

ORIGINAL ARTICLES

Portuguese translation, cross-cultural adaptation and reliability of Young Spine Questionnaire

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ABSTRACT

Objective: To translate and perform the cross-cultural adaptation of the Young Spine Questionnaire (YSQ) into Portuguese, and to assess its reliability.

Method: Translation and cross-cultural adaptations were conducted according to accepted international standards. A preliminary version underwent pilot-testing with 32 children (11-14 years old), equally divided by gender and age. Children were asked to rate each question in terms of clarity and comprehensibility, and to provide general feedback regarding the questionnaire. The final version of the questionnaire was approved by a committee consisting of experts from various fields. Test-retest reliability was assessed on 58 children using Cohen's and Fleiss' Kappa.

Results: Translation and cross-cultural adaptation of the YSQ only resulted in minor changes and the children rated all questions as "clear and understandable" in the pilot test, without gender or age differences being detected. Test-retest data was collected with a mean interval of 13 days. Reliability scores ranged from 0.56-0.97, equivalent to "moderate" to "almost perfect" agreement. Most questions (84%) had "substantial" or "almost perfect" agreement.

Conclusion: The translation and cross-cultural adaptation of YSQ into Portuguese was successfully performed. This questionnaire was also shown to be reliable, supporting its future use in research projects.

Keywords: Low back pain; Neck pain; Spinal pain; Children; Adolescents; Portugal.

INTRODUCTION

Low back pain (LBP) causes more global disability than any other condition worldwide¹. Portugal is no exception with LBP being the main cause of morbidity in adults and in the elderly². In recent years, several studies have shown that a considerable percentage of children and youth are also affected by this problem, with a lifetime prevalence of LBP of 40% in this population³. Additionally, recent studies reported higher prevalence of neck pain compared to LBP in 10-14 years⁴. This is alarming when considering that back pain in children and adolescents are often carried into adulthood⁵, raising the possibility that even more adults and elders in future generations will suffer from this comorbidity. Unfortunately, only few studies

have addressed the magnitude of spinal problems in a Portuguese population of children and adolescents⁶, and more knowledge is warranted.

Research in spinal complaints of the younger population is challenging as very few validated instruments have been published. The Young Spine Questionnaire (YSQ) was developed with the goal of fulfilling the need for a questionnaire to measure spinal pain and its consequences, specifically designed for children and adolescents⁷. This instrument captures a multitude of spinal complaints, namely the neck, middle of back and low back. It also allows determining prevalence, pain intensity, social consequences and limitations, and parents' influence. It has been used in large longitudinal studies^{4,8}, facilitating the comparison with international literature.

Thus, by highlighting the need of more investigations regarding the prevalence and consequences of spinal disorders in Portuguese children and adolescents, and the need for developing better instruments to assess it, this study aims to perform the translation and cross-cultural adaptation of YSQ into Portuguese, and to assess its reliability.

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MATERIAL AND METHODS

This study was approved by the Ethics Committee for Research in Areas of Human Health and Welfare in the

University of Évora (GD/11558/2020/P1). Participants' parents provided informed written or electronic consent.

Translation and cross-cultural adaptation – Study I

Procedures

To perform the translation and cross-cultural adaptation of YSQ⁷ into Portuguese, the procedures recommended by Beaton *et al.*⁹ were followed. Briefly, an initial translation and synthesis of translations were made by two native speaking Portuguese people (stage I and II). In stage III, two professional translators with English as their first language and fluent in Portuguese, performed the back translations without previous knowledge regarding YSQ and matters regarding spinal pain. Then, in conjunction with the creators of the original instrument, a total of 6 researchers from physical therapy, pediatrics, sports sciences and physical education, and biomedical engineering formed the committee panel and deliberated about the previous steps (stage IV). After the changes approved by the committee, the resulting version of the questionnaire underwent pilot testing. Afterwards another committee deliberation, the final Portuguese version of the YSQ was approved.

Further details of each stage are provided in the supplementary material (Tables S I-VI).

Pilot testing

For pilot testing it was aimed to recruit 32 children, in line with previous recommendations^{9,10}.

Thirty-two children, aged 11 to 14 years, equally divided by age and gender, were recruited by convenience in local sports clubs and in public parks. Local schools were deliberately deselected due to cumbersome rules and regulations to obtain permission. Participants were asked to fill out the questionnaire, and during this process they were asked to rate its comprehensibility on a dichotomous scale (1 - “clear and understandable”; 2 – “difficult understanding”), and on a numerical scale from 0 to 10 (0 - “very easy to understand”; 10 - “very difficult to understand”)¹¹. Subsequently, they were asked about the changes and topics that raised more discussion during previous committee.

