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ARTICLE

Bodywork and Singing Voice: An Educational Tool for Voice Optimization

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ABSTRACT

Bodywork applied to vocal technique is an increasingly used tool in teaching practice. However, there is little research that can provide evidence of its effectiveness. This research is an exploratory and descriptive case study that investigates the self-perception of 14 voice major students after receiving a bodywork program. The main objective is to analyze if a bodywork program designed for singers affects the emission and vocal quality and, therefore, may be a good pedagogical tool in voice education. The body-mind method applied is the Méthode de Libération de Cuirasse © (MLC). To conduct the intervention, the participants performed different vocal tasks and answered a questionnaire to reveal their perceptions in relation to vocal emission, body balance, frame of mind, and degree of well-being before and after each of the sessions of bodywork. Two months after the last session, a second questionnaire was administered and a free narrative of the lived experience of participants was collected for subsequent analysis and interpretation. Results showed more comfort when singing, greater harmonic richness, greater facility in the high register, and better breath control as well as an improvement in general well-being and state of the body.

KEYWORDS

Body-mind; alignment; singing; voice; education; voice quality; well-being

Singers are musicians who practice their artistic activity without having visual control over what they produce, trusting in what they perceive through proprioception and/or auditory feedback (Tarvainen 2018). For this reason, bodywork focused on proprioception and self-examination could provide a useful tool for the technical training of future singers.

Since the 1950's through to today, different body-mind methods such as Alexander Technique, Feldenkrais, Body Mapping, Yoga, Pilates, and Tai Chi have been explored with the objective of enhancing the singing voice. Some of these studies which focus on body-mind methods are based on the author's experience and offer descriptive results, which may lack analytical and statistical data (Carman 2004; Heirich 1993; Malde 2009; Nelson and Blades 2005). There is an increasing tendency of using research tools such as questionnaires, diaries, interviews, audio and video recordings, and assessment of a group of experts to provide more information on the efficacy of various body-mind approaches. These studies have reported positive effects on resonance (Jones 1972),

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and the development of singing technique including articulation, broadening the register, vibrato, tone quality and tuning (Buchanan 2011; Buchanan and Hays 2014; Collyer 2018; Norberg 2010; Paparo 2016, 2022), performance and communication (Norberg 2010), musical expression (Buchanan 2011; Buchanan and Hays 2014), breathing and support (Buchanan 2011; Buchanan and Hays 2014; Collyer 2018; Mezzedimi et al. 2019; Norberg 2010; Paparo 2016, 2022), performance anxiety (Norberg 2010), self-confidence, and empowerment (Buchanan 2011; Buchanan and Hays 2014; Collyer 2018).

All practices in these studies seek body balance, with the objective of achieving an optimal instrument for the voice. For this purpose, we need to understand the anatomical and physiological relation between body balance and voice, along with other important aspects such as breathing, emotions, and expressivity.

The links between the body, breathing, voice, and emotions are described below.

Body Alignment and Voice

The structure and alignment of the human skeleton are the scaffolding on which all other parts of the body depend. Therefore, any discussion about the vocal mechanism must begin here. Posture and mental attitude determine body alignment and balance, which are the basis of efficient breathing and are fundamental to healthy singing (Bunch-Dayme 2009). However, according to Cardoso, Lumini-Oliveira, and Meneses (2019) there is no ideal valid posture for singers; what exists is a non-static balance defined by different body segments: feet, pelvis, shoulder girdle and head.

Feet, Legs and Pelvis

On the one hand, the position of the pelvis determines the alignment of the entire vertebral column, thereby affecting the higher regions that are more closely linked to harmonic richness—as some authors have pointed out (Caçador and Paço 2018; Johnson and Skinner 2009; Luck and Toiviainen 2007; Staes et al. 2011). Also, the position of the pelvis (Caçador and Paço 2018) and the degree of tension of the iliopsoas can affect the ease or difficulty of the diaphragm descent during inspiration (Sajko and Stuber 2009).

On the other hand, the posterior muscle chain begins on the soles of the feet and ends at the base of the skull, meaning that working on the soles of the feet increase extensibility in the posterior chain and consequently can act on verticality (Rafael et al. 2011).

Shoulder Girdle

The shoulders are one of the most common sources of pain. If the muscles of the shoulder girdle are consistently contracted, elevating the shoulders and curling them forward, they will become fatigued and form painful knots. Similarly, if the shoulders are forcibly depressed, excessively pulling the shoulders down and back, the muscles of the shoulder girdle are stretched, which also results in muscle tension. Because of the larynx's proximity to the shoulder girdle, tension in these muscles will often create tension within the larynx (McCarther 2014). This area also impacts the respiratory mechanism. For example, tension in the trapezius is often stress related, so reducing this tension as part of a general stress reduction strategy involving other muscles in the neck (such as the intrinsic and extrinsic

muscles of the larynx) will have a positive impact on vocal function. It has been observed that when singers are trained to relax the trapezius through biofeedback, no compensatory activity is seen in other respiratory muscles, suggesting a positive contribution to the mechanism of singing breathing (Watson 2014).

