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Vocal handicap index in popular and erudite professional singers

Índice de desvantagem vocal em cantores populares e eruditos profissionais

ABSTRACT

Purpose: To compare the voice handicap index of popular and erudite professional singers according to gender, age, professional experience time, and presence or absence of self-reported vocal complaints. **Methods:** One hundred thirty-two professional singers, 74 popular and 58 erudite, who responded to a questionnaire with regards to identification, age, gender, professional experience time in singing, musical genres (for popular singers), vocal classification (for erudite singers), presence of self-reported vocal complaints, and the specific protocols for popular (Modern Singing Handicap Index - MSHI) and erudite (Classical Singing Handicap Index - CSHI) singing. **Results:** Higher proportion of women and higher incidence of vocal complaints were observed in the popular singers compared with the erudite singers. Most of the popular singers belonged to the genre of Brazilian Popular Music. Regarding the classification of erudite singers, there was greater participation of sopranos and tenors. No statistical differences were observed with respect to age and professional experience time between the groups. Comparison of the MSHI and CSHI scores showed no statistically significant difference between these scores and genre or age in both groups of singers. Professional experience time was related to the total score and the subscales disability and impairment in the MSHI, only for popular singers with vocal complaints. There was no correlation between these variables and the CSHI for erudite singers. **Conclusion:** The impact of vocal difficulty/problem interferes differently in these two musical genres when related to vocal complaint and professional experience time. The MSHI and CSHI protocols proved to be important tools not only for the identification of problems, but also for the understanding of how these individuals relate their voices with this occupational activity.

RESUMO

Objetivo: Comparar o índice de desvantagem vocal em cantores populares e eruditos profissionais de acordo com gênero, idade, tempo de atuação profissional e presença ou ausência de queixa vocal autorreferida. **Método:** Participaram 132 cantores profissionais, 74 populares e 58 eruditos, que preencheram questionário com os dados: idade, gênero, tempo de experiência profissional no canto, gênero musical (cantores populares), classificação vocal (cantores eruditos), presença de queixa vocal autorreferida, além dos protocolos específicos para canto popular (Índice de Desvantagem Vocal para o Canto Moderno - IDCM) e erudito (Índice de Desvantagem Vocal para o Canto Clássico - IDCC). **Resultados:** Houve maior proporção de mulheres e maior ocorrência de queixa vocal nos cantores populares, comparados aos eruditos. A maioria dos populares pertencia ao gênero da música popular brasileira. Quanto à classificação vocal dos eruditos, houve maior participação de sopranos e tenores. Não houve diferença estatística para idade e tempo de canto entre os grupos. Ao comparar os escores de IDCM e IDCC, nos populares e eruditos, não houve diferença estatisticamente significativa entre tais escores e o gênero e idade. O tempo de experiência profissional relacionou-se com escores total e subescalas incapacidade e defeito do IDCM, apenas para cantores populares com queixa. Nos eruditos não houve correlação entre essas variáveis e IDCC. **Conclusão:** O impacto da dificuldade/problema vocal interfere de formas diferentes nos dois gêneros musicais, quando relacionados com a queixa vocal e o tempo de atuação profissional. Os protocolos IDCM e IDCC mostraram ser importantes não apenas para a identificação de problemas, mas como ferramenta para a compreensão essencial de como esses sujeitos relacionam a voz com a atividade ocupacional.

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INTRODUCTION

Professional singing usually involves a high vocal demand with varying degrees of requirements and refinements, which interferes differently in the lives of professionals⁽¹⁾. Certain vocal difficulties and/or changes generate different impacts in relation to personal and professional aspects. Factors such as demographic characteristics, professional experience time in singing, in addition to the musical genres performed by these individuals can influence some vocal aspects related to the singing activity.

An important tool to assess this impact and analyze the point of view of singers on their vocal matters are the self-assessment protocols entitled Classical Singing Handicap Index - CSHI⁽²⁾, intended for erudite singers, and Modern Singing Handicap Index - MSHI⁽³⁾, which addresses popular singers. Both instruments feature a common structure of 30 statements divided into three subclasses: disability, handicap, and impairment, which correspond, respectively, to the functional (impact of voice on professional activities), emotional (voice psychological effects), and organic (self-perceived phonation) domains.

