INTRODUCTION

Singing has been present for thousands of years in several cultures, and has been related to magic, health, religious ceremonies, feasts and wars. It is one of the most beautiful forms of art, that many times expresses that which words alone are unable to say. However, singing is not only about a form of expression, but also of a value-changing kind of social interaction. The singular way in which the artist sees the world influences the judgments made about him or herself. The pleasure coming from this kind of work motivates the singer.

In order to sing, one uses the same structures used in the spoken voice, but with adjustments that are necessary to musical interpretation. In singing, breathing is trained and is faster than the breathing in speech, with predetermined cycles according to the musical phrases. In singing a greater volume of air is used, that must be controlled on its way out, as the thorax walls move. The vibration cycles of the vocal folds have a higher closing than opening coefficient, which provides the singer with longer lasting time and a sound that is richer in harmonics. During singing, the larynx tends to remain in a lower and more stable position, even in notes with higher frequencies. The singer's resonance is usually high, concentrated in the upper part of the vocal tract. Singers have better control of the expiration airflow which results in a rich variation of loudness and allows for greater vocal projection. Another important aspect for the singer is having an ample vocal frequency extension, usually around two and a half octaves, greater than the one used to speak. All of these factors alongside the singers' vocal training
contribute so that the vocal quality in singing is more stable. Therefore, singing may be considered an excellent tool for vocal training.

There are authors who allude that voice disorders may be corrected through singing, which directly influences voice quality\(^2,3\). According to Fuchs et al. (2009)\(^4\), singing aids in vocal self-perception and may be one of the factors that leads the individual to better care for his voice and not commit as many abuses, avoiding screaming and using their voice in a more sophisticated manner than those who don’t sing. Thus, singing experience directly influences vocal performance, as well as the individual’s vocal self-perception.

According to Bicalho et al. (2010)\(^5\), voice professional may attribute different values and weights to the self-perception of their voice quality.

Vocal self-perception has been of great value in clinical practice nowadays, as it captures the individual’s perspective in regards to the impact that he/she believes their voice has on listeners. Kasama and Brasolotto (2007)\(^6\) suggest that vocal self-perception is intimately tied to quality of life, and may be used as a tool in the detection of communication-related problems. However, there are no reports in literature about the vocal self-perception of singers, who are professionals who use their voices a great deal with high demands regarding vocal quality.

The purpose of this study was to identify the level of self-perception of vocal aspects of singers in a professional choir.

**METHOD**

This study was approved by the Research Ethics Committee at the Dental College of Bauru FOB-USP under protocol number n\(^6\) 109/204. All the ethical principles that compose resolutions number 196/96 and 257/97 on ethics in studies involving human beings and the guidelines of the Research Ethics Committee at the FOB-USP.

This is a cross-sectional descriptive study, that has analyzed data obtained from the questionnaire completed in the research Project entitled “Characteristics of phonetography in choir singers of different vocal classifications”\(^7\).

The analyzed data were obtained from the questionnaire completed by 44 individuals from a professional choir of the city of Bauru/SP, 16 men and 28 women with ages ranging in between 20 and 75 years (\(X\) 51.5 years \(\pm\) 14.36 years).

The participating choir singers completed a questionnaire (Figure 1) containing 30 objective questions. This procedure was conducted verbally and the answers were taken down by the researcher in order to find information regarding:

I) Singing voice: self-perception of voice (five positive characteristics and five negative characteristics observed in their voices); singing voice complaints (if there is vocal discomfort after singing) and singing experience (singing education, for how long and time singing in choirs).

II) Spoken voice: self-perception of voice listing the vocal characteristics observed, five positive (beautiful, pleasant, clear, strong and soft) and five negative (ugly, stingy, muffed, weak and rough) and voice complaints (hoarseness, voice loss, pain)

III) Habits related to vocal health: amount of water intake throughout the day, frequent use of alcohol and smoking.

The positive or negative vocal self-perception was classified as low, medium or high, according to the number of characteristics reported by the choir singers, where up to two reported characteristics is considered low, three medium and four or five is considered a high level.