Neck, Jaw, and Palate

The position of the cervical spine is especially relevant (Houtte, Evelyne, and Claeys 2011; Luck and Toiviainen 2007) because it is directly related to the voice (Staes et al. 2011), resonance, tone control (Arboleda, Barbara, and Frederick 2008) and harmonic enhancement (Jones 1972). It can also affect the sensation of phonatory effort (Marina and Johns 2017).

In a 2009 study carried out by Johnson and Skinner with professional opera singers, a relationship was observed between a change of posture in the cervical area and an increase in the pharyngeal airway space at the third cervical level while singing, demonstrating that craniocervical position and posture influence the singer's performance and can alter the characteristics of the voice (Longo et al. 2020; Staes et al. 2011).

Focusing on the jaw, Cookman and Verdolini (1999) demonstrate a relationship between the position and relaxation of the jaw and the laryngeal musculature. Professional singers are cognizant of this relationship and often use a larynx descent maneuver to relax the larynx and increase its resonance (Eve and Lowell 2020). Similarly, an open jaw position is associated with improved vocal production, including a higher fundamental frequency and enhanced phonatory stability and vocal clarity (Mautner 2015).

The Body and Respiration

Balanced inspiration and expiration are essential for an appropriate breathing pattern. Inspiration depends on the activity in the diaphragm and external intercostal muscles. Subglottic pressure is created during phonation by the contraction of the abdominal wall, predominantly as a result of lateral abdominal muscle activity, which drives the relaxed diaphragm upwards while simultaneously the internal intercostals pull the ribs downwards (Watson 2014).

To improve breath the diaphragm, intercostal muscles, pelvic floor muscles, and abdominals have to be flexible to work coordinately. A pilot study by Ciuryk et al. (2021) observed the impact of manual diaphragm relaxation therapy on voice emission. The analysis of the results showed an improvement of acoustic parameters (Fundamental frequency, Jitter and Shimmer), demonstrating that work on the diaphragm can improve vocal efficiency (Ciuryk et al. 2021).

In relation to the pelvic floor, there is no direct incidence on the voice, but its weakness usually causes a disorganization in breathing. This agrees with the idea that tonification and coordination exercises for perineum may be important in voice work (Calais-Germain and Germain 2013).

Emotions and the Body

The emotions and the body are closely linked; when emotions arise, they affect the voice, facial expression, muscle activity and all the senses, generating a response to a perceived

stimulus that enables us to find our place in our environment. There is research that shows how anxiety, stress, and anguish are factors that trigger or play a role in functional dysphonia, or influence people's perception of being vocally handicapped (Dietrich et al. 2008; Gassull et al. 2010).

Some persistent emotions produce stress, which is a response to a situation that disturbs our equanimity. The way each person's body reacts is different, resulting in alterations in muscle tension and alignment (Acevedo, Acevedo, and Adriano de Luca 2001). Alexander Lowen (2004) explains how the muscles act as protectors and regulators of emotional impulses, so that the more muscular tension there is, the less contact occurs with the emotions, feelings, and internal impulses.

When there is a strong emotional charge, the body tenses and locks up and the alignment gradually changes. For this reason, the purpose of many mind-body techniques is to find emotional well- being through specific work on the body.

Methodology and Instruments

This research is a pre-post repeated measures case study that applies a mixed methodology, combining quantitative and qualitative data. The purpose of this study is to analyze the impact of the body-mind work proposed on the vocal quality of a group of voice major students. Specifically, in this article we present the results of the evaluation of students' self-perception of vocal quality, state of the body, breathing, and frame of mind after performing bodywork. Participating students were also assessed on their incorporation of the proposed exercises into individual study routines. The data was collected through two questionnaires: the Follow-up Questionnaire (see annex 1) and the Final Questionnaire (see annex 2), and a free narrative entitled "My journey through the body-mind work sessions", provided by the participants themselves at the end of the intervention.

Context and Sample

The research framework was based on an agreement with the Conservatori Superior de Música del Liceu in Barcelona, and the fieldwork was carried out at the facilities of this institution with the collaboration of the voice department.

The nonrandom sample consisted of 14 voice major students (3 men and 11 women) consisting of two baritones, one tenor, one mezzo-soprano and 10 sopranos. We are aware that the sample is small, but it is in the higher range of similar studies, which have samples between 1 and 11 participants (Buchanan 2011; Buchanan and Hays 2014; Collyer 2018; Jones 1972; Norberg 2010; Paparo 2016, 2022), except the study conducted by Mezzedimi and his team which had 15 participants (Mezzedimi et al. 2019).

