

Cultural adaptation and validation of the KINDL questionnaire in Brazil for adolescents between 12 and 16 years of age

Adaptação cultural e validação do Questionário KINDL no Brasil para adolescentes entre 12 e 16 anos

Abstract

Objective: Obtain a Portuguese version of the Kiddo-KINDL questionnaire that is semantic and culturally equivalent to the original version. **Methods:** For the adaptation, the methodology of direct and inverse translation was used. The questionnaire was applied to groups from three schools in Uberlândia, MG - Brazil, and comprised of 378 children and adolescents aged between 12 and 16. 16% of the students were randomly selected to repeat the test. In the statistical analysis, the following aspects were appraised and analyzed such as: lost data, floor and ceiling effect, internal consistency of the item and reliability of the internal consistence of the scales. **Results:** The percentage of lost data in the scales was low varying between 1.6% to 2.57%, which indicates good acceptability of the questionnaire. The rates of floor and ceiling effect were lower than 12% suggesting that the instrument is sensitive to detect differences in quality of life related to the health of the children and adolescents ranked within the extreme ends. The Kiddo-KINDL as a whole has shown high reliability (Alpha Cronbach = 0.79). **Conclusion:** The Kiddo-KINDL is a reliable tool to be used with children and adolescents in Brazil, and has provided important data of multidimensional nature.

Keywords: Reliability. Questionnaire. Quality of life. Validation studies. Adolescents. Reproducibility of results

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Resumo

Objetivo: Obter uma versão em português do questionário Kiddo-KINDL que seja semântica e culturalmente equivalente à versão original. **Métodos:** Para a adaptação, utilizou-se a metodologia de tradução direta e inversa. O questionário foi aplicado nas salas de aula em três escolas de Uberlândia, MG, em 378 crianças/adolescentes com idade entre 12 e 16 anos completos, dentre os quais 16% foram selecionados aleatoriamente para fazer o reteste. Na análise estatística foram avaliados os dados perdidos, efeito piso e teto, consistência interna do item e confiabilidade da consistência interna das escalas. **Resultados:** A porcentagem de dados perdidos nas escalas foi baixa, variando de 1,6% a 2,57%, indicando uma boa aceitabilidade do questionário. As taxas de efeito piso e teto encontradas sugerem a possibilidade de o instrumento ser sensível para detectar diferenças na qualidade de vida relacionada à saúde entre as crianças/adolescentes situadas nos extremos. A confiabilidade do Kiddo-KINDL mostrou-se adequada em geral, exceto na escala *bem-estar físico*. **Conclusão:** O Kiddo-KINDL é um instrumento confiável para ser utilizado em crianças e adolescentes no Brasil, fornecendo dados importantes de natureza multidimensional.

Palavras-chave: Confiabilidade. Questionário. Qualidade de vida. Estudos de validação. Adolescentes. Reprodutibilidade dos resultados.

Introduction

The interest in evaluating quality of life (QL) has increased in the field of public health. The ability to use QL as a measurement of significance in clinical and epidemiologic studies has led to several studies, and to the development of numerous tools^{1,2,3}.

Among so many concepts, Guyatt et al⁴ (1993) suggest that QL is a term which represents the attempt to name certain characteristics of human experience, from the individual's own perspective through his/her subjective perception, and its central factor is the feeling of well-being. Assumpção Jr. et al⁵ (2000) also point out that QL is a central concept which determines the subjective feeling of well-being also for children, and that they are and have always been able to express themselves regarding this subjectivity.

For children, QL has been defined as a subjective and multidimensional concept, which includes functional capacity and psychosocial interaction of the child with his/her family⁶. However, health-related quality of life (HRQL) aims to assess the impact of an illness or worsening of quality of life⁷.

In the past decade, great emphasis has been placed on values and the perception of the patient as to his/her own health, and several tools have been developed for this purpose⁸. However, in Brazil the HRQL for children and adolescents has not been studied much, and there has been a demand for specific tools aimed at this age group that are valid, reliable and that can be used with both youngsters and their guardians (parents).

The KINDL questionnaire was originally developed by Bullinger & Ravens-Sieberer⁹ (1995) and revised by Ravens-Sieberer & Bullinger¹⁰ (1997) to be used for both healthy and sick children and adolescents. It has a Cronbach's Alpha of above 0.7¹¹. Furthermore, it was used and tested in several prospective and epidemiologic studies which involved over 5,000 healthy and chronically ill children¹².

