





# Evaluation of the Ability to Sing Easily: Adaptation and validation to the European Portuguese language

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## ABSTRACT

**Introduction:** A number of voice assessment tools are currently in use in both clinical and research settings. The Evaluation of the Ability to Sing Easily offers a comprehensive self-assessment tool designed for singers. EASE captures subtle changes in vocal health by inquiring about the subject's current experience. This makes Evaluation of the Ability to Sing Easily a valuable tool for the early identification of vocal issues and the monitoring of a singer's overall vocal health.

**Objective:** This study aimed to adapt and validate the Evaluation of the Ability to Sing Easily for European Portuguese and assess its psychometric properties.

**Methodology:** A five-step cross-cultural adaptation process was followed, including forward translation, backward translation, committee review, pilot testing, and finalization. The Evaluation of the Ability to Sing Easily for European Portuguese was then administered to 120 singers (Fado and Choir) to evaluate internal consistency and known-groups validity.

**Results:** The pilot test identified and resolved ambiguities in seven Evaluation of the Ability to Sing Easily for European Portuguese items. Internal consistency was high, with Cronbach's alpha exceeding 0.80 for the Evaluation of the Ability to Sing Easily scale and sub-scales in both Fado and Choir singers. Fado singers reported higher vocal fatigue scores, while Choir singers reported higher Pathologic Risk Indicators scores. A weak negative correlation between singing load and PRI scores was observed in Choir singers.

**Conclusion:** The Evaluation of the Ability to Sing Easily for European Portuguese demonstrates good internal consistency and cultural relevance for Portuguese singers. Known-groups validity suggests potential differences in vocal function between Fado and Choir singers. Further research is needed to explore external validity, test-retest reliability, and applicability to other singing styles.

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## INFORMAÇÃO DO ARTIGO

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## RESUMO

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**Introdução:** Atualmente, são utilizadas várias ferramentas de avaliação da voz, tanto em contextos clínicos como de investigação. O *Evaluation of the Ability to Sing Easily* oferece uma ferramenta de autoavaliação abrangente concebida para cantores. O *Evaluation of the Ability to Sing Easily* capta alterações subtis na saúde vocal, focando-se na experiência atual do sujeito. Considera-se, portanto, o EASE como uma ferramenta valiosa para a identificação precoce de problemas vocais e para a monitorização da saúde vocal geral de um cantor.

**Objetivos:** Este estudo teve como objetivo adaptar e validar o *Evaluation of the Ability to Sing Easily* para a língua portuguesa europeia e avaliar as suas propriedades psicométricas.

**Metodologia:** Foi adotada uma abordagem de cinco etapas para assegurar a adaptação transcultural do instrumento, incluindo a tradução direta, a retrotradução, pareceres do comité e testes-piloto.

**Resultados:** O teste-piloto foi realizado com dez cantores, o que determinou a reformulação de sete itens, permitindo assim a formulação do formulário final. O *Evaluation of the Ability to Sing Easily* para a língua portuguesa europeia foi preenchido por 120 cantores, com idades compreendidas entre os 18 e os 72 anos, sendo 58,3% do sexo feminino. Os resultados medianos foram significativamente superiores para os cantores de Coro, exceto num item em que a mediana foi significativamente superior para os cantores de Fado. Obteve-se uma elevada consistência interna, com um alfa de Cronbach > 0,80 para o *Evaluation of the Ability to Sing Easily*, tanto para fadistas como para coralistas, e as suas subescalas aproximaram-se ou excederam 0,80.

**Conclusões:** O *Evaluation of the Ability to Sing Easily* para a língua portuguesa europeia pode ser considerado um instrumento fiável para aplicar no caso dos cantores portugueses, uma vez que os resultados suportam a capacidade do *Evaluation of the Ability to Sing Easily* para a língua portuguesa europeia para medir os mesmos constructos de uma forma semelhante à da versão original.

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## Introduction

A range of voice-related patient-reported outcome measures (PROMs) have been developed for use in clinical and research settings, with varying levels of reliability and validity.<sup>1</sup> One such widely known PROM in the context of voice assessment is the Voice Handicap Index (VHI), which was first published in 1997<sup>2</sup> and later validated in 2004<sup>3</sup> for use with European Portuguese speakers. A number of versions of this gold standard instrument have been developed for use with different clinical populations. However, one of these, the Singing Voice Handicap Index (SVHI),<sup>4</sup> is worthy of particular mention in the context of this paper, since it has been widely used. The Singing Voice Handicap Index (SVHI) is a valuable tool for assessing the severity of voice issues in singers, as it captures specific complaints related to their singing voice.<sup>5</sup> Upon analysis of the content of SVHI, it can be observed that the instrument suggests to the participant that there is an implicit alteration. It is not possible for such an event to occur with the instrument that this paper intends to adapt and validate – the Evaluation of the Ability to Sing Easily (EASE) was developed with the objective of measuring the symptom and symptom burden associated

with vocal load on the voice of singers. It was first developed in Australia with the contribution of a large sample of musical theatre singers.<sup>6</sup>

EASE can be considered an innovative instrument, with several reasons attributing to this quality, for instance, it is quick to administer and user-friendly. During an assessment, the singer is asked to answer according to the status, thereby, eliminating the recall bias which is more reliable for symptom evaluation.<sup>7,8</sup> Perhaps the most notable distinction is that it does not assume an already established alteration in a singer's voice, nor is it a disease-specific instrument which allows the capturing of even the slight differences in the singer's vocal health. In addition, it can also screen singers at risk for developing voice disorders.

