a short version composed of 20 items, which keeps evaluating reading anxiety with adequate psychometric properties, including evidence related to its internal structure and convergent validity. The subscales showed good internal consistency, similar to the original scale. However, we have identified new meanings for the factors, representing new interpretations of the scale's composition, without changing the capacity of the questionnaire to measure the reading anxiety construct.

The association between RAS-20 and MASC validates results from the Zbornik (1988) study using the original scale, i.e. reading anxiety is a different construct as compared to general anxiety. Although in the Zbornik study reading anxiety was correlated to general anxiety, measured by the Children's Anxiety Scale (CAS), that association was moderate. We hypothesize that the significant correlation between RAS-20 and MASC measure of physical symptoms is related to the fact that both children and their parents often are aware of the physical changes when children are anxious, but seldom about the cognitive consequences of anxiety (March et al., 1997). Our result suggests that it is relevant to use another instrument to measure a more specific aspect of anxiety, in this case, anxiety in connection with the reading practice. As mentioned above, reading anxiety is a situation-specific anxiety experienced only in reading contexts (Baghaei et al., 2014; Piccolo et al., 2017; Zbornik, 1988).

In addition, the significant correlation between RAS-20 and MAQ shows that reading and math anxiety are related as constructs of broad school anxiety, reinforcing the specificity of the construct which RAS-20 measures. The relationship between related constructs supports the hypothesis that the two scales evaluate psychological processes with related but distinct dimensions (Cunha et al., 2016). Also, our findings contribute to expand investigations on specific academic anxiety which up to now has primarily focused on second language learners, and anxieties related to math and overall performance (Devine et al., 2018; Jalongo & Hirsh, 2010; Ruiz et al., 2018).

Finally, RAS-20 was associated with reading performance, such as children with higher reading anxiety underperformed their peers with lower levels of anxiety. This finding corroborates results from the Zbornik (1988) study using the original 45-item scale and contemporary research on reading anxiety (Katzir, Kim, & Dotan, 2018; Ramirez et al., 2019). The association between reading anxiety and reading performance reinforces the concept that the reading anxiety scale is measuring a concept associated with reading skills and highlights the importance of emotional aspects evaluation for a better understanding of school performance (Davis, Margolis, Thomas, Huo, & Marsh, 2018; Hendren, Haft, Black, White, & Hoefft, 2018; Jarrett, Black, Grills-Taquechel, & Ollendick, 2015; Katzir et al., 2018; Ramirez et al., 2019; Steinmayr et al., 2016).

This study has limitations which we plan to overcome with future studies. First, larger sample sizes and greater representability of the Brazilian population would improve the reliability of our results, as well as the strength of the factorial structure presented in this study. Also, the investigation of RAS-20 psychometric properties has to be expanded, enhancing the scientific evidence supporting its use.

Results from this study provide further insight into different anxiety constructs and the dynamics underlying the relationship between reading anxiety and reading performance allowing informed research for individualized interventions targeting students with unique reading anxiety patterns/profiles.

## Final Considerations

The cultural adaptation of the Reading Anxiety Scale will initially enable the exploration of reading anxiety in Brazil. Additionally, it will be available as a tool to better understand the impact of emotional conflict on Brazilian children's reading performance. The identification of children with reading anxiety will make it possible to design and implement school interventions to prevent school disabilities and enhance reading achievement.

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## Contributors

L.R. PICCOLO conceptualized and designed the study, conducted statistical analyses, and wrote the manuscript; F.P. BASSO and M. LIMA coordinated data collection and review the manuscript, C.H. GIACOMONI, J. ZBORNIK, V.G. HAASE, and, J.F. SALLES, conceptualized and designed the study, and critically reviewed the manuscript. The authors declare no conflict of interest.

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## ATTACHMENT

Escala de Ansiedade de Leitura adaptada de *Reading Anxiety Scale* (Zbornik, 1988) por Piccolo, Giacomoni, Júlio-Costa, Lima, Basso, Haase, Zbornik e Salles

Nome: \_\_\_\_\_

Idade: \_\_\_\_\_ Sexo: \_\_\_\_\_ Série: \_\_\_\_\_ Escola: \_\_\_\_\_

### Instruções

Primeiro, escreva o seu nome e sobrenome no canto superior esquerdo. Quando tiver terminado, olhe para o seu questionário. Eu vou ler as instruções em voz alta para você.