Children were also requested to express the meaning of each question in their own words. Lastly, they were asked open questions, *i.e.* what they thought about the questionnaire, if they had any further suggestions to the content, if the response options were appropriate, if questions should be reframed in a different way and what the overall purpose of the questionnaire was. To further explore the content validity of the questionnaire, the ratings of comprehensibility (numerical scale) of the participants in the pilot-testing were analyzed

according to age (11-12 versus 13-14 years old) and gender differences.

All interviews were conducted by the same researcher (JT).

Test-retest reliability analysis – Study II

Participants

One hundred and thirteen children belonging to four districts of Portugal were recruited by convenience for this study. A total of 58 children were considered to provide valid data for reliability analysis.

Procedures

An interval of 10 to 14 days between the first (T1) and second (T2) response was the aim of the test-retest study. At T2, children were asked if their spinal symptoms had changed considerably since T1. If children reported changes in spinal symptoms or filled out the questionnaire at T2 after more than 21 days, they were excluded from the analysis.

For assessing the reliability of the questionnaire, the minimum sample required was based on detecting a Cohen's Kappa coefficient (*k*) of 0.40. Considering an alpha set at 5% and 80% power, 50 participants were required¹².

Statistical analyses

Descriptive statistics were presented with mean (SD) and median (quartiles), where appropriate.

Regarding data from the overall mean rating of the numeric rating scale, Mann-Whitney U Test was used to assess differences between genders, and between younger (11-12 years) and older (13-14 years) children.

Construct validity was assessed exploring the correlation between the overall mean rating of the numeric rating scales and the children's Portuguese grades. The hypothesis was that there would be no correlation between the two variables, since the questionnaire was expected to be accessible even for children with lower Portuguese grades. The correlation was assessed with the Kendall's Tau Test.

To assess the reliability of the questionnaire, Cohen's Kappa and Fleiss' Kappa (ordinal variables: questions 1d, 2d and 3d) statistics were used. Values were considered to be poor (<0), slight (0.01 to 0.2), fair (0.21 to 0.4), moderate (0.41 to 0.6), substantial (0.61 to 0.8) and almost perfect (0.81 to 1) agreement¹³.

Statistical analysis of data was performed using IBM SPSS, version 27 (IBM Corp., Armonk, NY, USA). The significance level was set at 5%.

RESULTS

Translation and cross-cultural adaptation – Study I

Thirty-two children, equally divided by age and gender,

with age ranging from 11 to 14 years participated in this stage. Mean point prevalence (n (%)) for neck, thoracic and lumbar pain was 0 (0%), 3 (9.4%) and 4 (12.5%), respectively. Detailed reports regarding the documents elaborated, reflections, and decisions undertaken are presented in the supplementary material (Tables S I-III). Based on these amendments, a preliminary version of the questionnaire underwent pilot testing.

Pilot testing

The specific phrasing to question 1d, 2d and 3d raised discussions in the expert committee, with 28% of children preferring the term “quando foi mais forte”, 9% favoring “quando esta foi pior”, while the majority stated to be indifferent (63%). The expert committee agreed on the former wording of the question.

Regarding the term for “lower back”, 34%, 19%, 13% and 34% of children preferred “fundo das costas”, “zona inferior das costas”, “zona lombar” or “others” (multiple answers included), respectively. Despite this small preference by children, “zona inferior das costas” was maintained as some committee members reported that “fundo das costas” could be of difficult interpretation in some Portuguese locations.

Other pertinent issues found in the pilot testing were that 50% children reported to be thinking about “average pain” and the other half about “peak pain” when rating the FPS-R Scale. In addition, only 28% the children were able to interpret correctly, chronologically speaking, the term “last week”. Lastly, no one reported to know the word “chiropractic”, and this was removed.

Regarding the comprehensibility of the dichotomous questions, the items were rated as “clear and understandable” by all children, except by one participant that rated questions 1d, 2d and 3d as “difficult to understand”. Concerning the 0-10 ordinal scale, the median of all questions was 0.5 (IQR=0.0 - 1.0), while the median of questions 1d, 2d and 3d was 1 (IQR=0.0 - 1.8). There was no gender ($r=-0.27$; $p=0.18$) or age ($r=-0.21$; $p=0.30$) differences when testing the overall mean numeric rating scale ratings.

For the construct validity, there was no correlation between the overall score of the questionnaire and the students’ grade in the discipline of Portuguese ($r=0.006$; $p=0.970$).

