Translation, Cultural Adaptation and Validation of the Satisfaction with Amplification in Daily Life Scale for European Portuguese

Tradução, Adaptação Cultural e Validação da Escala *Satisfaction with Amplification in Daily Life* para o Português de Portugal

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ABSTRACT

Introduction: The scale Satisfaction with Amplification in Daily Life uses a simple and easily administered questionnaire to evaluate the adaptation of individuals to their hearing aids. The objective of this study is to validate the scale for European Portuguese speakers, by means of translation and cultural adaptation of the questionnaire. The study includes an evaluation of reproducibility and a description of the results of the administration of the questionnaire to patients fitted with hearing aids.

Material and Methods: We invited 147 individuals fitted with hearing aids (uni- or bilateral) to participate in the study. Participants had used a hearing aid for at least six weeks and were patients of the Department of Otolaryngology at the Egas Moniz Hospital (Lisbon). The consent as well the guidelines for translation from and into the English language were obtained from the author of the scale, and the translation from and into, and cultural adaptation were carried out, along with an evaluation of reproducibility and internal consistency.

Results: The participants were 54% male and 46% female, aged between 16 and 93 (66.09 ± 17.41 years). The results of the study showed an overall level of satisfaction of 5.4 among hearing aids users. The sub-scale satisfaction levels were: positive effects 5.88, service and cost 5.25, negative effects 4.24, and self-image 5.57. The Cronbach α score was 0.75 which indicates good internal consistency. Furthermore, the questionnaire's overall and sub-scale average scores did not differ significantly from the results obtained under the American scale. The inter-examiner reproducibility was also good.

Discussion: This study provides reliable results of the scale for the Portuguese of Portugal and adequate internal consistency, with significant age variability in the sample.

Conclusion: This adaptation of the Satisfaction with Amplification in Daily Life questionnaire for European Portuguese speakers should be considered a good tool for evaluation of the level of satisfaction of hearing aid users, and until now, is the only available scale for speakers of European Portuguese.

Keywords: Hearing Aids; Hearing Disorders; Patient Satisfaction; Portugal; Surveys and Questionnaires

RESUMO

Introdução: O questionário *Satisfaction with Amplification in Daily Life* (Satisfação com a Amplificação no Dia-a-Dia) consiste numa escala simples e de rápida aplicação para avaliar a adaptação dos indivíduos que utilizam próteses auditivas. O objetivo deste estudo é a validação para o português de Portugal desta escala, através da sua tradução e adaptação cultural. Apresenta-se também a avaliação da reprodutibilidade e a descrição dos resultados da aplicação deste questionário em doentes adaptados com prótese auditiva.

Material e Métodos: Participaram no estudo 147 indivíduos adaptados com prótese auditiva (uni ou bilateral), no mínimo com seis semanas de uso, seguidos no Serviço de Otorrinolaringologia do Hospital Egas Moniz (Lisboa). Foi pedida a autorização e normas para a tradução do questionário à autora da escala e realizada a tradução e retroversão do questionário, adaptação cultural, avaliação da reprodutibilidade e da consistência interna.

Resultados: Do grupo observado, 54% dos indivíduos eram do género masculino e 46% do feminino, com idades compreendidas entre os 16 e 93 anos (66,09 ± 17,41 anos). Os resultados obtidos neste estudo demonstram um nível de satisfação global de 5,34 nos utilizadores de próteses auditivas. O nível de satisfação das subescalas foi de 5,88 nos efeitos positivos, 5,25 em serviços e custo, 4,24 nos fatores negativos e 5,57 na imagem pessoal. O valor 0,75 do α de Cronbach demonstra existir uma boa consistência interna da escala. Para a pontuação global e das subescalas do questionário, os resultados médios obtidos demonstram não haver diferenças significativas com a escala americana. Verifica-se ainda haver uma boa reprodutibilidade inter-pesquisadores.

