

Effects of indirect vocal therapy via telehealth in speech-language therapy on self-assessment and vocal quality of physical education professionals

Catarina Lima¹ Pollyana Diedio¹ Alcione Ghedini Brasolotto¹ Angélica Emygdio Antonetti-Carvalho¹ Kelly Silverio¹ 

¹ Universidade de São Paulo, Faculdade de Odontologia de Bauru – FOBUSP, Departamento de Fonoaudiologia, Bauru, São Paulo, Brasil.

ABSTRACT

Purpose: this study aimed to verify the effects of indirect vocal therapy (IVT), via telehealth, in physical education professionals in voice self-assessment, as well as vocal quality.

Methods: 16 physical education professionals, aged between 18 and 50 years, both sexes, participated in the study. All participants were submitted to eight IVT sessions twice a week, 30 minutes each, remotely. The assessments happened remotely, too. Vocal health was explained to modify vocal habits and general health, coping strategies, stress management, and therapeutic interaction. The following protocols were applied: Vocal Disorders Screening Index, Voice Symptoms Scale (VoiSS), Voice Handicap Index (VHI), and vocal recording (/a/ and counting) was performed, evaluating the general degree of vocal quality, pre and post-IVT. The Wilcoxon Test ($p < 0.05$) was applied to verify the findings.

Results: there was a significant decrease in the values of the VoiSS protocol (total $p = 0.041$; limitation $p = 0.032$), and VHI (total $p = 0.012$; $p = 0.005$), and in the general degree of vocal quality in vowel /a/ ($p = 0.011$).

Conclusion: IVT applied through telehealth in physical education professionals, has positive effects on vocal and laryngopharyngeal symptoms, improving the self-perception of voice handicaps. IVT significantly improved the general degree of vocal quality, only in the emission of the sustained vowel.

Keywords: Voice; Physical Education and Training; Telemedicine

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Corresponding author:

Kelly Cristina Alves Silverio
Alameda Dr. Octávio Pinheiro Brisola, 9-71
CEP: 17012-901 - Bauru, São Paulo, Brasil
E-mail: kellysilverio@usp.br

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INTRODUCTION

Physical Education professionals can be considered, along with other work activities, voice professionals, since their voice is of great importance in the development of their work¹. This category develops their activities in environments with unfavorable acoustics and competitive noise (environments with reverberation, external environments, and music at a high intensity)^{1,2}, and, to be heard and keep students motivated, they use a strong vocal intensity². As a consequence, it is observed that, during or after the classes, Physical Education professionals can present, with some frequency, periods of aphonia, hoarseness, changes in pitch, and sore throat^{3,4}. Thus, the literature describes them as a risk group for vocal alterations related to the development of work activities, which can be characterized as a Work-related voice disorders¹⁻⁶.

This situation is aggravated by the fact that these professionals have a reduced perception of their own voice and the importance it carries in their work activities². Therefore, the lack of perception of symptoms that indicate vocal alteration and knowledge about voice care may increase the possibility of developing dysphonia. Thus, these professionals should receive guidance through vocal health education programs, training on how to use their voice better, as well as training on how to recognize vocal alterations to seek help before the onset of dysphonia^{1,3,5}.

In the voice area, there are several therapeutic approaches, each one with its particularities regarding its proposals and intervention methods⁷⁻¹¹. The different approaches can be divided into two large groups: direct and indirect voice therapy^{8,12}, both of which are applied in voice training and treatment^{13,14}.

Direct voice therapy acts directly on the vocal tract, using vocal exercises and phonatory tasks, aiming to balance vocal physiology and biomechanics^{13,15}. Indirect voice therapy (IVT) consists of providing the individual with knowledge about vocal production mechanisms and how certain actions can influence these mechanisms. Furthermore, IVT addresses issues such as the involvement of the physical, psychosocial, and emotional environments, which interfere with vocal quality^{13,16-18}.

IVT is divided, according to Van Stan et al.¹², into pedagogy and counseling. In the pedagogy category, the authors point out “Knowledge Improvement” and “Vocal Hygiene” as their tools. The first involves providing information about vocal health so that harmful behaviors can be modified. “Vocal Hygiene” refers to

changes in the physical environment in which the patient develops their vocal functions. As for the counseling category, the “Coping Strategies” tool consists of modifying psychosocial and emotional factors through positive reinforcement, dealing with vocally healthy attitudes, and discouraging harmful attitudes to vocal health; as for the “Stress Management” tool, it is about the discussion with the patient in search of strategies that can help in the control of stress; and, finally, the “Therapeutic Interaction” tool involves a dialogue between the therapist and patient for the modification of psychosocial factors that are capable of negatively affect vocal health and an effective problem-solving.

The literature shows the applicability of IVT in person and with the predominant use of the “Knowledge Improvement” tool, belonging to the category of pedagogy in kindergarten teachers, actors, and other voice professionals¹⁹⁻²³. Some studies combine IVT with direct strategies such as respiratory control and pitch and loudness control²¹. Among the mentioned studies, only two^{19,23} assessed the vocal quality of the participants after applying IVT. In both studies, a decrease in measures of acoustic signal disturbance and an improvement in attitudes related to vocal health after guidance was observed. It was also observed that there is a low demand for speech-language and hearing therapy in the area of voice by this population.

One study²⁴ applied the tools of both categories belonging to IVT, “Pedagogy” and “Counseling”, in individuals with primary functional dysphonia. The study showed an improvement in the variables related to self-assessment after eight sessions and found that such progress was maintained one month after the end of the therapy.