The questionnaire measures the HRQL of children and adolescents and was developed because of its great relevance to the theme “quality of life of children and adolescents”, and due to a lack of appropriate measurements¹³. The KINDL is comprised of five questionnaires, three of them used for children and adolescents (i) aged between 4-7 (Kiddy-KINDL), (ii) 8-11 (Kid-KINDL) and (iii) 12-16 (Kiddo-KINDL); two of them are directed to parents/guardians of children aged 4-7 and 8-16. It can be used in epidemiologic studies, providing relevant data for the promotion of health, as well as in clinical studies, assessing the therapeutic effects in the quality of life of children with chronic and acute illness; and in the rehabilitation and in the effects of recovery programs.

The KINDL is available in eleven languages (German, English, French, Italian, Spanish, Greek, Dutch, Turkish, Norwegian, Swedish and Russian). However, there is no culturally adapted version to the Portuguese language. Due to the importance of the theme and the shortage of tools in Portuguese to assess adolescents’ quality of life¹⁴, the objective of this study was to carry out a cultural adaptation in order to obtain a Portuguese version of the Kiddo-KINDL questionnaire (aged 12 to 16), semantically and culturally equivalent to the original German version and to assess its applicability, reproducibility and reliability.

Methods

After the authors’ authorization, the questionnaire was translated according to the KINDL Translation Protocol. First, two independent versions were made from English¹² into Portuguese by two health professionals who knew English. Afterwards, these two versions were revised by a team of researchers, and in case of any discrepancies, changes were made until the first Portuguese version was ready. Then, the modified Portuguese version was again translated into English and German by two other health professionals who knew English and

German, and who neither knew the original scale, nor had participated in the previous stage. Afterwards, this English version was compared to the original version by a team of Brazilian researchers and the German version was sent to the authors of the original version. After comparing the original version and the retrograde post-translation, the German authors found that both versions were accurate. Thus, the final Portuguese version was concluded. (Figure 1).

The KINDL questionnaire is comprised of 24 (twenty-four) questions, spread across six scales. Each scale corresponds to a dimension of quality of life: physical well-being, emotional well-being, self-esteem, family, friends and daily routine (school). The score attributed to each answer goes from 1 to 5 for questions with a positive direction and from 5 to 1 for the negative ones (Figure 2a). Scores can be expressed either by addition or by the mean. Furthermore, total points can be expressed in percentage, which can be calculated both for the scale and for the total questionnaire (Figure 2b).

The sample was comprised of 378 adolescents enrolled in three schools in the city of Uberlândia in the state of Minas Gerais. The criterion used in selecting the schools took into account administrative heterogeneity (public and private schools), geographical location (two schools in the central and one in the peripheral area), and the representativeness of the socio-economic profile of their students. Therefore, one public school (PS) was chosen in the peripheral area and two in the central area, one private (PS) and one public (PS). The selection of these three types of schools provided a more heterogeneous sample. The study involved adolescents, 12 to 16 years of age, enrolled in one of the selected schools, who had a good level of comprehension and understanding and also had handed in the consent form, duly signed by their parents.

The questionnaire was applied collectively in a classroom between June 29 and July 9, 2009. Two researchers handed out the questionnaires and gave instructions on how to answer them independently.

Questionário para Crianças



Oil


Gostaríamos de saber como você se sentiu nos últimos sete dias, e para isso fizemos algumas perguntas que gostaríamos que você respondesse.

⇒ Por favor, leia cada questão com cuidado

⇒ Pense em como as coisas têm sido para você nos últimos sete dias

⇒ Escolha a resposta que pareça mais certa para você em cada linha e coloque um "X" no quadrado apropriado.

Não há respostas certas ou erradas. O que você acha e pensa é o que importa.

Por exemplo: 	Nunca	Raramente	Às vezes	Frequentemente	Sempre
Nos últimos 7 dias, eu gostei de ouvir música	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Data de preenchimento:

(dia / mês / ano)

Por favor, fale um pouco sobre você. Ponha um "X" ou complete!



Eu sou: Menina Menino

Idade: _____ anos

Quantos irmãos ou irmãs você tem? 0 1 2 3 4 5 Mais de 5

Em que tipo de escola você estuda? _____

1. Primeiramente, gostaríamos de saber um pouco sobre sua saúde física...

Durante a semana passada...	Nunca	Raramente	Às vezes	Frequentemente	Sempre
1. ... me senti mal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. ... tive alguma dor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. ... fiquei cansado e esgotado	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. ... me senti forte e cheio de energia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. ... depois um pouco sobre como você tem se sentido no geral...