Method

The intervention consisted in four body-mind work sessions of 45 minutes duration comprising soft movement exercises aimed at body opening and muscular stretching. These were carried out once every two weeks, and each session focused on a specific area: feet, legs, and pelvis; respiratory structures (diaphragm, intercostals and abdominals);

shoulder girdle; and neck-jaw-palate structure. Before and after each session, the participants performed a vocalization test and answered the Follow-up Questionnaire. In the session dedicated to the respiratory structures, the participants also answered some questions about how they perceived their breathing. The vocalization test consisted of an arpeggio extended with a 12th, singing by semitones to a major third. The women started on a C3 and the men on an A1 (see Figure 1).

At the end of each session, the research facilitators recommended that participants incorporated the exercises which had been perceived as the most effective for their own voice and body into their study routine, sending a summary of all the exercises to participants as a reminder.

Two months after the end of the intervention, participants were asked to answer the Final Questionnaire online, with items that explored what had been relevant to them and why. They were also asked to write a free narrative about their experience during the sessions. Figure 2 shows the intervention plan.

Instruments

Data was obtained from two questionnaires (Follow-up Questionnaire and Final Questionnaire- see annex 1 and 2) and a free narrative. The questionnaires were created with the Google Forms application, which enabled us to collect both quantitative and qualitative answers in a single database and provided us with a first level of analysis of the distribution of the answers.

Follow-Up Questionnaire

The questions in the Follow-up Questionnaire were designed to measure the participants' perception before and after each session of body-mind work, with a focus on the different parameters related to their sensations using three subscales: body, voice, and emotion. The questionnaire contained 21 semantic differential items for rating on a scale from 1 to 5, except for the general well-being parameter, which was rated on a scale from 0 to 10.

After the body-mind session, the subjects were also asked to rate their ability to describe sensations of body, vocal, and emotional changes; three questions to find out,

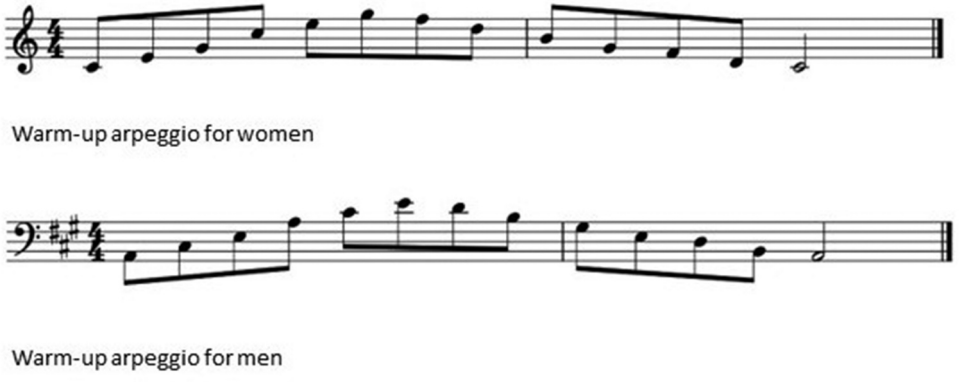

Figure 1. Warm-up arpeggio.

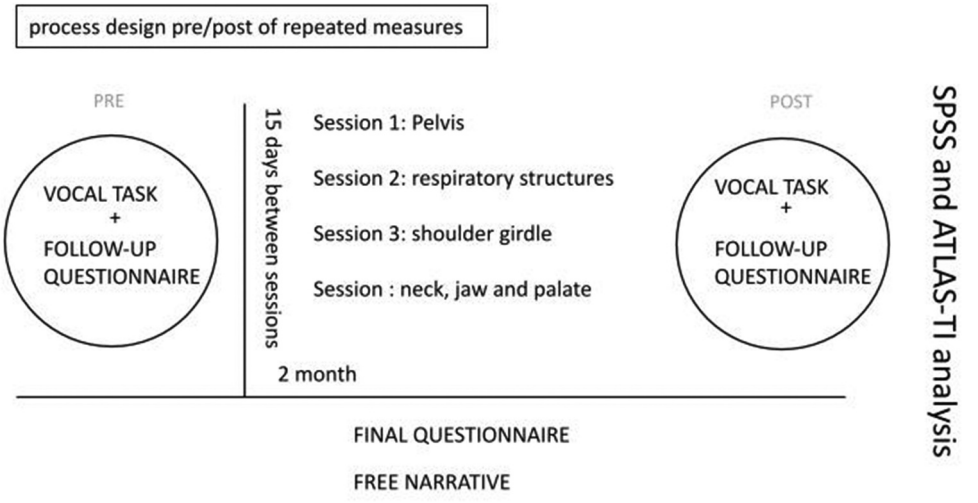

Figure 2. Intervention plan.

respectively, whether they had incorporated any of the exercises proposed in the previous sessions into their study routine, at what times they put them into practice, and in what way they felt that these had helped them.