Discussão: Este estudo apresenta resultados confiáveis da escala para o português de Portugal e valores de consistência interna adequados, numa amostra de grande variabilidade etária.

Conclusão: A adaptação do *Satisfaction with Amplification in Daily Life* para português de Portugal deve ser considerada um bom instrumento para a avaliação da satisfação dos utilizadores de próteses auditivas e é, até ao momento, a única escala neste domínio validada para aplicação na população portuguesa.

Palavras-chave: Inquéritos e Questionários; Perturbações da Audição; Portugal; Próteses Auditivas; Satisfação do Doente

INTRODUCTION

According with the World Health Organization, there are approximately 278 million people worldwide with some degree of disabling hearing loss[1] and around 10% of the Portuguese population is affected, increasing to around 16.5% when the elderly population is considered.[2]

Aural rehabilitation provides solutions aimed at

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minimizing the hearing handicap and disadvantage of patients with hearing loss. The selection of a hearing aid device is the primary approach when no medical or surgical treatment is possible.

Different instruments for the evaluation of current hearing aid wearer satisfaction and scales aimed at the assessment of the different elements related to its use have been used.[3-9]

Self-assessment questionnaires are simple, fast and efficient for the evaluation of the patient through the adaptation to a hearing aid device. The APHAB (*Abbreviated Profile of Hearing Aid Benefit*),[3,10] the HHIE (*Hearing Inventory for the Elderly*)[11] and the HHIA (*Hearing Handicap Inventory for the Adults*) have already been translated for European Portuguese.[12,13]

Hearing aid wearer satisfaction in daily living have also been analysed with the questionnaire *Satisfaction with Amplification in Daily Life* (SADL), which has been developed and validated by different studies.[4,14-21] However, this scale has not yet been translated and validated for European Portuguese (EPt).

Hearing aid wearer level of satisfaction, as well as auditory benefits and psycho-social disadvantages related to the use of hearing aid devices are assessed by the SADL scale (Appendix 1) [http://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/7794/4933] and the quantification of these different elements is obtained using four subscales: Positive Effect, Service and Cost, Negative Features and Personal Image (*Efeitos Positivos, Custos e Serviços, Fatores Negativos e Imagem Pessoal*).

This study aimed at the translation and validity of the SADL scale for EPt, including cultural adaptation of the scale to be used in the Portuguese population, the assessment of its reproducibility and the description of the results of the application of the scale to hearing aid wearers.

MATERIAL AND METHODS

This study was analysed and approved by the Ethics Committee (*Comissão de Ética para a Saúde (CES)*) of the *Centro Hospitalar de Lisboa Ocidental (Centro Hospitalar Lisboa Ocidental - CHLO)* in 23 November 2015. Patients over the age of 18 or their legal representatives (when underage), gave their informed written consent to participate in the study.

A convenience sample has been used, involving 147 patients aged over 16 attending the ENT (Ear, Nose and Throat) Department at the Hospital Egas Moniz - *CHLO* and evenly distributed according to gender. The following inclusion criteria were used: postlingual hearing loss, bilateral hearing loss (not necessarily symmetrical), adaptation to hearing aid (uni or bilateral), ability to understand and read in Portuguese and having responded to all SADL subscales. Patients with severely impaired ability to understand and respond to the SADL questionnaire as well as those who declined to participate in the study were excluded from the study.

Authorisation and translation requirements request

A request for authorisation and translation requirements was sent to the author of the scale, Robyn M. Cox, Hearing Aid Research Lab (HARL), University of Memphis School of Audiology and Speech-Language Pathology and was granted on Aug 25, 2015.

Procedures

A- Translation from English to Portuguese and linguistic adaptation

The questionnaire was given to two English translators/interpreters fluent in Portuguese who have not met before and who have not previously had any contact with the questionnaire, in order to obtain two independent translations of the SADL scale.

