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Are future teachers at risk of developing voice disorders in their training? An exploratory study

Futuros professores correm risco de desenvolver distúrbio de voz na sua formação? Um estudo exploratório

Los futuros docentes corren riesgo de desarrollar trastornos de la voz en su formación? Estudio exploratorio

Maria Lúcia Vaz Masson[1]
Amanda Valadares da Silva Feitosa[1]
Léslie Piccolotto Ferreira[2]
Iára Bittante de Oliveira[3]
Lady Catherine Cantor-Cutiva[4]

Abstract

Introduction: Voice disorders (VD) in teachers are related to vocal overload, environmental factors, and working conditions and are recognized as work-related problems. The high prevalence of VD among Pedagogy students suggests that this issue may begin even before professional practice. **Objective:** To verify the presence of symptoms, vocal fatigue, and the risk of voice disorders among Brazilian Pedagogy students. **Method:** This is an exploratory, quantitative, and cross-sectional study conducted through an online questionnaire and validated self-assessment protocols: Vocal Symptom Scale (VoiSS), Vocal Fatigue Index (VFI), and Screening Index of Voice Disorder (SIVD). The data were analyzed

[1] Universidade Federal da Bahia, Salvador, BA, Brazil.
[2] Pontifícia Universidade Católica de São Paulo - PUC-SP, SP, Brazil.
[3] Pontifícia Universidade Católica de Campinas - PUCAMP, SP, Brazil.
[4] University of Iowa, USA.

Authors' contributions:
AVSF: data collection, analysis, and draft of the article.
MLVM: methodology, data analysis, draft of the article, critical review, and supervision.
LPF: methodology, data analysis, draft of the article, and critical review.
IBO: methodology, data analysis, draft of the article, and critical review.
LCCC: study design, methodology, data analysis, and critical review.

Email for correspondence: masson@ufba.br
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descriptively. **Results:** 85 students participated in the study, 31 years old (±12.87), 83.53% female. Of these, 54.12% were in their fifth semester, and 43.53% were engaged in academic practice or internships. On average, the daily professional voice use was 10 (±9) hours. The analysis of symptoms and vocal fatigue revealed a considerable proportion of students with total scores above the cutoff points. However, 82.7% of the students scored below the cutoff point on the SIVD. **Conclusion:** Most Brazilian Pedagogy students showed signs of vocal fatigue and symptoms, exposing them to the risk of developing a VD. Further studies are needed to elucidate the influence of environmental and organizational factors on the development of voice disorders among Pedagogy students.

Keywords: Signs and Symptoms; Students; Voice Disorders; Work; Teaching; Surveys and Questionnaires.

Resumo

Introdução: o distúrbio de voz (DV) em professores está relacionado à sobrecarga vocal, ambiente e organização de trabalho, sendo reconhecido como um agravo relacionado ao trabalho. A elevada prevalência de DV entre estudantes de Pedagogia sugere que esse problema pode iniciar antes mesmo da atuação profissional. **Objetivo**: verificar a presença dos sintomas, fadiga vocal e risco para distúrbio de voz em estudantes de Pedagogia brasileiros. **Método**: estudo exploratório, quantitativo e transversal, realizado por meio de questionário on-line e protocolos validados de autoavaliação: Escala de Sintomas Vocais (ESV), Índice de Fadiga Vocal (IFV) e Índice de Triagem para Distúrbio de Voz (ITDV). Os dados foram analisados de maneira descritiva. **Resultados**: participaram 85 estudantes, com média de 31(±12,87) anos de idade, 83,53% do gênero feminino, 54,12% cursando o 5º período e 43,53% realizando práticas acadêmicas ou atividades de estágio. Desse total, foi constatado um uso médio de 10(±9) horas diárias da voz profissional. As análises dos sintomas e fadiga vocal revelaram proporções consideráveis de alunos com escores totais acima dos pontos de corte. Contudo, 82,7% dos alunos registraram escores abaixo do ponto de corte no ITDV. **Conclusão**: a maioria dos estudantes de Pedagogia brasileiros apresentou sinais de fadiga e sintomas vocais, expondo-os a risco para o desenvolvimento de um DV. Novos estudos devem ser realizados para elucidar a influência dos fatores do ambiente e organização do trabalho no desencadeamento de um distúrbio de voz em estudantes de Pedagogia.