Durante a semana passada...	Nunca	Raramente	Às vezes	Frequentemente	Sempre
1. ... me diverti e ri muito	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. ... não tive nada pra fazer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. ... me senti sozinho	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. ... fiquei com medo ou inseguro	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. ... e como tem se sentido sobre você mesmo.

Durante a semana passada...	Nunca	Raramente	Às vezes	Frequentemente	Sempre
1. ... me orgulhei de mim mesmo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. ... me senti no topo do mundo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. ... me senti satisfeito comigo mesmo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. ... tive muitas idéias boas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. As próximas perguntas são sobre a sua família...

Durante a semana passada...	Nunca	Raramente	Às vezes	Frequentemente	Sempre
1. ... me dei bem com meus pais	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. ... me senti bem em casa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. ... brigamos em casa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. ... me senti limitado por meus pais	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. ... e sobre os seus amigos.

Durante a semana passada...	Nunca	Raramente	Às vezes	Frequentemente	Sempre
1. ... passei tempo com os meus amigos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. ... fui um "sucesso" com os meus amigos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. ... me dei bem com meus amigos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. ... me senti diferente das outras pessoas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Finalmente, gostaríamos de saber um pouco sobre a sua escola.

Durante a semana passada, enquanto eu estava na escola...	Nunca	Raramente	Às vezes	Frequentemente	Sempre
1. ... foi fácil fazer as atividades escolares	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. ... achei as minhas aulas interessantes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. ... me preocupei com meu futuro	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. ... tive medo de tirar notas baixas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Obrigado por nos ajudar!



Figura 2a

Perguntas com Direção Positiva

Questões: 4, 5, 9, 10, 11, 12, 13, 14, 17, 18, 19, 21, 22, 23

Respostas	Valor
Nunca	1
Raramente	2
Às vezes	3
Frequentemente	4
Sempre	5

Perguntas com Direção Negativa

Questões: 1, 2, 3, 6, 7, 8, 15, 16, 20, 24

Respostas	Valor
Nunca	5
Raramente	4
Às vezes	3
Frequentemente	2
Sempre	1

Figura 2b

Cálculo da pontuação em valores percentuais

$$\text{Escala: } \frac{(\text{soma dos escores obtidos nas 4 questões}) - 4}{16} \times 100$$

$$\text{Questionário Total: } \frac{(\text{soma dos escores obtidos nas 24 questões}) - 24}{96} \times 100$$

The Statistical Package for Social Science (SPSS), version 16.0, was used for data analysis. The rates of floor effect and ceiling effect were calculated for each scale in all questionnaires and were considered suitable when below 15%¹⁵. The Intra-class Correlation Coefficient was used to assess test/re-test reliability. Toward that end, the questionnaire was given to 16% of the same group of students chosen randomly and seven days apart.

To validate the scale, that is, to check whether it measures what it is meant to measure¹⁶, exploratory factorial validation was used, which analyses construct validity¹⁷ and content validity, using analysis of the main components and varimax rotation. A Cronbach's Alpha coefficient was calculated for each scale to check the reliability of internal consistency; for comparing groups, measures with a minimum reliability of 0.5 to 0.7 or preferably higher, are recommended¹⁸. The Pearson correlation coefficient was calculated for the six scales.

The present study was submitted for appraisal to the Ethics Committee for Research of the *Centro Universitário do Triângulo*; the selection of schools began and data were collected after approval.

Results

During the translation process, questions were not translated literally because most languages do not allow for purely technical translations. In the translation and adaptation of the Kiddo-KINDL questionnaire, adjustments to three questions (Table 1) were necessary. This table shows the English version as well as translator 1 and 2's version and the consensus between both translations.

Out of the 465 pre-selected youngsters, there were 87 losses, five adolescents whose parents did not give authorization and 82 who did not bring a signed parental consent form, meaning they could not participate in the study. Finally, 378 youngsters were

Table 1 – Translations and adjustments to the Kiddo-KINDL.**Tabela 1** – Traduções e adaptações do Kiddo-KINDL.

