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RESEARCH ARTICLE (ORIGINAL)

Back Pain and Body Posture Evaluation Instrument: Validation of the Questionnaire for Portuguese Pre-Adolescents

Instrumento de Avaliação da Postura Corporal e Dor nas Costas: Validação do Questionário em Pré-Adolescentes Portugueses

Instrumento de Evaluación del Dolor Corporal Y de Espalda: Validación del Cuestionario en Preadolescentes Portugueses

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Abstract

Background: Knowledge of pre-adolescents' postural habits and back pain profiles is essential for school health teams to develop systematized intervention strategies.
Objective: To perform the psychometric validation of the Back Pain and Body Posture Evaluation Instrument (BackPEI) for Portuguese pre-adolescents.
Methodology: A methodological study was conducted for the instrument's linguistic adaptation, pre-test, and psychometric evaluation. This evaluation took place in two phases, using a test-retest design to assess the instrument's reliability.
Results: A total of 115 pre-adolescents participated in the study (M = 11.5 years). Questions 2.5 and 2.3 obtained the lowest (k = 0.072) and highest (k = 0.693) levels of agreement, respectively. For question 2.23 (pain intensity), no difference was found between the test (M = 3.54; SD = 1.98) and the retest (M = 3.54; SD = 1.33; p = 0.959), with the answers showing a strong correlation (ICC = 0.719).
Conclusion: The European Portuguese version of the BackPEI retained the original 21 items, with the addition of two items suggested by the experts and proved to be a reliable tool for assessing postural habits and back pain in Portuguese pre-adolescents.

Keywords: back pain; posture; adolescent; questionnaire; school health services

Resumo

Enquadramento: O conhecimento do perfil dos hábitos posturais e da dor nas costas nos pré-adolescentes é essencial para desenvolver estratégias sistematizadas de intervenção, por equipas de Saúde Escolar.
Objetivo: Validar psicometricamente o Instrumento de Avaliação da Postura Corporal e Dor nas costas (BackPEI), em pré-adolescentes portugueses.
Metodologia: Estudo metodológico de adaptação linguística, pré-teste e avaliação das propriedades psicométricas do instrumento, em dois momentos, com desenho de teste/reteste, para testar a sua confiabilidade.
Resultados: Participaram 115 pré-adolescentes (M = 11,5 anos). As questões 2.5 e 2.3 obtiveram o menor (k = 0,072) e o maior (k = 0,693) nível de concordância, respetivamente. Na questão 2.23 (intensidade da dor) não houve diferença entre as médias do teste (3,54; DP = 1,98) e do reteste (3,54; DP = 1,33; p = 0,959), as respostas encontram-se bem correlacionadas (CCI = 0,719).
Conclusão: O BackPEI - Portugal manteve os 21 itens da versão original, mais dois itens sugeridos pelos peritos, revelando-se um questionário confiável para avaliar hábitos posturais e dor nas costas em pré-adolescentes portugueses.

Palavras-chave: dor nas costas; postura; adolescente; questionário; serviços de saúde escolar

Resumen

Marco contextual: El conocimiento del perfil de hábitos posturales y del dolor de espalda en preadolescentes es fundamental para el desarrollo de estrategias de intervención sistemáticas por parte de los equipos de Salud Escolar.
Objetivo: Validar psicométricamente el Instrumento de Evaluación de Postura Corporal y Dolor de Espalda (BackPEI) en preadolescentes portugueses.
Metodología: Estudio metodológico de adaptación lingüística, pre-test y evaluación de las propiedades psicométricas del instrumento, en dos momentos de evaluación, utilizando un diseño test/retest, para comprobar su confiabilidad.
Resultados: Participaron 115 preadolescentes (M = 11,5 años). Las preguntas 2.5 y 2.3 obtuvieron el nivel de acuerdo más bajo (k = 0,072) y más alto (k = 0,693), respectivamente. Los resultados de la pregunta 2.23 (intensidad del dolor) mostraron que no hay diferencia entre las medias del test (3,54; SD = 1,98) y el retest (3,54; SD = 1,33; p = 0,959) y las respuestas están bien correlacionadas (CCI = 0,719).
Conclusión: El BackPEI – Portugal mantuvo los 21 ítems de la versión original, más dos ítems sugeridos por expertos, siendo un cuestionario confiable para la evaluación de hábitos posturales y dolor de espalda en preadolescentes portugueses.