According to the original authors,<sup>6</sup> this scale intends to be useful to determine: (i) load thresholds and vocal doses, (ii) determine recovery times to assist performance scheduling and quotas, (iii) predict voice problems evolution, (iv) monitor therapeutic outcomes, and (v) determine performance fitness.

The ability of EASE to predict findings regarding instrumental evaluation is still unknown and requires further study. Though, some advances have been already achieved regarding EASE's usability from the clinical standpoint.<sup>9-12</sup>

Lately, studies have focused on exploring the construct validity of the scale and respective sub-scales (VF = Vocal Fatigue, PRI = Pathologic Risk Indicators), as well as the Vocal Concern (VC) items.<sup>11</sup> The subsequent analysis revealed highly statistically significant differences concerning whether singers perceived themselves as having a voice problem. EASE was also able to discriminate active and nonactive singers, and correspondingly, in an active cohort, it was able to discriminate between gender, role, and the perceived voice problem. Higher scores in the VF sub-scale were found to be associated with singers with a high vocal load. So far, these results validate the functionality of EASE as a useful tool for measuring the singers' perceptions of vocal function. Also, it supports the ability of the sub-scales to be scored separately.

During the study in addition to the cross-cultural adaptation to Brazilian Portuguese,<sup>13</sup> the validity, reliability, and sensitivity measures have also been calculated for the same language, along with the cut-off values for individuals at a risk for developing voice disorders.<sup>14</sup> The authors of the cross-cultural adaptation and validation of the EASE for Kannada-Speaking applied it to a sample of Carnatic classical singers.<sup>15</sup> Their conclusions emphasized and overlapped the results of the previous similar works regarding validity and reliability. Through a cross-cultural adaptation, the cultural and linguistic equivalence of the EASE protocol in Chilean Spanish was also achieved.<sup>16</sup> Lately, it was found that singers who received education in vocal health had significantly lower, therefore better, EASE scores.<sup>17</sup>

The purpose of this study is to allow the use of EASE in a country and for a language other than the original, in the context of the respective culture. Thus, the aim of this study is to conduct a cross-cultural adaptation and validation of the original EASE for European Portuguese language (EASE-PT).

## Methodology

This research project has been approved by the Ethical Committee of the Fernando Pessoa University.

### *The instrument*

EASE is a vocal function self-report instrument, which is intended to be sensitive enough to quantify subtle nuances of a singer's voice. This scale aims to reflect how singers' voice is feel and sound at the time of the administration measuring their perceptions of their vocal status. It is composed of twenty-two items with good psychometric properties and includes descriptors of vocal fatigue and impairment.

### *Cross-cultural adaptation*

The cross-cultural adaptation followed the guidelines from Sousa and Rojjanasrirat.<sup>18</sup> First phase – one-way translation: The forward translation (FT) from the source language (SL) (i.e., English) to the target language (TL) (i.e., Portuguese) was done by two independent, and certified translators native to the TL (FT 1 and FT 2). Specifically, one expert is from the specific field under study and skilled about health care terminology; the other expert is only familiar with medical terminology and is not aware of the construct of the instrument. Second phase – comparison of the two translated versions: The comparison was conducted through a committee approach, by including a third independent reviewer (CR). The purpose was to utilize a third eye in the identification of ambiguities and discrepancies. During the analysis, a consensus was achieved among the previous translators and the authors of this paper. This process generated the preliminary initial (PI) translated version of the EASE-PT. Third phase – blind backward translation: The PI was translated back into the source language by two independent translators (BT 1 and BT 2). Specifically, the expertise credentials of these individuals are aligned with the characteristics of the translators of the 1st phase, but with English as their native language. Fourth phase – comparison of the two back-translated versions: This phase entailed conducting a comparison of the two back-translations, and of both the forward translations with the original version. A consensus was achieved among the previous translators and the authors of this paper in the same way as the second phase. The process involved a discussion of similarities and discrepancies. Fifth phase – pilot testing of the pre-final version: The pilot test was done through a pre-final version of the scale. In the line with the mentioned recommendations, ten participants with different backgrounds were recruited. Participants were asked to rate the items of the scale, deciding whether each one was clear or unclear. They were asked to provide a suggestion if the item was rated as unclear, and subsequent to the feedback, the item was reformulated assuming a minimum inter-rater agreement of 80%.

### *Data collection*

The pilot test was sent to the participants through either through email in a spreadsheet or presented in-person and filled by hand. The final version of the instrument was administered through Lime Survey version 2.63.1+170305 hosted in a private domain, for the duration of 25<sup>th</sup> April 2018 and it lasted till 10<sup>th</sup> June 2018. At the end of the administration, the participants were provided with leaflets containing scientific information on vocal hygiene for singers. As per the ethical guidelines, confidentiality was

ensured along with the impossibility to respond more than once through the creation of individual tokens.

In addition, more characterization questions were added in an attempt to meet the results of the original version. Participants were recruited using convenience/snowball sampling techniques. The inclusion criteria for these participants were being an active singer of Fado or Choir singer and older than 18 years old.

## Data analysis

Statistical analysis was performed using the IBM® SPSS® Statistics V25 (IBM® Corporation, Chicago, USA). The EASE-PT consisted of 22 questions, based on the original scale, with four possible answers to describe the situation frequency: “*De modo nenhum* – Not at all (1)”, “*Suavemente* – Mildly (2)”, “*Moderadamente* – Moderately (3)” and “*Extremamente* – Extremely (4)”. Of the 22 questions, 19 questions focused on fatigue and vocal limitations, and the other 3 focused on positive aspects. The score was a simple sum of the 19 negative items and the 3 positives added reversely [“Not at all (4)”, “Mildly (3)”, “Moderately (2)” and “Extremely (1)”.]. As such, the EASE-PT measure values may vary from 22 up to 88.