English version	Translator 1	Translator 2	Consensus between the first and second translation
<i>During the past week...</i>	<i>Durante a semana passada...</i>	<i>Durante a semana passada...</i>	<i>Durante a semana passada...</i>
... I felt restricted by my parents	...me senti limitado pelos meus pais	...me senti restringido por meus pais	... me senti limitado por meus pais
... I did things together with my friends	... fiz algumas coisas junto com os meus amigos	... passei tempo com meus amigos	... passei tempo com meus amigos
... I found school interesting	... achei a escola interessante	... achei as minhas aulas interessantes	... achei as minhas aulas interessantes

included in the sample and answered the questionnaire in a session lasting approximately 15 to 20 minutes per class.

The average age of the sample was 13.84±0.97 years and of the 378 participants, 215 (56.9%) were females and 163 (43.1%) males. As for the type of school, 30.7% were from the public school in the peripheral area of the city, 34.4% from the public school in the central area, and 34.9% from the private school.

Descriptive statistical analysis was used to calculate the lost data rate in each scale and to compute the proportion of interviewees with the lowest and highest possible scores for each scale, floor and ceiling effects respectively (Table 2). The figures of floor and ceiling effects varied between 0.7% and 12%.

The tool revealed 0.84 conformity in the intra-class correlation test. The Kiddo-KINDL internal consistency measured by Cronbach's Alpha was 0.79 for the total scale and varied from 0.12 to 0.73 in the *physical*

well-being and family scales, respectively (Table 3).

Exploratory factorial analysis was used to assess the construct validity of the tool, checking whether it really presents a six-factor structure (Table 4). This analysis resulted in six self-values above 1.0, which are: 5.13, 2.18, 1.76, 1.40, 1.11 and 1.05, and account for 52.61% of total variation, using varimax rotation. In table 4, the charts including the factor load signaled the factors which best related to the respective scale.

The correlations between scales are presented in Table 5. All correlations were significant ($p < 0.01$) and, according to the classification by Dancey & Reidy (2006)¹⁹, varied from weak ($r < 0.3$) to strong ($r > 0.7$).

Discussion

This study assessed the psychometric proprieties of the Kiddo-KINDL questionnaire in Brazilian Portuguese. The

Table 2 – Data lost, effect flooring and ceiling effect of the scales of Kiddo-KINDL.**Tabela 2** – Dados perdidos, efeito piso e efeito teto das escalas do Kiddo-KINDL.

Scales	Lost data (%)	Flooring effect (%)	Ceiling effect (%)
Physical Well-Being	1.60	1.10%	0.70%
Emotional Well-Being	1.60	1.60%	12.00%
Self-Esteem	1.70	3.20%	3.70%
Family	2.35	3.10%	11.50%
Friends	2.57	2.80%	8.80%
Daily routine (school)	2.57	2.80%	1.20%

Table 3 – Mean, standard deviation, minimum and maximum score for each scale, item and the total. Cronbach's Alpha of the six scales and total Kiddo-KINDL (n = 378).

Tabela 3 – Média, desvio padrão, pontuação mínima e máxima para cada escala, item e total. Alfa Cronbach das seis escalas e total do Kiddo-KINDL (n = 378).

	Mean	SD	Minimum and maximum score	Cronbach's Alpha
Physical well-being	3.41	1.28	6.0 – 20	0.12
1. ... I felt ill	4.11	0.05	1.0 - 5.0	
2. ... I was in pain	3.87	0.05	1.0 - 5.0	
3. ... I was tired and worn-out	3.49	0.06	1.0 - 5.0	
4. ... I felt strong and full of energy	2.18	0.06	1.0 - 5.0	
Emotional well-being	4.26	1.06	4.0 – 20	0.51
5. ... I had fun and laughed a lot	4.29	0.05	1.0 - 5.0	
6. ... I was bored	3.75	0.06	1.0 - 5.0	
7. ... I felt alone	4.10	0.06	1.0 - 5.0	
8. ... I felt scared or unsure of myself	4.26	0.05	1.0 - 5.0	
Self-esteem	3.29	1.30	4.0 – 20	0.71
9. ... I was proud of myself	3.42	0.06	1.0 - 5.0	
10. ... I felt on top of the world	2.39	0.06	1.0 - 5.0	
11. ... I felt pleased with myself	3.76	0.06	1.0 - 5.0	
12. ... I had lots of good ideas	3.60	0.06	1.0 - 5.0	
Family	3.94	1.17	4.0 – 20	0.73
13. ... I got on well with my parents	4.16	0.05	1.0 - 5.0	
14. ... I felt fine at home	4.25	0.06	1.0 - 5.0	
15. ... We quarrelled at home	3.78	0.06	1.0 - 5.0	
16. ... I felt restricted by my parents	3.55	0.07	1.0 - 5.0	
Friends	3.93	1.14	4.0 – 20	0.56
17. ... I did things together with my friends	4.02	0.55	1.0 - 5.0	
18. ... I was a "success" with my friends	3.57	0.06	1.0 - 5.0	
19. ... I got along well with my friends	4.40	0.05	1.0 - 5.0	
20. ... I felt different from other people	3.74	0.07	1.0 - 5.0	
Daily routine (school)	3.21	1.45	4.0 – 20	0.31
21. ... doing the schoolwork was easy	3.35	0.06	1.0 - 5.0	
22. ... I found school interesting	3.23	0.07	1.0 - 5.0	
23. ... I worried about my future	4.25	0.06	1.0 - 5.0	
24. ... I worried about getting bad marks or grades	2.01	0.07	1.0 - 5.0	
Total scale	3.67	1.29	24 – 112	0.79