Palabras clave: dolor de espalda; postura; adolescente; cuestionario; servicios de salud escolar

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Introduction

The musculoskeletal system (MSS) of children and adolescents is still developing, making this a crucial stage of life marked by various physical transformations (Direção-Geral da Saúde, 2015).
Puberty, which occurs in early adolescence, is characterized by rapid growth and increased difficulty in adapting to the new body shape, which can lead to the adoption of incorrect postural habits (Baptista et al., 2020; Kasten et al., 2017).
During this period, adopting inadequate postural habits while performing activities of daily living (ADLs), particularly in school settings, combined with various risk factors, can contribute to postural changes that can lead to musculoskeletal injuries (MSIs), with pain, primarily in the spine, being the most common (Direção-Geral da Saúde, 2015; Schmidt et al., 2021).
Back pain in children and adolescents can limit participation in recreational and sports activities and influence school performance. It should be carefully assessed to prevent the development of chronic pain in the future (Achar & Yamanaka, 2020).
Therefore, assessing the postural habits and back pain profiles of children and adolescents using validated instruments is essential. It is the first step toward developing systematized postural education intervention strategies by school health teams, in line with the National School Health Plan (PNSE; Direção-Geral da Saúde, 2015).
This study aims to provide a validated assessment tool and contribute to the promotion of musculoskeletal health in schools. To this end, it will validate the psychometric properties of the Back Pain and Body Posture Evaluation Instrument (BackPEI) for use with Portuguese pre-adolescents.

Background

The current PNSE highlights that MSIs in children and young people often result from physical overload caused by excessively heavy backpacks, adopting incorrect postural habits due to a mismatch between school furniture and students' anthropometric characteristics, and inadequate sports activities due to the type of practice or excessive exercise. (Direção-Geral da Saúde, 2015, p. 13)
In a national study conducted in 2020 with a sample of 632 pre-adolescents, 47.4% of respondents reported MSS disorders in the previous 3 months, particularly pain in the shoulders (27.8%), back (25.3%), thigh/ankle (26.1%), neck (23.4%), lower back (22.8%), and knees (19.6%; Martins et al., 2020). The study also found a higher prevalence of MSIs among females, individuals who spent more time watching television daily, and those who walked or cycled to school (Martins et al., 2020).
The study "Health Behavior in School-Aged Children: The Health of Portuguese Adolescents in a Pandemic Context" reports an increase in back pain among this age group from 2018 to 2022 "in terms of physical symptoms: 8.6% of students in 2018 and 12.2% in 2022 reported having back pain almost every day" (Gaspar et al., 2022, p. 61). In addition, 18.3% of adolescents reported having taken medication for this type of complaint at least once (Gaspar et al., 2022).
It is therefore essential to assess postural habits and back pain using instruments that have been validated for this age group and to examine their association with various risk factors to implement strategies for prevention, early diagnosis, and/or timely referral for treatment (Schmidt et al., 2021).
The most commonly used methods for assessing postural habits, body posture, and back pain are the musculoskeletal symptom questionnaires (68%), the Visual Analog Scale of pain (43%), the trunk muscle balance test (37%), the video-based practical test for assessing ADL performance (31%), and the observation-based practical test for assessing ADL performance (12%; Henrotin et al., 2001).
These findings suggest that using the questionnaire is more effective than the other methods.
Therefore, this study aims to validate the psychometric properties of the BackPEI questionnaire for Portuguese pre-adolescents. Research shows that this instrument is the most suitable for assessing postural habits, back pain, and related risk factors in this population in school settings.
This study is part of a Ph.D. project in Nursing registered at the Center for Interdisciplinary Research in Health and approved by the Regional Scientific Committee of the Faculty of Health Sciences and Nursing at Universidade Católica Portuguesa in March 2019.