The questionnaire design allowed the participants to see their answers in the pretest, which had taken place before the intervention. Thus, this initial score was used after the intervention to evaluate whether their impressions were the same or had shifted toward any of the adjectives in the semantic differential.

The construction and validation process of the questionnaire was carried out as follows: an initial questionnaire was designed from the theoretical knowledge and existing bibliographical references. Then, in order to evaluate the semantic and content validity of the questionnaire, a focus group (Förster Marín and Rojas-Barahona 2008) was set up, with three sessions conducted by four experts from two different universities making up a multidisciplinary team specialized in speech therapy, voice education, body therapy/education and psychology respectively. Each of the sessions served to filter and refine the instrument by evaluating the clarity and relevance of each of the items. Subsequently, when it was used in the pilot test in this research, an internal reliability statistical analysis was carried out applying Cronbach's alpha, a statistical measurement tool, which gave a value of 0.917 for the overall questionnaire, indicating good reliability. The validity of the three proposed scales was also confirmed. The results of the scores in each subscale were as follows: 0.82 for body, 0.79 for voice (omitting the bright—matte timber voice item, which was eliminated from the questionnaire) and 0.87 for emotion. These results confirmed that the test was reliable.

Final Questionnaire

The final questionnaire consisted of qualitative questions to determine which sessions had been the most significant, whether participants had put the exercises into practice, which exercises had been incorporated into participants' personal study routine, and if the intervention had improved participants' ability to define physical, vocal, and

emotional sensations, thereby helping them to detect parts of the body that may interfere with vocal emission.

Free Narrative

The participants were asked to write a free narrative entitled "My journey through the body work sessions" describing their experience of the different sessions of bodywork at physical, vocal, and emotional levels.

Application

We applied the Méthode de libération de cuirasse © (MLC). MLC, created by M. Lise Labonté, is a psycho-corporal and energetic approach that uses mental imagery and movements to become aware of the tensions stored in the body, called breastplates, and free yourself from them to find well-being. MLC is inspired by the anti-gymnastics method, created by Thérèese Bertherat. The voice is not the focus of this method, though there are a lot of movements used by MLC that are useful to re-equilibrate the body and relax excessive tension of different segments that are involved in voice emission. MLC uses different instruments like foam balls, tennis balls, or canes. Placing these instruments on specific parts of the body, gentle movements are made to bring the body toward balance. In this study, a short program of four sessions was proposed, focusing each one on different parts of the body (you can see some exercises of each session in Annex 3).

Results

To analyze the participants' perception of corporal, vocal and emotional changes, the IBM SPSS Statistics program (a statistics program for quantitative data analysis) was used with a T-Wilcoxon statistical test for the comparison of the medians of each item before and after each session, grouping the results in each subscale and adding a total score for each of them. To find out about the experience, impact and importance of the proposed bodywork, and also to what extent what was experienced during the sessions was incorporated into the students' study routine, the Free Narrative and the open questions in the Final Questionnaire were codified and analyzed with the qualitative analysis program ATLAS.ti based on pre-established categories and some emerging ones.

Self-Perception of Vocal Changes

As can be observed in Table 1, an overview of the results of the voice subscale reveals that Sessions 1 (pelvis) and 2 (respiratory pattern) had a more significant impact on voice self-perception than Sessions 3 (shoulder girdle) and 4 (neck-jaw-palate).

In the voice subscale results table, an improvement in the median of all the items following the intervention can be observed, with the exception of three items: ease in producing high notes in the last session, ease in producing low notes in Session 3, and the beauty of the voice in the last session. The changes in harmonic richness in Sessions 1 and 2 were significant; and also, the ability to sing high notes in Sessions 2 and 3, and the ability to sing low notes in session 1. The sum of the voice subscale scores was significant for Sessions 1 and 2.

Table 1. Voice, body, and emotion self-perception.