The statistical analysis of the obtained data was conducted using the Hypothesis test that adopted 95% as a significance level. The confidence intervals of the scores for spoken voice and singing voice in their different levels were compared, both for positive and negative, as well as for the complaint index.

In order to obtain the correlation for the other indexes, Regression statistics was conducted, using the R-Square test, that adopts a correlation level equal to 1.0. This test permits the assessment of the correlation of negative vocal habits, time of choir singing experience and having had singing lessons with speaking voice complaints.
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### I. In regards to your **SINGING** voice, do you consider it:

1. Beautiful  Y ( )  N ( )
2. Pleasant  Y ( )  N ( )
3. Clear  Y ( )  N ( )
4. Strong  Y ( )  N ( )
5. Soft  Y ( )  N ( )
6. Ugly  Y ( )  N ( )
7. Stingy  Y ( )  N ( )
8. Muffed  Y ( )  N ( )
9. Weak  Y ( )  N ( )
10. Rough  Y ( )  N ( )

11. Do you feel any vocal discomfort after singing?  Y ( )  N ( )
12. Have you taken or do you take singing lessons?  Y ( )  N ( )
13. If so, for how long?  ______________

### II. In regards to your **SPOKEN** voice, do you consider it:

1. Beautiful  Y ( )  N ( )
2. Pleasant  Y ( )  N ( )
3. Clear  Y ( )  N ( )
4. Strong  Y ( )  N ( )
5. Soft  Y ( )  N ( )
6. Ugly  Y ( )  N ( )
7. Stingy  Y ( )  N ( )
8. Muffed  Y ( )  N ( )
9. Weak  Y ( )  N ( )
10. Rough  Y ( )  N ( )

11. Do you feel hoarseness in your voice?  Y ( )  N ( )
12. Do you feel pain in the vocal fold region (throat)?  Y ( )  N ( )
13. Do you have frequente aphonia (do you lose your voice frequently)?  Y ( )  N ( )

### III. Habits related to vocal health:

1. Do you smoke?  Y ( )  N ( )
2. Have you been a smoker in the past?  Y ( )  N ( )
3. Do you drink alcoholic beverages frequently (at least once a week)?  Y ( )  N ( )
4. What is your daily water intake?  ______________

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**Figure 1 – Questionnaire**
Vocal self-perception of professional choir singers

RESULTS

All of the choir singers had a positive vocal self-perception for both singing and spoken voice, where 62% of them reported four or more positive vocal characteristics, being classified as a high positive self-perception of voice (Figure 2).

![Figure 2 – Percentages of the number of positive vocal characteristics of spoken and singing voice reported by the choir singers in this study](image)

The statistical analysis found that the self-perception indexes did not evidence differences in between spoken voice and singing voice (Table 1). Negative vocal self-perception was found in 36% of the choir singers for their spoken voice, and in 30% for their singing voice, and most of them (32% spoken voice and 25% singing voice) reported only one or two negative characteristics, accounting for a low negative vocal self-perception (Figure 3).

Table 1 – Confidence intervals of the obtained scores of positive self-perception of spoken and singing voices

<table>
<thead>
<tr>
<th></th>
<th>Low Level</th>
<th>Medium Level</th>
<th>High Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower Limit</td>
<td>Upper Limit</td>
<td>Lower Limit</td>
</tr>
<tr>
<td>Spoken Voice</td>
<td>54.93%</td>
<td>67.79%</td>
<td>19.28%</td>
</tr>
<tr>
<td>Singing Voice</td>
<td>66.83%</td>
<td>78.61%</td>
<td>15.12%</td>
</tr>
<tr>
<td>Result</td>
<td>Statistically Equal</td>
<td>Statistically Equal</td>
<td>Statistically Equal</td>
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Hypothesis Test: p = 95%

![Figure 3 – Percentages of the number of negative vocal characteristics of spoken voice and singing voice reported by the choir singers in this study](image)
The statistical analysis showed that the low and medium levels of negative vocal self-perception did not evidence differences in between spoken and singing voices. However, the high level had a statistically significant difference (Table 2).