The descriptive statistics of the all questions from the EASE-PT scale and subscales were calculated. The negatively scored items were identified and interpreted accordingly. Differences in the median value of the scale and subscales or of the items according to several independent variables (group, gender, voice use in the previous day) were identified through the Mann-Whitney test. The correlation between these scales and age or workload in the previous week was assessed using the Spearman correlation coefficient.

## Validation

In order to calculate the scale properties and construct validity, the following parameters were evaluated: (a) item-internal consistency; (b) equality of item-scale correlations within a scale; (c) approximate equality of item means and standard deviations. Also, the internal consistency reliability of the scale and each subscale’s score was estimated through Cronbach’s alpha coefficient. The known-groups validity was also evaluated.

## Results

### Cross-cultural adaptation for the European Portuguese language

The results of the adaptation of the instrument are detailed in Table 1. In the 5th phase, ten singers were recruited: two Fado singers and eight Choir singers. During the survey, seven items were classified as unclear by at least 20% of the subjects, thereby highlighting the need to further revise seven items (namely, 2, 4, 5, 6, 7, 11, 20) in the questionnaire. To be more precise, these subjects pointed out some difficulties in understanding terms such as “scratchy, overworked muscles, breathiness, voice feeling good, and delayed onset of notes. Also, difficulties were identified in finding native words to distinguish “worried” and “concerned”. The final form of such items was achieved by combining the singers’ recommendations and the committee’s opinions. The final and full version of the scale, called EASE-PT, is presented in Appendix 1.

**Table 1.** Summary of cross-cultural adaptation of EASE-PT

Scale	Original items	1 <sup>st</sup> and 2 <sup>nd</sup> phase	3 <sup>rd</sup> and 4 <sup>th</sup> phase
Title	Evaluation of the Ability to Sing Easily	FT 1 – Avaliação da Capacidade para Cantar com Facilidade FT 2 – Avaliação da Capacidade para Cantar com Facilidade CR – (no change)	BT 1 – Evaluation of Ability to Sing with Ease BT 2 – Assessing the Ability to Sing with Ease CR – Avaliação da Capacidade para Cantar com Facilidade
VF	1. My voice is husky	FT 1 – A minha voz está rouca FT 2 – A minha voz está rouca CR – (no change)	BT 1 – My voice is hoarse BT 2 – My voice is hoarse CR – A minha voz está rouca
VF	2. My voice is dry/scratchy	FT 1 – A minha voz está seca/arranhada FT 2 – A minha voz está seca/arranhada CR – (no change)	BT 1 – My voice is dry/scratchy BT 2 – My voice is dry/scratchy (raspy) CR – A minha voz está seca/arranhada
PRI	3. My voice cracks and breaks	FT 1 – A minha voz muda e tem falhas FT 2 – A minha voz muda e tem falhas CR – A minha voz quebra e falha	BT 1 – My voice changes and makes mistakes BT 2 – My voice changes and falters CR – A minha voz quebra e falha
VF	4. My throat muscles are feeling overworked	FT 1 – Os músculos da minha garganta estão sobrecarregados FT 2 – Os músculos da minha garganta estão exaustos CR – Os músculos da minha garganta estão sobrecarregados	BT 1 – My throat muscles are strained BT 2 – My throat muscles are overworked CR – Os músculos da minha garganta estão sobrecarregados
PRI	5. My voice is breathy	FT 1 – A minha voz está soprada (ar na voz) FT 2 – A minha voz está aspirada CR – A minha voz está soprada	BT 1 – My voice is wheezy (air in the voice) BT 2 – My voice is airy (air in the voice) CR – A minha voz está soprada
VF	6. My singing voice feels good*	FT 1 – A minha voz a cantar é agradável FT 2 – A minha voz a cantar proporciona uma sensação agradável CR – A minha voz a cantar é boa	BT 1 – My singing voice is pleasant BT 2 – My singing voice is pleasant CR – A minha voz a cantar é boa
VF	7. The onsets of my notes are delayed or breathy	FT 1 – Os inícios das minhas notas são atrasados ou soprados FT 2 – Os inícios das minhas notas são atrasados ou aspirados CR – Os inícios das minhas notas são atrasados ou soprados	BT 1 – The beginnings of my notes are delayed or wheezy BT 2 – My beginnings of notes are delayed or airy CR – Os inícios das minhas notas são atrasados ou soprados
VF	8. My voice feels strained	FT 1 – A minha voz está tensa	BT 1 – My voice feels tight