percentage of lost data in the scales was low, as observed in other studies^{20,21,22,23}. This information, along with a small loss in the given sample, displays good acceptability and performance of individuals, when participating in the survey and when they answered the questionnaires.

The rates of ceiling and floor effects

found reproduced, by and large, the results of other studies^{20,22,24}, indicating that the tool can accurately detect the differences of quality of life between the adolescents situated in the extremes, that is, with the best or worst scores.

The tool presented a concordance, within the Intra-class Correlation Coefficient,

Table 4 – Factorial loads for the 24 items of the scale KINDL generated by means of Factorial Analysis varimax rotation.
Tabela 4 – Cargas fatoriais para os 24 itens da escala KINDL geradas por meio da Análise Fatorial Exploratória com rotação varimax.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Physical well-being						
1. ... I felt ill	-0.03	0.72	0.09	0.12	0.10	0.07
2. ... I was in pain	0.06	0.72	0.09	-0.10	-0.15	0.20
3. ... I was tired and worn-out	0.07	0.53	0.14	0.29	0.12	-0.18
4. ... I felt strong and full of energy	0.01	-0.27	-0.12	-0.60	-0.07	-0.01
Emotional well-being						
5. ... I had fun and laughed a lot	0.55	-0.04	0.20	0.21	0.03	0.00
6. ... I was bored	0.10	0.10	0.04	0.13	0.04	0.74
7. ... I felt alone	0.26	0.44	0.20	0.08	0.07	0.44
8. ... I felt scared or unsure of myself	0.06	0.53	0.12	0.18	0.35	0.00
Self-esteem						
9. ... I was proud of myself	0.35	0.09	0.10	0.59	-0.06	0.07
10. ... I felt on top of the world	0.15	0.02	0.09	0.66	0.06	0.02
11. ... I felt pleased with myself	0.40	0.23	0.28	0.48	-0.07	0.04
12. ... I had lots of good ideas	0.29	-0.07	0.00	0.57	-0.05	0.18
Family						
13. ... I got on well with my parents	0.05	0.13	0.77	0.15	-0.12	0.00
14. ... I felt fine at home	0.15	0.03	0.77	0.16	-0.03	0.05
15. ... We quarrelled at home	0.05	0.23	0.70	0.02	0.03	0.14
16. ... I felt restricted by my parents	-0.03	-0.02	0.66	-0.04	0.14	0.06
Friends						
17. ... I did things together with my friends	0.77	0.00	-0.02	-0.01	-0.01	0.04
18. ... I was a "success" with my friends	0.73	0.02	0.07	0.15	-0.08	0.16
19. ... I got along well with my friends	0.71	0.11	0.08	0.14	0.00	-0.03
20. ... I felt different from other people	0.10	0.20	0.22	-0.03	0.15	0.46
Daily routine (school)						
21. ... doing the schoolwork was easy	-0.07	-0.01	0.39	0.33	0.00	0.42
22. ... I found school interesting	-0.01	0.05	0.24	0.55	-0.36	0.25
23. ... I worried about my future	0.01	-0.01	0.14	0.37	-0.66	0.10
24. ... I worried about getting bad marks or grades	-0.06	0.06	0.05	0.11	0.79	0.15

Fator 1 = Amigos, Fator 2 = Bem-estar físico, Fator 3 = Família, Fator 4 = Autoestima e Rotina diária (Escola), Fator 5 = Rotina diária (escola), Fator 6 = Bem-estar emocional e Rotina diária (Escola) / Factor 1 = Friends, Factor 2 = Physical well-being, Factor 3 = Family, Factor 4 = Self-esteem e Daily routine (school), Factor 5 = Daily routine (school), Factor 6 = Emotional well-being e Daily routine (school)..