B- Revision of the Portuguese translation by a group of revision

Both documents were analysed by a three-element group of revision including two Portuguese ENT specialists and one audiologist (with fluency in English) and by consensus:

- The differences between both translations were reduced and the best expressions and words for each item were selected,
- The text was adapted to the Portuguese cultural knowledge.

A single and new questionnaire has been obtained, called Portuguese *Satisfaction with Amplification in Daily Life* or Portuguese SADL.

C- Revision of the grammatical and idiomatic equivalence

A copy of the Portuguese SADL was given to two different English translators-interpreters, with no prior knowledge of the original content, in order to avoid any influence on the translation of the words and a back translation of the questionnaire has been obtained. The same revision group analysed both new versions and compared these with the English original.

D- Cultural adaptation

The questionnaires responded by the initial 24 patients were used for the cultural adaptation and reproducibility. The cultural adaptation of the Portuguese SADL aimed at establishing the cultural equivalence between the English and the Portuguese versions of the questionnaire:

- In total, 24 hearing aid wearers were individually interviewed.
- The questionnaire was initially applied by the first interviewer (#1) by orally reading each item, in order to include any illiterate patient or with some sort of vision disorder.

The cultural equivalence was established when at least 80% of the patients did not have any difficulty in understanding and responding to each item.[22,23] Whenever a lower percentage was obtained with an item, this was

individually submitted to a new translation process.

E- Reproducibility of the questionnaire

In order to test inter-examiner reproducibility, the questionnaire was applied:

- To the same 24 patients that were interviewed on the stage of cultural adaptation;
- By a second interviewer (#2);
- Preferably on a different day from the day of the first interview.

The comparison between the results obtained in both questionnaires applied by different interviewers was used for the assessment of inter-examiner reproducibility.

F- Internal consistency

Internal consistency reliability of the instrument was evaluated. The questionnaire was applied to the remaining patients up to a total of 147 patients. Internal consistency of the global scale and subscales was analysed, aimed at its validity and at its further application to research.

Scoring

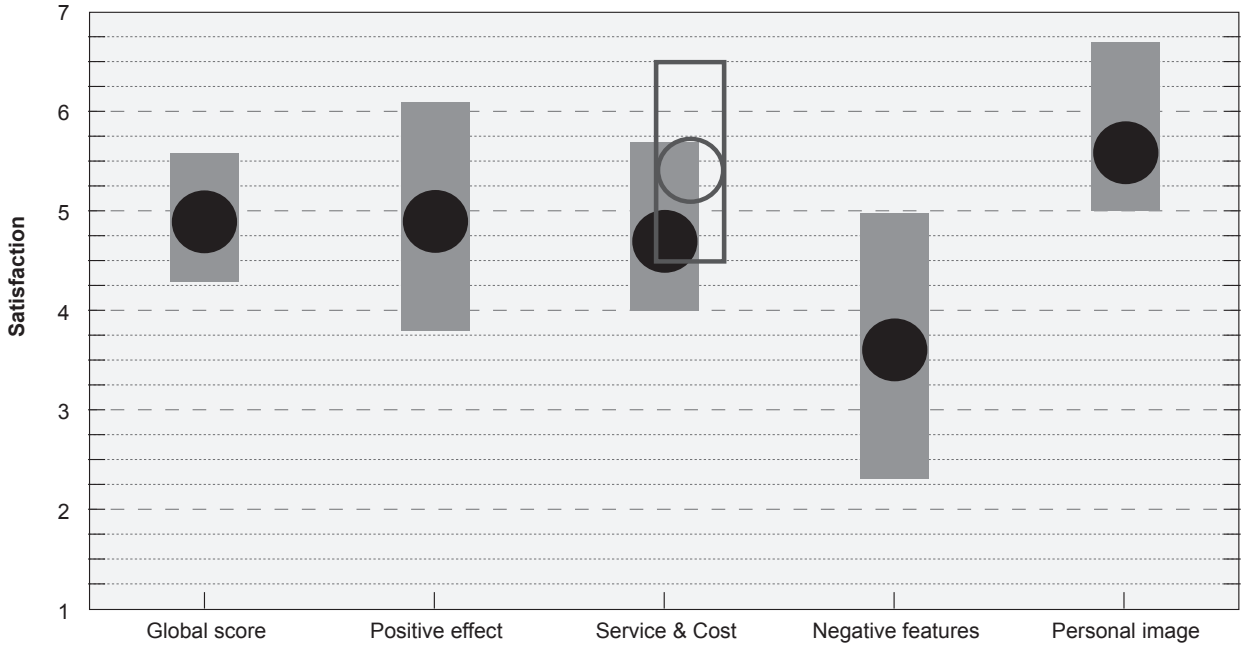
A global score and a score for each of the four subscales was obtained. A categorical and ordinal scale was used for each item response, ranging from A to G and with different scoring (Table 1). Responses given by each patient to 11 out of 15 items of the SADL scale directly matched the scoring scale (i.e., ranging from 1 point assigned to an A response, to 7 points assigned to a G response) and had a reverse scoring in the remaining items (items 2, 4, 7 and 13) (i.e., 7 points were assigned to the A response, corresponding to higher satisfaction).