Scale	Original items	1 <sup>st</sup> and 2 <sup>nd</sup> phase	3 <sup>rd</sup> and 4 <sup>th</sup> phase
		FT 2 – A minha voz está tensa CR – (no change)	BT 2 – My voice is tense CR – A minha voz está tensa
VC	9. I am worried about my voice	FT 1 – Estou preocupado com a minha voz FT 2 – Estou angustiado(a) com a minha voz CR – Estou preocupado(a) com a minha voz	BT 1 – I am worried about my voice BT 2 – I am worried about my voice CR – Estou preocupado(a) com a minha voz
PRI	10. I am having difficulty with my breath for long phrases	FT 1 – Estou a ter dificuldades com a minha respiração em frases longas FT 2 – Estou a ter dificuldades com a minha respiração em frases longas CR – (no change)	BT 1 – I am having difficulty with my breathing with long phrases BT 2 – I am having trouble breathing in long sentences CR – Estou a ter dificuldades com a minha respiração em frases longas
VF	11. My top notes are breathy	FT 1 – As minhas notas mais altas são sopradas FT 2 – As minhas notas altas são aspiradas CR – As minhas notas mais agudas são sopradas	BT 1 – My higher notes are wheezy BT 2 – My highest notes are airy CR – As minhas notas mais agudas são sopradas
VF	12. My voice sounds rich and resonant*	FT 1 – A minha voz soa de forma rica e sonante FT 2 – A minha voz soa de forma profunda e ressonante CR – A minha voz soa de forma rica e sonante	BT 1 – My voice sounds rich and vibrant BT 2 – My voice sounds rich and full CR – A minha voz soa de forma rica e sonante
PRI	13. My voice is cutting out on some notes	FT 1 – A minha voz falha em algumas notas FT 2 – A minha voz falha em algumas notas CR – (no change)	BT 1 – My voice misses some notes BT 2 – My voice falters on a few notes CR – A minha voz falha em alguns notas
PRI	14. I am having difficulty singing softly	FT 1 – Estou a ter dificuldades em cantar de forma suave FT 2 – Estou a ter dificuldades em cantar de forma suave CR – Estou a ter dificuldades em cantar suavemente	BT 1 – I am experiencing difficulty singing gently BT 2 – I am having trouble singing softly CR – Estou a ter dificuldades em cantar suavemente
VF	15. My voice is tired	FT 1 – A minha voz está cansada FT 2 – A minha voz está cansada CR – (no change)	BT 1 – My voice is tired BT 2 – My voice is tired CR – A minha voz está cansada
PRI	16. I am having difficulty changing registers	FT 1 – Estou a ter dificuldades em mudar de registos FT 2 – Estou a ter dificuldades em mudar de registos CR – Estou a ter dificuldades a passar de registo	BT 1 – I am having difficulty switching registers BT 2 – I am having trouble switching scales CR – Estou a ter dificuldades a passar de registo
PRI	17. I am having difficulty with my high notes	FT 1 – Estou a ter dificuldades com as minhas notas agudas FT 2 – Estou a ter dificuldades com as minhas notas agudas CR – Estou a ter dificuldades com as notas mais agudas	BT 1 – I am having difficulty with sharp notes BT 2 – I am having trouble with my sharp notes CR – Estou a ter dificuldades com as notas mais agudas
PRI	18. Singing feels like hard work	FT 1 – Cantar é uma tarefa difícil FT 2 – Cantar é uma tarefa difícil CR – Sinto que cantar é uma tarefa difícil	BT 1 – Singing is a difficult task BT 2 – Singing is a difficult task / Singing is difficult CR – Sinto que cantar é uma tarefa difícil
PRI	19. I am having difficulty projecting my voice	FT 1 – Estou a ter dificuldades em projetar a minha voz FT 2 – Estou a ter dificuldades em projetar a minha voz CR – (no change)	BT 1 – I am having difficulty projecting my voice BT 2 – I am having trouble projecting my voice CR – Estou a ter dificuldades em projetar a minha voz
VC	20. I am concerned about my voice	FT 1 – Estou preocupado(a) com a minha voz FT 2 – Estou preocupado(a) com a minha voz CR – (no change)	BT 1 – I am worried about my voice BT 2 – I am worried about my voice CR – Estou preocupado(a) com a minha voz
VF	21. My voice feels ready for performance if required*	FT 1 – A minha voz está preparada para atuar, se necessário FT 2 – A minha voz está preparada para atuar se necessário CR – (no change)	BT 1 – My voice is ready to perform, if necessary BT 2 – My voice is ready to perform, if necessary CR – A minha voz está preparada para atuar, se for necessário
PRI	22. I am having difficulty sustaining long notes	FT 1 – Estou a ter dificuldades em manter as notas longas FT 2 – Estou a ter dificuldades em manter as notas longas CR – (no change)	BT 1 – I am having difficulty holding long notes BT 2 – I am having trouble holding long notes CR – Estou a ter dificuldades em manter as notas longas

\* Reverse scored items

## Descriptive Statistics for the Sample

Post the finalization of the scale, it was administered to a larger sample for the study. Overall, 122 respondents started answering but only 120 singers completed the EASE (all items). The age range varied between 18–72 years with a mean of 36.2 ( $\pm 12.8$ ) years and 70 respondents (58.3%) were female. Of the respondents, 78 (65%) were Choir singers (ages ranged from 18–69 years with a mean of 38.8 ( $\pm 13.0$ ) years, and 48 (61.5%) were female) and 42 (35%) were Fado singers (ages ranged from 18–72 years with a mean of 34.8 ( $\pm 12.6$ ) years, 22 (52.4%) were

female). Specifically, 8% were aged between 18–24 years, 38% 25–44 years, 32% 45–64 years, and 22% were 65 years or older.

Different results (Table 2) were obtained for Fado and Choir singers for several items (items 4, 12, 13, 14, 17, and 18) with a median result significantly higher for Choir singers ( $p < 0.05$ ) except for item 4 where median result was significantly higher for Fado singers. Owing to these differential quantifications, data analysis regarding the validation of the scale was conducted separately for both groups.