Studies with this type of approach involving Physical Education professionals were not found in the literature. Therefore, there is a need for speech-language and hearing therapy intervention proposals for this population, to minimize previously reported vocal problems. Telehealth in speech-language and hearing therapy can be a means of facilitating access for Physical Education professionals to an IVT program.

Telehealth in speech-language and hearing therapy is understood as the use of Information and Communication Technologies (ICTs) to offer prevention and health promotion services, as well as rehabilitation services^{25,26}. Some studies in the area of voice, with different types of voice professionals, such as television journalists²⁷ and even health professionals, stand out²⁸. All studies concluded that intervention through

telehealth in speech-language and hearing therapy is as effective as face-to-face intervention in different approaches and populations. In a systematic review study on telehealth services in the speech-language and hearing area, in general²⁹, it was possible to assert that assistance via telehealth in speech-language and hearing therapy presents good results in the adult population.

Telehealth in speech-language and hearing therapy may have some advantages as a service option, such as the ease of schedules²⁷, long distances between professional and patient, difficulty in locomotion or patient mobility, chronic diseases, and even infectious diseases that require reduced contact between patient and therapist²⁵, such as in cases of contamination by SARS-CoV-2, which occurred recently. Thus, in March 2020, the Ministry of Health released Ordinance No. 467, allowing the use of telehealth as a way to help face the health crisis that the country was facing³⁰. Following this need, in August 2020, the Federal Council of Speech-Language and Hearing Therapy published Resolution No. 580, which regulates telehealth in speech-language and hearing therapy and provides other recommendations²⁶.

Finally, telehealth in speech-language and hearing therapy presents itself as a possibility of resource, as satisfactory as face-to-face assistance, and Physical Education professionals are at a high risk for the development of vocal alterations. No studies have, so far, investigated this population that lacks voice care. Therefore, in view of the above, the present study aims to verify the effects of IVT, applied via telehealth in speech-language and hearing therapy, in Physical Education professionals on self-assessment and vocal quality.

As a hypothesis of this study, IVT, applied through speech-language and hearing therapy, has positive effects on self-assessment and vocal quality of Physical Education professionals. On the other hand, the null hypothesis is that IVT, applied through speech-language and hearing therapy, does not change the self-assessment and vocal quality of Physical Education professionals.

METHODS

This is an experimental, prospective, and longitudinal study, conducted in accordance with Resolution No. 466/2012 of the National Health Council/CONEP. It was submitted to the Research Ethics Committee of the Bauru School of Dentistry, Brazil, and approved

under opinion number 4,078,291 and CAAE number 32005720.2.0000.5417. Physical Education professionals were invited to participate in the study through publicity in gyms in the city, telephone, and e-mail. The study was conducted from May 2020 to November 2021.

After screening, which contained questions investigating the inclusion and exclusion criteria and the presence or absence of vocal complaints, and solving the volunteers' doubts, they filled out and signed the Informed Consent Form, through an electronic form prepared in Google Forms (Google LLC, California, USA), using the institutional email of the research group. After agreeing with the Informed Consent Form, the participant received the other questionnaires and protocols to be completed, also via Google Forms.

It is worth mentioning that the General Data Protection Law No. 13,709, of August 14, 2018, was also respected for maintaining the confidentiality and security of the research participants' data. It is important to highlight that all the research (project development and data collection) was carried out during the period of social isolation caused by the pandemic generated by the Sars-CoV-2 virus.

At the end of the study, the participants, who still had complaints and vocal alterations, were referred for further evaluation and subsequent treatment with the same group of researchers when clinical activities returned in person.

Physical Education professionals of both sexes, who were working in gyms, were invited to participate in the study.

The inclusion criteria were: to be aged between 18 and 50 years old, to be a Physical Education professional working in gyms for at least one year, and never have been submitted to voice therapy, or, if have been submitted, the time without therapy should be equal to or greater than six months. Volunteers who declared pregnancy or hormonal problems without medical control and those who underwent surgery in the cervical and/or laryngeal region were excluded from the study.

The primary outcome variables were self-assessment of vocal symptoms, comprising the Screening Index for Voice Disorder (SIVD)³¹ and the Voice Symptom Scale (VoiSS)³² questionnaires, followed by self-assessment of voice handicap, comprising the Voice Handicap Index (VHI)³³. The study had vocal quality as a secondary outcome variable, consisting of auditory-perceptual analysis of the general degree of vocal quality.

The assessment procedures, composed of self-assessment protocols and vocal recording, were carried out before and after the conclusion of the therapeutic process with IVT, considering participants' symptoms and complaints presented in the last month before the initial assessment. For the assessment after the end of IVT, the month of the therapeutic process was considered.

For the SIVD protocol, participants were instructed to complete its scale, which had the following response options "never", "sometimes", "almost always" and "always" for each vocal/laryngopharyngeal symptom. One point was computed for "sometimes" and "always". As for the VoiSS and VHI, the participants answered a five-point scale about the frequency of the proposed situations, which had the following answer and score options: "never" (0 point), "rarely" (1 point), "sometimes" (2 points), "almost always" (3 points) and "always" (4 points). The final score was computed by the simple summation of responses.

