

The Effectiveness of the EASE Scale in the Development of a Vocal Warm-up Program for an Amateur Choir

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Summary: Objectives. This study aims to assess the effectiveness of the EASE-BR (Evaluation of the Ability to Sing Easily for Brazil) protocol in the development of a vocal warm-up program for members of an amateur choir.

Study Design. This is a prospective cross-sectional study measuring pre- and postintervention results at two moments.

Methods. Forty-four subjects filled out a questionnaire to characterize the sample and underwent two major applications of the EASE-BR scale—the first to determine the group's vocal requirements and the second to assess the performance after the application of a customized vocal warm-up routine.

Results. Overall reduction of the scores in the postintervention moment has been determined. The score of 16 of the questions (72.7%) showed a statistically relevant reduction after the intervention.

Conclusions. The EASE-BR scale proved a valuable assessment tool and its use may help develop customized vocal warm-up programs for different types of singers.

Key Words: Voice–Voice training–Voice quality–Clinical protocols–Larynx.

INTRODUCTION

Several studies have been carried out on singer voice and its different peculiarities. Singing may be in a choir or solo, classical or popular, of different schools, genera, and styles and have different requirements.^{1–3} When performed in group, singing is a social interaction that teaches harmony, teamwork, and respect for others. Choir singing features persons with varied vocal characteristics who, although grouped under the same category, have acoustic nuances to be considered.²

One of the most important activities before singing is vocal warm-up, which corresponds to a series of respiratory and vocal exercises aiming to warm-up the vocal fold musculature before more intense action to prevent overloading and improperly using the voice, as well as allowing better overall conditions for sound production.^{4,5} However, such practice is often unfamiliar to many voice professionals.^{6,7}

In speech therapy, a major tool toward assessment and therapeutic planning is the patient's perception, which allows the therapist to detect the individual's voice requirements and elect the most appropriate therapeutic course for that case. Voice self-assessment is a valuable tool to infer interventions on voice based on the answers of the person being analyzed, besides encouraging the patient to reflect on the impact of voice on his or her social and professional relations. There are voice self-assessment protocols for voice activities and specific target audiences; thus, the speech therapist must seek the one that best fits the situation of the patient at hand.

The Evaluation of the Ability to Sing Easily (EASE) scale is a recent voice self-assessment tool that targets the singer's

perception on his or her singing voice after a performance, thus providing an immediate status of vocal readiness. For it to be used in Brazilian Portuguese, the protocol underwent a cultural equivalence process according to international rules and received the name EASE-BR.^{8–11}

This protocol is able to reveal potential deficits during a performance and its application during vocal preparation of singers is relevant. This way, the present research aimed to assess the effectiveness of the EASE-BR protocol in the development of a voice warm-up program for members of an amateur choir.

METHODS

Study design

This is a prospective cross-sectional study measuring pre- and postintervention results at two moments.

Subjects

Members of an amateur choir linked to a federal university in the South region of Brazil were invited to take part in this study. This choir was recently established (existing for less than 4 years) and is open to any participant regardless of previous vocal or choral training. There are five rehearsal times, each lasting for 90 minutes. Choir members may attend as many rehearsals as they wish during the week according to their availability and interest. The choirmaster meets with units from the choir regularly, but the units only converge occasionally in major rehearsals.

Over the study period, the choir had 98 potential candidates. This study did not employ sampling calculation because it is a convenience sample. The participants who attended 75% or more of the rehearsals during the study period, with at least one rehearsal a week, and who consented in providing their personal information, were included. Participants who referred some voice sign or symptom during the evaluations and those who did not take part in both phases of this study were excluded. The subjects provided their informed consent according to the project approved by the university's ethics committee under opinion 1.287.785.

Accepted for publication November 6, 2017.

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Journal of Voice, Vol. 33, No. 3, pp. 310–316

0892-1997

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<https://doi.org/10.1016/j.jvoice.2017.11.003>

Procedures

All subjects filled out a questionnaire created by the authors and the EASE-BR at different moments.