Spoken voice disorders were reported by 31% of the subjects, who reported presence of hoarseness, aphonia and/or pain. In singing voice, 25% of the participants reported presence of vocal discomfort after singing. The statistical analysis showed no difference in between the complaints reported in spoken and singing voice. The confidence intervals were 19.28% and 30.72% for singing voice and 25.66% and 37.96% for the spoken voice.

When questioned, the subjects did not report laryngeal disorders, found in a otorhinolaryngological examination.

Table 2 – Confidence Intervals of the obtained scores of negative self-perception of spoken and singing voices

<table>
<thead>
<tr>
<th></th>
<th>Low Level</th>
<th>Medium Level</th>
<th>High Level</th>
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<tbody>
<tr>
<td></td>
<td>Lower Limit</td>
<td>Upper Limit</td>
<td>Lower Limit</td>
</tr>
<tr>
<td>Spoken Voice</td>
<td>25.66%</td>
<td>37.96%</td>
<td>1.76%</td>
</tr>
<tr>
<td>Singing Voice</td>
<td>19.28%</td>
<td>30.72%</td>
<td>0.30%</td>
</tr>
<tr>
<td>Result</td>
<td>Statistically Equal</td>
<td>Statistically Equal</td>
<td>Statistically Different</td>
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Hypothesis Test: p = 95%

Table 3 – Correlation between negative vocal habits, time of experience in choir singing and singing lessons with spoken voice complaints

<table>
<thead>
<tr>
<th></th>
<th>Spoken Voice Complaints</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking and Alcohol</td>
<td>0.009</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Time of Choir Singing Experience</td>
<td>0.005</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Singing Lessons</td>
<td>0.004</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

R-Square: p = 1.0

**DISCUSSION**

Choir singing is a human activity that, in addition to providing group interaction, involving all of its social aspects, provides better self-perception, develops the choir singer's self-esteem and values their individuality.

The present study showed that the main part of the singers of the participating choir have high positive vocal self-perception and low negative vocal self-perception for both spoken and singing voices. This fact may be attributed to a better vocal performance, expected in singers. This data is similar to that found in the study by Fuchs (2009), that concludes that singing experience directly influences vocal performance, as well as the individual's self-perception of voice.

Although there is no statistical correlation with vocal complaints, a factor that may influence vocal self-perception is the time of singing experience.
According to Amato (2007)², the group interaction that choir singing provides stimulates the singers' motivation, and they show great personal growth, establishing a social and cultural network from further valuing their individuality. Furthermore, this experience transforms the choir singer's view of the world, since choir singing is a social practice that works as an asset to the individual.

In regards to the participation in singing lessons, it was observed that only 43% of the studied choir singers sought improvement of their vocal techniques through singing lessons. Even if not presenting statistical correlation with complaints, this fact may concern professional who care for the vocal well-being of singers and must hence guarantee information and guidance to these individuals.

Another aspect is that, in the statistical comparison in between spoken voice and singing voice, the only index that proved to be different was the high level of negative vocal self-perception, greater for the singing voice, as shown in Table 2. The perception of negative vocal characteristics, especially in regards to the singing voice, suggests that choir singers have a refined sensitivity in identifying small disorders, proving to be critical of their voice quality, due to the demand that they have.

This finding may also be indirectly related to laryngeal, respiratory and vocal tract adjustments that the choir member uses during singing, which gives him a better vocal performance, but also a greater demand. In regards to this, Bicalho et al. (2010)⁶ reported that voice professional may attribute different importances and values in their self-perceptions, and are higher-demanding in certain aspects.

This data confirms the fact that singers have vocal complaints, even if there is no significant difference in between spoken and singing voices.