The voice recording of the participants was adapted as a way of adjusting it to the scenario of social distancing, imposed by the pandemic caused by the Sars-CoV-2 virus, at the time of data collection. Thus, the participants recorded their voices through the voice recorder of their cell phones, with the researcher's recommendations to remain in a silent environment, away from other noises, with the TV and radio turned off and with doors and windows closed. Participants were instructed to sit comfortably in an orthostatic position, positioning the cell phone microphone in such a way that it was towards the mouth, approximately 10 centimeters away. The following emissions were requested: sustained vowel /a/, for at least five seconds, in usual pitch and loudness, and counting of numbers from one to ten. After recording, the participant was instructed to send the voice file to the researcher responsible for the project through the WhatsApp application (Meta Inc, California, USA) to check its quality. Thus, it was possible to ensure that the auditory-perceptual assessment was carried out properly. After the conference, the file was transferred to the institution's Google Drive digital platform (Google LLC, California, USA), receiving a code (name initials, what was recorded, and moment of assessment) as a form of data protection and subsequent access. It was not possible to perform an acoustic analysis of the voices due to the way they were recorded.

It is worth emphasizing that the researcher responsible for applying IVT was blind to the assessment of the outcome variables.

The auditory-perceptual analysis of vocal quality was performed by a speech-language and hearing therapist judge with experience in the field of voice and in vocal assessment, blinded regarding the moment of recording (pre or post-therapy). For the calculation of intra-rater agreement, 20% of the sample was repeated. Due to recording limitations, only the general degree of vocal quality, using a Likert scale from 0 to 3, where zero meant "no deviation", one "slight deviation", two "moderate deviation" and three "intense deviation", was analyzed. Statistical calculation was performed by comparing the moments before and after IVT.

For the application of IVT, eight sessions were performed, twice a week, lasting 30 minutes each. Therapeutic sessions were conducted at distance, via video call, using Google Meet (Google LLC, California, USA). The researcher who applied IVT remained in the virtual video call environment, and in an isolated and silent room in her residence. This environment was well-lit, with a clear background. The therapist used headphones, ensuring minimal privacy during the intervention, as well as wore a lab coat³⁴. Participants were also instructed to seek a private environment and use headphones to carry out the sessions.

IVT sessions were developed with the principles and use of IVT¹² tools, as proposed by Antonetti-Carvalho²⁴.

To promote strategies and knowledge about vocal health, in order to modify vocal habits and general health that affect the voice, "Knowledge Improvement" and "Vocal Hygiene" tools were used. Psychosocial factors that negatively affected the vocal health of volunteers were also identified and modified. Therefore, the therapist also used coping strategies³⁵, stress management, and therapeutic interaction.

IVT was developed in a dialogue format, using audiovisual resources such as videos, photos, PowerPoint presentations, and virtual anatomical models. At the end of each session, the participant was instructed to avoid the occurrence of vocal abuse and harmful habits to vocal health and to practice healthier habits. As support for the "Knowledge Improvement" tool, a website, specially created by a group of researchers for work on vocal health with the general population (www.cuidadoscomavoz.com.br), was used. At the beginning of each session, the participant was asked about the topic discussed in the previous session. On occasions when they reported the

occurrence of a harmful behavior to their vocal health, they were asked, making use of the “Therapeutic Interaction”, “Coping Strategies” and, when necessary, “Stress Management” tools, about the reason for the

occurrence, its frequency, whether they tried to do something to avoid it, and what could be done in the future so that it did not happen again. Chart 1 illustrates the content addressed in each IVT session.

Chart 1. Indirect vocal therapy detailed per session. The sessions took place twice a week, lasting 30 minutes each

SESSION 1	SESSION 2
<ol style="list-style-type: none"> 1. Interview: questioning about the main complaint and survey of vocal habits and general health data; 2. Definition of frequency and intensity of habits; 3. Survey of the objectives that the participant would like to achieve in the short and medium term. 	<ol style="list-style-type: none"> 1. Explanation of the physiology of vocal production; 2. Explanation of the physiological mechanisms of hydration; 3. Discussion about the importance of systemic and surface hydration.
SESSION 3	SESSION 4
<ol style="list-style-type: none"> 1. Resumption of the subject addressed in session 2 and clarification of doubts; 2. Questioning about the execution of the new habit and discussion about improvement or maintenance; 3. Clarification of the auditory-perceptual assessment. 	<ol style="list-style-type: none"> 1. Resumption of the subject addressed in session 3 and clarification of doubts; 2. Guidance on vocal and body rest mechanisms and their importance.
SESSION 5	SESSION 6
<ol style="list-style-type: none"> 1. Resumption of the subject addressed in session 4 and clarification of doubts; 2. Questioning about the execution of the new habit and discussion about improvement or maintenance; 3. Specific discussion based on the survey of habits (vocal and health). 	<ol style="list-style-type: none"> 1. Resumption of the subject addressed in session 5 and clarification of doubts; 2. Questioning about the execution of the new habit and discussion about improvement or maintenance; 3. Specific discussion based on the survey of habits (vocal and health).
SESSION 7	SESSION 8
<ol style="list-style-type: none"> 1. Resumption of the subject addressed in session 6 and clarification of doubts; 2. Questioning about the execution of the new habit and discussion about improvement or maintenance; 3. Specific discussion based on the survey of habits (vocal and health). 	<ol style="list-style-type: none"> 1. Resumption of the subject addressed in session 7 and clarification of doubts; 2. Questioning about the execution of the new habit and discussion about improvement or maintenance; 3. Specific discussion based on the survey of habits (vocal and health).

Finally, the quantitative variables (SIVD, VoiSS, and VHI scores) were submitted to data distribution analysis, using the Shapiro-Wilk test ($p < 0.05$), and non-normal distribution was observed. Thus, to verify the comparison before and after IVT via telehealth in speech-language and hearing therapy, the Wilcoxon test was applied ($p < 0.05$). For the ordinal qualitative variable (perceptual-auditory assessment), to compare the results before and after the intervention, the Wilcoxon test ($p < 0.05$) was also applied. Kappa Calculation was used for the analysis of intra-rater reliability.