As afirmativas contidas neste questionário dizem respeito à forma como você se sente sobre a leitura. Não há respostas certas ou erradas, porque os alunos têm diferentes opiniões e sentimentos sobre a sua leitura. O importante é marcar a resposta que mostra como você realmente se sente ou qual é sua opinião.

Eu vou ler cada frase em voz alta, enquanto você a lê no questionário silenciosamente. Depois que cada frase for lida, você deve decidir como você se sente sobre isso e marcar um "X" na casela correspondente: Marque 1 para mostrar que você concorda totalmente com a frase. Marque 2 para mostrar que você concorda com a frase. Marque 3 se você não tem certeza se você concorda com a frase. Marque 4 para mostrar que você discorda da frase. Marque 5 para mostrar que você discorda totalmente da frase. Não use caneta. Certifique-se de marcar uma resposta para cada frase. Apague completamente qualquer resposta que você deseja mudar.

1 – concordo totalmente

2 – concordo

3 – não tenho certeza

4 – discordo

5 – discordo totalmente

### EXEMPLOS

|                                                          | 1.<br>Concordo<br>totalmente | 2.<br>Concordo | 3.<br>Não tenho<br>certeza | 4.<br>Discordo | 5.<br>Discordo<br>totalmente |
|----------------------------------------------------------|------------------------------|----------------|----------------------------|----------------|------------------------------|
| a. Ler é mais divertido do que computador.               |                              |                |                            |                |                              |
| b. Eu gostaria de ser um(a) cientista quando eu crescer. |                              |                |                            |                |                              |

|                                                                                     | 1.<br>Concordo<br>totalmente | 2.<br>Concordo | 3.<br>Não tenho<br>certeza | 4.<br>Discordo | 5.<br>Discordo<br>totalmente |
|-------------------------------------------------------------------------------------|------------------------------|----------------|----------------------------|----------------|------------------------------|
| 1 Na minha opinião, ler é difícil.                                                  |                              |                |                            |                |                              |
| 2 Tenho dificuldade em compreender o que leio.                                      |                              |                |                            |                |                              |
| 3 Eu preciso de ajuda para ler.                                                     |                              |                |                            |                |                              |
| 4 Eu consigo ler, mas eu não consigo entender o que eu leio.                        |                              |                |                            |                |                              |
| 5 O(a) professor(a) me ajuda quando estamos lendo.                                  |                              |                |                            |                |                              |
| 6 Não importa o quanto eu tente, eu não consigo ler bem.                            |                              |                |                            |                |                              |
| 7 Pessoas que leem bem não são como eu.                                             |                              |                |                            |                |                              |
| 8 Se ninguém me ajudasse, eu não conseguiria ler.                                   |                              |                |                            |                |                              |
| 9 Eu esqueço rapidamente o que eu li mesmo que eu tenha acabado de ler.             |                              |                |                            |                |                              |
| 10 Eu consigo ler, mas eu não gosto.                                                |                              |                |                            |                |                              |
| 11 Eu não consigo melhorar minha leitura sem ajuda.                                 |                              |                |                            |                |                              |
| 12 Eu não gosto de ler.                                                             |                              |                |                            |                |                              |
| 13 Eu não consigo ler bem sem ajuda de outras pessoas.                              |                              |                |                            |                |                              |
| 14 Se eu fosse uma pessoa melhor, eu provavelmente saberia ler melhor.              |                              |                |                            |                |                              |
| 15 Eu não gosto de olhar para livros.                                               |                              |                |                            |                |                              |
| 16 Eu gosto que alguém me ajude quando estou fazendo os deveres de casa de leitura. |                              |                |                            |                |                              |
| 17 Eu não sou inteligente o suficiente para ler bem.                                |                              |                |                            |                |                              |
| 18 Mesmo que eu pudesse, não gostaria de melhorar a minha leitura.                  |                              |                |                            |                |                              |
| 19 Olhar para os livros me deixa chateado e/ou nervoso.                             |                              |                |                            |                |                              |
| 20 Eu fico chateado quando tem muita coisa para ler.                                |                              |                |                            |                |                              |