They present a five-point Likert scale where the higher the score, the greater the handicap referred by the singer. These instruments have proved to be effective in verifying the individuals' perception on the handicap of their singing voices during professional activity⁽²⁻⁵⁾.

Although the translation of these instruments into Portuguese have maintained the terms "modern" and "classical" in the protocols, such nomenclature is not commonly used in Brazil to refer to the two major musical genres: popular and erudite. The terminologies "classical" and "modern" are also used to name historical periods of the art, in which musical works with characteristic aesthetic components and instrumental forms were developed. Having said that, in this study, we have adopted the terms "popular" for modern singing (MSHI) and "erudite" for classical singing (CSHI).

Another aspect frequently observed is the use of the term "style" to refer to a given musical genre. According to a specialized dictionary⁽⁶⁾, a musical genre indicates one or more musical varieties that share a certain identity with each other. The definition of "style", in turn, refers to the style of a time period and also means a particular way of composing and playing associated with a composer, performer, or place. Therefore, there may be singers with different styles, which are unique to them, even if they belong to the same musical genre. It is important to understand these concepts when studying, researching, and working in the area of singing voice.

Regarding the applicability of the MSHI and CSHI, it can be noted that, in both protocols, there are references to presentations, concerts, repertoire, and other aspects that emphasize the concern of these instruments with investigating the professional who uses the singing voice as a working tool, and not as a hobby or as a means of interaction with a social group or community.

A study⁽³⁾ was conducted with the purpose of verifying the sensitivity of the MSHI protocol through its application to amateur choir singers, with and without vocal complaint, and non-singers with similar demographic characteristics. The results show greater handicap in singers with voice complaint compared with those of singers without complaint and non-singers. The authors

concluded that the MSHI is sensitive to evaluate singers and it can be used in the mapping of vocal problems.

In another study with amateur church choristers⁽⁴⁾, 42 individuals responded to the MSHI protocol, a questionnaire on demographics, singing practices, and vocal screening. Singers with altered voice quality obtained higher scores on the subscales disability and handicap and the total domain. In addition, those who reported having singing lessons obtained lower scores in the handicap subscale.

With respect to the CSHI, a study conducted with a population of choir singers investigated the relationship of protocol scores with gender, age, vocal classification, and professional experience time in singing in 59 singers, with and without vocal complaints⁽²⁾. The total score was higher in the group with complaints, with greater impact on the organic (impairment) and functional (disability) domains. Association was observed between the CSHI score and age and professional experience time in singing among singers without complaint.

Few studies have addressed the comparison between popular and erudite genres, although it is clear that singers of these two genres present particular characteristics^(7,8). A study⁽⁵⁾ reported some of these differences by analyzing the MSHI in 59 popular singers and the CSHI in 59 erudite singers, with and without vocal complaints. The results showed that participants of both groups obtained higher scores on the subscale impairment, followed by disability and handicap. Among the participants with vocal complaints, erudite singers obtained higher scores compared with those of popular singers, whereas in the group without complaints, erudite singers presented lower scores in the handicap subscale.

Therefore, considering that the function of the MSHI and CSHI protocols is to verify, from the standpoint of professional singers, the association between their voice and occupation, we deemed necessary to develop research to investigate the peculiarities of each musical genre that included population samples from different origins and backgrounds, not just a group of singers with similar vocal activities and experiences.

The purpose of this study was to compare the voice handicap index of popular and erudite professional singers by means of the MSHI and CSHI protocols according to gender, age, professional experience time, and presence or absence of self-reported vocal complaints.

METHODS

This study was approved by the Research Ethics Committee of the aforementioned institution under the protocol number 140.453.