Table 5 – Pearson's correlation in the areas of KINDL.

Tabela 5 – Correlação de Pearson para as escalas do KINDL.

	Emotional	Self-esteem	Family	Friends	School	Total Scale
Physical	0.4506	0.2472	0.2628	0.3062	0.1610	0.5478
Emotional		0.4694	0.3184	0.4076	0.2939	0.7016
Self-esteem			0.3249	0.4133	0.3882	0.7121
Family				0.4506	0.4675	0.7151
Friends					0.3666	0.7314
School						0.6645

of 0.84, which proves that the tool presents a high level of concordance²⁵.

The reliability of the total scale was good on the whole (Cronbach's Alpha =0.79). Furthermore the scales presented suitable values of reliability (Cronbach's Alpha >0.5)¹⁸, except for *physical well-being and daily routine*. In another validation of the same questionnaire, these two scales were also the ones that revealed lower scores of internal consistency^{23,26}. A possible justification for this can be due to problems of cultural adaptation, aggravated by the fact that the scale has many subjective concepts; it has a heterogeneous content and is comprised of only four questions. Moreover, the fact that the sample included only healthy youngsters may have contributed to the fact that the reliability of the *physical well-being* scale revealed such low values.

The internal consistency values of the answers obtained via the Cronbach's Alpha reliability coefficient were satisfactory and similar to other validations of the same questionnaire^{23,27,28,29}. It is worth noting that Cronbach's Alpha of the whole scale showed higher values than those revealed in each separate scale. This is due to the fact that the greater the number of items, the higher will its rate of accuracy be, because according to Bernoulli's theorem, errors tend to be nil when the number is close to infinite¹⁷.

Results obtained in exploratory factor analysis were similar to those found by Helseth & Lund²⁷ (2005), who obtained 57% of total variation when considering six factors. The factors can be interpreted as follows:

a) Factor 1 can be considered the *Friends* factor, because the items of this scale reveal a high load with this factor, except for item 20, which was more identified with factor 6, and which in turn varied between *emotional well-being and school*. A possible explanation can be the fact that the school is a place where friendship ties are more evident in the children's lives and because they spend many hours of each day there. The interpretation of this factor is weakened

by the load of items 5 and 7 (*emotional well-being*) and of items 9, 11 and 12 (*self-esteem*), which revealed moderate to low load with this factor.

- b) Factor 2 is related to *Physical well-being*, which shows a high load with the items of this scale. However, items 7 and 8 (*emotional well-being*), 11 (*self-esteem*) and 20 (*friends*) jeopardize the interpretation.
- c) The items of the *Family* scale revealed a high load with factor 3, which ensured the interpretation of this factor. However, items 5 and 7 (*emotional well-being*), 11 (*self-esteem*), 20 (*friends*) and 21 and 22 (*daily routine - school*), compromised the interpretation because they revealed a low load with this factor.
- d) Factor 4 aggregates *Self-esteem and Daily routine - (school)*, for it presents moderate and high loads with these scales. However, items 3 and 4 (*physical well-being*) and 5 (*emotional well-being*) show moderate and low loads with this factor.
- e) Factor 5 presents high and moderate loads with the items of the School scale, except for item 21. Item 8 (*emotional well-being*) presented a low load with this factor.
- f) Factor 6 did not present a definite pattern, showing a high to moderate load with items 6 and 7 (*emotional well-being*), 20, 21 and 22 (*daily routine - school*). This can be attributed to the close tie between the school environment and emotional well-being. According to Carson & Bittner (1994)³⁰, experiences linked to the school environment can alter students' emotional state, which can lead to unhealthy outcomes such as phobias, physical complaints and depressive episodes.
- Factors 1, 2 and 3 were observed to define the *Friends*, *Physical well-being* and *Emotional well-being* scales, respectively. Factor 5 was related with the Daily routine (school) scale, but this scale is also represented by factor 4, along with Self-esteem. Factor 6 did not reveal any characteristic

pattern of a scale, but showed load with the *Emotional well-being and Daily routine (school)* scales. Only the *Emotional well-being* scale was not identified with any factor because it showed loads which varied from low to high in the six factors.