RESULTS

Initially, 46 individuals, who answered the Screening Form, containing questions that investigated the inclusion and exclusion criteria and the presence or absence of vocal complaints, accepted to participate in the study. Of these, 35 met the inclusion criteria to participate in the study. However, only 16 agreed to participate, 10 women and 6 men aged between 21 and 43 years (mean = 29 years). Figure 1 illustrates the survey steps in the sample setup.

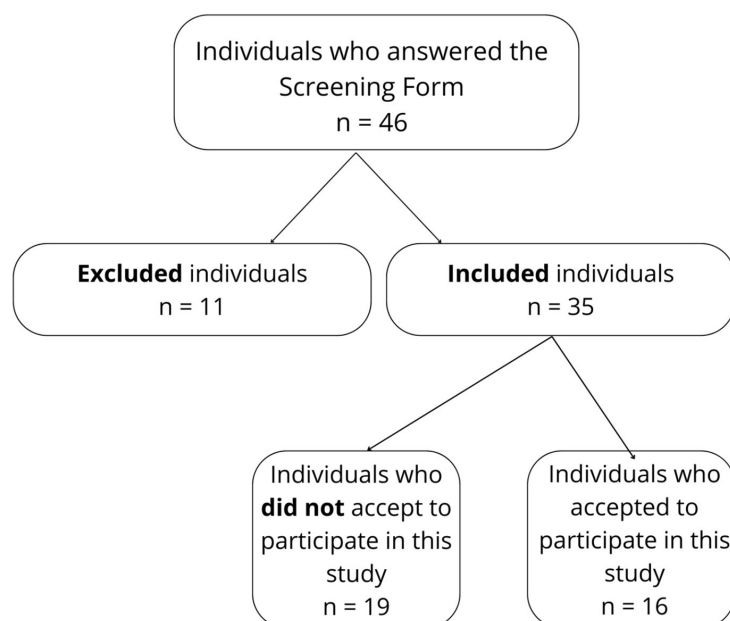


Figure 1. Flow diagram of the sample

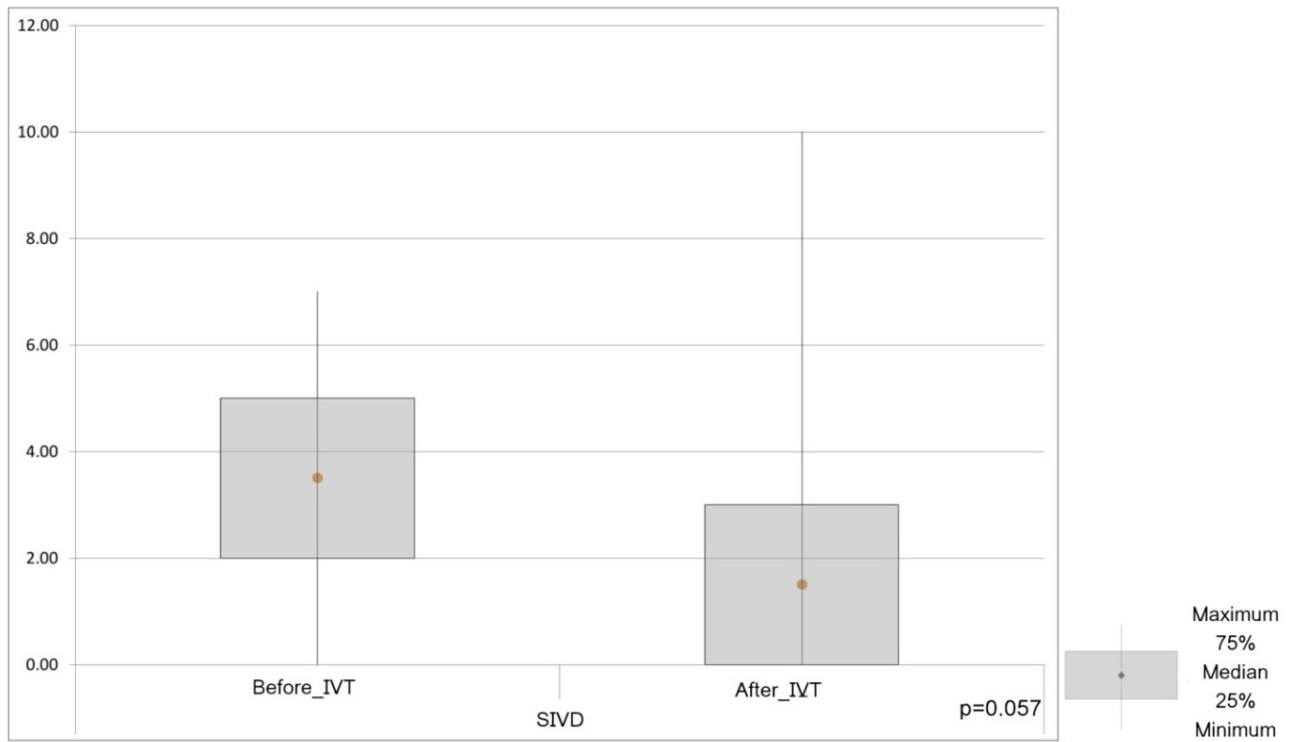
Of the excluded volunteers, two were older than the age established in the exclusion criteria; six did not work in gyms, two had hormonal changes and one individual was excluded for not working in gyms for at least one year. Regarding the participants included in the study, six men and ten women participated. Eleven had vocal complaints and five denied it. Among the participants who had vocal complaints, hoarseness was the most common symptom, followed by burning in the throat. None of them reported smoking or diagnosed hearing loss.