	SESSION 1			SESSION 2			SESSION 3			SESSION 4		
	Mean PRE	Mean POST	p	Mean PRE	Mean POST	p	Mean PRE	Mean POST	p	Mean PRE	Mean POST	p
VOICE												
Harmonic richness	2	3,31	**0,006***	3	3,57	**0,052***	2,71	3,14	0,233	2,5	2,79	0,33
Well-toned voice	2,77	3,62	0,134	3,64	4	0,436	2,5	3,21	0,075	3,21	3,57	0,403
Clear voice	3,77	4	0,454	3,5	3,86	0,248	2,79	3,14	0,296	3,36	3,64	0,206
Easy emission	2,54	3,54	0,051	3	3,57	0,163	2,43	3,21	0,078	2,93	3,36	0,204
Ease on high pitch	2,38	3,54	0,072	2,79	3,86	**0,022***	2,36	3,43	**0,017***	3,21	3	0,465
Ease on low pitch	3,08	3,92	**0,031***	3,5	4	0,2	3,64	3,57	0,805	3,21	3,64	0,19
Beauty in the voice	2,92	3,46	0,235	3	3,71	0,065	2,79	3,21	0,218	3,21	3,14	0,763
Voice total	19,46	25,38	**0,025***	22,43	26,57	**0,039***	19,21	22,93	0,084	21,64	23,14	0,362
BODY												
Well-being	5,15	7,45	**0,003***	6,29	7,86	**0,034***	6,29	8	**0,008***	6,21	7,5	**0,005***
Relaxation	2,31	4,08	**0,002***	2,64	4,14	**0,005***	2,36	4	**0,002***	2,54	3,93	**0,002***
Rooting	2,38	3,85	**0,009***	3	4,21	**0,003***	3	3,93	**0,025***	2,86	3,79	**0,025***
Openness	2,33	3,38	**0,006***	2,93	3,92	**0,022***	2,79	3,93	**0,014***	2,57	3,71	**0,007***
Activity	2,92	2,62	0,442	3,29	3,5	0,521	3,29	4,07	**0,035***	2,86	3,79	**0,01***
Energy	2,54	2,92	0,289	2,86	3	0,417	2,71	3,43	**0,013***	2,43	3,21	**0,026***
Alignment	2,62	4	**0,009***	2,57	4	**0,001***	2,71	3,64	**0,012***	2,64	3,64	**0,01***
Availability	2,62	3,92	**0,004***	3,14	4,29	**0,016***	2,86	4,29	**0,001***	2,86	3,86	**0,013***
Body total	17,54	24,77	**0,001***	20,43	26,36	**0,002***	19,71	27,29	**0,001***	18,57	25,93	**0,005***
EMOTIONS												
Tranquility	2,77	3,23	0,298	3	3,64	0,164	2,57	3,25	**0,034***	2,5	3,43	**0,012***
Happiness	2,92	3,5	**0,023***	3,36	3,07	0,305	3,64	3,69	0,763	3,14	3,5	0,16
Calm	3	3,5	0,314	3,64	3,86	0,581	3,77	3,85	0,608	3,15	3,93	**0,005***
Orientation/Situation	3	3,17	0,811	3,14	3,79	0,053	2,79	3,69	**0,008***	2,79	3,64	**0,006***
Decision	3,15	3,92	**0,03***	3,64	3,64	1	3	3,36	0,236	3,07	3,64	**0,033***
Strength	2,92	3,62	0,053	3,5	3,71	0,477	3,14	3,79	**0,021***	3	3,64	0,063
Energy	3,08	3,38	0,535	3,14	3,71	0,084	3	3,43	0,293	2,79	3,43	**0,048***
Emotions' total	20,85	23,54	0,077	23,43	25,43	0,258	21,64	23,79	0,061	20,21	25,21	**0,008***

Depending on the sessions, participants were more or less able to perceive vocal changes and to describe what had changed, with the respiratory structures session producing the best results in this regard. An increase in perceptual capacity in itself was also observed; in the first session, 58.3% noticed changes, with 50% being able to define these changes. After the second session, over 92.4% of the participants perceived vocal changes and between 46% and 77% were able to describe them.

Self-Perception of Changes in the Body and Breathing

The improvement was statistically significant, especially in the items concerning the body, as can be seen in Table 1. The only deterioration was in the item "I feel active" ("Activity" item in the Table 1) in Session 1, while there was a non-significant improvement in the item "I feel energetic" in Sessions 1 and 2. The rest of the items showed a significant improvement in all sessions.

All participants perceived changes in their bodies and the majority (between 78% and 93%) were able to describe these changes.

After the session focused on respiratory structures, the participants perceived less effort ($p = 0.004$) and easier breathing ($p = 0.008$) and were able to lengthen their expiration time ($p = 0.006$), and those who perceived pressure in the neck or sternum when lengthening the fiato felt that it had decreased ($p = 0.014$).

Self-Perception of Changes in the Body- Emotion Relationship

On the other hand, the results of the emotion subscale show that there was a more significant impact on the self-perception of emotions in Sessions 3 and 4.

Table 1 shows how the mean of the scores of all the items improved, except for happiness in Session 2, highlighting those that improved significantly.

Incorporation of the Exercises

As regards the incorporation of the proposed exercises into the students' study routines, we observed that the percentage of affirmative answers increased after each session, from 23% after the first session to 100% at the end of the intervention, when all the participants claimed to have created their own routine with the exercises they found most useful.