Questionnaire

The questionnaire was used to create a profile of each member's gender, age, occupation, time as a member of the choir, amount of time dedicated to singing per week, and voice type.

EASE-BR

EASE-BR is a translated version currently in validation process of the EASE scale. It consists of a Rasch psychometric scale containing 22 questions, each with four alternatives to be chosen according to the frequency of the situation: "not at all," "mildly," "moderately," and "extremely." Of those 22 questions, 19 are descriptors related to voice fatigue and limitation and the other 3 are positive aspects. The score is a simple sum of the 19 negative items with 0 = not at all, 1 = mildly, 2 = moderately, and 3 = extremely. The three positive questions (6, 12, and 21) are scored inversely as follows: 3 = not at all, 2 = mildly, 1 = moderately, and 0 = extremely.

EASE-BR has four subscales: voice fatigue (VF) and voice risk index (VRI), each with 10 questions and cut-off points at 4.5; voice concern (VC), with two questions and cut-off point at 1.5; and total (T), with 22 questions and cut-off point at 6.5. Scores above the cut-off values indicate propensity to voice problems.

To assess the effectiveness of EASE-BR, the participants were invited to take part in two major rehearsals, when a larger number of members are present. Those meetings were 1-month apart to keep the participants from remembering their answers and to cease any effect reached in the first intervention. In rehearsal 1, called preintervention phase, the protocol was applied before the members warmed up their voices for singing (1A) and after singing (1B). Based on the analysis of the voice warm-up exercises and the answers given, a customized warm-up program was created, which was tested in the subsequent major rehearsal. In rehearsal 2, called intervention phase, the EASE-BR questionnaire was applied before the customized voice warm-up (2A) and after the singing activity (2B). Both rehearsals lasted for 90 minutes in addition to the warm-up period. The presinging applications (1A and 2A) were used as control as they represent the choir members' expectations and should be similar. The postsinging applications (1B and 2B) represent the effects of voice warm-up after the intense singing activity. In all applications, the subjects were instructed to answer the questions individually, item by item, as the researcher read the question out loud. This way, when the last question was read, all participants had finished the task. In case of doubts, the researcher gave explanations or exemplified the item. During the major rehearsals, the participants were asked to avoid talking or whispering to prevent influence on the data.

Customized vocal warm-up

To create the customized vocal warm-up program, the techniques used by the choirmaster in the regular vocal warm-up of the group were taken into account. The types of technique and

their application times were recorded. The exercise duration was measured with a stopwatch right after the end of the instruction on the exercise to be performed.

In parallel, two speech therapists with minimum clinical experience of 5 years in the area of voice performed the qualitative and quantitative analyses of the scores obtained in EASE-BR in the preintervention phase. The questions were organized according to the scores so as to elect the vocal exercises adequate to the most recurrent issues. In the customized vocal warm-up program, each exercise selected lasted for 3 minutes,¹² which is enough for a beneficial effect on voice while not causing fatigue to the musculature (Box A1).

Statistical analysis

Data normality was verified through the Shapiro-Wilk test, which indicated that the distribution of most of the data did represent a Gaussian curve. Thus, the data were expressed as mean and standard deviation, and the inferential analysis to compare the groups used Student *t* test for paired samples. The internal consistency of the subscales in EASE-BR was assessed using Cronbach α coefficient, with values above 0.70 considered acceptable. Pearson correlation analyzed the intercorrelation among the subscales of EASE-BR. All analyses used the software *Statistical Package for Social Sciences (SPSS)* version 22.0 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows. IBM Corp., Armonk, NY) at a 5% significance level ($P \leq 0.05$).

RESULTS

Sample

After the inclusion and exclusion criteria were applied, the final sample comprised 44 subjects, as shown in Figure 1. The data presented in Table 1 show a predominance of female subjects and ages ranging from 14 to 77 years. The number of individuals per voice type was homogeneous when male and female voices were compared. The sample included subjects who had been attending the choir for 3–55 months.

