Aten Primaria. 2014;**46(Espec Cong 1)**:112-117

Atención Primaria

www.elsevier.es/ap

SCIENTIFIC ARTICLE

Cross-cultural adaptation and validation of the Portuguese version of the "European Health and Behaviour Survey-section B"

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KEYWORDS
Health;
Behaviour;
Validation;
Scale

Abstract
Background: The European Health and Behaviour Survey is a questionaire used to assess a wide range of health-related behaviours, attitudes to health, beliefs concerning the importance of behaviours for health, and health knowledge, using a standardized protocol suitable for translation and administration in different countries of Europe. The objective of this study was to translate and culturally adapt the EHBS-Section B (section used to assess attitudes towards the importance of 25 activities for health) to the Portuguese language and to test its reliability and validity.
Methods: This new version was obtained with forward/backward translations, consensus panels and a pre-test. The Portuguese versions of EHBS-Section B, Health and Risk-taking Behaviour Scale (HRBS), Health Belief Scale (HBS) and a form for the characteristics of the participants were applied to 849 Portuguese adolescents.
Results: Reliability was good with a Cronbach's alpha coefficient of 0.867, and an intraclass correlation coefficient (ICC) of 0.96. Corrected item-total coefficients ranged from 0.301 to 0.620 and weighted kappa coefficients ranged from 0.74 to 0.94 for the 17 items of the EHBS-Section B. Construct validity was supported by the confirmation of two predefined hypotheses involving expected significant correlations between EHBS-Section B, HRBS and HBS that represent similar constructs.
Conclusions: The Portuguese EHBS-Section B exhibited suitable psychometric properties, in terms of internal consistency, reproducibility and construct validity. It can be used in educational and research settings.

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Background

Behaviours related to health are activities that heighten risk of disease or promote the maintenance of health. They consist of two classes of behaviour: *a)* health risk behaviours, or activities carried out with a frequency or intensity that increases risk of disease or injury; these include cigarette smoking, excessive alcohol consumption, excessive illicit drugs consumption, certain sexual behaviours and drink-driving; *b)* Positive health behaviours, or activities that may help prevent disease and injury, detect disease and disability at an early stage, or enhance health; such as regular physical activity, not eat too much animal fat, eating fruit and fibre, not eat too much sugar and breast, make deliberate efforts to control or avoid stress, have a dental examination and eat breakfast almost every day.[1] Personal health behaviours are thought to play a key role in determining the prevalence of diseases of major socio-economic impact throughout the world, including cardio-vascular diseases, cancers and accidents.[2]

According to this, there are many researchers, during the recent decades, that have been working in the construction and development of instruments for assessing health behaviours and risk in premature age groups, that somehow can assure early preventive interventions.[3-7]

An european inventory was developed from literature for the assessment of substance use, positive health practices, diet and eating habits, driving behaviour and preventive health care, attitudes and beliefs concerning the importance of 25 activities for health, and knowledge about the influence of seven factors (including smoking, alcohol and diet) on major diseases. Andrew Steptoe and Jane Wardle worked on a survey —European Health and Behaviour Survey— that embodies several sections, which assess a wide range of health-related behaviours and health knowledge, using a standardized protocol suitable for translation and administration in different countries of Europe.

There was no Portuguese version available of the psychometric study before the present study and, in order to use this questionnaire validated in Portugal, a process of cross-cultural adaptation and validation was required. Like this, the objective of this study was to translate and culturally adapt the EHBS_Section B to the Portuguese language and to test its reliability and validity in students adolescents.

Methods

Cross-cultural adaptation

This process was conducted according to previously established guidelines,[8,9] under license of the EHBS copyright holder (© Andrew Steptoe and Jane Wardle - UCL Department of Epidemiology and Public Health - http://www.ucl.ac.uk/slms/people/show.php?personid=12323). The English EHBS-Section B[3] was translated into Portuguese independently by two Portuguese native translators (one researcher with experience in health education —M. Geada— and one professional translator). The obtained translations were discussed in a first consensus panel to achieve the first preliminary version. This consensus version was translated back to English by another two translators (two English native professional translators) without prior knowledge of the original version. The translations and back translations were discussed in a second consensus panel to achieve a second preliminary version. This consensus version was completed by 20 students to confirm if all items of the questionnaire were understandable and included all the expected concepts without any redundancy. A third consensus panel was held to achieve the final version (supplementary materials).