Item scoring was designed so that satisfaction is reflected by a higher score. A score is also obtained for each of the four subscales and may be compared to the guideline values from the original study (Cox and Alexander, 1999); in addition, the scores for each subscale may be computed (SADL *scoring software*® for Windows, version 1.1) based on mean scores for each item. All subscales must have been scored in order to be considered as valid and to be used for the analysis. The four subscales of the SADL correspond to four different domains reflecting the elements for global satisfaction. This way, mean scores for each subscale and for global satisfaction were obtained (Fig.1).

The questionnaire was initially administered in a pencil and paper format, as suggested by the authors of the scale, even though we have chosen to read it out loud and have asked the patient to write down the responses

Table 1 - Subscales of the questionnaire. Scoring.

Subscale SADL	Assessed subject	Items
Positive effect	Acoustic and psychological benefit	1, 3, 5, 6, 9 and 10
Service and cost	Hearing aid dispenser's professional skills, cost and number of repairs	12, 14 and 15
Negative features	Amplification of environmental noise, feedback and use of the phone	2, 7 and 11
Personal image	Aesthetics and stigma regarding the use of prosthesis	4, 8 and 13
Not a reverse item	A-G response, 1 - 7 score	1, 3, 5, 6, 8, 9, 10, 11, 12, 14 and 15
Reverse item	A-G response, 7 - 1 score	2, 4, 7 and 13



Black circle: Mean score; Gray bar: 20th to 80th percentile scores; Clear augmentation to "Service & Cost": For patients who receive a free hearing aid from the VA.

Figure 1 – Image of the software where each subscale score is ranked

during an interview in the stage of cultural adaptation and inter-examiner reproducibility, allowing the patients to better understand the items as well as the response options, in order to avoid difficulties in responding to the questionnaire.

Statistical methods

Data were entered into a database using the Statistical Package for The Social Sciences (SPSS)® version 21.0 for Windows software.

The following were used for the analysis of the different variables:

- Descriptive statistical analysis producing mean, standard deviation and range of scores for each item on both applications (interviews) and mean score of both applications.
- One-sample t-test was used for cultural validity and the results have been compared to mean scores of the American sample (Cox and Alexander, 2001). The levels of satisfaction were compared to those obtained in the American sample.
- As data were numerical and followed a normal distribution, interclass correlation coefficient has been used in the analysis of reproducibility.
- Scale reliability was assessed through its internal consistency and Cronbach's alpha, average inter-item correlation and item-total correlation range were calculated.

A 5% level of significance was used for the statistical tests.