Palavras-chave: Sinais e Sintomas; Estudantes; Distúrbios da Voz; Trabalho; Ensino; Inquéritos e Questionários.

Resumen

Introducción: El trastorno de voz (TV) en profesores está relacionado con la sobrecarga vocal, el ambiente y las condiciones laborales, y se reconoce como un problema ocupacional. La alta prevalencia de TV entre los estudiantes de Pedagogía sugiere que este problema puede comenzar antes de la práctica profesional. **Objetivo:** Verificar la presencia de síntomas, fatiga vocal y riesgo de trastorno de voz en estudiantes de Pedagogía brasileños. **Método:** Estudio exploratorio, cuantitativo y transversal, realizado mediante cuestionario en línea y protocolos validados de autoevaluación: Escala de Síntomas Vocales (ESV), Índice de Fatiga Vocal (IFV) e Índice de Evaluación para Trastornos de la Voz (IETV). Los datos se analizaron de forma descriptiva. **Resultados:** Participaron 85 estudiantes, con una edad promedio de 31 (±12,87) años, de los cuales el 83,53% eran mujeres. El 54,12% cursaba el quinto semestre y el 43,53% realizaba prácticas académicas o pasantías. El uso promedio de la voz profesional fue de 10 (±9) horas diarias. El análisis de síntomas y fatiga vocal reveló una proporción considerable de estudiantes con puntajes por encima de los puntos de corte. Sin embargo, el 82,7% de los estudiantes registraron puntajes por debajo del punto de corte en el IETV. **Conclusión:** La mayoría de los estudiantes de Pedagogía brasileños presentó signos de fatiga y síntomas vocales, exponiéndolos al riesgo de desarrollar un TV. Se deben realizar nuevos estudios para clarificar la influencia de factores ambientales y organizativos en el desarrollo de un trastorno de voz en estudiantes de Pedagogía.

Palabras clave: Signos y Síntomas; Estudiantes; Trastornos de la Voz; Enseñanza; Encuestas y Cuestionarios.

Introduction

The voice is the primary working tool for teachers. The development of voice disorders (VD) results from occupational conditions related to the work environment or the nature of professional activities, leading to personal, social, and financial consequences[1,2].

In this sense, studies have confirmed the occurrence of VD among teachers across various educational levels and school systems[3-5]. Vocal complaints such as throat clearing, vocal fatigue, throat pain or the sensation of a foreign body in the throat, hoarseness, difficulty being heard, vocal strain, dry cough, and mucus production[6-8], are common among teachers. These symptoms have also been reported by pre-service teachers, with upper respiratory tract infections, extensive voice use, smoking, and stress being the most frequently reported causes, often associated with hoarseness, vocal fatigue, and throat clearing[8].

The high prevalence of vocal symptoms among future teachers may indicate a risk for the development of VD even before the onset of their teaching careers[9], with a progressive increase in symptoms from the beginning to the end of their training[10]. Additionally, there is limited knowledge regarding vocal health and hygiene[10], with commonly adopted strategies relying on folk remedies and voice rest[11].

During teacher training, students are expected to engage in practical teaching activities, such as school internships, which may require high vocal demand even before graduation. Consequently, they may be exposed to VD early on due to unfavorable environmental and organizational work conditions experienced during their teaching internships[9-11].

It should be noted that the need for guidance on vocal care during training is a recurrent issue in research involving teachers, including incorporating voice-related topics into the curriculum. A randomized clinical trial involving students with mild vocal issues examined the long-term effects of a vocal education program covering voice physiology and ergonomics, basic training, and vocal function during teacher training. The study reported a high dropout rate, particularly in the training group. However, the results indicated a greater reduction in voice-related problems in the training group compared to the control group, although the difference was not statistically significant[12].