Each participant organized their own exercise routine depending on their needs, according to their perception of which exercises could help them improve their voice quality. The exercises most practiced by the participants were those that work on the diaphragm and intercostals (used by 46% of them), followed by exercises focused on the back and the shoulder girdle (38%). Other exercises that the participants incorporated into their routine were those for the feet (30%), the pelvis (23%), and the neck (15%).

The times at which the participants stated that they practiced the exercises also underwent a change and it was observed that more and more students began to do them before starting to study. After the first session, 50% practiced the exercises before going to sleep and 50% before studying, and after the fourth session, 90% before studying and 10% at other times.

Participants' Perception of the Effectiveness and Importance of Bodywork in Relation to Other Parameters

The qualitative analysis of the participants' free narratives in combination with the answers to the open questions in the questionnaires provided us with a view of the participants' perception of the effectiveness and importance of bodywork in relation to other parameters.

Some of these categories were pre-established, such as the body-voice and emotion-voice relationships, the effectiveness of bodywork, and the importance of bodywork. However, the qualitative analysis of the participants' reports also generated emerging categories, such as the management of emotions or the connection with oneself.

Figure 3 shows how the participants related the effectiveness of bodywork to aspects of improved vocal quality and breathing and their perception of their physical well-being, and also emotional aspects such as the management of emotions.

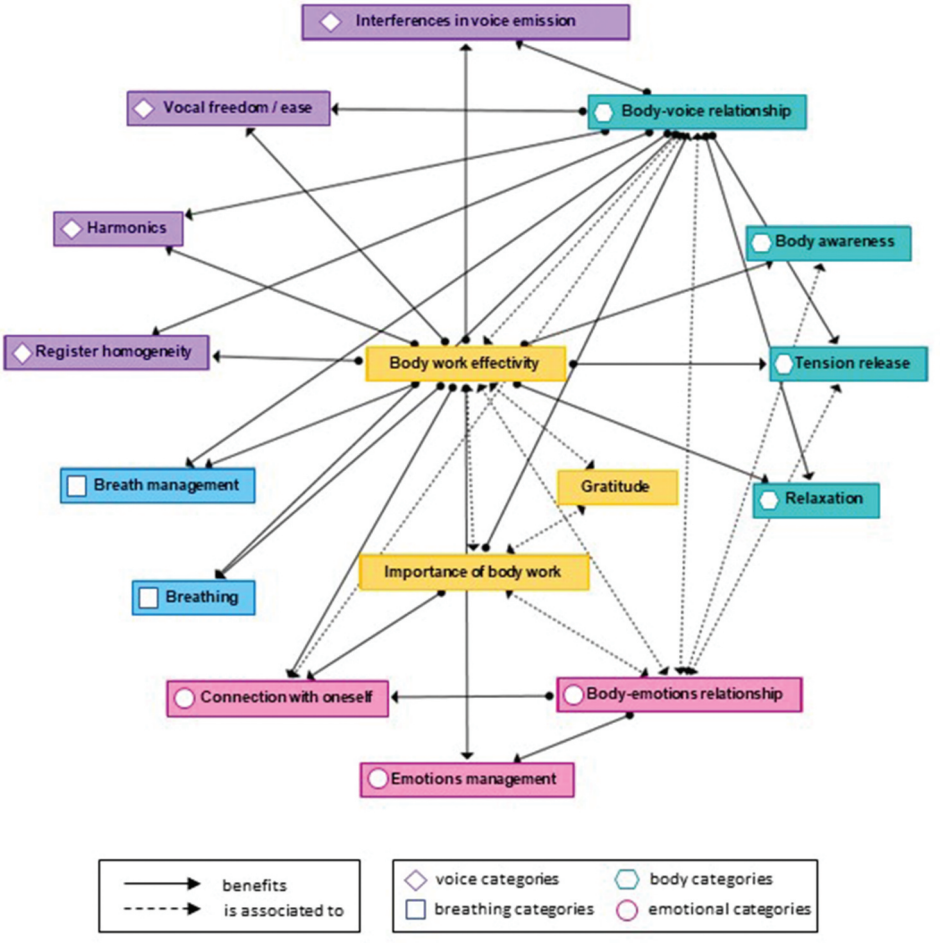

Figure 3. Self-perception of bodywork effectivity.

Furthermore, the participants underscored the importance of this bodywork insomuch that it enabled them to experience and personally verify the relationship between the body and the voice, the relationship between the body and emotions, their own emotional experience, and the connection with themselves.

In most of the narratives, the students also expressed their gratitude for having had the opportunity to participate in this intervention, relating this to the effectiveness and importance of the work in view of the improvements made in their vocal quality. Participant 14[1]: "I am very happy to have participated in this project because I think it has been a very enriching journey. I am convinced that this emotional work and bodywork should be a compulsory subject for all music major students."