Aiming to obtain a larger number of respondents from other cities and states and thus diversify the qualification and types of professional activities, we decided to apply the Modern Singing Handicap Index (MSHI) and the Classical Singing Handicap Index (CSHI) through the Internet. To this end, MSHI and CSHI online protocols were created using Google Docs[®] application. Two separate forms were generated: one for popular singers and one for erudite singers. The first screen of the forms showed the presentation of the research and prerequisite information for participation, i.e., having been engaged in professional singing for at least one year. The criterion adopted to fulfill this requirement was that individuals had their singing voice

as a basic tool for their professional practice, being impossible to develop their occupational activity without it. Therefore, the definition assigned to voice professionals was considered as presented in the National Consensus on Professional Voice. The Informed Consent Form (ICF) was presented on the same screen, and continuing to the next screen was only possible if the volunteer marked the option consenting to participate in the study. The second screen contained the characterization questionnaire, where participants should inform their name initials, date of birth, gender, professional experience time in singing, music genre (in the case of the popular music, specify which was the most commonly performed genre), vocal classification (for erudite singers only), and self-reported vocal complaints. The presence of voice complaint was considered when participants replied affirmatively to the question and mentioned one or more vocal signs and/or symptoms. The third screen showed the MSHI, for popular singing, and the CSHI, for erudite singing, according to the original proposals translated into Brazilian Portuguese^(2,3).

Data collection was conducted through snowball sampling from the initial personal contacts and indications and, thereafter, each participant referred one or two possible volunteers.

Data were entered into an Excel spreadsheet and analyzed using the SPSS 17.0 software program for Windows. Descriptive analysis was performed by means of absolute and relative frequencies and measures of central (mean and median) and dispersion (standard deviation, minimum and maximum) tendency. The Chi-square test of association was used for comparison of the qualitative variables. The quantitative variables were tested for adherence to the normal curve using the Komolgorov-Smirnov test, and as they presented normality, non-parametric tests were applied: the Mann-Whitney test was used for the difference between the means, whereas the Spearman test was applied for correlation.

Eventually, univariate and multiple linear regression analyses were conducted. For the entry of variables into the final model, the statistically significant factors were selected and those with $p < 20\%$ were associated. This procedure was conducted to isolate the confounding factors (intervening variables). Therefore, when the variables age and professional experience time in singing were significant in the first statistical analysis, a new analysis was performed with data stratification regarding the absence or presence of vocal complaint. This procedure was conducted considering that vocal complaint is presented as a dichotomous qualitative variable, and it could influence the significance of other variables. A descriptive level of 5% ($p \leq 0.05$) was considered for statistical significance.

RESULTS

The study sample was composed of 132 professional singers, 74 (56.1%) popular and 58 (43.9%) erudite, with higher proportion of women (59.1%), mean age of 33.5 years, age range from 18 to 66 years.

Figure 1 shows the distribution of popular singers according to the musical genre performed.

Figure 2 presents the characterization of classical singers with respect to vocal classification.

Comparison between the popular and erudite groups showed statistically significant difference for the variables gender and self-reported complaint (Chi-square test), with higher proportion of women ($n=50$) in the group of popular singers compared with that

of the group of erudite singers ($n=28$). Presence of vocal complaint was also higher among popular singers ($n=34$) compared with that among erudite singers ($n=14$). Regarding age and professional experience time in singing, no statistically significant difference was observed (Mann-Whitney test), with mean age of 34.8 for popular singers and 31.8 years for erudite singers, and mean professional experience time in singing of 14.6 years and 12.6 years for popular and erudite singers, respectively.

No statistically significant difference was found in the comparison of all of the MSHI and CSHI scores with the variable gender (Table 1) for both groups.

Table 2 shows the correlation between the MSHI and CSHI scores and age and professional experience time in singing. Among the popular singers, there was weak statistically significant negative correlation for the MSHI protocol scores (except for the handicap subscale) and the age of participants. No statistically significant correlation was found for the erudite singers. With regard to the professional experience time in singing of popular singers, all MSHI scores showed weak statistically significant negative correlation with this variable; for the erudite singers, in turn, there was no statistically significant correlation between this variable and the CSHI scores.

Concerning the comparison between the presence and absence of self-reported vocal complaint with the protocols, all of the scores showed statistically significant differences for both groups (Table 3). Among the popular singers, the variables age, professional

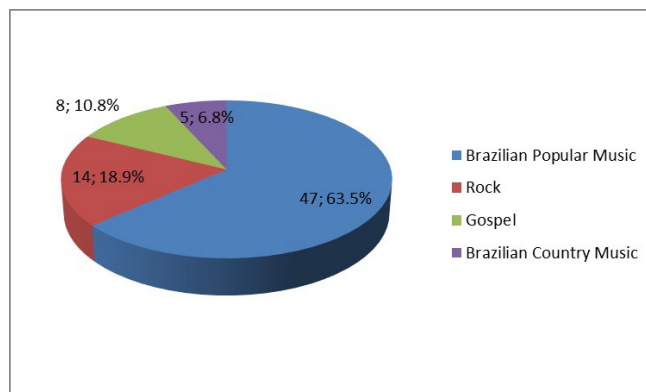


Figure 1. Distribution of popular singers according to the musical genre performed