In this context, a group of 11 researchers from seven Latin American countries (Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Uruguay), coordinated by the University of Iowa, developed a multicenter study titled "Voice Disorders in Teaching Licensure: A Longitudinal Study," aiming to understand the natural progression of vocal symptoms during teacher training while considering country-specific differences. The Brazilian arm of the study was represented by the Pontifícia Universidade Católica de São Paulo (PUC-SP), the Pontifícia Universidade Católica de Campinas (PUC-Campinas), and the Universidade Federal da Bahia (UFBA). This exploratory study presents a cross-sectional analysis within the broader research project, aiming to assess the presence of vocal fatigue, vocal symptoms, and the risk of developing a voice disorder among Brazilian Pedagogy students.

Methods

Study design

This study is an exploratory, quantitative, observational, cross-sectional analysis involving students enrolled in Pedagogy programs at various Brazilian universities and colleges. The research protocol received approval from the Research Ethics Committee of the Pontifícia Universidade Católica de São Paulo, under the consubstantiated opinion No. 6.150.028/2023.

Recruitment, Population, and Sample

Participant recruitment targeted higher education institutions offering Pedagogy programs that achieved a score above 3 in the Course Concept (CC) evaluation, as per data available on the MEC *[Ministry of Education]* official website (https://emec.mec.gov.br/emec/nova). The CC assessment encompasses three dimensions: didactic-pedagogical organization, faculty profile, and physical infrastructure of the course[13]. This score is derived from the Preliminary Course Concept (CPC), which considers factors such as: Student performance in the Enade *[National Exam for the Assessment of Student Performance]*; The Indicator of Difference between Observed and Expected Performance (IDD); The proportion of faculty holding master's and doctoral degrees, as well as their employment status (part-time or full-time); Student responses regarding didactic-pedagogical organization, infrastructure, physical facilities,

and opportunities for academic and professional development[14]. A score of 3 or higher is deemed satisfactory; courses receiving evaluations below this threshold may face discreditation.

To ensure representation across Brazil's diverse regions, 175 institutions were selected, providing a comprehensive sample of the national territory. However, the states of Acre and Roraima did not have institutions meeting the inclusion criteria for this research.

Subsequently, emails were submitted to coordinators of Pedagogy programs, yielding responses from 12 institutions that agreed to disseminate the invitation to their students. Additional efforts were made with the coordination of the Pedagogy program at the Universidade Federal da Bahia (UFBA), where the primary author conducted this research. The program coordinator assisted by providing, in Excel format, the email addresses of students enrolled in both daytime and evening sessions to whom the invitation was sent. Posters and messages circulated on social media platforms associated with research groups in São Paulo (LaborVox) and Salvador (TRASSADO) also served as recruitment channels.

Inclusion and Exclusion Criteria

Inclusion criteria encompassed individuals aged 18 or older, of any gender, enrolled in any semester of the Pedagogy program, and expressing interest in participating in the research. All participants signed the Informed Consent Form (ICF). Exclusion criteria included the absence of one or more responses to items in the validated questionnaires, which would impede the calculation of scores.

Data Collection

Figure 1 presents the flowchart of data collection for this study. Data were collected via an online questionnaire developed by the research team and hosted on the Qualtrics Survey platform, from October to December 2023 (pilot phase) and March to April 2024. Variables considered included age, gender, semester of the course, engagement in academic practice or internships, daily hours of voice use in these practices and academic activities such as group work, class participation, and presentations, environmental conditions of the location, employment status in addition to studies and/or teaching. Validated self-assessment vocal protocols utilized were: VoiSS *[Voice Symptom Scale]*; VFI [Vocal Fatigue Index]; and SIVD *[Screening Index for Voice Disorder]*. These instruments are detailed below.