Research question

Is BackPEI a valid instrument for assessing postural habits and back pain in Portuguese pre-adolescents?

Methodology

A methodological study was conducted to validate the psychometric properties of the BackPEI questionnaire in Portuguese pre-adolescents.
The study was divided into three phases: linguistic adaptation using the Delphi method, pre-testing, and evaluation of the instrument's psychometric properties at two time points using a test-retest design to assess its reliability.
Authorization to adapt and validate the BackPEI for Portuguese pre-adolescents was obtained from the original authors in June 2018.

Population and sample

The study population consisted of pre-adolescents in grades 5 and 6 (ages 10 to 13) from a secondary school (grades 5 to 9) of a school group in northern Portugal (n = 162).
A non-probability convenience sample was selected.
The decision to validate the instrument in this age group is based on findings by Borras and Vidal-Conti (2022), which indicate a very low prevalence of non-specific back pain among children under the age of 7 and an exponential

increase in adolescents aged 13 and 15. It is therefore a priority to identify postural habits and the presence of back pain during pre-adolescence to implement appropriate interventions and minimize the need for future conventional treatment (Martins & Paiva, 2023).

Data collection instrument

The BackPEI is a self-administered, two-part questionnaire originally developed in Brazilian Portuguese (BR-PT) in Brazil (Noll et al., 2013).

The first part includes questions for sociodemographic characterization of the sample. The second part, consisting of 21 questions, assesses body perception about the performance of the following ADLs: sleeping, sitting position in the classroom, sitting position when talking to friends, sitting position when using the computer, lifting objects from the floor, and carrying objects (Noll et al., 2013).

In addition, the questionnaire addresses the prevalence, frequency, and intensity of back pain, as well as associated risk factors, particularly behavioral ones.

Pain intensity is measured using the Faces Pain Scale (0 = *no pain*; 10 = *maximum pain*).

A distinctive feature of this questionnaire is that it includes separate versions for males and females to facilitate body awareness, given that postural habits and back pain differ between genders (Noll et al., 2013).

Some questions (2.9 to 2.14) include illustrated images (female and male versions), where participants must select the image that most closely resembles their usual position (Noll et al., 2013).

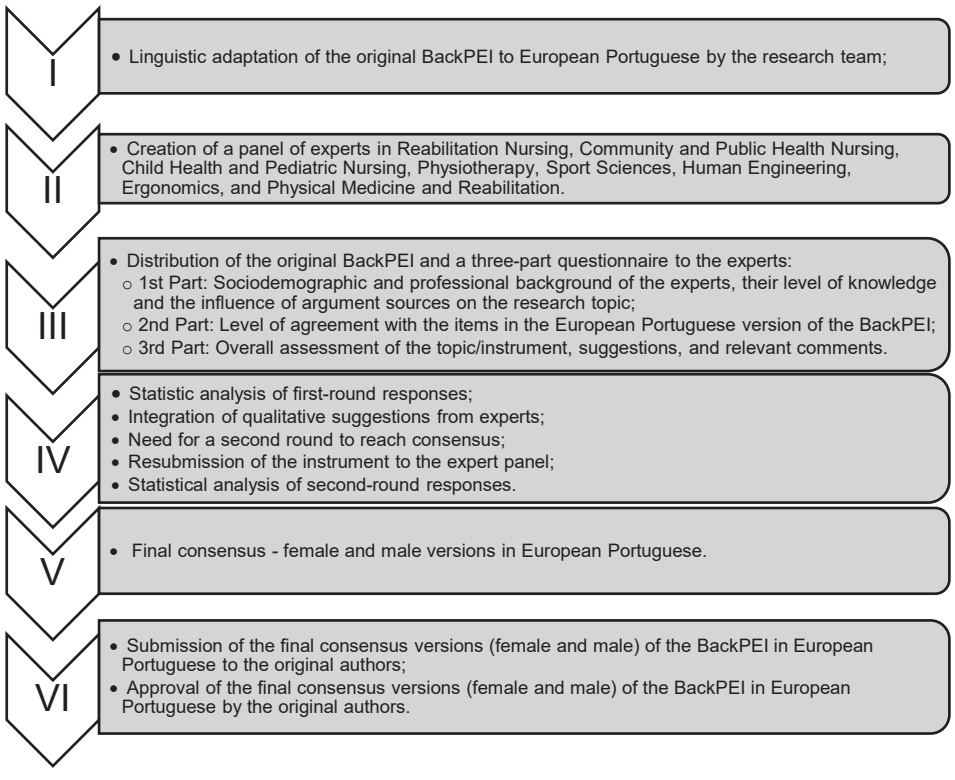
The BackPEI has good psychometric properties. The reproducibility data for the first 20 questions were assessed using Cohen's kappa coefficient (k) and classified as 'very good ($k > 0.8$) or 'good' ($0.6 < k \leq 0.8$; Noll et al., 2013). For the pain intensity question, analyzed using the Wilcoxon test and the intraclass correlation coefficient (ICC), no differences were found between the means ($p = 0.251$), and the responses showed a high correlation (ICC = 0.937) for the two tests (Noll et al., 2013).