Participants reported an improvement in their singing voice after the bodywork sessions, some of them even stating it was instantaneous and occurred in all the sessions. Participant 14: "After all the sessions I always felt my voice much better; deeper breathing, easier sound emission, more harmonics, and consistency throughout the register." Participant 15: "The changes have come very quickly—in other words it is work that delivers results in a very short term."

Some participants explained that they found certain exercises more useful. They also valued the fact of acquiring tools that enabled them to incorporate bodywork into their routine as singers, in important situations such as singing exams and even in their everyday lives. Participant 5: "The day I really noticed an internal change was the day of my singing exam. Before going to the conservatory, I did some carefully chosen exercises." Participant 2: "Now, it doesn't make sense for me not to adapt my day-to-day routine to this bodywork. I think it's important in a singer's routine, but also to improve quality of life."

Perception of Body-Voice Relationship

Participants mentioned the following aspects when describing improvements in the voice after the bodywork sessions: greater sense of ease, freedom and naturalness, more fluid sound emission, more harmonics, enhanced consistency throughout the register, greater facility with high notes and in sustaining notes, deeper breathing, more immediate, more aware sound emission, and therefore, more control over the body.

The work carried out on the different parts of the body involved in voice emission helped them to develop greater body awareness, unblock the parts of the body that accumulate tension and cope with it. All this was reflected in a vocal improvement and better disposition when singing, which was more fluid and relaxed. And it helped them understand the importance of observation and awareness of their own bodies as their own instrument, because any trouble with the body can affect the singing voice. Participant 1: "After these sessions I am more aware of where the tension is in my daily life, and I have started noticing it more when I sing." Participant 12: "These sessions have helped me a lot to find an awareness of my body that I had never previously experienced in such detail and depth."

Some participants expressed difficulty in maintaining the changes achieved through bodywork, but they also commented that they understand that it is a task that must be incorporated into their everyday lives so that the inner balance of the body becomes the starting point.

Perception of the Body-Emotion Relationship

The participants explained that bodywork connected them with their own emotions and helped them process and manage them. They also pointed out that this relationship is transferred to and affects the singing voice, either in a positive way, eliminating blockages, or by preventing emotions from interfering negatively with the voice. Some of them said that they had been able to directly experience the existence of this body-emotions-voice relationship and had been able to reflect on it.

> Participant 5: I managed to find an inner peace that I hadn't felt on stage for a long time. I think that this helped me a lot and at the same time it made me think and see how connected my body, mind and voice are.

> Participant 15: Releasing all that tension enabled me to start thinking differently and above all awarely; thinking about how I feel, naming the emotions and also locating where they are expressed in the different parts of my body. I never imagined I could make such a clear connection between physical sensation and the feelings associated with it.

The sessions brought emotional blocks to light and the participants reported a significant release of tension at both the physical and emotional levels.

Discussion

Within the field of research that studies the relationship between body and voice there are two parallel paths. On one side, qualitative research studies that intend to validate the effectiveness of body-mind programs. On the other side, descriptive studies that relate acoustical voice characteristics with the body. The latest offer objective parameters, either acoustical voice analysis or postural analysis, but do not provide contributions to the optimization of the singing voice. In both cases, the samples of the studies are very limited.

This investigation focuses on establishing the relationship between body and voice provided by the descriptive research as well as assessing an intervention program impact.

Self-Perception of Vocal Changes After the Intervention

Above all, the proposed bodywork led to a perception of greater harmonic richness in the voice, improved timbral consistency, and greater facility in vocal emission in general as well as in the extreme notes, which were considered easier to sing. This prompts us to think that a bodywork program of this type, conceived and designed to put the body in conditions that facilitate the vocal mechanism, can serve as a useful complement during singer training.

Sessions 1 (pelvis) and 2 (respiratory structures) were the ones that had the most perceived impact on vocal quality. One of the items that was given significant positive statistical value was harmonic richness (S1 $p = 0.006$ and S2 $p = 0.052$). These results may be attributed to two factors: the pelvis implies the realignment of the entire vertebral column, thereby affecting the higher regions that are more closely linked to harmonic richness—as some authors have pointed out (Caçador and Paço 2018; Johnson and Skinner 2009; Luck and Toiviainen 2007; Staes et al. 2011), and a better movement of

the diaphragm facilitates laryngeal descent, providing more space for harmonics' production (Herbst 2017).

Other items that obtained significant changes were ease in singing low notes in the first session (p 0.031), and in singing high notes in the second session (p 0.022). It should be taken into account that the position of the pelvis largely determines the movement of the diaphragm (Pettersen and Eggebø 2010), which in turn can facilitate the movements of ascent and, in particular, descent of the larynx (Herbst 2017), thus making singing in these extreme registers easier to achieve.