EASE-BR

No statistical significance was observed before rehearsal in virtually all questions, which indicates the subjects' expectations did not differ between the two phases (Table A1). When the postrehearsal scores were compared, a decrease in values of the intervention phase was noted (Table 2).

Table 3 shows the analysis of EASE subscales after the singing practice. The intervention phase had better results; however, many participants had scores above the cut-off points indicated for the subscales. Another noteworthy finding involves the intercorrelation among the subscales: very strong correlations between subscale T and subscales VF and VRI and strong correlations in the other combinations (T vs. VC, VF vs. VRI, VF vs. VC, and VRI vs. VC) (Table 4).

DISCUSSION

The present study aimed to assess the effectiveness of the EASE-BR scale in the development of a customized voice warm-up program for an amateur choir and found positive results. Of the

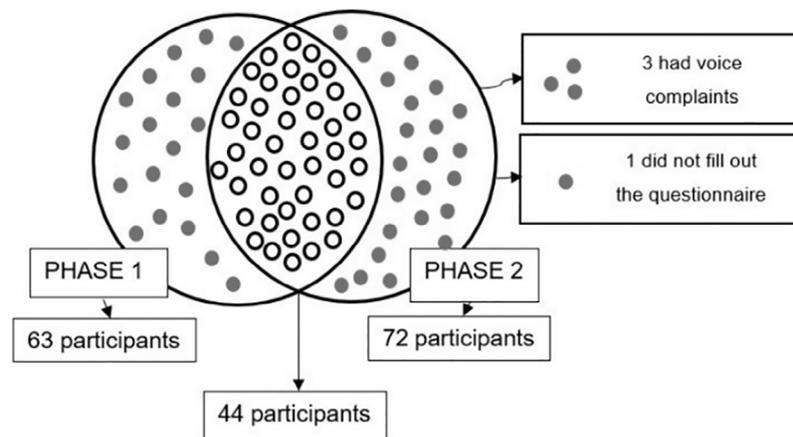


FIGURE 1. Sample composition after the inclusion and exclusion criteria.

22 items assessed by the scale, the scores of 16 (72.7%) showed a statistically significant improvement. Therefore, the intervention allows inferring that the EASE scale is a tool that enables monitoring voice changes in singers.

Of the six items that showed no statistical difference, three refer to the presence of air during singing (questions 5, 7, and 11). The detection of breathiness, or air in the voice, requires keen perception by the individual and clarity regarding its concept—which is not common for an amateur singer to recognize it. Another item with nonsignificant result was question 19 (“I am having difficulty projecting my voice”), which concerns voice projection. The answer to this item differs from the finding in item 12 (“my voice sound rich and resonant”), which corroborates the idea the participants have a hard time acknowledging certain aspects in their voices. Another possible explanation is the difficulty of self-monitoring the voice given the number of overlapping voices in this singing modality.

The results that had no statistical difference in items 11 and 17, which refer to high notes, may be attributed to the number of exercises applied that favor such benefits in voice, which was not observed in the preintervention phase of this study.

The analysis of the subscales of EASE-BR showed an improvement in all areas studied. However, many participants retained scores above the cut-off points¹¹ after the intervention. The nature of the subjects in this study strongly differs from those used to propose the cut-off values (professional music theater singers).¹¹ This way, analyses to define the appropriate cut-off points for amateur choir singers would be required.

The use of the protocol presented in this research proposes a reflection regarding the use of measurement tools in therapy. It is often that many evaluations that use scores and cut-off points are not used adequately by professionals, who limit themselves to look at the values found instead of at what each question aims to inform about a person.