It was also observed that the average time that the participants worked in the gym was from 2 to 7 years (average = 4.4 years), with a workload ranging from 2 to 8 hours (average = 5.8 hours).

As for the participants who had vocal complaints before the beginning of the therapeutic process, it was observed that, after its completion, three participants still had vocal complaints. The most cited was hoarseness (26.3%), followed by vocal fatigue (15.7%), burning in the throat (13.3%), throat scraping (10.5%), discomfort in the throat and change in “tone” of voice (6.6%), and sore throat (5.2%).

All 16 participants completed the therapeutic process with no dropouts.

Figure 2 reveals the analysis of the results of the SIVD protocol before and after IVT. SIVD did not show a statistically significant lower value after the intervention ($p=0.057$).

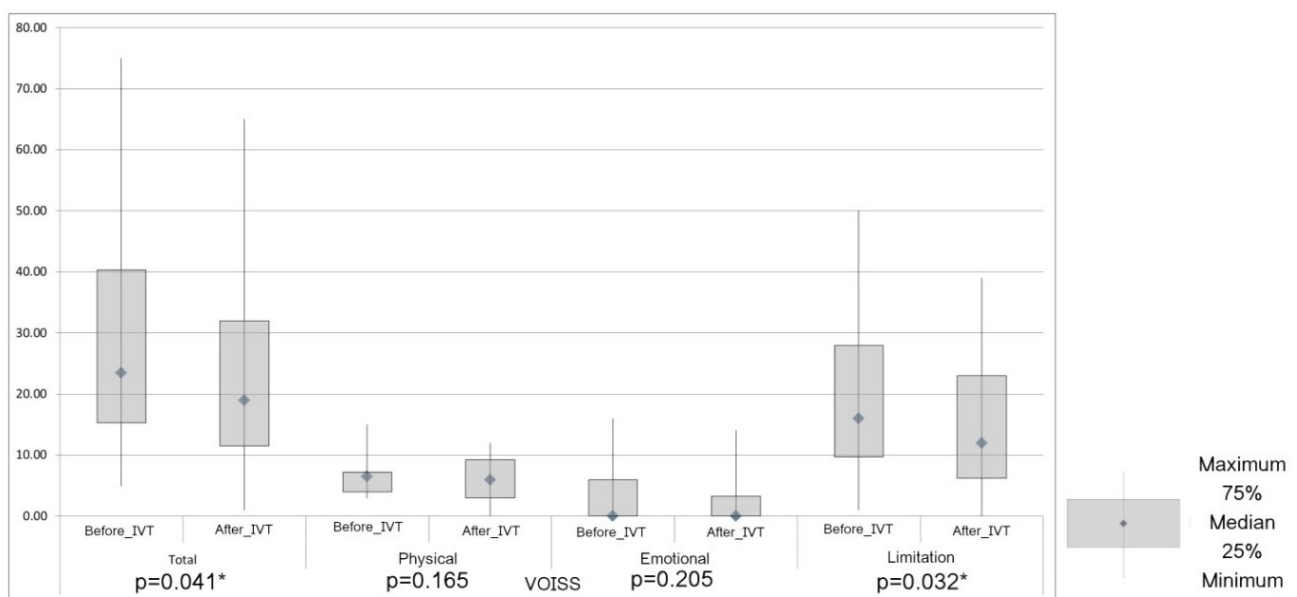


Wilcoxon test ($p < 0.05^*$)

Figure 2. Score analysis of the Screening Index for Voice Disorder (SIVD) before and after the Indirect Vocal Therapy (IVT)

Figure 3 reveals the results of the VoiSS protocol, in its total score and domains, in the comparison between the pre and post-intervention moments with IVT. It was possible to observe that in the total domain of VoiSS the values decreased significantly ($p = 0.041$), as well as in

the limitation domain, after the intervention ($p = 0.032$). The same was not observed in the emotional ($p = 0.165$) and physical ($p = 0.205$) domains, which did not present significant differences after the intervention.



Wilcoxon test ($p < 0.05^*$)

Figure 3. Score analysis of the Voice Symptom Scale (VoiSS) scores before and after Indirect Vocal Therapy (IVT)

The VHI protocol score, in the total domain, also showed significantly lower values in the post-intervention moment ($p=0.012$), as well as in its

organic domain ($p=0.005$). No significant differences were found in the physical ($p=0.054$) and emotional ($p=0.09$) domains. Figure 4 illustrates these data.