Further qualitative considerations given by participants and the expert committee’s decisions are presented in the supplementary material (Tables S V and S VI). After these deliberations and minor changes, the final version of the questionnaire was approved.

Test-retest reliability analysis – Study II

Participants

Participants main characteristics across each stage of

the assessment of test-retest reliability are summarized in Table I.

In the Figure 1 is shown the flow chart of participants through each stage of the test-retest reliability procedures. Frequent reasons for not being able to adhere to the protocol and loss to follow-up include vacations, missing training sessions and, mostly, COVID-19 pandemic.

The mean interval between valid responses at T1 and T2 was 13.2 ± 3.1 days.

Kappa values ranged from 0.56 to 0.97. Most of the questions (84%) had “substantial” to “almost perfect” agreement. The remaining questions (questions 2a, 3a and 3d) had “moderate” agreement.

Detailed results, by question, are presented in Table II.

DISCUSSION

The main purpose of this study was to perform the translation and cross-cultural adaptation of the original English YSQ version into Portuguese. Overall, the ratings of each question, both the dichotomous and numerical scales, were excellent for clarity and comprehensibility. These findings were also supported by succeeding analysis, namely by gender and age. Furthermore, there was no significant correlation between the comprehensibility’s ratings of questions and children’s Portuguese grades supporting the construct validity. These findings support that the Portuguese version of the YSQ is comprehensible even to children as young as 11 years, across gender and independent of children’s Portuguese grades.

The questions with FPS-R scale (questions 1d, 2d and 3d) had the lowest kappa scores likely because the technical limitations imposed by the platform used for the electronic questionnaire, which might have created some misunderstandings in some children. Nevertheless, these questions also achieved good ratings for clarity and comprehensibility.

The second purpose of this study was to assess the test-retest reliability of the Portuguese version of the YSQ. The results showed “substantial” to “almost perfect” agreement for most of its questions. Additionally, none had a rating lower than “moderate” agreement. This supports its future application both in clinical and research settings, which is of importance considering that low back pain represent the most prevalent rheumatic disease in Portugal, which is associated with poor quality of life¹⁴.

Unfortunately, there are no additional studies in the literature that have addressed the reliability of YSQ. Thus, currently, it is not possible to compare the psychometric property of the Portuguese version of YSQ with other versions. Nevertheless, it showed higher Kappa levels compared to a pediatric sleep

Table I. Characteristics of children involved in test-retest reliability assessment

	T1 (n= 113)	T2 - all (n= 78)	T2 - valid# (n= 58)
Age (years)	12.4 ± 1.1	12.4 ± 1.1	12.3 ± 1.0
Sex			
Female	63% (58)	65% (47)	60% (33)
Male	37% (55)	35% (31)	40% (25)
Portuguese grade (Quartiles)	4 (3 – 5)	4 (4 – 5)	4 (4 – 5)
Spinal complaints*	19% (22)	14% (11)	12% (7)
Point Prevalence			
Neck pain	2.7% (3)	7.7% (6)	6.9% (4)
Thoracic pain	5% (6)	6.4% (5)	5.2% (3)
Lumbar pain	5% (6)	5.1% (4)	3.4% (2)

* Reported recurrent and/or seek medical care due to spinal complains in the last 6 months. # After the exclusion of children that reported changes in spinal symptoms and/or fulfilled the questionnaire at T2 after more than 21 days

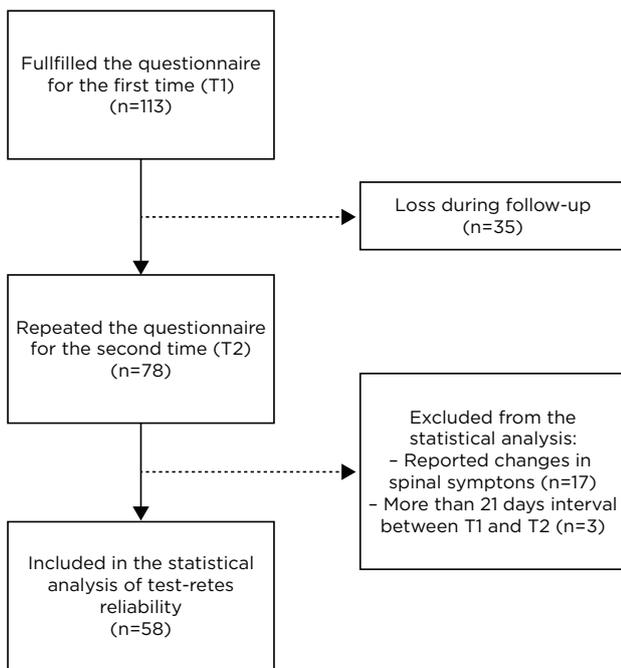


Figure 1. Flow diagram of the selection process during the test-retest reliability study

questionnaire with reasonable psychometric properties when tested on Portuguese children¹⁵.