Vocal Self-Assessment Protocols

The VoiSS *[Voice Symptom Scale]* was origi-

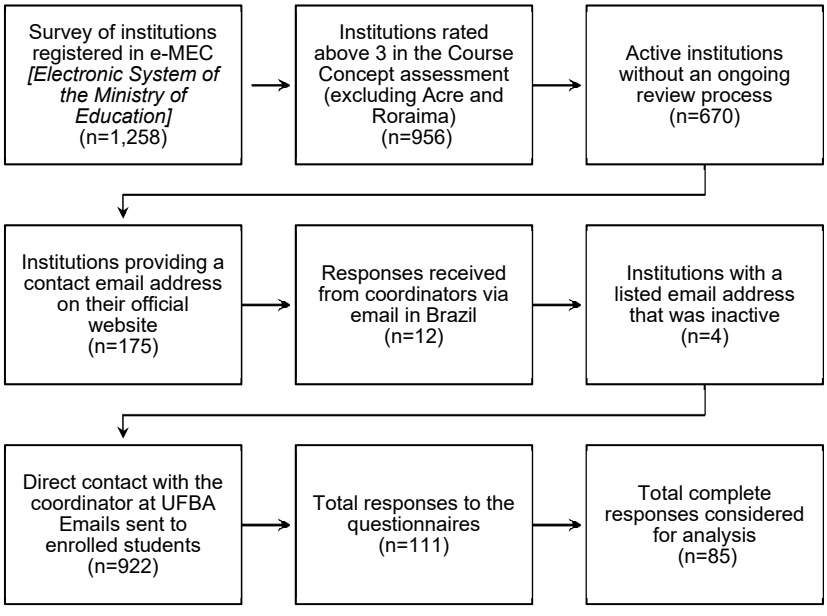

Figure 1. Flowchart of Data Collection

nally developed in the United Kingdom, translated and validated in Brazil as the *Escala de Sintomas Vocais* (ESV)[15,16]. It comprises 30 questions divided into three subscales: Impairment (15 questions); Emotional Impact (8 questions); and Physical Symptoms (7 questions). In addition to vocal symptoms, it assesses the impact a dysphonia may have on an individual's life, offering an advantage over other scales. Each question is scored on a scale from 0 to 4 points: 0=never; 1=rarely; 2=sometimes; 3=almost always; 4=always. The questionnaire scores are categorized as follows: Total Score, indicating the overall level of voice alteration, with a maximum of 120 points, and subscales: Impairment (maximum of 60 points); Emotional (maximum of 32 points); and Physical Symptoms (maximum of 28 points). Higher scores reflect greater self-perception of vocal deviation in the respective domains. The cutoff points are 16 for the Total Score; 11.5 for Impairment; 1.5 for Emotional; and 6.5 for Physical Symptoms[16].

The VFI *[Vocal Fatigue Index]*[17] is a self-assessment tool of American origin, translated and validated for Brazil as the Índice de Fadiga Vocal (IFV). It aims to evaluate symptoms indicative of vocal fatigue. The VFI protocol contains 17 questions, divided into four factors: Factor 1 - Tiredness and voice impairment (7 questions); Factor 2 - Avoidance of voice use (3 questions); Factor 3 - Physical discomfort associated with voice (4 questions); and Factor 4 - Improvement of voice symptoms with rest (3 questions). Assessment is based on the frequency of occurrences described in the questions, on a scale from 0 to 4 points: 0=never; 1=almost never; 2=sometimes; 3=almost always; 4=always. The VFI scores are calculated for the four factors: Factor 1 (maximum 28 points); Factor 2 (maximum 12 points); Factor 3 (maximum 16 points); and Factor 4 (maximum 12 points). These scores indicate situations of fatigue, restriction, physical discomfort, and vocal recovery. The cutoff points are: Factor 1 = 4.5 points; Factor 2 = 3.5 points; Factor 3 = 1.5 points; Factor 4 = 8.5 points; and Total VFI = 11.5 points. The following formula is used to calculate the total VFI score: Total VFI = Factor 1 + Factor 2 + Factor 3 + (12 - Factor 4).[17].

The SIVD *[Screening Index for Voice Disorder]*[18] is a Brazilian instrument designed to identify voice disorders in teachers, even in their early stages. It is an assessment questionnaire where responses are based on the frequency of vocal symptoms, with options "never," "rarely," "sometimes," or "always." Scoring for the SIVD involves assigning 1 point for each response marked as "sometimes" or "always." The 12 vocal symptoms assessed are hoarseness, voice loss, voice breaks, deep voice, throat clearing, dry cough, productive cough, pain when speaking, pain when swallowing, throat secretion, dry throat, and fatigue when speaking. Higher scores on the SIVD indicate a greater probability of vocal alteration. The established cutoff point is 5 or more points to be considered at risk for developing a voice disorder[18].