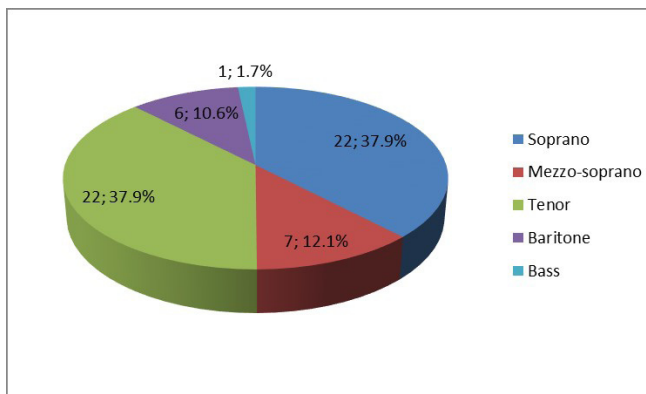


Figure 2. Characterization of classical singers with respect to vocal classification

Table 1. Descriptive analysis of the total score and the subscales disability, handicap, and impairment of the MSHI and CSHI, according to music genre, of popular and erudite singers

	MSHI						CSHI						p*						
	Male			Female			Male			Female									
	N	\bar{X} (sd)	Min-Max	N	\bar{X} (sd)	Min-Max	N	\bar{X} (sd)	Min-Max	N	\bar{X} (sd)	Min-Max		Median	Min-Max				
Total score (%)	24	28.1 (26.0)	20.4	0.8-79.2	50	17.7 (14.5)	13.3	0.0-50.8	0.260	0.260	30	20.3 (21.7)	15	0.0-80.0	19.9 (22.5)	17.7	0.0-80.0	0.988	
Subclass Disability (%)	24	9.0 (8.6)	5.8	0.0-26.7	50	5.4 (4.9)	4.2	0.0-20.0	0.148	0.148	30	7.1 (7.8)	3.3	0.0-29.2	28	7.0 (7.2)	3.3	0.0-25.8	0.876
Subclass Handicap (%)	24	7.8 (8.3)	4.6	0.0-25.8	50	4.2 (4.3)	2.9	0.0-16.7	0.350	0.350	30	5.2 (6.0)	2.9	0.0-20.8	28	5.7 (7.1)	2.9	0.0-26.7	0.838
Subclass Impairment (%)	24	11.4 (10.0)	9.2	0.0-29.2	50	8.1 (6.6)	7.5	0.0-23.3	0.282	0.282	30	7.9 (8.5)	6.3	0.0-31.7	28	7.3 (8.6)	3.8	0.0-27.5	0.656

*Mann-Whitney test

Table 2. Correlation between the total score and the subscales disability, handicap, and impairment of the MSHI and CSHI and age and professional experience time in singing, in years, of popular and erudite singers

	Age						Professional experience time in singing					
	MSHI			CSHI			MSHI			CSHI		
	n	r	p*	n	r	p*	n	r	p*	n	r	p*
Total score (%)	74	-0.24	0.037	58	-0.07	0.594	74	-0.40	<0.001	58	-0.17	0.197
Subclass Disability (%)	74	-0.22	0.055	58	-0.17	0.216	74	-0.37	0.001	58	-0.24	0.075
Subclass Handicap (%)	74	-0.21	0.077	58	-0.04	0.767	74	-0.40	<0.001	58	-0.13	0.346
Subclass Impairment (%)	74	-0.26	0.028	58	-0.03	0.820	74	-0.36	0.002	58	-0.13	0.348

*Spearman test

Table 3. Descriptive analysis of the total score and the subscales disability, handicap, and impairment of the MSHI and CSHI according to the vocal complaint self-reported by popular and erudite singers