Validation study

Subjects

The sample consisted by 849 student's adolescents, 386 male and 453 female, who attending the 9th grade in eight (four in rural areas and four in urban areas) public Portuguese schools. Subjects were selected after obtaining informed consent and checking the inclusion and exclusion criteria. To be included in this validation study, subjects had to have between 14 and 17 years old, and absence of special educational needs. All schools obtained approval from their respective pedagogical councils and parent associations.

Measurements

Measurements were performed at the above mentioned schools. Each subject was assessed during a school visit, replying to the questionnaire in the classroom. One group of 110 students was also included in the reproducibility assessment (were assessed again four weeks later). Data was collected using the mentioned directions.

The EHBS-section B is a auto-answer tool, consisting of 25 items, which is designed to assess the patients' attitudes concerning their health status. According to the original scoring system 8, answers are measured on a Likert type scale from 1 ("I give little importance") to 10 ("I give a lot of importance") and listed: the higher the score, the more favorable are the attitudes of the participants considering healthy behaviours. The present study used the original scoring system. A form was used to collect subject information on gender, age, residence area, socio-economic class and familiar funcionality.

Statistical analyses

Quantitative variables are described using mean and standard deviation values whereas categorical variables are described using frequency and percentage values.

Reliability. Internal consistency was measured using Cronbach's alpha and corrected item-total correlations. An alpha value between 0.70 and 0.95 was regarded as acceptable reliability.[10] Corrected item-total scale correlation of 0.30 or higher was considered acceptable for each item in the scale.[11] Reproducibility of the EHBS-Section B scale was assessed using intraclass correlation coefficients (ICC) for agreement, formula 2.1. Reproducibility of the EHBS-Section B scale items was tested using quadratic weighted kappa coefficients. An ICC or a weighted kappa coefficient greater than or equal to 0.70 received a positive rating.[10]

Validity. Usually it is made reference to three types of validity: content validity, criterion validity, and finally, construct validity.[12-14] The construct validity, also called concept of validity subordinates all the others validities and

seeks to find answers to the following question: "this measuring tool actually measures the construct it intends to measure?".[13,15] In this sense, this type of validity, "seeks to evaluate in what terms the results of the test are indicative of underlying theoretical constructs, i.e. the dimensions of the measuring tools seeks out".[14,15] According to what is being written, the assessing methodology used for the construct validity of a test result is diverse and accumulates information from different sources. However, one of the most used methods and with recognition by several authors is factorial analysis,[15] and so this was the method we used.

A construct validity was also investigated testing 2 predefined hypotheses involving expected significant correlations between EHBS scale, HRBS (Health and Risk-taking Behaviour Scale[7]) and HBS (Health Belief Scale[7]) that represent similar constructs. Construct validity was analyzed using Spearman's correlation. Spearman's correlation coefficients were read as follows: excellent relationship if higher than 0.90; good if between 0.90 and 0.71; fair if between 0.70 and 0.51; weak if between 0.50 and 0.31, little or none if lower than or equal to 0.30.[16] A p value of 0.05 was taken as the reference level of significance. Statistical analyses were conducted using SPSS-Statistical Package for Social Sciences (Version 20.0 for Windows).

Results

Cross-cultural adaptation

The second preliminary version of the Portuguese EHBS-Section B questionnaire was well accepted in the pre-test. All the questions and response options were considered satisfactorily understandable by the respondent's subjects. Therefore, this version was not subjected to any additional modification and was used in the validation study.

Validation study

Subjects

The descriptive statistics are presented in Table 1 (Characteristics of the subjects). A total of 849 students were included in the validity and internal consistency assessment, of which 110 (12.95%) were also included in the reproducibility assessment. There were no missing data for any individual item of the EBHS-Section B and other scales used.

Reliability

Cronbach's alpha coefficient was 0.867 and corrected item-total scale correlations ranged from 0.301 to 0.620 with the exception of seven items – which had an corrected item-total scale correlation lower than 0.30 – and that, therefore, were excluded. ICC was 0.96 (95% CI 0.92-0.97) for the EHBS-Section B scale and weighted kappa coefficients ranged from 0.74 to 0.94 for the 17 items of the questionnaire (Table 2).

Validity

The three predefined hypotheses involving expected significant correlation between EHBS scale, HRBS, and HBS were confirmed, remarking the expected results.