Linguistic adaptation

Since the questionnaire was originally in BR-PT, the BackPEI underwent linguistic adaptation to European Portuguese (PT) in six phases (Figure 1), using the Delphi method (McPherson et al., 2018).

Figure 1

Phases of the linguistic adaptation of the BackPEI using the Delphi method



Pre-testing
The final consensus versions (female and male) of the BackPEI in European Portuguese were administered to 12 pre-adolescents with characteristics similar to those of the study population (Gunawan et al., 2021). Participants completed the questionnaire via Google Forms®.
Participants reported no language difficulties or confusion, except for the question about the parents' level of education, which was easily clarified by the subject teacher/researchers. On average, it took 10 minutes to complete the questionnaire.
Based on these findings, the instrument was ready for administration in the psychometric validation phase.

Psychometric validation
Following authorization from the coordinator of a Community Care Unit (UCC) in northern Portugal, the psychometric validation of the BackPEI was carried out in March 2022. A partnership was then established with the School Health Nursing department of the UCC.
In order to conduct the study, a formal request for approval was submitted to the Board of Directors of the school group associated with the UCC, which was obtained in June 2022.
The study was presented to the directors of all 5th and 6th grade classes, as well as to the teachers of Computer Science and/or Physical Education, subjects in which conditions were created for administering the instrument and organizing the necessary steps for data collection.
Data were collected in two phases (May/June 2023 – Phase 1 and October/November 2023 – Phase 2) via Google Forms®, allowing pre-adolescents to self-complete the BackPEI.
The subject teacher, the researcher, and the school health nurse from the UCC responsible for the school group were present during data collection with all classes.
Prior to administering the questionnaire, the researcher explained its purpose and measured each student's body weight, height, and school backpack weight. Each participant received a card with their individual data to enter into the online questionnaire.
Data were analyzed using appropriate statistical methods and the same psychometric procedures as those applied in the original BackPEI version. The analysis was performed using IBM SPSS Statistics, version 28.0. Reliability was assessed by administering the final consensus versions (female and male) of the BackPEI in European Portuguese at two different time points.
For psychometric validation, Cohen's kappa was used to assess inter-rater agreement for ordinal and nominal variables. The results were interpreted according to the classification proposed by Fleiss et al. (2003): values below 0 indicate no agreement; 0-0.20 indicate slight to none agreement; 0.21-0.40 indicate fair agreement; 0.41-0.60 indicate moderate agreement; 0.61-0.80 indicate substantial agreement; and 0.81-100 indicate almost perfect or excellent agreement.
For continuous variables, the ICC was used, with interpretation based on the criteria proposed by Fleiss et al. (2003): values below 0.4 indicate poor agreement, values between 0.4 and 0.75 indicate moderate agreement, and values above 0.75 indicate good to excellent agreement. A significance level of 0.05 was adopted in this study.