	MSHI						CSHI						p*					
	Without complaint			With complaint			Without complaint			With complaint								
	N	\bar{X} (sd)	Min-Max	N	\bar{X} (sd)	Min-Max	N	\bar{X} (sd)	Min-Max	N	\bar{X} (sd)	Min-Max		Median	Min-Max			
Total score (%)	40	10.6 (13.0)	5.8	0.0-60.8	34	33.4 (18.8)	33.3	7.5-79.2	<0.001	44	12.7 (14.5)	7.5	0.0-78.3	14	43.5 (25.0)	42.1	12.5-80.8	<0.001
Subclass Disability (%)	40	3.2 (3.7)	2.5	0.0-18.3	34	10.5 (6.9)	8.8	1.7-26.7	<0.001	44	4.5 (5.2)	3.3	0.0-25.8	14	14.9 (8.1)	12.5	5.0-29.2	<0.001
Subclass Handicap (%)	40	2.5 (4.2)	0.8	0.0-18.3	34	8.8 (6.3)	7.5	0.0-25.8	<0.001	44	3.3 (4.1)	2.1	0.0-20.8	14	12.2 (8.1)	12.1	2.5-26.7	<0.001
Subclass Impairment (%)	40	5.0 (6.1)	2.1	0.0-24.2	34	14.1 (7.0)	13.8	3.3-29.2	<0.001	44	4.9 (6.0)	2.9	0.0-31.7	14	16.4 (9.3)	17.1	2.5-30.8	<0.001

*Mann-Whitney test

Table 4. Multiple regression analysis for the total score and subclasses of the MSHI with the variable professional experience time in singing according to the presence or absence of vocal complaint self-reported by popular singers

Variable	MSHI								
	Without complaint				p*	With complaint			
	N	β	CI _{95%}	N		β	CI _{95%}	p*	
Total score (%)	Age	40	-0.1	-0.58 ; 0.38	0.671	34	0.42	-0.13 ; 1.83	0.087
	Time in singing		-0.01	-0.55 ; 0.54	0.979		-0.53	-2.28 ; -0.10	0.033
Subclass	Age	40	-0.09	-0.16 ; 0.11	0.695	34	0.40	-0.06 ; 0.67	0.101
Disability (%)	Time in singing		0.01	-0.16 ; 0.16	0.991		-0.5	-0.82 ; -0.01	0.043
Subclass	Age	40	-0.13	-0.20 ; 0.11	0.556	34	0.40	-0.06 ; 0.60	0.110
Handicap (%)	Time in singing		0.05	-0.16 ; 0.19	0.831		-0.45	-0.71 ; 0.03	0.068
Subclass	Age	40	-0.06	-0.25 ; 0.19	0.791	34	0.37	-0.09 ; 0.65	0.131
Impairment (%)	Time in singing		-0.05	-0.28 ; 0.23	0.834		-0.51	-0.84 ; -0.02	0.040

*Linear regression analysis

Table 5. Univariate linear regression analysis for the total score and the disability subclass of the CSHI with the variable professional experience time in singing according to the presence or absence of vocal complaint self-reported by erudite singers

Variable	CSHI								
	Without complaint				p	With complaint			
	N	β	CI _{95%}	N		β	CI _{95%}	p	
Score Total (%)	Professional experience time in singing	44	-0.21	-0.67 ; 0.25	0.357	14	0.09	-1.36 ; 1.53	0.989
Subclass Disability (%)	Professional experience time in singing	44	-0.11	-0.28 ; 0.05	0.182	14	-0.02	-0.49 ; 0.45	0.932

experience time in singing, and self-reported complaints were statistically significant for all the MSHI protocol scores. Based on these outcomes, a multiple linear regression analysis was performed (Table 4) with the stratification the variable vocal complaint as to its presence or absence.

In this model, no statistically significant correlation was observed between the MSHI scores and the variables age and professional experience time in singing for popular singers without self-reported voice complaint. In contrast, analysis of the stratification of presence of vocal complaint showed that professional experience time in singing presented statistically significant negative correlation with the total score and the subclasses disability and impairment adjusted by age, that is, the longer the professional experience time in singing, the lower the MSHI scores for popular singers with self-reported vocal complaint; however, this correlation was not observed in the handicap subscale.