**Table 2.** Descriptive analysis of the 22 items of EASE-PT, and comparison by singer group.

Scale	Item	All		Fado	Choir	Fado	Choir	P	
		n (%)	Me (Q1-Q3)	n (%)	n (%)	Me (Q1-Q3)	Me (Q1-Q3)		
VF	1. My voice is husky	Not at all (1)	78 (65)		23 (54.8)	55 (70.5)		0.139	
		Mildly (2)	32 (26.7)	1 (1-2)	16 (38.1)	16 (20.5)	1 (1-2)		1 (1-2)
		Moderately (3)	10 (8.3)		3 (7.1)	7 (9)			
VF	2. My voice is dry/scratchy	Not at all (1)	65 (54.2)		18 (42.9)	47 (60.3)		0.082	
		Mildly (2)	43 (35.8)	1 (1-2)	19 (45.2)	24 (30.8)	2 (1-2)		1 (1-2)
		Moderately (3)	11 (9.2)		4 (9.5)	7 (9)			
		Extremely (4)	1 (0.8)		1 (2.4)				
PRI	3. My voice cracks and breaks	Not at all (1)	84 (70)		28 (66.7)	56 (71.8)		0.541	
		Mildly (2)	29 (24.2)	1 (1-2)	11 (26.2)	18 (23.1)	1 (1-2)		1 (1-2)
		Moderately (3)	7 (5.8)		3 (7.1)	4 (5.1)			
VF	4. My throat muscles are feeling overworked	Not at all (1)	87 (72.5)		26 (61.9)	61 (78.2)		<b>0.046</b>	
		Mildly (2)	25 (20.8)	1 (1-2)	11 (26.2)	14 (17.9)	1 <sup>a</sup> (1-2)		1 <sup>b</sup> (1-1)
		Moderately (3)	7 (5.8)		5 (11.9)	2 (2.6)			
		Extremely	1 (0.8)			1 (1.3)			
PRI	5. My voice is breathy	Not at all (1)	79 (65.8)		24 (57.1)	55 (70.5)		0.118	
		Mildly (2)	36 (30)	1 (1-2)	15 (35.7)	21 (26.9)	1 (1-2)		1 (1-2)
		Moderately (3)	5 (4.2)		3 (7.1)	2 (2.6)			
VF	6. My singing voice feels good ‡	Extremely (1)	31 (25.8)		11 (26.2)	20 (25.6)		0.943	
		Moderately (2)	69 (57.5)	2 (1-2)	24 (57.1)	45 (57.7)	2 (1-2)		2 (1-2)
		Mildly (3)	16 (13.3)		6 (14.3)	10 (12.8)			
		Not at all (4)	4 (3.3)		1 (2.4)	3 (3.8)			
VF	7. The onsets of my notes are delayed or breathy	Not at all (1)	60 (50)		24 (57.1)	36 (46.2)		0.206	
		Mildly (2)	40 (33.3)	1.5 (1-2)	13 (31)	27 (34.6)	1 (1-2)		2 (1-2)
		Moderately (3)	20 (16.7)		5 (11.9)	15 (19.2)			
VF	8. My voice feels strained	Not at all (1)	62 (51.7)		23 (54.8)	39 (50)		0.290	
		Mildly (2)	39 (32.5)	1 (1-2)	16 (38.1)	23 (29.5)	1 (1-2)		1.5 (1-2)
		Moderately (3)	17 (14.2)		3 (7.1)	14 (17.9)			
		Extremely (4)	2 (1.7)			2 (2.6)			
VC	9. I am worried about my voice	Not at all (1)	68 (56.7)		19 (45.2)	49 (62.8)		0.173	
		Mildly (2)	30 (25)	1 (1-2)	16 (38.1)	14 (17.9)	2 (1-2)		1 (1-2)
		Moderately (3)	17 (14.2)		5 (11.9)	12 (15.4)			
		Extremely (4)	5 (4.2)		2 (4.8)	3 (3.8)			
PRI	10. I am having difficulty with my breath for long phrases	Not at all (1)	46 (38.3)		16 (38.1)	30 (38.5)		0.772	
		Mildly (2)	50 (41.7)	2 (1-2)	19 (45.2)	31 (39.7)	2 (1-2)		2 (1-2)
		Moderately (3)	20 (16.7)		6 (14.3)	14 (17.9)			
		Extremely (4)	4 (3.3)		1 (2.4)	3 (3.8)			
VF	11. My top notes are breathy	Not at all (1)	63 (52.5)		22 (52.4)	41 (52.6)		0.479	
		Mildly (2)	36 (30)	1 (1-2)	17 (40.5)	19 (24.4)	1 (1-2)		1 (1-2)
		Moderately (3)	17 (14.2)		2 (4.8)	15 (19.2)			
		Extremely (4)	4 (3.3)		1 (2.4)	3 (3.8)			
VF	12. My voice sounds rich and resonant ‡	Extremely (1)	17 (14.2)		11 (26.2)	6 (7.7)		<b>0.039</b>	
		Moderately (2)	70 (58.3)	2 (2-3)	22 (52.4)	48 (61.5)	2 <sup>b</sup> (1-2)		2 <sup>a</sup> (2-3)
		Mildly (3)	26 (21.7)		6 (14.3)	20 (25.6)			
		Not at all (4)	7 (5.8)		3 (7.1)	4 (5.1)			
PRI	13. My voice is cutting out on some notes	Not at all (1)	42 (35)		20 (47.6)	22 (28.2)		<b>0.039</b>	
		Mildly (2)	53 (44.2)	2 (1-2)	21 (50)	32 (41)	2 <sup>b</sup> (1-2)		2 <sup>a</sup> (1-3)
		Moderately (3)	22 (18.3)		1 (2.4)	21 (26.9)			
		Extremely (4)	3 (2.5)			3 (3.8)			
PRI	14. I am having difficulty singing softly	Not at all (1)	76 (63.3)		28 (66.7)	48 (61.5)		<b>0.001</b>	
		Mildly (2)	35 (29.2)	1 (1-2)	13 (31)	22 (28.2)	1 <sup>b</sup> (1-2)		1 <sup>a</sup> (1-2)
		Moderately (3)	9 (7.5)		1 (2.4)	8 (10.3)			
VF	15. My voice is tired	Not at all (1)	57 (47.5)		17 (40.5)	40 (51.3)		0.418	
		Mildly (2)	45 (37.5)	2 (1-2)	20 (47.6)	25 (32.1)	2 (1-2)		1 (1-2)
		Moderately (3)	16 (13.3)		5 (11.9)	11 (14.1)			
		Extremely (4)	2 (1.7)			2 (2.6)			