Self-Perception of Body Changes After Bodywork

Regarding the perception of body changes, the results show an improvement in practically all the items studied and the participants explained that this type of training helped them to develop greater body awareness and to learn how to reduce excess tension in their body. These results are similar to the majority of research that applied body-mind methods to singers. We find, however, an exception: Collyer (2018) reported a significantly worse punctuation of posture and body alignment after a yoga program for singers.

Various authors argue that the relaxation of areas with excess tension (Jennifer et al. 2015; Paparo 2016), improvement in body alignment (Cardoso, Lumini-Oliveira, and Meneses 2019; Houtte, Evelyne, and Claeys 2011; Luck and Toiviainen 2007; Mezzedimi et al. 2019) and the perception of opening up have an impact on vocal quality. This leads us to think that these changes in the perceived body attitude can be directly related to the acoustic changes in the voice perceived by the participants.

Self-Perception of Breath Management

It is clear that a program focused on making the respiratory muscles and structures more flexible instead of focusing on expiratory control is highly effective. In their Pilates research study, Mezzedimi et al. (2019) observed a positive impact in the self-evaluation test, especially in relation to postural alignment and respiratory capacity. In her yoga program, Collyer (2018) just showed a slight improvement of breathing management. Our results show that significant changes in the quality of the respiratory pattern were perceived after Session 2: the participants felt that their breathing was easier and deeper, that they were able to prolong their expiratory time, and those who noted tension in the throat or the sternum when lengthening the fiato felt that it decreased. This finding concurs with the observation made by Torres Gallardo (2013) that "for good phonation and for good breath control, the inspiratory muscles must be elastic". Furthermore, this aspect is seen as one of the factors that makes the proposed work effective, both as regards its general explanation and the students' choice of exercises for their personal study routines.

Effectiveness of Bodywork

The effectiveness and perceived benefits of this type of intervention go beyond the vocal aspects. In the free narratives written by the participants two months after the end of the training sessions, they showed that they had not only realized that the bodywork helped them with aspects directly related to the voice, such as vocal

production, the fact of developing greater body awareness, and having tools to relax the body, but that they also perceived other benefits such as greater self- knowledge and connection with oneself, agreeing with the findings by Buchanan (2011) and Buchanan and Hays (2014) in their research applying Body Mapping with music students. The participants also reported the experience of the relationship between their bodies and the emotions, which led to more than one participant finding a way to better manage them. These results agree with those of Buchanan (2011) and Buchanan and Hays (2014), which report an improvement in their study participants' emotional communication.

Conclusion

The results of this research lead us to think that bodywork—and more specifically body-mind work—applied to the voice is/can be a useful complement in singer training. The goal of this type of intervention should be to ensure the body is in conditions to facilitate the vocal mechanism.

Among the different regions given attention, the work on the pelvis and respiratory structures had the greatest impact on the participants' perception in the spheres of both the body and vocal emission. The perception of body change may be explained by the larger size of these regions, a fact that facilitates their perception and also their modification. The perception of improvement in vocal quality may be due to the way the pelvis works with the larynx and diaphragm, both directly responsible for the control and acoustic Output of the voice.

With regard to breathing, the data indicates that direct work on the respiratory muscles is extremely effective, more so than focusing on training in specific breathing skills.

Finally, the fact that the participants incorporated the exercises into their study routines and perceive such training as something that helps them to become more aware of their own bodies and sing better supports the idea that a type of body education thought out and designed specifically to facilitate voice emission can be more effective than unfocused bodywork.

This research is a case-study and gives an approximation to how body-mind work can have an impact on voice quality. We must say that there is still little scientific production on this topic from the field of music education, agreeing with several authors that have stated the need for systematic studies relating different types of body-mind methods with the singing voice (Buchanan 2011; Engelhart 1989; Gordon et al. 2007; Hudson 2002; Paparo 2022; York 1957). Specifically, to understand the different relationships between each body segment and the quality of voice, more research is needed. It is also important to include objective acoustic voice analysis to validate these results. This is the target of our next research.

To conclude, increasing this line of research would help to improve voice education in schools, choirs, conservatories and degrees related with voice (music and acting programs, early childhood and primary education, voice therapy, journalism, among others).

Note

1. Comments extracted from the free narratives written by the participants. We have named each participant as follows: participant 1; participant 2; etc.

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Data Availability Statement

All data generated or analyzed during this study are included in this article. Further enquiries can be directed to the corresponding author.

Statement of Ethics

Study Approval Statement. This study protocol was reviewed and approved by the ethical committee of Autonomous University of Barcelona, approval number CEEAH No.: 4959 on 01- 15-2020. ***Consent to Participate Statement***. A written informed consent was obtained from the participants to participate in the study.

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