In the analysis of the erudite singers, only the variable self-reported vocal complaint showed statistically significant association with the CSHI protocol scores. However, professional experience time in singing for the total score and the disability subscale presented $p < 0.20$. To eliminate the chance of any influence from other variables in the results, an analysis of these scores stratified by the vocal complaint variable was conducted (Table 5). No statistically significant difference of these variables was found in either stratification.

DISCUSSION

The online resource used for data collection proved to be an excellent choice, especially when considering the optimization of time and the limited mobility of people in big cities. This option

also facilitated the contact with this population, considering that this group of professionals often has unconventional schedules dependent on the agenda of their concerts, meetings, and rehearsals. The online tool provided singers with the freedom to respond to the protocol when convenient.

Regarding the sample categorization, there was predominance of female popular singers and male erudite singers. Previous studies⁽²⁻⁴⁾ have also shown a larger number of women in the popular genre. The groups presented similar behavior with respect to the variables age and professional experience time in singing. The mean age shows that individuals in this population fit into the age range of maximum vocal efficiency, according to the literature⁽⁹⁾. Nevertheless, singers over 45 years old who remain professionally active and present no vocal complaints were identified in both groups. This information shows that, even with the occurrence of structural, functional and/or hormonal changes due to the natural aging process, singing can aid in voice longevity, providing better conditions of vocal production throughout life^(10,11). Therefore, it is believed that the reference made to the period of maximum vocal efficiency might be rethought in the case of professional singers.

With regard to the professional characterization of popular singers, the musical genre most commonly performed was Brazilian Popular Music (MPB), followed by rock, gospel, and Brazilian country. In general, most professionals who work in bars, nightclubs, and other public places common to popular singers present repertoire of MPB, pop, rock, and their subgenres. In a study⁽¹²⁾ that characterized 30 night singers with singing voice complaint, 26 individuals were interpreters of MPB. Therefore, the prevalence of individuals who perform such genres was expected.

Gospel singing, in turn, has gained ground in the music industry in Brazil with the creation of a specific niche in the domestic market. It has also been addressed in the academia, with the publication of 17 studies between 2008 and 2012⁽¹³⁾. However, most of these studies address a population typically composed of amateur singers^(14,15). We also need to investigate the behavior of professional singers, their care, difficulties, and attitudes toward the voice, health, and relations with the professional context.

Brazilian country music is also a genre of large scope in the country, but the occurrence of studies that exclusively investigate this population is still low. According to a survey on the scientific production on Speech, Language and Hearing Sciences addressing the singing voice in Brazil between 2008 and 2012⁽¹³⁾, of the 41 studies on popular singing, Brazilian country is one of the subgenres addressed by this research field, but not all studies make it clear what the target population of singers is. According to the authors, it is important that the research individual be clearly described and located, because this is the only way to relate the singer with the musical genre, form of professional practice, among other aspects⁽¹³⁾.

The vocal classification of erudite singers showed that most of them were sopranos and tenors. These data reflect the reality of erudite singers, where there is a predominance of high voices in both genders⁽⁴⁾. It is important to note that, for this population, new studies⁽¹⁶⁾ have advanced onto proposals that go beyond the knowledge of population profile, with the introduction of research on body aspects, concepts, and strategies used in singing, among other approaches.

As for the presence of self-reported vocal complaint, the predominance of popular singers was expected, considering that higher occurrence of complaints and alterations is observed both in the literature^(7,8) and in clinical practice in singers of the popular genre. A research⁽¹⁷⁾ that compared the vocal health habits of popular and erudite singers reported that the first present living conditions that may result in greater vocal wear, such as fewer hours of rest a day and increased workload. Regarding erudite singers, according to the authors, due to the increased demand of the vocal tract and differentiated phonation adjustments, these singers attend classes with several singing teachers, start their careers early, and therefore are more likely to develop symptoms of dysphonia. However, on the contrary, erudite singers present lower occurrence of these symptoms, mainly because they have closer contact with techniques and greater dedication to the study of singing. This might occur owing to the refinement and sophistication inherent to this musical category, which presents greater demand with respect to vocal production, and thus any minor alterations can cause a great impact on these individuals^(7,8,18).