RESULTS

In total, 147 hearing aid wearers (54% male, 16-93 age range, 66.09 years - mean age, 17.41 - standard deviation) participated in the study.

A descriptive analysis of the scores for each item of the questionnaire is shown in Table 2A, based on the responses of our group of patients. The responses obtained with the initial 24-patient group from the main examiner (interviewer #1) were considered, as the comparison of each item's score between the first and the second application of the questionnaire did not show statistically significant differences. In our group of hearing aid wearers, highest satisfaction levels were found in the following items: item 12 (6.61), item 6 (6.45), item 3 (6.23) and item 1 (6.10), while lowest were found in item 14 (3.50) and 2 (4.01). Minimum scores were found in all the items, except in items 1, 3, 5 and 12 and maximum values were found in all the items. Highest standard deviations were found in items 7, 2 and 11 and lowest in 12 and 6.

Global scores and scores for the four subscales are shown in Table 3: mean, standard deviation, range of scores. Highest satisfaction scores were obtained in positive effect (5.88) and personal image (5.57) and lowest in negative features (4.24). Positive effect (5.88) and personal image (5.57) subscale scored above mean global score (5.34); service and cost (5.25) and negative features (4.24) scored below.

The descriptive analysis of the additional items (Table 4) showed that almost all the patients presented with moderate to severe hearing difficulty, an 8-16-hour daily hearing aid use, mostly with over 10 years hearing aid experience, 1-10 years current hearing aid experience and around two thirds of the patients described unaided hearing difficulty.

The comparison between the global score and subscale scores obtained in our study and those obtained in the American study (Cox and Alexander) is shown in Table 5. A one-sample t-test has been used and statistically significant differences were found between both samples regarding global and subscale scores, except regarding personal image subscale, in which higher scores were found in the Portuguese group of patients. However, mean scores in the Portuguese sample were within the range from the 20th to the 80th percentiles in all the dimensions.

The questionnaire's reproducibility was tested using interclass correlation coefficient (Table 6) as data were numerical and followed a normal distribution. The results showed a strong correlation between examiners (over 0.8) except regarding personal image subscale, even though it was acceptable.

Cronbach's alpha coefficient was obtained for all the subscales and was used to show the internal consistency of the instrument. The results obtained for Cronbach's alpha, inter-item average correlation and item-total correlation

Table 2 - Descriptive analysis of mean scores for each item

Item	n	M	SD	Min	Max
1	147	6,10	1.02	3	7
2	147	4.01	1.93	1	7
3	147	6.23	1.09	2	7
4	147	5.42	1.68	1	7
5	147	5.51	1.36	2	7
6	147	6.45	0.94	1	7
7	147	4.13	2.07	1	7
8	147	5.50	1.21	1	7
9	147	5.76	1.26	1	7
10	147	5.22	1.16	1	7
11	147	4.57	1.83	1	7
12	147	6.61	0.67	4	7
13	147	5.79	1.69	1	7
14	147	3.50	1.49	1	6
15	147	5.62	1.31	1	7

M: Mean; SD: Standard deviation; Min: Minimum; Max: Maximum

Table 3 - Descriptive analysis of mean scores for each subscale

	n	M	SD	Min	Max
Positive effect	147	5.88	0.89	2.50	7.00
Service and cost	147	5.25	0.86	2.33	6.67
Negative features	147	4.24	1.26	1.00	7.00
Personal image	147	5.57	0.99	2.67	7.00
Global	147	5.34	0.69	2.67	6.73

M: Mean; SD: Standard deviation; Min: Minimum; Max: Maximum

range are shown in Table 6. Global and positive effect subscale showed adequate internal consistency values, with Cronbach's alpha values of 0.75 and 0.87, respectively. Service and cost showed an acceptable internal consistency value, considering that only three items are included in this subscale, with a Cronbach's alpha of 0.52. However, low internal consistency values were found in negative features and personal image subscales.