Ethical considerations
The participation of the pre-adolescents in this study was authorized by their parents or guardians through informed consent. Confidentiality and anonymity were ensured throughout the study. Anthropometric measurements, backpack weight, and responses to the self-administered BackPEI were collected anonymously and with full respect for each student's privacy.
The study was approved by the Health Ethics Committee of the Local Health Unit of Alto Minho, EPE, under opinion no. 41/2022 (June 2022).

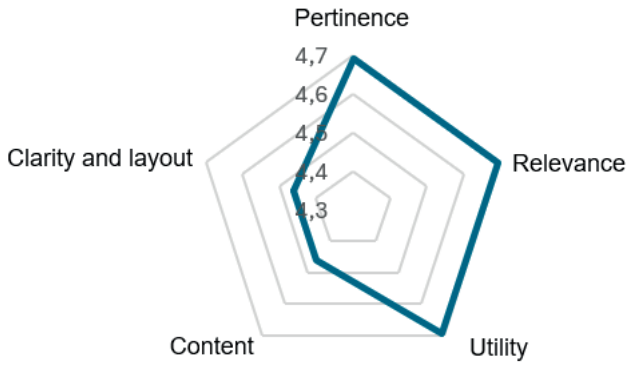
Results

This study produced specific results for each stage of the linguistic adaptation and psychometric validation process of the BackPEI for Portuguese pre-adolescents.

Linguistic adaptation
For the linguistic adaptation of the BackPEI using the Delphi method, a panel of 13 experts was selected based on their scientific and professional qualifications. On average, the experts had 24.4 years of professional experience in their respective fields (*SD* = 9).
Statistical analysis of the first-round responses revealed that, regarding the level of agreement on the items of European Portuguese BackPEI, two of the 21 questions from the BR-PT version (questions 19 and 20) achieved moderate consensus, with agreement levels below 70%, and were therefore submitted to a second round.
Some qualitative suggestions from the experts were also incorporated, including the addition of two new questions to the European Portuguese version (items 2.15 and 2.16): "Do you think your backpack is heavy?", with five response options (*Always*, *Often*, *Sometimes*, *Almost Never*, and *Never*); and, "Calculate the average time, in minutes, that you spend carrying your school backpack on your back each day (e.g., home-school/school-home)", where participants had to provide a quantitative response.
The instrument, which included the original questions that had not reached consensus in the first round and the two new questions, was resubmitted to the expert panel.
After statistical treatment and analysis of the second-round responses, all items received positive agreement, reaching final consensus on both the female and male versions of the European Portuguese BackPEI without the need for a third round.
The authors of the original BR-PT version of the BackPEI approved the final consensus on its linguistic adaptation (both female and male versions) to EU-PT.
Overall, the experts assessed the instrument's relevance, utility, content, clarity, and appearance using a 5-point Likert scale ranging from 1 (*not suitable*) to 5 (*very suitable*). The average rating for all parameters exceeded 4 (Figure 2), indicating a highly positive overall assessment by the expert panel.

Figure 2

Overall assessment of the BackPEI by the expert panel



Sociodemographic characterization of the sample

A total of 115 pre-adolescents from a secondary school in northern Portugal participated in this study.

Of the participants, 50.9% were female and 49.1% male, with a mean age of 11.5 years (*SD* = 0.57). On average, the participants weighed 43.3 kg (*SD* = 11.9 kg) and had a height of 149 cm (*SD* = 7.9 cm). At the time of data collection, the average backpack weight was 6 kg (*SD* = 3 kg).

Psychometric validation

To validate the psychometric properties of the BackPEI, the recommendation of at least five participants per item was followed (*n* = 115; Gunawan et al., 2021).

To assess the instrument's reproducibility, the BackPEI was administered twice (test-retest).