It was especially observed that there was no complaint or report of laryngeal disorders among women undergoing menopause. In a study by Machado et al. (2005)⁸, the authors suggest that women identify the changes in voice that occur in consequence of menopause. However, it should be taken into account that there was no laryngeal assessment in order to confirm the obtained data. Literature reports an increase in complaints and voice disorders in women in menopause, as well as those related to aging, in non-singing elderly³⁻¹¹. It may be inferred that singing, for these choir members, may have strengthened laryngeal structures, thus preventing or minimizing vocal disorders related to hormonal changes or aging. To Brown et al. (1990)⁹, singing may directly influence vocal quality in elderly people. In their study, the voice of elderly singers and of young adults had better performance when compared to non-singing elderly. Hazlett and Ball (1996)² reported that the time of singing experience and the effects of voice training of singers may set back the voice changes that occur due to aging.

In regards to the habits related to vocal well-being, the choir singers' mean intake of 1.7liters of water throughout the day showed that they are aware of the need for hydration. Literature reports indicate that this is a positive aspect, since good levels of hydration is important for all living creatures, and especially for the individual with professional voice use, since it prevents vocal fatigue¹².

In regards to the negative habits, these have also not shown statistical correlation to vocal complaints. However, regular alcohol intake by 50% of the participating subjects is an aspect that deserves special attention, especially in guidance information stating that this intake should not occur before singing.

The results regarding smoking pointed towards the greater knowledge that this group has about the harmful effects of tobacco, since only 4.5% of the participants are smokers, and 22% have given up this habit. Goulart et al. (2010)¹³ reported that, in Brazil, the prevalence of smoking dropped from 35% to 18% in the period in between 1989 and 2003, and in 2006 this index suffered yet another reduction, dropping to 16%. Public Health programs, as well as National Voice Campaigns are actions that encourage citizens to stop smoking, the National Health Department and the National Cancer Institute (INCA) have taken on the role of organizing the National Program for Tobacco Control.

The results observed in this study suggest that choir singing has played an important role in the self-perception of voice, and possibly in the prevention of voice disorders.

CONCLUSION

Based on the data obtained in this study, it may be concluded that the evaluated choir singers had a high level of self-perception of their vocal aspects, and may suggest that choir singing plays an important role in promoting vocal well-being.

ACKNOWLEDGMENTS

To Tatiane Camargo and Daniela Barbosa for making the data of their research available for analysis.

To Dr. Léslie, for the encouragement in publishing this study.
RESUMO

Objetivo: identificar o nível de autopercepção vocal de cantores de um coral profissional. Método: participaram 44 coristas, com idades entre 20 e 75 anos (média de 51,5 ± 14,36), de ambos os sexos. Estes responderam a um questionário com 30 questões objetivas sobre autopercepção vocal e queixas da voz cantada e falada; experiência com o canto e hábitos relacionados ao bem estar vocal.

Resultados: todos os coristas auto definiram suas vozes com características positivas, não apresentando diferença estatística entre voz falada e cantada. Os coristas identificaram também características vocais negativas para voz falada e cantada, sendo que foi encontrada diferença estatística. O índice de queixas vocais foi de 31% para voz falada e 25% para voz cantada, sem apresentar diferença estatística. 43% dos participantes realizaram aulas de canto, com tempo médio de 1,95 anos (± 2,29 anos) e o tempo de participação em corais variou de seis meses a 66 anos, com tempo médio de 17,74 anos (± 18,45 anos). Quanto aos hábitos relacionados ao bem estar vocal, o índice médio de ingestão diária de água foi de 1,7 litros (± 0,92 litros); 50% dos coristas fazem ingestação de álcool com frequência; o índice numérico de tabagistas foi de 4,5% e 22% dos coristas são ex-tabagistas. Não foram encontradas correlações estatísticas entre tabagismo, etilismo e experiência no canto com queixas vocais. Conclusão: os coristas avaliados apresentaram um nível elevado de autopercepção de seus aspectos vocais, podendo sugerir que o canto coral desempenha um papel importante na promoção do bem estar vocal.

DESCRITORES: Voz; Envelhecimento; Hábitos; Autoimagem

REFERENCES