To properly describe the findings, the amateur nature of the choir at hand must be pointed out. This type of group has very heterogeneous members regarding the experience with singing voice^{12,13} and high drop-out and replacement rates of members,¹⁴ who are usually little aware of vocal hygiene.¹⁵

The present study worked with a predominantly female sample—a finding that matches the literature.^{16–20} The choice of singing as a leisure activity may correspond to a gender-stereotyped preference as this type of activity involves a recurring emotional component. Studies show that women take part in this type of activity more often than men.^{17–20} One research reports women notice more the positive aspects of choir singing than men, which explains such adherence.¹⁶

Regarding the distribution in voice types, there was a homogeneous distribution between female and male voices. One finding to highlight is the presence of a female participant integrating the tenor voice type. In amateur choirs, it is common to use four voice types: soprano or alto (female voices) and tenor or bass (male voices). The mezzo-soprano (female) and baritone (male) intermediate voice types in these choirs are usually allocated in lower voice types because of the shortage of participants in the alto or bass categories. Many amateur choir regents take this into account when composing, and write songs in higher notes. It is

TABLE 1.
Sample Characterization

Variables	n = 44
Age (y)—mean ± SD	43.8 ± 20.0
Sex—n (%)	
Male	9 (20.5)
Female	
Voice type—n (%)	35 (79.5)
Soprano	17 (38.6)
Contralto	17 (38.6)
Tenor	6 (13.6)
Bass	4 (9.2)
Time attending the choir—n (%)	
Less than 1 year	18 (40.9)
1 year or more	26 (59.1)
Weekly time dedicated to singing—n (%)	
1 rehearsal	17 (38.6)
2 rehearsals	14 (31.8)
3 rehearsals	5 (11.4)
4 rehearsals	5 (11.4)
5 rehearsals	3 (6.8)

Abbreviation: SD, standard deviation.

TABLE 2.
Comparison of the EASE-BR Results After Singing

Question	1B (Mean ± SD)	2B (Mean ± SD)	Significance (P)
1 My voice is husky	0.59 ± 0.871	0.18 ± 0.390	0.011*
2 My voice is dry/scratchy	0.93 ± 0.846	0.25 ± 0.438	<0.001*
3 My voice cracks and breaks	0.34 ± 0.608	0.11 ± 0.321	0.017*
4 My throat muscles are feeling overworked	0.73 ± 0.899	0.39 ± 0.538	0.017*
5 My voice is breathy	0.32 ± 0.601	0.23 ± 0.565	0.243
6 My singing voice feels good	0.86 ± 0.852	0.55 ± 0.697	0.033*
7 The onsets of my notes are delayed or breathy	0.39 ± 0.689	0.30 ± 0.668	0.472
8 My voice feels strained	0.57 ± 0.818	0.27 ± 0.585	0.031*
9 I am worried about my voice	0.73 ± 0.973	0.36 ± 0.685	0.006*
10 I am having difficulty with my breath for long phrases	0.77 ± 0.886	0.45 ± 0.627	0.029*
11 My top notes are breathy	0.55 ± 0.848	0.45 ± 0.791	0.523
12 My voice sounds rich and resonant	0.93 ± 1.021	0.61 ± 0.784	0.042*
13 My voice is cutting out on some notes	0.89 ± 0.784	0.50 ± 0.699	0.001*
14 I am having difficulty singing softly	0.34 ± 0.680	0.18 ± 0.390	0.049*
15 My voice is tired	0.75 ± 0.918	0.45 ± 0.504	0.026*
16 I am having difficulty changing registers	0.61 ± 0.754	0.39 ± 0.493	0.049*
17 I am having difficulty with my high notes	0.73 ± 0.899	0.57 ± 0.759	0.267
18 Singing feels like hard work	0.66 ± 0.861	0.41 ± 0.497	0.054
19 I am having difficulty projecting my voice	0.48 ± 0.762	0.30 ± 0.462	0.103
20 I am concerned about my voice	0.59 ± 0.897	0.25 ± 0.438	0.006*
21 My voice feels ready for performance if required	0.95 ± 0.963	0.48 ± 0.698	0.008*
22 I am having difficulty sustaining long notes	0.89 ± 0.993	0.52 ± 0.664	0.008*

* Student *t* test for paired samples. *P* < 0.05 adopted as significantly relevant.