The values obtained in the Kaiser-Meyer-Olkin (KMO = 0.901) and Bartlett test ($\chi^2 = 3964.61$; $P = .000$) revealed a significant correlation between the items, confirming thereby that the application of the factorial model is the adequate one. The final factor solution presented in Table 3 (Factor weights after varimax rotation,

Table 1 Characteristics of the subjects

Characteristics[a]	Total sample (N = 849)	Reproducibility group (N = 110)[b]
Gender		
Female	457 (53.8)	59 (53.6)
Male	392 (46.2)	51 (46.4)
Age (years)	14.67 ± 0.9	14.72 ± 0.8
Residence area		
Rural	467 (55.0)	64 (58.2)
Urban	382 (45.0)	46 (41.8)
Socio-economic class		
Superior high class	98 (11.5)	12 (10.9)
Low class upper	229 (27.0)	32 (29.1)
Middle class	443 (52.2)	58 (52.7)
Lower class	79 (9.30)	8 (7.3)
Familiar funcionality		
Highly functional	576 (67.8)	74 (67.3)
Moderately functional	217 (25.6)	25 (22.7)
Severe dysfunction	56 (6.6)	11 (10.0)
EHBS-Section B score (points)	136.39 ± 21.8	130.67 ± 20.4

[a]Quantitative variables: mean ± standard deviation; categorical variables: frequency (percentage). EHBS-Section B is 17-170 points.
[b]Group where all subjects were assessed again four weeks later.

Table 2 Reliability of the EHBS-Section B scale items

EHBS-Section B scale items[a]	Mean	Standard deviation	R item-total (ex./item)	α Cronbach (ex./item)	Weighted kappa coefficients[b]
1. To have a blood pressure reading every 12 months	5.63	2.96	0.491	0.829	0.79
2. To have a dental examination at least once a year	7.64	2.57	0.348	0.838	0.83
3. Not to eat too much animal fat	6.97	2.60	0.518	0.841	0.89
4. To eat enough dietary fibre	7.76	2.43	0.547	0.837	0.81
5. Not to eat too much sugar	6.80	2.65	0.537	0.816	0.90
6. To avoid food with additives such as flavourings, colourings and preservatives	6.26	2.76	0.545	0.825	0.93
7. To eat breakfast almost every day	8.65	2.46	0.353	0.838	0.74
8. Not to smoke	8.13	3.01	0.368	0.837	0.86
9. To wear a seatbelt when travelling in a car	8.47	2.20	0.394	0.835	0.88
10. Never to drive after drinking alcohol	9.16	1.82	0.448	0.832	0.94
11. To drive within the speed limit most of time	7.77	2.68	0.499	0.828	0.89
12. To take regular exercise	8.43	2.14	0.381	0.835	0.93
13. Not to drink too much coffee	7.08	2.14	0.531	0.816	0.87
14. To drink alcohol moderately	8.33	2.31	0.620	0.822	0.76
15. To make deliberate efforts to control or avoid stress	8.12	1.58	0.318	0.802	0.77
16. To use a condom when having sex with a partner whose previous experience is not known	9.08	1.54	0.301	0.836	0.87
17. For women (examine their breasts)/for men (examine their testicles) at least once a month to detect possible signs of cancer	5.68	2.74	0.452	0.828	0.90
Alfa Cronbach Global			**0.867**		
Split-half Coeficients		**First half = 0.798**		**Second half = 0.742**	

[a]Were excluded seven itens (original version) they had as corrected item-total coefficients lower than 0.30.
[b]The questionnaire was administered twice, separated by four week.

variance explained and mean/standard deviation of Scale EHBS-Section B), allowed the selection of six factors with eigenvalues superior to 1 that, in the overall, explain 63.19 % of the variance: factor 1 – "Food attitude", contributes to 28.75% of total variance and is the most important factor; factor 2 – "Transportation attitude" explains 9.41% of the total variance; factor 3 – "Addictive attitude ", contributes to 6.94% of the total variance; factor 4 – "Preventive attitude", is the fourth most important factor with 6.37% of the cumulative percentage of variance; factor 5 – " Promoter attitude " explains 6.06% of the total variance; and finally, the factor 6 – "Sexual attitude" that contributes 5.66% of the total variance.

Another contribution to the study of the scale validity was made from the correlations' matrix between the scores of the six factors (Table 4 - Matrix of correlations between the scores of EHBS-Section B). The variation of the correlation indicates that the increase in one dimension of the scale is associated with the increase of the other dimensions. Obviously, all the dimensions have higher correlation with the overall score than to each other. Analyzed the highest correlations of each factor with the other dimensions, it is seen that F1 – Food attitude is mainly linked to F4 – Preventive attitude (r = 0.441); F2 – Transportation attitude is further more connected to F3 – Addiction attitude (r = 0.449); F5 – Promoter attitude correlates in a higher level to F1 – Food attitude (r = 0.342); and F6 – Sexual attitude is mainly associated to F3 – Addictive attitude (r = 0.301).