The reproducibility analysis (Table 1) revealed varying levels of agreement, with kappa coefficients ranging from 0.072 to 0.719. Questions 2.3, 2.14, and 2.23 exhibited the highest levels of agreement (k = 0.693; 0.576; and 0.719, respectively), whereas questions 2.4 and 2.5 exhibited the lowest agreement (k = 0.092 and 0.072, respectively).

One question showed *substantial agreement*, two showed *moderate agreement*, 10 showed *fair agreement*, and nine showed *slight to none agreement*. Regarding question 2.23 on pain intensity, no significant difference was found between the test (M = 3.54; SD = 1.98) and retest (M = 3.54; SD = 1.33; p = 0.959), and the two tests were highly correlated (ICC = 0.719).

Table 1

Cohen's kappa coefficients and intraclass correlation coefficients for BackPEI items (*n* = 115)

		95% Confidence Interval		
Item	***k***	Minimum	Maximum	***p***
2.1 – Practice of physical exercise	0.349	0.099	0.600	0.000
2.2 – Frequency of physical exercise	0.304	0.152	0.457	0.000
2.3 – Competitive or non-competitive physical exercise?	0.693	0.517	0.870	0.000
2.4 – Time spent watching TV	0.092	-0.061	0.246	0.198
2.5 – Time spent each day using a computer (including at home and at school)	0.072	-0.091	0.235	0.351
2.6 – Reading and/or studying in bed	0.248	0.086	0.411	0.001
2.7 – Preferred sleeping position	0.221	0.078	0.365	0.002
2.8 – Time slept each night	0.114	-0.006	0.234	0.031
2.9 – Sitting position when writing	0.180	0.053	0.306	0.003
2.10 – Sitting position on a chair when talking	0.148	0.016	0.280	0.009
2.11 – Sitting position when using a computer	0.149	0.019	0.279	0.011
2.12 – Position adopted when lifting an object from the floor	0.158	0.016	0.299	0.014
2.13 – Carrying school material	0.484	0.044	0.925	0.000
2.14 – Mode of transporting the school backpack	0.576	0.407	0.746	0.000
2.15 – Backpack weight	0.361	0.225	0.497	0.000
2.16 – Time (minutes) spent each day carrying the school backpack [a]	0.226	-0.118	0.463	0.087
2.17 – Mother's level of education	0.359	0.216	0.503	0.000
2.18 – Father's level of education	0.270	0.112	0.427	0.000
2.19 – Parents with a history of back pain	0.396	0.235	0.558	0.000
2.20 – Presence of back pain	0.201	-0.017	0.419	0.040
2.21 – Frequency of back pain	0.183	-0.005	0.370	0.065
2.22 – Impeding the performance of activities	0.154	-0.049	0.357	0.148
2.23 – Intensity of back pain[a]	0.719	0.080	0.914	0.018

Note. *k* = Cohen's kappa coefficient; *a* = Intraclass correlation coefficient; *p* = Level of significance.

Discussion

The objective of this study was to validate the psychometric properties of the BackPEI for Portuguese pre-adolescents. The study included an initial phase of linguistic adaptation using the Delphi method, followed by a second phase aimed at assessing the questionnaire's reliability using a test-retest design.

The linguistic adaptation of the BackPEI followed the established recommendations of the Delphi method. The experts expressed positive agreement with its items and suggested the inclusion of two additional items. The results indicate that the EU-PT version of the BackPEI is a reliable and relevant tool for national-level research. The items were considered objective and easy to understand. However, some items had higher reproducibility than others.

Cohen's kappa results for questions 1 to 22 (excluding questions 2.15 and 2.16, which were added exclusively to the EU-PT version based on expert suggestions) revealed some differences when compared to previous adaptations of the BackPEI. In the original version of the instrument, 12 questions were classified as *good* and eight as *very good* (Noll et al., 2013). The Turkish version has three items with *moderate agreement*, 15 with *substantial agreement*, and three with *excellent agreement* (Gençbaş & Bebiş, 2019). In the Spanish version, one question was classified as *fair*, one as *moderate*, eight as *good*, and five as *very good* (Miñana-Signes, 2021).