DISCUSSION

SADL is a useful and reliable instrument for clinical use as it is relatively short, with only 15 items, for the assessment of the multidimensional nature of satisfaction and the identification of problems in hearing aid wearers, providing a global score and a score for each of the four subscales.

The results obtained in this study showed a global satisfaction 5.34 score in hearing aid wearers. A 5.88 score was obtained in positive effects and 5.57 in personal image subscales, both above the mean global score while a 4.24 score in negative features and 5.25 in service and cost, below the mean global score (Fig. 2). A value of 0.75 in Cronbach's alpha coefficient showed good internal consistency of the SADL scale (values above 0.7 reflect good consistency). Mean global and subscale scores obtained in this study are in line with those obtained with the American sample, within the range from the 20th to the 80th percentiles and also showed a good inter-examiner reproducibility.

This study involved patients across a wide age range (16-93), even though most patients were aged over 50 (mean age of 66.09 years and standard deviation of 17.41 years). Adequate internal consistency values were found for the overall scale, even though lower values were found regarding three subscales and a more careful interpretation of the results of these dimensions was necessary. However, the presence of lower internal consistency values in subscales is a normal event and the same happened in the original scale[4,14] in which a 0.82 value of Cronbach's alpha coefficient was found (in line with the value obtained in this study), although lower values of internal consistency were found in service and cost (0.61) and personal image (0.56) subscales.

Higher satisfaction levels in positive effect were found in our group of patients (mainly in items 1, 3 and 6). This result is in line with other studies[4,16,19,24,25] and has been related to the feeling of satisfaction generated by the improved communication. In addition, a higher expectation of some benefit with hearing aid use will be reflected by a better adaptation and higher satisfaction.[14] A high satisfaction was

Table 4 - Descriptive analysis of the results regarding the additional items of the questionnaire

Item		Result
Experience with current hearing aid	Less than 6 weeks	11%
	6 weeks to 11 months	23%
	1 to 10 years	54%
	Over 10 years	12%
Lifetime hearing aid experience	Less than 6 weeks	5%
	6 weeks to 11 months	12%
	1 to 10 years	37%
	Over 10 years	46%
Daily hearing aid use	4-8 hours	15%
	8-16 hours	85%
Degree of hearing difficulty	Mild	6%
	Moderate	50%
	Severe	44%
Hearing difficulty unaided on the telephone	Yes	33%
	No	67%

Table 5 - Comparison between the global and subscale scores obtained by our group of patients and by the American sample within the range from the 20th to the 80th percentiles

SADL domain	Cox & Alexander	Sample			
			t-test	DF	*p*
Positive effect	4.9 (3.8 - 6.1)	5.88 (5.33 - 6.67)	13.31***	144	< 0.001
Service and cost	4.7 (4.5 - 6.5)	5.25 (4.67 - 6.00)	7.74***	141	< 0.001
Negative features	3.6 (2.3 - 5.0)	4.24 (3.00 - 5.33)	6.07***	141	< 0.001
Personal image	5.6 (5.0 - 6.7)	5.57 (5.00 - 6.33)	0.36***	145	0.723
Global	4.9 (4.2 - 5.9)	5.34 (4.80 - 5.87)	7.71***	146	< 0.001

*** $p \leq 0.001$

Table 6 - Dimension reliability

	Cronbach's alpha	Inter-item average correlation	Item-total correlation range	Interclass correlation
Positive effect	0.87	0.537	0.492 - 0.780	0.88
Service and cost	0.52	0.293	0.323 - 0.431	0.91
Negative features	0.30	0.116	0.014 - 0.283	0.95
Negative features	0.29	0.124	0.096 - 0.227	0.69
Global	0.75	0.217	0.130 - 0.560	0.85

also found regarding hearing aid dispenser's professional skills (item 12), which may relate to the fact that mainly wearers of a single brand of hearing aid devices were included in the study. A good satisfaction regarding hearing aid reliability was also found (item 15). The meaning of these results is reinforced by the fact that almost half of the patients (46%) had over 10-year hearing aid experience and 95% had over one-year experience.