The major limitation of this work is the substantial loss of participants from T1 to T2 during the reliability analysis, mostly due the impact of COVID-19 pandemic. An additional limitation is the fact that most of the participants were recruited in sports clubs, which might limit the generalizability of the findings.

In terms of future research, it would be important to assess the reliability of the questionnaire in a clinical/rehabilitation setting, with participants with recent

Table II - Test-retest reliability of Young Spine Questionnaire

Questions	Kappa	95% CI		p
		LL	UL	
1a	0.63	0.50	0.76	<0.001
1b	0.83	0.72	0.95	<0.001
1c	0.91	0.81	1	<0.001
1d*	0.73	0.59	0.87	<0.001
2a	0.56	0.43	0.69	<0.001
2b	0.85	0.73	0.96	<0.001
2c	0.82	0.69	0.95	<0.001
2d*	0.65	0.46	0.84	<0.001
3a	0.59	0.46	0.71	<0.001
3b	0.78	0.65	0.91	<0.001
3c	0.94	0.86	1	<0.001
3d*	0.59	0.44	0.74	<0.001
4a	0.97	0.91	1	<0.001
4b	0.84	0.73	0.94	<0.001
4c	0.79	0.68	0.90	<0.001
5a	0.79	0.68	0.91	<0.001
5b	0.77	0.642	0.90	<0.001
5c	0.84	0.730	0.95	<0.001
5d	0.77	0.650	0.89	<0.001

#Fleiss' Kappa 95% CI, 95% confidence interval; LL, lower limit; UL, upper limit

history of spinal complains. Additionally, it would be important to compare its performance in urban versus rural settings. Lastly, performing a validation in younger children using their parents as proxies is warranted.

CONCLUSION

The process of translation and cross-cultural adaptation for Portuguese of the YSQ was successfully completed. The YSQ was shown to be a valid and reliable instrument, that now is available to professionals in the context of Portuguese primary health care, as well for clinical and research projects.

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Conflicts of interest

None of the authors declared conflicts of interest

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SUPPLEMENTARY MATERIAL

Stage I and II - T12 Report

TABLE SI - Reflections about Stage I and II of the translation and cross-cultural adaptation

T12 Report	
	<p>All parties considered “quiroprático” should be removed, since it would not be familiar for most portuguese children. Upon discussion, it was decided that “outro profissional de saúde” would represent the idea of the original questionnaire and give a wider broader of options for children.</p> <p>“Once or twice” was considered a difficult option to translate, since the literal translation would not make perfect sense considering the verbal conjugation used in the questionnaire. That problem came from the original recording. Initially, both translators wanted to change this translation, but after contacting the authors, we decided to maintain the original idea. As such, we added an extra “Tive” to “uma vez ou duas”, allowing to maintain the original design of the authors and also to make a better constructed sentence. This topic will also be addressed with children during the interview.</p> <p>It was decided to use “dor” instead of “dores”.</p> <p>It was also decided to use “fundo das costas” instead of “parte de baixo das costas”, since the first option was considered to be more popularly used.</p> <p>Although there were differences in both translations, none of them changed the meaning of the sentences and it was easy to find a consensus regarding the final version.</p>

TABLE SII - Stage III - B12 Report

T12 Report	
Authors	<p>With the exception of the structural changes mentioned previously, no changes in the meaning were detected when comparing B1 and B2 to the original YSQ.</p> <p>There were subtle changes in the translations, but none changed the meaning and the substance of the sentences.</p> <p>Both translators reported some hesitation about which would be the best translation option for certain words (e.g.: resposta, rosto and imagem), although none of the possibilities would change the meaning of the sentences.</p> <p>Overall, both did not report any particular challenges with the translation process.</p>
Back-translator #1	<p>“I had some hesitation over frequently OR often.</p> <p>I had some hesitation over translating “resposta” as “response” or “answer”.</p> <p>I wrote pain in “your” neck or back instead of pain in “the” neck or back. This seemed more natural to me.</p> <p>I considered translating “rosto” as “expression” instead of “face” but I kept to “face” as that is closer to the original.</p> <p>I also considered translating “imagem” as “picture” or “illustration” but in the end I decided to go with “image”.</p> <p>There is often a battle between naturalness and exactitude in translation work.”</p>
Back-translator #2	<p>“There are only a few different choices for translation. I can see it is a questionnaire for a younger audience, so sometimes I have tried to avoid more formal language.</p> <p>For example, 'This questionnaire "is about" (instead of "concerns") or 'If so, did that back or neck pain "stop" (instead of "prevent") them from going to work?"</p>

Stage IV - Committee report

Researches with background in physical therapy, pediatrics, sports sciences and physical education and biomedical engineering participated in the committee review.