Abbreviations: 1B, Phase 1, after singing; 2B, Phase 2, after singing; SD, standard deviation.

theorized that many of the participants in the alto and bass voice types are in fact mezzo-sopranos and baritones, and that the participant in question would be a “true” alto. In modern music schools, the “tenorin” nomenclature is used to denominate such cases.

As for the time attending the choir, the sample comprised both beginner members and those who had been part of the group since its creation. It is known that the time singing in a choir may impact voice performance²¹ and self-perception.²² In a longitudinal research on an amateur choir, the participants reported fewer voice symptoms after 1 year. Those authors attributed that finding to the fact the subjects had become more aware of the functionality of their vocal tracts.²³

The benefits of warming up the voice before its extended use are widely described in the literature. Preparation through voice warm-up enables the coordination and resistance required by

singing and is essential to maintain vocal health.^{5,7} However, there is no consensus regarding the methods or time of application of those techniques as singing is a quite complex activity that involves several music styles and different requirements.^{5,7,24–26} Controversial information includes the reduction²⁷ or increase²⁸ in phonation pressure levels; regarding vocal-fold viscosity—reduction,²⁷ no alteration²⁹ or gender-dependent alteration favoring women.³⁰ One research³¹ carried out on 117 subjects reported the most recurring voice warm-up time was around 5–10 minutes, essentially focusing on vocalizations. Despite performing warm-up, part of those subjects reported voice issues. Another study³² sought to observe voice changes in 15- and 30-minute warm-up routines and reported marked improvements in the longer warm-up.

In the present study, the time of application of the exercises was 30 minutes. The customized voice-warm-up comprised

TABLE 3.
Analysis of EASE-BR Subscales After Singing

Subscale	Phase 1		Phase 2		Significance (P)
	n	Mean ± SD	n	Mean ± SD	
VF	25	7.25 ± 5.993	19	3.93 ± 3.579	0.001*
VRI	19	6.02 ± 5.605	14	3.66 ± 3.595	0.009*
VC	17	1.32 ± 1.788	9	0.61 ± 1.039	0.001*
T	31	14.59 ± 12.378	21	8.20 ± 7.391	0.003*

* Student *t* test for paired samples. *P* < 0.05 adopted as significantly relevant.

Abbreviations: SD, standard deviation; T, EASE total; VC, voice concern; VF, voice fatigue; VRI, voice risk index.

TABLE 4.
Descriptive Statistics of the Subscales EASE Total, VF, VRI,
and VC (n = 44)

	EASE Total	VF	VRI	VC
Mean	51.09	23.02	23.70	4.360
Standard deviation	33.41	14.21	17.04	5.261
Cronbach α coefficient	0.967	0.914	0.948	0.914
Intercorrelations*				
EASE Total	1.000			
VF	0.935	1.000		
VRI	0.949	0.802	1.000	
VC	0.748	0.640	0.624	1.000

* Pearson correlation coefficient. All correlation coefficients significant at $P < 0.001$.

Abbreviations: VC, voice concern; VF, voice fatigue; VRI, voice risk index.

exercises that lasted for 3 minutes on average. According to an American study,³³ defining an ideal dose of exercises is difficult because some factors influence that measure: desirable and undesirable responses, the relation of those effects at different

amounts of time, and the individuals who performed the techniques. In 2005, the ideal dose of the voiced tongue vibration technique for healthy adult patients was proposed as 3 minutes for women and 5 minutes for men.¹² The adoption of time instead of using series and repetitions in the present study aimed to ensure a minimum amount of exercises while respecting the individuality of the participants. Although the focus of this study is vocal warm-up, it is important to note the importance of performing vocal cool-downs as well.

CONCLUSIONS

Protocols and evaluation instruments are tools that help select adequate therapeutic procedures to each patient. Its use, therefore, must take into account not only the analysis of scores and values but also the interpretation of results item by item to understand the person being evaluated.

The EASE scale proved a valuable assessment tool and its use may help develop customized vocal warm-up programs for different types of singers. The present study showed it is effective for amateur choir singers and allowed further reflections in voice science.