Notably, the four questions related to postural habits in the sitting position (items 2.4, 2.9, 2.10, and 2.11) had the lowest kappa values. This result is consistent with the findings of the original version (k = 0.634; k = 0.667; k = 0.647; and k = 0.624, respectively; Noll et al., 2013), the Turkish version (k = 0.667; k = 0.500; k = 0.611; k = 0.752, respectively; Gençbaş & Bebiş, 2019), and the Spanish version (k = 0.522; k = 0.312; k = 0.378; k = 0.550, respectively; Miñana-Signes, 2021).

The consistently low levels of agreement may be due to the use of multiple-choice image-based response options

for these items. Since pre-adolescents can adopt various sitting positions during the school day, this variability may lead to different responses at the two time points, thereby affecting reproducibility (Miñana-Signes, 2021). Questions 2.4 and 2.5 had the lowest levels of agreement. These questions assessed the average daily amount of time participants spent watching television or using a computer. One possible explanation for this could be that these habits are in decline and being replaced by mobile device usage, as the findings from the "Health Behavior in School-Aged Children" study suggest (Gaspar et al., 2022).

Overall, the items that showed poor reproducibility, as well as the discrepancies observed between the EU-PT version and other international versions of the BackPEI, can be explained by the longer time interval between the two test administrations in this study. This interval resulted from contingencies related to the school calendar and may have affected how participants interpreted the questions at different time points (Vilelas, 2020).

Regarding the additional questions suggested by the experts, one question about perceived backpack weight was added. This item demonstrated a fair level of agreement (k = 0.361), which supports its inclusion in the EU-PT version.

However, the second added question concerning the average time (in minutes) that pre-adolescents carry their backpack each day showed a poor level of agreement (ICC = 0.087). Nevertheless, the item was considered relevant and included in the EU-PT version. This poor level of agreement may be explained by the fact that the average time spent carrying a backpack varied depending on the day of the week.

The results for question 2.23 (pain intensity) showed that the responses were well-correlated (*ICC* = 0.719), similar to the original version (*ICC* = 0.937) and the Spanish version (*ICC* = 0.951).

Conclusion

The results of the linguistic adaptation and psychometric validation indicate that the EU-PT version of the BackPEI is suitable for use with Portuguese pre-adolescents. The psychometric analysis showed that the instrument has a reliable test-retest design that produces results consistent with those of the original version. The 21 items from the original BackPEI were kept, and two new questions suggested by the expert panel were added, resulting in a total of 23 items in the EU-PT version.

Future studies should validate the BackPEI for other age groups, as well as validate instruments that assess ADLs based on videos or direct visual observation in school settings.

The EU-PT version of the BackPEI is a valid instrument for assessing postural habits and back pain in Portuguese pre-adolescents. Its application may lead to more accurate diagnoses and support the development of systematized postural education interventions tailored to each school community. These interventions, implemented by school health teams, can promote the musculoskeletal health of pre-adolescents.

Author contributions

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Writing – review & editing: Matos, M. J., Festas, C., Barreiras, C., Almeida, S., Noll, M.

References

Achar, S., & Yamanaka, J. (2020). Back pain in children and adolescents. *American Family Physician, 102*(1), 19-28. https://www.aafp.org/pubs/afp/issues/2020/0701/p19.html

Baptista, Â., Quintas, C., Baltar, P., Alves, R., Lavrador, V., & Silva, T. D. (2020). O jovem. In A. L. Ramos, & M. C. Barbieri-Figueiredo (Coord.), *Enfermagem em saúde da criança e do jovem* (pp. 193-216). Lidel.

Borras, P. A., & Vidal-Conti, J. (2022). An on-line school-based randomised controlled trial to prevent non-specific low back pain in children. *Health Education Journal, 81*(3), 352-362. https://doi.org/10.1177/00178969221077408

Direção-Geral da Saúde. (2015). *Programa nacional de saúde escolar.* Ministério da Saúde.