Furthermore, popular singers frequently are not limited to the performance of an only musical mode, singing different genres which require distinct settings that can generate wear if not performed appropriately⁽¹⁸⁾. It is critical to understand the demand of each singer, which is characterized by the demand level that is imposed on the vocal tract^(1,7). It is also fundamental to investigate refinement, which depends on the personal interpretation style and song repertoire, and consequently have a

better understanding of the complaint and a more efficient clinical management⁽⁷⁾. All of these factors underlie the construction of the individual in their expressiveness and their relations with the professional voice⁽¹⁸⁾.

According to the results presented, the variable gender was not related to the MSHI and CSHI protocols (Table 1). This fact demonstrates that, despite the assumption that perceptions of men and women with respect to the handicap in their voices can be diverse, other aspects may be prevailing. Overall, the popular singers presented higher scores compared with those of the erudite singers regardless of the gender factor. This shows that aspects regarding the musical genre performed have greater influence on these professionals than the fact of being a man or a woman. This finding differs from the study⁽²⁾ in which female choristers presented higher scores in the disability subscale. However, the research investigated a group of choir singers, which represents a population distinct from that of this study.

We reiterate that the MSHI and CSHI protocols are targeted to professional singers, as shown, for example, in the subscale handicap, matters such as: "I feel that my career is at risk because of my voice problem"; "I am forced to cancel some professional commitments because of my voice"; "Colleagues, managers/agents, and critics have noticed my vocal difficulties"; "I avoid scheduling future work commitments". For an amateur singer, it would hardly be possible to address these issues precisely because they are specific to those who actually live this reality. There are many studies addressing this population, considering that most of the choruses organized by institutions, colleges, high schools, clubs, and organizations are composed of amateur singers⁽¹⁹⁾. However, to apply these protocols that aim to evaluate the professional performance in an amateur population^(3,4) or even use non-singers for comparison in order to investigate the sensitivity of the instrument⁽³⁾, are methodological procedures that can lead to bias and compromised outcomes. The relation of the professional singer, whose voice is crucial to their livelihood, is completely different from that established by an amateur singer, who is a person that sings for pleasure, without the commitment of labor activity. In the clinical practice, we observe the burden that making a living imposes on the emotional aspects of the individual, in addition to the competition that exists in any labor market. From this perspective, the choice of the instrument in a survey should be clear, because only in this way advances, population expansion, and reproducibility of studies will be possible.

With respect to age (Table 2), a first analysis shows a weak negative correlation with the MSHI scores, indicating that as age increased, the difficulty of the popular singer decreased. However, when a second analysis is performed with stratified data, which separated the popular singers according to the presence or absence of vocal complaint (Table 4), the variable age lost statistical significance. Thus it became clear that the variable vocal complaint masked the data referring to age. These variables were also not correlated for the erudite singers (Table 2).

Therefore, for the present study, age was not predominant in MSHI and CSHI scores. This result differs from that of a study⁽²⁾ which identified that the older the erudite singers without vocal complaint in the sample, the smaller the handicap

perceived by them. However, in the aforementioned study, there was no statistical analysis with the isolation of variables, and thus a possible presence of confounding factors (or intervening variables) was not identified. Epidemiology provides support⁽²⁰⁾ for the fact that age is a potential factor of confusion of many associations, because it is often associated with exposure and condition (or disease) in different situations. This was confirmed in the present study, where age was a confounding factor and had to be controlled by adjusting the analysis.

Regarding professional experience time in singing, after the correlation analysis (Table 2) and the subsequent regression analysis with stratification of the vocal complaint variable (Table 4), it was found that popular singers with no self-reported vocal complaint did not suffer the influence of professional experience on their vocal performance. In contrast, among those with vocal complaint, having more experience proved to be a factor that helps professionals in the functional and organic aspects (disability and impairment, respectively). Perhaps this experience can assist them in stage posture, presentations, and in their professional activity as a whole (functional level), and also interferes with the perception of phonation characteristics (organic level), with the use of breathing techniques, articulation, projection, and other features that help overcome or circumvent the vocal problem.

No association of the CSHI scores with professional experience time in singing (Table 5) was observed for the erudite singers, a fact that can be justified by the experience often acquired by this population before professionalization. When erudite singers begin their professional life, they generally have already experienced several years of training in singing, either through formal education or with private tutors, sometimes of different teaching approaches. The genre itself demands such an investment, given the sophistication required by the vocal use, the complexity of the works performed, or even the culture of musical training in the area^(21,22).