APPENDIX

Box A1 Techniques Used and Duration per Voice Warm-up			
Regular Voice Warm-up		Customized Voice Warm-up	
Technique	Time	Technique	Time
01. Body movement (shoulders, arms, hands, feet) ^{5,24}	1 min	01. Facial massage ^{5,24} associated with nasal sound	2 min
02. Continuous fricative sound [s] ^{5,7,24}	30 s	02. Body movement (shoulders, arms, hands, legs, feet) ^{5,24}	3 min
03. Lip vibration ^{5,7,24}	30 s	03. Cervical movement associated with fricative sound ^{5,24}	3 min
04. Tongue vibration ^{5,7,24}	30 s	04. Fricative sound [s] ^{5,7,24}	
		• Continuous	1 min
		• Staccato	1 min
		• With pauses	1 min
05. Fricative and plosive sounds ^{5,7,24}	30 s	05. Exaggerated mastication movements associated with nasal sound ^{5,24}	3 min
06. Yawning-sighing	30 s	06. Tongue snap ^{5,24} associated with nasal sound	3 min
07. Diaphragm support ⁵	30 s	07. Tongue protrusion associated with vowels	3 min
08. Vocalizes ⁵	1 min	08. Vibrant sounds: ^{5,7,24}	
		• Continuous	1 min
		• Glissando	1 min
		• Frequency variation	1 min
		09. Glottal <i>closure</i> with hand palm and [vu]	3 min
		10. Vocalizes ⁵	4 min
	5 min		30 min

TABLE A1.
Comparison of the EASE-BR Results Before Singing

Question	1A (Mean ± SD)	2A (Mean ± SD)	Significance (P)
1 My voice is husky	0.30 ± 0.553	0.32 ± 0.561	0.838
2 My voice is dry/scratchy	0.36 ± 0.574	0.39 ± 0.493	0.800
3 My voice cracks and breaks	0.16 ± 0.370	0.18 ± 0.446	0.800
4 My throat muscles are feeling overworked	0.20 ± 0.408	0.30 ± 0.462	0.210
5 My voice is breathy	0.20 ± 0.462	0.20 ± 0.462	1.000
6 My singing voice feels good	1.09 ± 0.830	0.98 ± 0.762	0.430
7 The onsets of my notes are delayed or breathy	0.64 ± 0.810	0.80 ± 0.795	0.267
8 My voice feels strained	0.36 ± 0.613	0.43 ± 0.587	0.473
9 I am worried about my voice	0.75 ± 0.967	0.55 ± 0.848	0.173
10 I am having difficulty with my breath for long phrases	1.07 ± 0.818	1.02 ± 0.876	0.719
11 My top notes are breathy	0.66 ± 0.745	0.59 ± 0.816	0.570
12 My voice sounds rich and resonant	1.09 ± 1.007	1.18 ± 0.971	0.628
13 My voice is cutting out on some notes	0.98 ± 0.902	0.95 ± 0.776	0.868
14 I am having difficulty singing softly	0.39 ± 0.813	0.50 ± 0.699	0.390
15 My voice is tired	0.45 ± 0.761	0.57 ± 0.728	0.390
16 I am having difficulty changing registers	0.86 ± 0.979	0.82 ± 0.896	0.789
17 I am having difficulty with my high notes	0.98 ± 1.000	1.05 ± 0.834	0.627
18 Singing feels like hard work	0.55 ± 0.663	0.70 ± 0.765	0.164
19 I am having difficulty projecting my voice	0.61 ± 0.920	0.61 ± 0.813	1.000
20 I am concerned about my voice	0.73 ± 0.924	0.41 ± 0.787	0.018*
21 My voice feels ready for performance if required	0.55 ± 0.761	0.59 ± 0.844	0.660
22 I am having difficulty sustaining long notes	1.09 ± 0.910	1.09 ± 0.910	1.000

* Student *t* test for paired samples. *P* < 0.05 adopted as significantly relevant.

Abbreviations: 1A, Phase 1, before singing; 2A, Phase 2, before singing; SD, standard deviation.

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