Discussion

In this article we described the process of cross-cultural adaptation of the EHBS-Section B to the Portuguese language and presented evidence in support of its reliability and validity in valid in young students.

The procedures of translation and cultural adaptation were performed successfully and resulted in a good comprehensible Portuguese version of the EHBS-Section B. The absence of major problems was also reported in the cross-cultural adaptation of several other language versions of the European Health and Behaviour Survey (http://www.ucl.ac.uk/psychobiology/research/ihbsdetails/ihbsdetails/ihbscountries). The clear and intelligible wording used in all questions and response options seems to allow the choice of commonly used words in others cultures or languages and, therefore, to provide a brief questionnaire that is easy to understand and complete.

High Cronbach's alpha coefficient for the scale and acceptable corrected item-total coefficients for all items confirmed that the Portuguese EHBS-Section B is internally consistent, with the correspondent items properly correlated with each other. The low corrected item-total coefficient obtained for seven of the items, which was below the acceptable value of 0.30, led to their exclusion.

The results for internal consistency were similar to those obtained in other studies (expressed in terms of Cronbach's alpha coefficients). High ICC for the scale scores and

Table 3 Factor weights after varimax rotation, variance explained and mean/standard deviation of Scale EHBS-Section B

Factors / Items	1	2	3	4	5	6
1				0.747		
2				0.784		
3	0.773					
4	0.640					
5	0.820					
6	0.760					
7					0.829	
8			0.738			
9		0.730				
10		0.636				
11		0.724				
12					0.573	
13			0.612			
14			0.648			
15				0.697		
16						0.767
17						0.796
Eigenvalue	5.175	1.694	1.250	1.147	1.090	1.019
% variance explained	28.75	9.41	6.94	6.37	6.06	5.66
% Total Variance Explained	63.19					
No. of items	4	3	3	3	2	2
Mean	27.76	24.90	25.63	21.36	17.22	19.21
Dp	8.23	5.08	6.32	6.17	3.67	2.12

Table 4 Matrix of correlations between the scores of EHBS-Section B

F_1 – Food attitude						
F_2 – Transportation attitude	0.380*					
F_3 – Addictive attitude	0.356*	0.449*				
F_4 – Preventive attitude	0.441*	0.333*	0.344*			
F_5 – Promoter attitude	0.342*	0.247*	0.274*	0.317*		
F_6 – Sexual attitude	0.161*	0.289*	0.301*	0.178*	0.224*	
Total scale	0.778*	0.680*	0.704*	0.708*	0.552*	0.404*
Factors	1	2	3	4	5	6

*$p < .001$.

acceptable weighted kappa coefficients for the 17 items of the questionnaire revealed that the stability of the Portuguese EHBS-Section B over time was good. The results for reproducibility were similar to those obtained with the other EHBS-Section B versions (expressed in terms of ICC), even using different time intervals between repeated administrations.

The two predefined hypotheses for construct validity were confirmed: *a)* EHBS-Section B presented good positive correlations with HRBS; *b)* EHBS-Section B presented weak positive correlations with HBS. Other study reported evidence for construct validity of the EHBS-Section B, highlighting six factors that explain 63.19% of the variance.

Some limitations of this study should be acknowledged. The sample used is not representative of the entire

What we know about the theme

- EHBS-Section is one questionnaire widely used internationally for to assess attitudes to health and is noted for its ease of administration, validity and reliability, development in different cultures and applicability in different contexts.
- There is not a Portuguese version of psychometric treatment of the EHBS-Section B.

What we get out the study

The Portuguese version of EHBS-Section B for adolescents.

population of Portuguese adolescents. In fact, only adolescents aged between 14 and 17 years were recruited. Further validation is recommended. Nevertheless, we may conclude that the Portuguese EHBS-Section B evidenced suitable psychometric characteristics, in terms of reliability and validity, for Portuguese adolescents.

Portuguese version of the EHBS-Section B is available as supplementary material. Supplementary materials related to this article can be requested by email from author or address: Health Scholl of Viseu, Rua Don João Crisóstomo Gomes de Almeida, n.º 102, 3500-843, Viseu, Portugal.

Funding

Study funded by the Portuguese Government under the PRODEP III (Project 310.005).

Acknowledgements

The authors would like to thank the responsibles of institutions that authorized the collection of data. Also, the adolescents who participated in this study deserve our deeply recognition.

Also a thank you to the authors of the European Health and Behaviour Survey.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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