The rationale for the interpretation of factors is the correlation between scales, and the fact that all correlated with the total score. One can see that the correlations involving the *emotional* scale were relatively higher in all the other scales, except for *school*; this fact can justify the lack of definition

of a specific factor representing *emotional well-being*.

Therefore, we believe that the Kiddo-KINDL is a reliable tool to be used with children and adolescents in Brazil, providing relevant data of a multidimensional nature. Moreover, it can be used as a model for similar procedures to be carried out and for developing new standardized tools in Brazil.

Conflicts of Interest: The authors declare no conflict of interests.

References

1. Prebianchi HB. Medidas de qualidade de vida para crianças: aspectos conceituais e metodológicos. *Psicol Teor Prát* 2003; 5(1): 57-69.
2. Huebner ES. Research and assessment of life satisfaction of children and adolescents. *Soc Indic Res* 2004; 66: 3-33.
3. Cicconelli RM, Ferraz MB, Santos W, Meinão I, Quaresma MR. Tradução para a língua portuguesa e validação do questionário genérico de avaliação da qualidade de vida SF-36 (Brasil SF36). *Rev Bras Reumatol* 1999; 39(3): 143-50.
4. Guyatt GH, Feeny DH, Patrick DL. Measuring Health-related Quality of Life. *Ann Intern Med.* 1993, 118(8): 622-9.
5. Asumpção Jr FB, Kuczynski E, Sprovieri MH, Aranha, EMG. Escala de avaliação de qualidade de vida: (AUQEI - Autoquestionnaire Qualité de Vie Infant Imagé) validade e confiabilidade de uma escala para qualidade de vida em crianças de 4 a 12 anos. *Arq Neuro-Psiquiatr* 2000; 58(1): 119-27.
6. Strand CV, Russell AS. WHO/ILAR Taskforce on quality of life. *J Rheumatol* 1997; 24(8): 1630-3.
7. Seidl EMF, Zannon CMLC. Qualidade de vida e saúde: aspectos conceituais e metodológicos. *Cad Saúde Pública* 2004; 20(2): 580-8.
8. Moyer VA, Elliott EJ, Davis RL, Gilbert R, Klassen T, Logan S et al. *Evidence-based Pediatrics and Child Health*. London: BMJ Books - BMJ Publishing Group; 2000.
9. Bullinger M, von Mackensen S, Kirchberger I. KINDL Ein Fragebogen zur Erfassung der gesundheitsbezogenen Lebensqualität von Kindern. Sonderdruck Zeitschrift für Gesundheitspsychologie 1994; 1: 64-77.
10. Ravens-Sieberer U, Bullinger M. News from the KINDL-Questionnaire – A new version for adolescents. 5. Jahrestagung der International Society for Quality of Life Research (ISOQOL). *Quality of Life Research* 1998; 7: 653.
11. Ravens-Sieberer U et al. KIDSCREEN-52 quality-of-life measure for children and adolescents. *Expert Rev Pharmacoeconomics Outcomes Res* 2005; 5(3): 353-64.
12. Ravens-Sieberer U, Bullinger M. *KINDL questionnaire*. 2010. Disponível em <http://kindl.org> [Acessado em 23 de agosto de 2010]
13. Ravens-Sieberer U, Bullinger M. Assessing health-related quality of life in chronically ill children with the German KINDL: first psychometric and content analytical results. *Qual Life Res* 1998; 7(5): 399-407.
14. Barros LP, Gropo LN, Petribú K, Colares V. Avaliação da qualidade de vida em adolescentes – revisão da literatura. *J Bras Psiquiatr* 2008; 57(3): 212-17.
15. Hays RD, Anderson R, Revicki D. Psychometric considerations in evaluating health-related quality of life measures. *Qual Life Res.* 1993; 2(6): 441-9.
16. Nunnally JC, Bernstein IH. *Psychometric Theory*. New York: McGraw-Hill; 1967.
17. Pasquali L. *Psicometria: teoria dos testes na psicologia e na educação*. Petrópolis: Ed. Vozes; 2003.
18. McHorney CA, Ware Jr JE, Lu R, Sherbourne CD. The MOS 36-item short-form health survey (SF-36): III. Test of data quality, scaling assumptions, and reliability across diverse patient groups. *Medical Care* 1994; 32(1): 40-66.
19. Dancy C, Reidy J. *Estatística Sem Matemática para Psicologia: Usando SPSS para Windows*. 3a ed. Porto Alegre: Artmed; 2006.