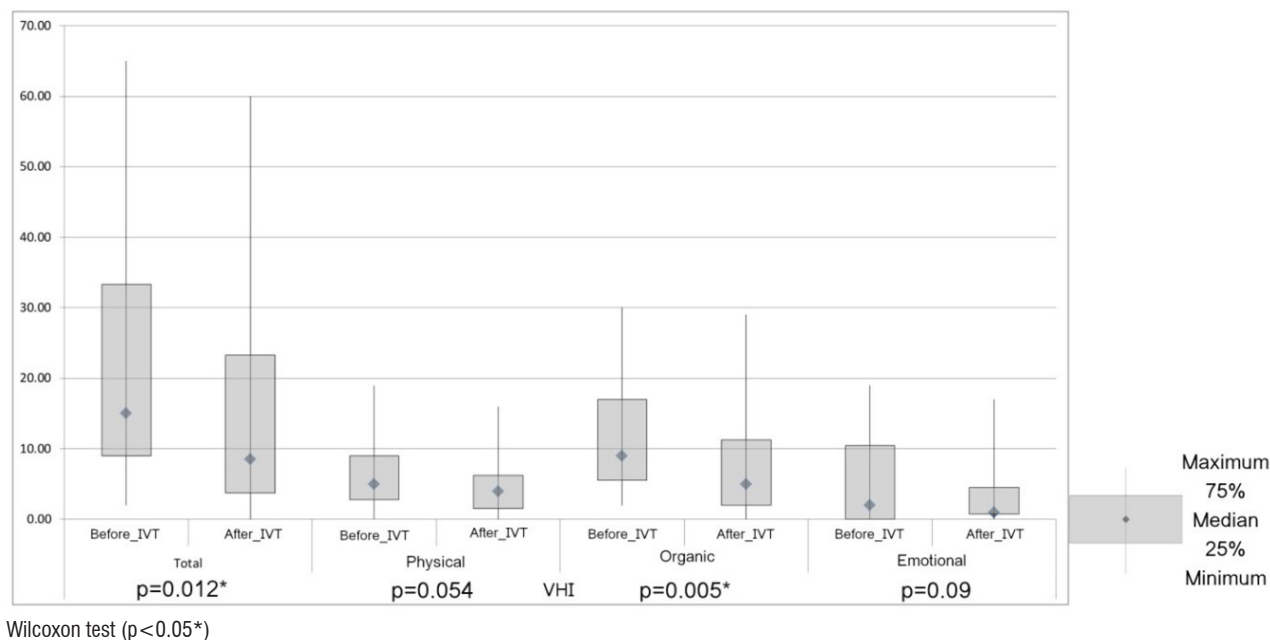


Figure 4. Score analysis of the Voice Handicap Index (VHI) scores before and after Indirect Vocal Therapy (IVT)

As for vocal quality, the auditory-perceptual analysis revealed that the deviation in the general degree of vocal quality in the emission of the sustained vowel decreased significantly after the intervention with IVT, going from moderate to mild ($p=0.011$). In counting

numbers, it was not possible to verify the same result, as there was no significant difference after IVT ($p=0.299$). The intra-rater reliability, according to the kappa calculation, was 0.53, indicating moderate reliability³⁶. Figure 5 illustrates the described results.

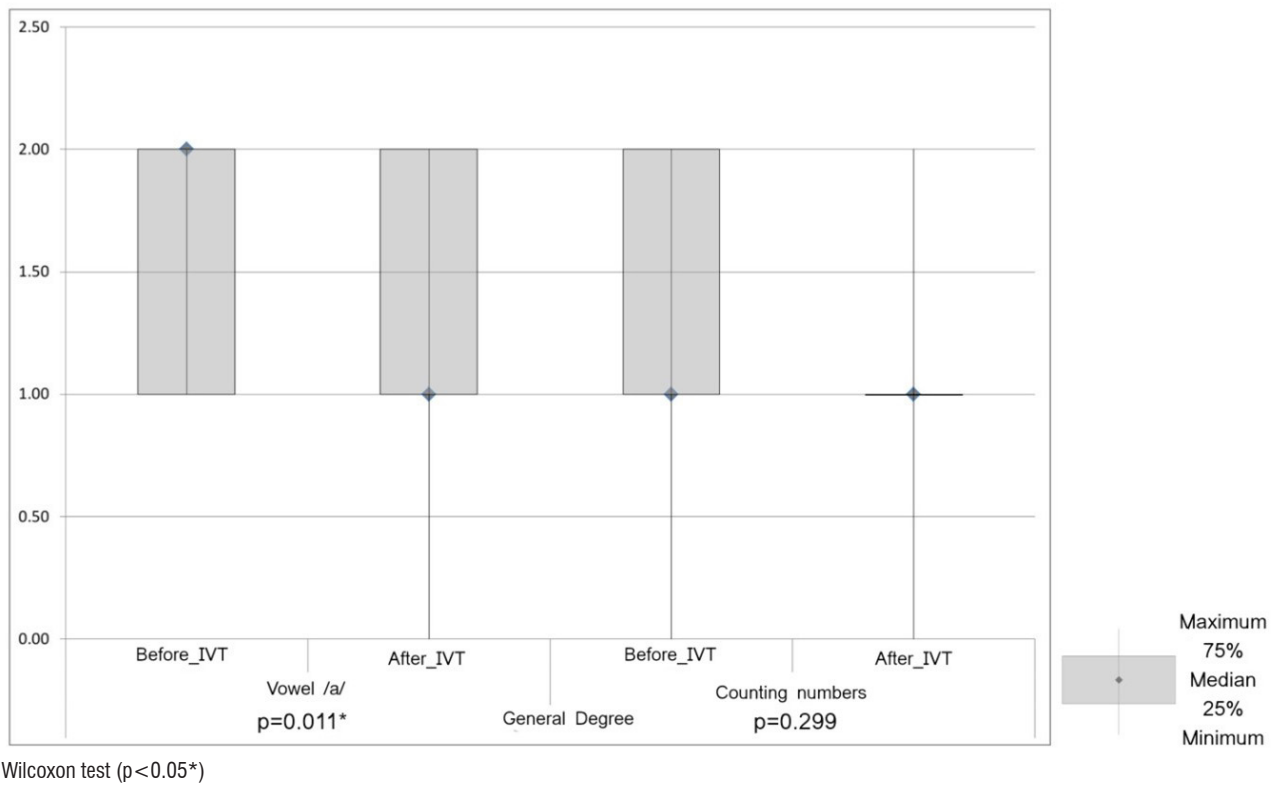


Figure 5. Auditory-perceptual analysis of the general degree regarding sustained vowel /a/ and counting numbers before and after Indirect Vocal Therapy (IVT)