Several aspects permeate this scenario and may explain the difference between the genders. One of them refers to the fact that vocal production in popular singing is closer to speaking, which can lead some singers to consider musical training unnecessary and, therefore, start their working life based on their empirical knowledge and confidence in their “innate” talent for singing⁽¹⁸⁾. Moreover, in the popular genre, there is no right way to sing and the understanding of normal or altered voice varies according to the vocal characteristics of each musical mode. Different vocal qualities are accepted in popular singing (such as the breathy voice in the *bossa nova* movement, for example) that do not necessarily represent a problem for the singer. Conversely, in erudite singing, voice quality is the key to better performance⁽⁸⁾.

There is an important fact in singing, present in any of the genres, that is not addressed by any of the domains of the MSHI and CSHI protocols, but present close relations - interpretation. The creation of interpretative style depends on anatomical and physiological conditions, general health, the psyche, and the emotional state of each singer, as well as on their training and professional experience⁽⁷⁾. The harmony between these aspects arouses what is named singing “with the soul”, which produces sensations and thrills the listener. Singing can be rehearsed,

imitated and learned, but the charisma of the singer and the emotion transmitted by voice cannot be measured by the vocal quality. This may explain the success of some performers, which often is not measured by a superior voice quality, but by the emotion and truth transmitted through the singing⁽⁸⁾.

Nevertheless, singing “with the soul” does not eliminate the value of the technical aspect and the search for comfortable phonation. For some professionals, the first contact with a singing teacher or audiologist occurs only when a vocal problem is already installed, usually a result of lack of technique and/or improper adjustments⁽⁸⁾. Fortunately, there has been a change in this attitude, because the importance of good training is clear for the development of a voice naturally and healthfully produced with quality, beauty, and technique. In addition, it is worth mentioning that the anatomy of a singer is not restricted to the larynx, for the whole health condition of the individual affects the voice. In this context, the speech-language therapist does not work only with the strictly vocal aspects of singers, but also with their general health conditions, which are directly or indirectly related to the voice⁽⁸⁾. We thus reaffirm the need for singers, whether popular or erudite, to seek specialized monitoring to assist in the training and professionalization of the singing process.

We therefore observed that the MSHI and CSHI protocols present high sensitivity for singers with vocal complaints, which is consistent with other studies⁽²⁻⁵⁾. However, special attention should be paid to the way this aspect is approached by the individual, who may not clearly notice the differences between vocal complaint and acute otorhinolaryngologic disorders such as colds, allergies, or other types of diseases, as well as a technical difficulty.

The existence of vocal complaints is a starting point for the clinical work with singers. Similarly, analysis of the MSHI and CSHI protocols is an essential tool for the understanding of how these individuals relate their voices with their occupational activity. With this knowledge, it is fundamental that the speech-language therapist not only identify the problem presented, but also make use of these instruments in favor of Speech, Language and Hearing Sciences or any other intervention with this voice professional.

In view of this, it is suggested that singers be thoroughly characterized in future studies so that they can understand the relation of their vocal use in a professional context and the various generating and/or influencing aspects of these difficulties. Additionally, it is expected that these protocols assist in interventions provided to the patient, being periodically reapplied at different moments of the therapeutic process as a way to aid in the difficulties perceived by this professional category.

CONCLUSION

Regarding the comparison between the groups of popular singers and erudite singers with respect to gender, age, professional experience time in singing, and presence or absence of self-reported vocal complaint using the Modern Singing Handicap Index (MSHI) and the Classical Singing Handicap Index (CSHI)

protocols, we conclude that there was no correlation of the scores of these protocols with the variables gender and age of singers.

Less experienced popular singers with vocal complaint presented higher values for the total score and the subscales disability and impairment in the MSHI. Erudite singers were not influenced by professional experience time in singing in the scores of the CSHI.

The impact of vocal difficulty/problem interferes differently in these two musical genres. The MSHI and CSHI protocols proved to be important tools not only for the identification of problems, but also for the understanding of how these individuals relate their voices with this occupational activity.

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Author contributions

CMLB was responsible for all phases of the study, which served as a basis for her doctorate dissertation under the supervision of MAAS.