Scale	Item	All		Fado	Choir	Fado	Choir	P	
		n (%)	Me (Q1-Q3)	n (%)	n (%)	Me (Q1-Q3)	Me (Q1-Q3)		
PRI	16. I am having difficulty changing registers	Not at all (1)	58 (48.3)	2 (1-2)	26 (61.9)	32 (41)	1 (1-2)	2 (1-3)	0.530
		Mildly (2)	41 (34.2)		15 (35.7)	26 (33.3)			
		Moderately (3)	16 (13.3)		1 (2.4)	15 (19.2)			
		Extremely (4)	5 (4.2)			5 (6.4)			
PRI	17. I am having difficulty with my high notes	Not at all (1)	46 (38.3)	2 (1-3)	21 (50)	25 (32.1)	1.5 <sup>b</sup> (1-2)	2 <sup>a</sup> (1-3)	0.004
		Mildly (2)	41 (34.2)		16 (38.1)	25 (32.1)			
		Moderately (3)	24 (20)		5 (11.9)	19 (24.4)			
		Extremely (4)	9 (7.5)			9 (11.5)			
PRI	18. Singing feels like hard work	Not at all (1)	63 (52.5)	1 (1-2)	24 (57.1)	39 (50)	1 <sup>b</sup> (1-2)	1.5 <sup>a</sup> (1-2)	0.005
		Mildly (2)	33 (27.5)		10 (23.8)	23 (29.5)			
		Moderately (3)	21 (17.5)		8 (19)	13 (16.7)			
		Extremely (4)	3 (2.5)			3 (3.8)			
PRI	19. I am having difficulty projecting my voice	Not at all (1)	56 (46.7)	2 (1-2)	21 (50)	35 (44.9)	1.5 (1-2)	2 (1-2)	0.480
		Mildly (2)	50 (41.7)		17 (40.5)	33 (42.3)			
		Moderately (3)	11 (9.2)		4 (9.5)	7 (9)			
		Extremely (4)	3 (2.5)			3 (3.8)			
VC	20. I am concerned about my voice	Not at all (1)	68 (56.7)	1 (1-2)	20 (47.6)	48 (61.5)	2 (1-2)	1 (1-2)	0.509
		Mildly (2)	40 (33.3)		16 (38.1)	24 (30.8)			
		Moderately (3)	9 (7.5)		5 (11.9)	4 (5.1)			
		Extremely (4)	3 (2.5)		1 (2.4)	2 (2.6)			
VF	21. My voice feels ready for performance if required ‡	Not at all (1)	52 (43.3)	2 (1-2)	24 (57.1)	28 (35.9)	1 (1-2)	2 (1-2)	0.121
		Mildly (2)	49 (40.8)		10 (23.8)	39 (50)			
		Moderately (3)	12 (10)		4 (9.5)	8 (10.3)			
		Extremely (4)	7 (5.8)		4 (9.5)	3 (3.8)			
PRI	22. I am having difficulty sustaining long notes	Not at all (1)	52 (43.3)	2 (1-2)	20 (47.6)	32 (41)	2 (1-2)	2 (1-2)	0.157
		Mildly (2)	54 (45)		18 (42.9)	36 (46.2)			
		Moderately (3)	12 (10)		4 (9.5)	8 (10.3)			
		Extremely (4)	2 (1.7)			2 (2.6)			

a, b – Different letters identify significant differences in the median value of the items according to \*Mann-Whitney test.  
‡ Reverse scored items

## Descriptive Statistics for Scales

All scales/sub-scales revealed to be positively skewed with the VF for Fado singers and PRI scales for Choir singers were moderately skewed. These results indicate that comparisons should be performed using non-parametric tests.

## Tests of Scaling Assumptions

Within each scale, item-scale correlations were found to be both comparable and substantial (Table 3). A higher range of item-scale correlations was observed for the scale and sub-scales.

**Table 3.** Results of item scaling tests and reliability estimates for EASE-PT scale and its sub-scales.

Scale	k <sup>a</sup>	Fado			Choir		
		Correlation		Scale	Correlation		Scale
		item-internal consistency <sup>b</sup>	Homogeneity <sup>c</sup>	Reliability <sup>d</sup>	item-internal consistency <sup>b</sup>	Homogeneity <sup>c</sup>	Reliability <sup>d</sup>
EASE-PT	22	0.24-0.71	0.520	0.900	0.36-0.6	0.525	0.905
VF – subscale	10	0.27-0.55	0.440	0.765	0.44-0.64	0.551	0.846
PRI – subscale	10	0.31-0.67	0.529	0.829	0.31-0.67	0.507	0.824
VC – subscale	2	0.81-0.81	0.805	0.890	0.68-0.68	0.676	0.796

<sup>a</sup> Number of items and number of item-internal consistency tests per scale.  
<sup>b</sup> Correlations between items and hypothesized scale corrected for overlap.  
<sup>c</sup> Average inter-item correlation.  
<sup>d</sup> Internal-consistency reliability (Cronbach's alpha).

## Reliability

As shown in Table 3, all scales were found to demonstrate high internal consistencies.<sup>19</sup> Cronbach's alpha exceeded 0.80 for EASE scale for both Fado and Choir singers, and its sub-scales were close to or exceeded 0.80 and ranged from 0.765 (VF) to 0.890 (VC) for Fado singers and from 0.796 (VC) to 0.846 (VF) for Choir singers.