DISCUSSION

This research followed literature recommendations for carrying out assessments and intervention in the voice area through telehealth in speech-language and hearing therapy³⁶. Despite some limitations, such as voice quality control through voice recording by cell phones, this study adds knowledge regarding alternative forms of intervention that can contribute to facilitate the access of professionals to speech-language and hearing therapy services in the voice area. In addition, considering the class of professionals studied, telehealth in speech-language and hearing therapy can improve voice self-perception and vocal health, having a direct positive impact on the aspects that lead to a vocal disadvantage for Physical Education professionals. Moreover, it provides an understanding of the impact of the demands and vocal characteristics of these professionals.

Even being invited to participate in free vocal health guidance sessions, offered at a distance, which provides less displacement and reorganization of the work schedule, in addition to protecting them from contamination by the Sars-CoV-2^{37,38} virus, the lack of

motivation and voice care that this group of professionals presented was notorious.

The striking feature of Physical Education professionals is to promote a change of habit when it comes to body health and general health, but the lack of care in dealing with an important instrument of their work, which is the voice, was evident in the studied population. The adherence of the participants to IVT was lower than 50%, exactly 45.7% (of 35 individuals able to participate in the intervention, 16 accepted), which demonstrates the need for awareness about the importance of voice care for this class of professionals. It can be assumed that the low participation is due to the fact that these professionals have some difficulty in relating the vocal changes experienced and the little recognition of the possible impacts on work activity and suffering, as already observed in other categories of voice professionals^{21,39}.

This is a class of workers who use their voices excessively, especially when they work in gyms, with body activities accompanied by loud music, considered to motivate students to attend classes. Therefore, it would be necessary to develop an intervention program that would encourage the change of habits that are harmful

to the voice, based on knowledge and reflections regarding vocal health itself, through the application of motivational tools.

IVT applied in the intervention of the present study is characterized by the regularity of its sessions (twice a week), with the promotion of a better understanding of the processes and dynamics that involve and interfere in voice production. The intervention offered expository moments but also encouraged participants' reflection regarding the routine and vocal demand, as well as the behaviors and impacts generated from these situations. Each subject addressed was resumed in the following sessions, reinforcing the knowledge acquired. Thus, the participants had help in monitoring, implementing, and weighing habits that had an impact on voice health. All these factors, that make up IVT, contributed to the improvement of vocal perception, as well as gave support to a process of raising awareness regarding the importance and impact of the voice in daily life and work-related activities. The sum of all these factors implied a promotion of health in voice, self-knowledge, and quality of life.

Observing the results, it was possible to verify that the complaints reported by the professionals who participated in the study were associated with vocal misuse and abuse. Complaints such as hoarseness and voice fatigue are in agreement with other studies that investigated vocal complaints of Physical Education professionals⁴. Such complaints reported by professionals decreased after the intervention. The decrease in the incidence of participants with vocal complaints, which went from 62.5% to 18.75% after the intervention, suggests that the vocal complaints brought by Physical Education professionals were associated with the practice of bad vocal habits and that IVT applied at a distance was effective in terms of their improvement. In this sense, it is observed how much the motivation to change habits can help in the recovery of vocal symptoms. Moreover, the data obtained corroborate the findings in the literature, which demonstrate a relationship between vocal knowledge and the presence of vocal symptoms. It is observed that the lower the knowledge regarding vocal health and hygiene, the greater the symptoms and vocal handicap, as well as vocal symptoms, demonstrating the importance of programs for the prevention and promotion of vocal health, despite the need for complementation with other forms of intervention to improve voice quality³⁹.

A significant reduction in the score obtained in the self-assessment protocols (VoiSS and VHI) was observed after the intervention, which did not occur in the SIVD protocol score, despite the reduction in the score. The SIVD protocol cut-off point, which indicates a possible vocal alteration, is five. It is noted that the initial values of the participants, before the intervention, showed a median value below five, but, after the intervention, the score was below two, revealing a clear improvement in vocal and laryngopharyngeal symptoms, ruling out the possibility of voice alteration after the intervention.

As for the vocal symptoms addressed in the VoiSS protocol, there was a decrease in the scores in the total and limitation domains indicating that the symptoms that limit the voice were the ones that suffered the most changes. It should be noted that the cut-off point that points to a difference between dysphonic and non-dysphonic individuals in the total score of the VoiSS protocol is 16³². And it is verified that the participants of the present study, despite the significant decrease in the total domain, still have scores above the cut-off point, indicating the need for more interventions in an attempt to further reduce such vocal symptoms. As for the VoiSS limitation domain, this aspect concerns questions related to voice functionality: "Do you have difficulty attracting attention?", "Do you have problems singing?", "Is your voice hoarse?", "When talking in company do people fail to hear you?", "Do you lose your voice?", "Do you have a weak voice?", "Do you have problems talking on the telephone?", "Do you find the effort of speaking tiring?", "Do you have difficulty competing against background noise?", "Are you unable to shout or raise your voice?", "Does the sound of your voice vary throughout the day?", "Do people ask what is wrong with your voice?", "Does your voice sound creaky and dry?", "Do you feel you have to strain to produce voice?", "Does your voice 'give out' in the middle of speaking?" This information was already reported in other studies that demonstrate a relationship between vocal difficulties that affect the functionality of the voice, affecting work activities⁴⁰. The physical and emotional domains, which investigate experienced organic symptoms and psychological effects related to the voice, respectively³², did not show a significant decrease. In the present study, such results allow us to consider that the change in habits related to vocal health developed on IVT was able to positively modify the symptoms related to the limitation in the use of the

voice, in Physical Education professionals, even though the intervention was carried out at a distance.