The lowest satisfaction was described as regards the cost of the hearing aid device (item 14) as well as the amplification of environmental noise (item 2). The first issue may relate to the Portuguese socioeconomic level making the purchase of a hearing aid device very expensive, which was not found so clearly in other studies. The amplification of environmental noise with an interference with speech understanding is an important issue, even though not preventing patients from using a hearing aid device.[26]

The use of the telephone was also related with lower satisfaction (item 11). The difficult unaided use of the telephone was already considered as one of the most important issues.[16,19,27] Any improvement in the results may have been due to technological improvements, with an increasing use of mobile phones and an improved connection with the hearing aid, as well as to the recommendations and training in the use of a telephone.

Highest standard deviations were found in items 2, 7 and 11, which were included in negative features subscale. This domain was designed by the authors and aimed at the gauge of problems related to the adaptation and to the performance of the wearer in a noisy environment, with feedback and the use of a telephone. Conversely, lowest standard deviation values were found in service and cost (item 12), which may relate to a higher matching opinion in this domain. Combined with the high satisfaction score found in this item (6.61), this would counter the general impression of low satisfaction in this domain.

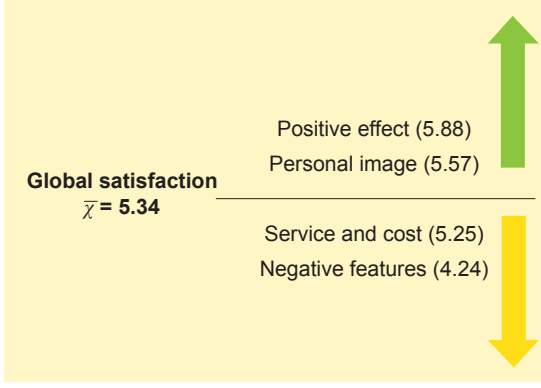


Figure 2 – Subscale ranking as regards global satisfaction

Only one item showed higher complexity as regards the understanding of its application (item 7), requiring an additional explanation, not only due to the specificity of the question as also due to the difficult explanation of the feedback (whistling) concept, in line with what was found by the authors of the scale. This question had to be reworded in the validity of the scale.

The adaptation of a scale to a different language is not simply the translation. The application to a small target population (20-40 patients) is required for an instrument to be considered as culturally adapted.[22,23] The assessment of its reproducibility and the use of a sample with an adequate dimension allowing for the analysis of its internal consistency and reliability are crucial for its validity. Further research would be very useful in order to support these findings, even though this study showed reliable results with the SADL scale for EPt.

CONCLUSION

The adaptation of the SADL scale for EPt showed a good internal consistency, reproducibility and overlapping results with other studies. The authors have considered that this adaptation is a good instrument for the evaluation of hearing aid wearer satisfaction, as this is the single scale that, apart from having been translated, is culturally adapted and validated for EPt. The fact that this is a short questionnaire, its convenient scoring, numerical scores and its clinical use allow for the multidimensional assessment of hearing aid wearer satisfaction as well as for problem identification.

OBSERVATIONS

This EPt version of SADL scale was approved and published at the site of the Hearing Aid Research Lab (HARL) of the University of Memphis in http://www.harlmemphis.org.

HUMAN AND ANIMAL PROTECTION

This study was analysed and approved by the Ethics Committee of the *Centro Hospitalar de Lisboa Ocidental* in 23 November 2015. The authors declare that the followed procedures were according to regulations established by the Ethics and Clinical Research Committee and according

to the Helsinki Declaration of the World Medical Association.

DATA CONFIDENTIALITY

The authors declare that they have followed the protocols of their work centre on the publication of patient data.

CONFLICTS OF INTEREST

The authors declare that there were no conflicts of interest in writing this manuscript.

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