## Known Groups Validity

In terms of demographic characteristics, 42 (35%) were Fado singers and 78 (65%) were Choir singers. Only the

PRI sub-scale of the EASE-PT scale showed significant differences between the two groups, being significantly higher for the Choir group ( $p=0.042$ ) (Table 4). In each of these groups, no significant differences were found with respect to gender (Table 5) and in the self-classification of the use of voice in the last 24 hours (Table 6). As well no significant correlation was detected with age (Table 7). Regarding the singing voice load (i.e., number of times singing in the last week, whether rehearsal or performances) a significant weak negative relation (Table 7;  $rs=-0.252$ ,  $p=0.026$ ) was obtained between the load and the PRI for Choir singers.<sup>20</sup>

**Table 4.** Descriptive statistics and comparison by singer group of the EASE-PT scale and its sub-scales.

Scale	n	Fado	Choir	p
EASE-PT	min-max	22-65	23-69	0.352
	Me (Q1-Q3)	34 (29-41)	36 (30-44)	
VF	min-max	10-29	11-34	0.934
	Me (Q1-Q3)	16 (13-19)	16 (13-20)	
PRI	min-max	10-30	10-29	0.042
	Me (Q1-Q3)	15 (12-18)	16.5 (13-20)	
VC	min-max	2-8	2-8	0.154
	Me (Q1-Q3)	3 (2-4)	2 (2-4)	

**Table 5.** Descriptive statistics and comparison by singer group and gender of the EASE-PT scale and its sub-scales.

Scale	n	Fado		p	Choir		p
		Male	Female		Male	Female	
EASE-PT	min-max	26-49	22-65	0.677	23-62	24-69	0.148
	Me (Q1-Q3)	33 (30-42)	34 (28-42)		32.5 (29-43)	38 (32-44)	
VF	min-max	12-25	10-29	0.440	11-27	11-34	0.081
	Me (Q1-Q3)	17 (14-19)	16 (13-20)		14 (13-19)	17 (15-20)	
PRI	min-max	10-22	10-30	0.761	10-29	10-29	0.480
	Me (Q1-Q3)	16 (12-18)	15 (12-19)		15.5 (13-21)	17 (15-20)	
VC	min-max	2-6	2-8	0.692	2-6	2-8	0.507
	Me (Q1-Q3)	3 (2-5)	3.5 (2-4)		2 (2-4)	2.5 (2-4)	

**Table 6.** Descriptive statistics and comparison by singer group and self-classification of use of voice in the last 24 hours of the EASE-PT scale and its sub-scales.

Scale	n	Fado		p	Choir		p
		at maximum "Light"	at least "Moderate"		at maximum "Light"	at least "Moderate"	
EASE-PT	min-max	26-49	22-65	0.449	23-51	24-69	0.504
	Me (Q1-Q3)	36.5 (30-46)	34 (28-41)		36 (31-46)	38 (29-44)	
VF	min-max	12-25	10-29	0.401	11-27	11-34	0.408
	Me (Q1-Q3)	17 (14-22)	16 (13-19)		15 (13-19)	17 (13-20)	
PRI	min-max	11-21	10-30	0.371	10-26	10-29	0.979
	Me (Q1-Q3)	15.5 (13-20)	15 (12-17)		17 (13-20)	16 (13-21)	
VC	min-max	2-6	2-8	0.899	2-5	2-8	0.067
	Me (Q1-Q3)	3.5 (2-4)	3 (2-4)		2 (2-3)	3 (2-4)	



**Table 7.** Association between Age or Number of times singing (rehearsal or performances) in the last week with the EASE scales.

Scale		Age		No. of times singing in the last week	
		Fado	Choir	Fado	Choir
EASE	$r_s$	0.214	-0.043	0.098	-0.205
	p	0.174	0.706	0.537	0.072
	n	42	78	42	78
VF	$r_s$	0.283	-0.021	0.097	-0.175
	p	0.069	0.857	0.541	0.126
	n	42	78	42	78
PRI	$r_s$	0.139	-0.042	0.064	-0.252
	p	0.381	0.715	0.690	0.026
	n	42	78	42	78
VC	$r_s$	0.004	0.074	0.197	0.001
	p	0.978	0.517	0.212	0.991
	n	42	78	42	78

$r_s$  = Spearman correlation coefficient

## Discussion

The adaptation of EASE allowed the authors to be sure that the EASE-PT measures the same contents of the original version considering the cultural particularities of Portuguese singers. This paper provides detailed information used during the process of this scale’s adaptation and validation to a new domain. It also presents the results of the assumption tests and the construct validity applied on to the scale. Important findings were recorded in the adaptation process that facilitated a more accurate version of the instrument. In addition, ambiguities, confusions, and precision of the terms were improved to ensure they match cultural issues before applying the final version to the sample.

Some weaknesses were identified and the outcomes must be interpreted considering the methodological approach underlying the whole process, namely the convenience sampling method, the diversity of singers, and the method of collecting data. This disparity underpins the study focus on two groups; correspondingly, other groups of singers, such as musical theatre and classical singers were not examined and results for the same could possibly differ and should be extrapolated carefully.

In general, EASE-PT showed a very favorable psychometric performance meeting the criteria that had been suggested for reliability,<sup>19,21</sup> that is, obtaining a minimum score of 0.90 for analyzing an individual singer’s score. However, the relatively recent establishment of the scale and thus minimal associated availability and use, in conjunction with a lack of similar studies for the original scale makes it difficult to compare our results. The results though demonstrate that EASE-PT proved to be a reliable instrument to assess its original aim and constructs, whether with Fado or Choir singers. No difference in results was inferred for age, gender, and perceived vocal load in the last 24 hours. However, interestingly, the study revealed that as the load increases the PRI decreases, the variability is very high which makes it difficult to accord clinical importance to this relation. Fado singers are more prone to report vocal

fatigue and Choir singers are more prone to report indicators related to the risk of pathology. As such, no plausible explanations were found to this intersect of load, PRI, and variability. However, this opens the scope for relevant future studies.