As for the VHI, there was a significant decrease in the total and organic domain after the intervention. It is worth remembering that the median value of the total domain before the intervention was already below the cutoff score of the referred protocol, which is 19, indicating that the voice handicap was below the values found in dysphonic individuals. Even so, the organic domain considers self-perceptions related to laryngeal discomfort and vocal aspects³³, and IVT was able to promote a reduction in these aspects. In this sense, it is understandable that the intervention with IVT, performed at a distance, promoted recovery regarding the vocal disadvantage in points related to laryngeal discomfort in the use of the voice.

The emotional domain of VHI showed no statistical difference after IVT. The questions contained in this protocol assess the reaction regarding the affective side face a voice problem³³. This data draws attention, as it implies that there was no necessary reduction to cause significant statistical impacts. In this way, it is possible to imply a release regarding the emotional relationship with the voice in Physical Education professionals, something perceived in other stages of the present research, such as in data collection. Such findings assume that Physical Education professionals bring more accurate self-perception and report discomfort in physical/organic aspects that limit the use of voice. It is a class of workers who use their voices professionally and who are not affected by the emotional aspects related to using their voices. Perhaps this is one of the reasons why they find it difficult to seek professional help to take care of their voice and postpone the search for a solution to the problem, unless the discomfort is physical.

The auditory-perceptual analysis showed a significant improvement in the general degree of vocal quality after the intervention only in the emission of vowel /a/. This fact confirms the vocal improvement, perceived by the participants through the self-assessment protocols, regarding the perception of vocal and laryngopharyngeal symptoms. The auditory-perceptual analysis pointed out that the voices went from moderate deviation to mild deviation in vocal quality, regarding the general aspect. Future studies may advance in the analysis of vocal quality in a more detailed and objective way, with analysis of acoustic parameters, aiming at a better understanding of which aspects of

vocal quality can be improved with changes in habits and vocal health awareness.

The information found is consistent with other studies that indicate that vocal orientations are associated with an improvement in vocal symptoms, which is due to a greater understanding of voice abusive behaviors⁴¹. The degree of vocal quality deviation that improved from moderate to mild, although evidenced only by the analysis of the sustained vowel, reveals that the intervention with the IVT was able to modify the voice of the participants, pointing out that the change of habits can lead to changes in the voice of Physical Education professionals.

Regarding the application of IVT via telehealth in speech-language and hearing therapy, it is worth noting that after the beginning of the treatment, there were no dropouts. Patients' adherence may be related to the ease of appointment times, as they did not need to spend time traveling between their current location and the institution's Speech-Language and Hearing Therapy Clinic. In this sense, the ease of schedules for attendance made it possible for it to be close to the participants' working hours, preventing them from having to reschedule or cancel their students. As much as there are advantages in the assistance via telehealth in speech-language and hearing therapy, this modality is not immune to difficulties. It was observed that the connection quality (not only of the therapist but also of the patient) must be good, as this avoids screen freezes and audio cuts that can impair the understanding of the message and motivation for therapeutic sessions.

As a limitation of the study, the impossibility of greater control of the vocal quality assessment process before and after the intervention is pointed out, since the use of the participants' personal cell phones was the only resource available to record their voices in the distance intervention. Although the present study follows recommendations from the literature for recording the voices of participants using cell phones, such as care for the environment, and positioning of the device's microphone to perform the recording³⁵, this resource cannot be considered reliable for a reliable assessment of vocal quality. However, adding it to the self-assessment of symptoms and voice handicap protocols, it becomes possible to understand that IVT can be administered at a distance and that it can bring many benefits to the health and vocal quality of Physical Education professionals.

Another limitation regarding assessment in this study refers to the lack of application of motivational

protocols to verify the readiness to change behavior before and after the therapeutic process. Thus, future studies should address this aspect.

Furthermore, another important limitation is the absence of a control group or a comparison group with only vocal exercises, which would allow the randomization of participants and a greater view of the advantages and limitations of IVT.

As already mentioned, future studies should seek better detail and advances in vocal quality analysis considering vocal health promotion actions, changes in habits, and newly acquired vocal behavior.

CONCLUSIONS

The results of the present study, under the conditions in which it was developed, allow us to conclude that IVT applied through telehealth in speech-language and hearing therapy in Physical Education professionals has positive effects on vocal complaints, vocal and laryngopharyngeal symptoms, mainly regarding those related to the limitation in voice use, which is associated with better functionality and less impact of vocal symptoms on daily activities, improving self-perception of voice handicap, especially in relation to organic aspects.

As for vocal quality, with regard to the general degree of vocal quality, IVT was able to generate a significant improvement in the vocal quality of these professionals, only in the emission of the sustained vowel.

Thus, this study accepts the hypothesis that IVT applied through telehealth in speech-language and hearing therapy has positive effects on self-assessment and vocal quality of Physical Education professionals.

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Authors contributions:

CL: data curation, literature review, and writing - original draft;

PD: methodology, data curation, and discussion writing;

AGB: conceptualization, writing review and editing;

AEA-C: formal analysis, data curation, statistical analysis, writing review and editing, and supervision;

KS: conceptualization, methodology, project administration, and writing review and editing, supervision.