Fleiss, J. L., Levin, B., & Paik, M. C. (2003). *Statistical methods for rates and proportions.* John Wiley & Sons.

Gaspar, T., Guedes, F. B., Cerqueira, A., Matos, M. G., & Equipa Aventura Social. (2022). *A saúde dos adolescentes portugueses em contexto de pandemia: Dados nacionais do estudo health behaviour in school-aged children 2022.* https://aventurasocial.com/dt_portfolios/a-saude-dos-adolescentes-portugueses-em-contexto-de-pandemia-dados-nacionais-2022/

Gençbaş, D., & Bebiş, H. (2019). The validity and reliablity of the turkish version of back pain and body posture evaluation. *ACU Sağlık Bil Derg, 10*(3), 383-389. https://doi.org/10.31067/0.2019.175

Gunawan, J., Marzilli, C., & Aungsuroch, Y. (2021). Establishing appropriate sample size for developing and validating a questionnaire in nursing research. *Belitung Nursing Journal, 7*(5), 356-360. https://doi.org/10.33546/bnj.1927

Henrotin, Y., Vanderthommen, M., Fauconnier, C., Grisart, J., Masquelier, É., Peretz, A., Toussaint, F., Lemaître, D., Angenot, P., Mahieu, G., Rossion, P., Bailly, D., Mahy, J. -L., Chif, D., Dechef, P., & Crielaard, J. -M. (2001). Définition, critères de qualité et évaluation d'un programme de type école du dos. Recommandations de la société belge des écoles du dos (SBED). *Revue du Rhumatisme, 68*(2), 185-191. https://doi.org/10.1016/S1169-8330(00)00095-8

Kasten, A. P., Rosa, B. N., Schmit, E. F., Noll, M., & Candotti, C. T.

(2017). Prevalência de desvios posturais na coluna em escolares: Revisão sistemática com metanálise. *Journal of Human Growth and Development, 27*(1), 99-108. https://doi.org/10.7322/jhgd.127684

Martins, R. L., Carvalho, N., Albuquerque, C., Andrade, A., Martins, C., Campos, S., Batsita, S., & Dinis, A. I. (2020). Perturbações músculo-esqueléticas em adolescentes: Estudo da prevalência e dos fatores determinantes. *Acta Paulista de Enfermagem, 33*, e-APE20190173. https://doi.org/10.37689/acta-ape/2020AO0173

Martins, T., & Paiva, M. A. (2023). Educação postural. In T. Martins, & E. Borges (Coord.), *Saúde escolar: Intervenções de promoção da saúde* (pp. 136-152). Lidel.

McPherson, S., Reese, C., & Wendler, M. C. (2018). Methodology update: Delphi studies. *Nursing Research, 67*(5), 404-410. https://doi.org/10.1097/NNR.0000000000000297

Miñana-Signes, V., Monfort-Pañego, M., Morant, J., & Noll, M. (2021). Cross-cultural adaptation and reliability of the back pain and body posture evaluation instrument (BackPEI) to the spanish adolescent population. *International Journal of Environmental Research and Public Health, 18*(3), 854. https://doi.org/10.3390/ijerph18030854

Noll, M., Candotti, C. T., Vieira, A., & Loss, J. F. (2013). Back pain and body posture evaluation instrument (BackPEI): Development, content validation and reproducibility. *International Journal of Public Health, 58*(4), 565-572. https://doi.org/10.1007/s00038-012-0434-1

Schmidt, K., Friedrichs, P., Cornelsen, H. C., Schmidt, P., & Tischer, T. (2021). *Musculoskeletal disorders among children and young people: Prevalence, risk factors, preventive: A scoping review.* European Agency for Safety and Health at Work. https://doi.org/10.2802/511243

Vilelas, J. (2020). *Investigação: O processo de construção do conhecimento* (3ª ed.). Sílabo.