In the future, the authors highly recommend studies which include laryngeal examination as a gold standard to improve the clinical significance of this tool. Although the instrument demonstrated satisfactory internal consistency, future research should investigate its stability over time in order to enhance the instrument’s overall validity, for example, by examining test-retest reliability.

## Conclusion

EASE is an instrument which measures a singers’ perception of vocal function and is divided into three different scales even though separate scores are advisable. This paper presents the outcome of the process of adaptation and validation of the EASE into the European Portuguese language.

The cross-cultural adaptation of the Evaluation of the Ability to Sing Easily (EASE) to European Portuguese (EASE-PT) resulted in a reliable instrument for assessing vocal function in singers. This study provides evidence to support the following conclusions: a) The EASE-PT demonstrates good internal consistency, with Cronbach’s alpha exceeding 0.80 for both Fado and Choir singers, indicating high reliability; b) the pilot testing and committee review process successfully identified and addressed ambiguities in the original EASE instrument, ensuring cultural relevance for Portuguese singers; c) known-groups validity analysis revealed some interesting findings. Fado singers reported higher vocal fatigue scores, while Choir singers reported higher pathologic risk indicators scores. The reason for this difference and the weak negative correlation between singing load and pathologic risk indicators in Choir singers require further investigation.

Overall, the EASE-PT offers a valuable tool for Portuguese singers. Nevertheless, the study is subject to certain limitations, including its exclusive focus on Fado and Choir singers, and the absence of established external validity. Future research should address these shortcomings by exploring these areas and investigating the instrument's stability over time.

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## Appendix

Avaliação da Capacidade para Cantar com Facilidade (EASE-PT)

ID \_\_\_\_\_

Idade _____ Género: Masculino _____ Feminino _____					
Neste momento tem algum problema de voz?	Sim	Não			
Nas últimas 24 horas como classifica o uso da sua voz?	Nenhum	Mínimo	Ligeiro	Moderado	Pesado
Número de vezes que cantou (ensaios e atuações) na última semana	_____				

Por favor, responda às seguintes perguntas baseando-se no estado atual da sua voz. Se a voz variou ao longo do dia, escolha a resposta que melhor se adequa neste momento, fazendo um círculo na categoria de resposta escolhida.

1. A minha voz está rouca	FV	De modo nenhum	Suavemente	Moderadamente	Extremamente
2. A minha voz está seca/áspera	FV	De modo nenhum	Suavemente	Moderadamente	Extremamente
3. A minha voz quebra e falha	IRP	De modo nenhum	Suavemente	Moderadamente	Extremamente
4. Os músculos da minha garganta estão hiper contraídos	FV	De modo nenhum	Suavemente	Moderadamente	Extremamente
5. A minha voz está com ar/soprada	IRP	De modo nenhum	Suavemente	Moderadamente	Extremamente
6. Ao cantar sinto que a minha voz está bem *	FV	De modo nenhum	Suavemente	Moderadamente	Extremamente
7. Os ataques das minhas notas não são colocados ou têm ar/soprados	FV	De modo nenhum	Suavemente	Moderadamente	Extremamente
8. A minha voz está tensa	FV	De modo nenhum	Suavemente	Moderadamente	Extremamente
9. Estou preocupado(a) com a minha voz	PV	De modo nenhum	Suavemente	Moderadamente	Extremamente
10. Estou a ter dificuldades com a minha respiração em frases longas	IRP	De modo nenhum	Suavemente	Moderadamente	Extremamente
11. As minhas notas mais agudas têm ar/são sopradas	FV	De modo nenhum	Suavemente	Moderadamente	Extremamente
12. A minha voz soa de forma rica e sonante *	FV	De modo nenhum	Suavemente	Moderadamente	Extremamente
13. A minha voz falha em alguns notas	IRP	De modo nenhum	Suavemente	Moderadamente	Extremamente
14. Estou a ter dificuldades em cantar suavemente	IRP	De modo nenhum	Suavemente	Moderadamente	Extremamente
15. A minha voz está cansada	FV	De modo nenhum	Suavemente	Moderadamente	Extremamente
16. Estou a ter dificuldades a passar de registo	IRP	De modo nenhum	Suavemente	Moderadamente	Extremamente
17. Estou a ter dificuldades com as notas mais agudas	IRP	De modo nenhum	Suavemente	Moderadamente	Extremamente
18. Sinto que cantar é uma tarefa difícil	IRP	De modo nenhum	Suavemente	Moderadamente	Extremamente
19. Estou a ter dificuldades em projetar a minha voz	IRP	De modo nenhum	Suavemente	Moderadamente	Extremamente
20. Estou apreensivo(a) em relação à minha voz	PV	De modo nenhum	Suavemente	Moderadamente	Extremamente
21. A minha voz está preparada para atuar, se for necessário *	FV	De modo nenhum	Suavemente	Moderadamente	Extremamente
22. Estou a ter dificuldades em manter as notas longas	IRP	De modo nenhum	Suavemente	Moderadamente	Extremamente

\*Itens que são pontuados de forma inversa.

A preencher pelo investigador:

Pontuação total = \_\_\_\_\_ Pontuação FV = \_\_\_\_\_ / 40 Pontuação IRP = \_\_\_\_\_ / 40 Pontuação PV = \_\_\_\_\_ / 8