Table SIII - Committee report

Committee report
<p>Several points were discussed during this point, although only the first 2 topics required more detailed discussion:</p> <ol style="list-style-type: none"> 1) "once or twice" response option had already been targeted of some discussion during the T12 report. This time, we have decided to use "tive uma ou duas vezes ao longo da vida" (I had once or twice throughout my life), with exception for the response options 4a, 4b and 4c. Although the original answer in English is the same, for the formulation of the questions in Portuguese, the response options were considered to sound more correct by removing the "tive"/"Had". 2) Pain intensity scale: This was probably the most difficult topic to reach a consensus. The doubts were between using "pain intensity/intensidade da dor" vs "amount of pain/quantidade de dor", and between "when it was the worse/quando foi pior" vs "when it was the strongest/quando foi mais forte". There was a subtle tendency in the committee to prefer "pain intensity", especially since that is the purpose of scale, although that term never emerged in T12, nor in B12. It was decided to use the following: "Coloca uma cruz no rosto que mostre a intensidade da dor que sentiste no pescoço, quando esta foi pior?" (Put a cross (X) on the face which shows the intensity of the pain you have had in the neck when it was worst). Due to the previous reasons, it was also decided that this topic would be included in the questions to be asked to children during to pilot testing. Upon their opinions and answers, the final version will be decided. 3) It was decided to add "zona sombreada"/"shaded area" in the sentences before each image regarding the spine. 4) Small change in the introduction: "Se nenhuma das respostas te parece apropriada, coloca uma cruz na opção mais próxima da tua resposta" instead of "Se nenhuma das respostas te parece apropriada, coloca uma cruz na resposta mais próxima." 5) It was decided to use "zona inferior das costas" instead of "fundo das costas". 6) All questions regarding the pain perception of pain during the present day or last week, were rearranged in a different order, without change in semantics: "Na última semana tiveste dor no pescoço" instead of "Tiveste dor no pescoço na última semana". <p>All the other questions and answers did not raise any concerns and were accepted by all parties.</p>

Pilot testing - Open questions

Table SIV - Open questions for pilot testing

Selected open questions for pilot testing
<ul style="list-style-type: none"> - Como chamas a esta parte das costas (apontando para o fundo das costas)? - Sabes o que é um quiroprático? - Como interpretas cada pergunta? - Como preferirias a resposta "Tive uma ou duas" vs " ... ao longo da vida"? - Como fica mais fácil para tu entenderes: "qual a intensidade da dor" vs "quanta dor" e "quanto esta foi pior" vs "quando foi mais forte"? - Alguma pergunta te pareceu desapropriada? - Alguma pergunta te pareceu pouco clara? - Achaste alguma resposta confusa? - Houve alguma resposta que não tivesse a opção que gostarias de responder? Qual? - Qual achas que é o propósito deste questionário?

Pilot testing - results

Table SV - Main results from pilot testing

Pilot testing - results
<p>Regarding the specific questions about the expressions that raised more discussion in the previous committee discussion, 28% of children preferred the term "quando foi mais forte", 9% favored "quando esta foi pior", while the majority stated to be indifferent (63%). In regards to the term for "lower back", 34%, 19%, 13% and 34% of children preferred "fundo das costas", "zona inferior das costas", "zona lombar" or "others" (multiple answers included), respectively.</p> <p>During the rating of items with FPS-R Scale, 50% children reported to be thinking about "average pain" and the other half in "peak pain". Only 28% the children were able to interpret correctly, chronologically speaking, the term "last week". No one reported to know the word "chiropractic".</p>

Committee report – after pilot testing

Table SVI - Committee report – after pilot testing

Committee report – after pilot testing
<p>Regarding the points that raised more discussion previously, in what concerns the best term for “low back”, given that no clear preference emerged from children, it was decided to keep the previous version (zona inferior das costas).</p> <p>Although it was not a strong preference, more children preferred the term “quando foi mais forte” instead “quando esta foi pior”.</p> <p>The pilot testing also suggested the need to change the expression of “last week” and to highlight in the questionnaire that, in questions with FPS-R scale, children should report peak pain.</p> <p>A decision was also made to use “mãe (ou madastra)” and “pai (ou padastro)” instead of “mãe ou madastra) and “pai ou padastro”, respectively.</p>