20. Landgraf JM, Ravens-Sieberer U, Bullinger, M. Quality of Life Research in Children: Methods and Instruments. *Dialog Pediatr Urol* 1997; 20(11): 5-7.
21. McCarthy ML, Silberstein CE, Atkins EA, Harryman SE, Sponseller PD, Hadley-Miller NA. Comparing reliability and validity of pediatric instruments for measuring health and well-being of children with spastic cerebral palsy. *Dev Med Child Neurol* 2002; 44(7): 468-76.
22. Rajmil L, Serra-Sutton V, Fernandez-Lopez JA, Berra S, Aymerich M, Cieza A et al. Versión española del cuestionario alemán de calidad de vida relacionada con la salud en población infantil y de adolescentes: el KINDL. *An Pediatr (Barc)* 2004; 60(6): 514-21.
23. Urzua A, Mercado G. La evaluación de la calidad de vida de los y las adolescentes através del Kiddo - KINDL. *Ter Psico.* 2008; 26(1): 133-41.
24. Vitale MG, Levy DE, Moskowitz AJ, Gelijns AC, Spellmann M, Verdisco L et al. Capturing quality of life in pediatric orthopaedics: two recent measures compared. *J Pediatr Orthop* 2001; 21(5): 629-35.
25. Weir JP. Quantifying test-retest reliability using the intraclass correlation coefficient and the SEM. *Journal of Strength and Conditioning Research.* 2005; 19(1): 231-40.
26. Rajmil L et al. Versión española del cuestionario alemán de calidad de vida relacionada con la salud en población infantil y de adolescentes: el Kindl. *An Pediatr (Barc)* 2004; 60(6): 514-21.
27. Helseth S, Lund T. Assessing health-related quality of life in adolescents: some psychometric properties of the first Norwegian version of KINDL. *Scand J Caring Sci* 2005; 19(2): 102-9.
28. Lee PH, Chang LI, Ravens-Sieberer U. Psychometric evaluation of the Taiwanese version of the Kiddo-KINDL generic children's health-related quality of life instrument. *Qual Life Res* 2008; 17(4): 603-11.
29. Wee HL, Ravens-Sieberer U, Erhart M, Li SC. Factor structure of the Singapore English version of the KINDL children quality of life questionnaire. *Health Qual Life Outcomes* 2007; 19: 5:4.
30. Carson DK & Bittner MT. Temperament and school-aged children's coping abilities and responses to stress. *The Journal of Genetic Psychology* 1994; 155(3): 289-302.

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CORRECTION / ERRATA

In the article “Cultural adaptation and validation of the KINDL questionnaire in Brazil for adolescents between 12 and 16 years of age”, DOI number: 10.1590/S1415-790X2012000400015, published in the *Rev. bras. epidemiol.* 2012; 15(4): 845-57, on page 851:

Where it reads:

Figura 2a

Perguntas com Direção Positiva		Perguntas com Direção Negativa	
Questões: 4, 5, 9, 10, 11, 12, 13, 14, 17, 18, 19, 21, 22, 23		Questões: 1, 2, 3, 6, 7, 8, 15, 16, 20, 24	
Respostas	Valor	Respostas	Valor
Nunca	1	Nunca	5
Raramente	2	Raramente	4
Às vezes	3	Às vezes	3
Frequentemente	4	Frequentemente	2
Sempre	5	Sempre	1

Figura 2b

Cálculo da pontuação em valores percentuais

Escala: (soma dos escores obtidos nas 4 questões) - 4 x 100
 $\frac{12}{72} \times 100$

Questionário Total: (soma dos escores obtidos nas 24 questões) - 24 x 100
 $\frac{24}{72} \times 100$

Read:

Figura 2a

Perguntas com Direção Positiva		Perguntas com Direção Negativa	
Questões: 4, 5, 9, 10, 11, 12, 13, 14, 17, 18, 19, 21, 22, 23		Questões: 1, 2, 3, 6, 7, 8, 15, 16, 20, 24	
Respostas	Valor	Respostas	Valor
Nunca	1	Nunca	5
Raramente	2	Raramente	4
Às vezes	3	Às vezes	3
Frequentemente	4	Frequentemente	2
Sempre	5	Sempre	1

Figura 2b

Cálculo da pontuação em valores percentuais

Escala: (soma dos escores obtidos nas 4 questões) - 4 x 100
 $\frac{16}{96} \times 100$

Questionário Total: (soma dos escores obtidos nas 24 questões) - 24 x 100
 $\frac{24}{96} \times 100$