Data Analysis

Data were analyzed descriptively using Microsoft Excel 16.0 (2019). Mean, standard deviation, maximum, and minimum values were considered for numerical variables, while categorical variables were described in absolute numbers and frequencies. Age was dichotomized into < 25 and ≥ 25 years, with results expressed as absolute numbers and frequencies for each group. The media was used to describe the variables "voice use in academic activities and internships" and "professional voice use" due to the wide discrepancy between minimum and maximum values. The total weekly voice usage was calculated by summing the hours dedicated to teaching, meetings, and academic supervision. Scores from the self-assessment protocols (VoiSS, VFI, and SIVD) were dichotomized into values below and above the cutoff points, with results presented as absolute numbers and frequencies. For the VoiSS and VFI, additional analyses included mean, standard deviation, median, minimum and maximum values. For the SIVD, participants were classified into probable risk for voice disorder (scores ≥ 5) and no risk for voice disorder (scores < 5). These groups were further stratified by academic year, with results expressed as absolute numbers and frequencies for those with and without risk.

Results

A total of 85 Brazilian Pedagogy students completed the questionnaire. The mean age was 31 years (±12.87), ranging from 17 to 63 years, with 83.53% identifying as female. Nearly half (54.12%) were engaged in academic training or internship activities, with an average weekly voice usage of 10.04 hours (±8.60), and a median (min-max) of 7 (2-46) hours. Among participants, 42% reported being employed, with an average professional voice use of 28.96 hours per week (±21.76), and a median of 30 (3-100) hours. Of this group, 22.22% (n=36) were teachers, with an equal percentage working as salespeople (Table 1).

Table 1. Sociodemographic Data, Academic Characteristics, and Voice Use Among Pedagogy Students in Brazil, 2024 (n=85)

Variable	Category	N	%
Age	< 25	38	44.70
	≥ 25	47	55.30
Gender	Male	13	15.30
	Female	71	83.53
	Invalid response	1	1.17
Course semester*	First	20	23.52
	Second	6	7.06
	Third	12	14.12
	Fourth	10	11.77
	Fifth	37	43.53
Engages in academic practice or internship?	Yes	46	54.12
	No	39	45.88
Employed?	Yes	36	42.35
	No	49	57.65
Occupation (for those employed, n=36)	Teacher	8	22.22
	Salesperson	8	22.22
	Other	20	55.56

Note*: Semesters not displayed in the table were excluded due to a lack of responses.

The data obtained from the VoiSS, VFI, and SIVD protocols provided a comprehensive overview of vocal symptoms and probable voice disorders among future teachers, indicating the presence or absence of vocal impairments in Pedagogy students (Table 2).

Table 2. Dichotomization of Total Self-Reported Scores by Brazilian Pedagogy Students According to the Cutoff Points of the VoiSS, VFI, and SIVD Self-Assessment Protocols, 2024

Instruments	Scores < cutoff point	Scores ≥ cutoff point	Cutoff points
VoiSS (n=85)	22 (25.88%)	63 (74.12%)	16
VFI (n=74)	18 (24.32%)	56 (75.68%)	11.50
SIVD (n=75)	62 (82.7%)	13 (17.3%)	5

VoiSS=Voice Symptom Scale; VFI=Vocal Fatigue Index; SIVD=Screening Index for Voice Disorder

The ESV results offer insight into the prevalence of vocal symptoms, as evidenced by total scores above the cutoff point. Notably, the Physical Symptoms and Emotional subscale had mean scores above the cutoff, suggesting a significant presence of physical symptoms associated with dysphonia and a psychological impact related to voice disorders. The Impairment factor had the highest mean score, indicating that functional limitations caused by dysphonia are a primary concern among participants (Table 3).

Table 3. Self-Reported Scores on the Vocal Symptom Scale Among Brazilian Pedagogy Students, 2024 (n = 74)

VoiSS Subscales	Mean	Median	Min.	Max.	SD	Maximum Score*
Physical	7.77	7.00	0.00	21.00	5.15	28
Emotional	3.88	2.00	0.00	19.00	4.48	32
Limitation	16.22	16.00	0.00	33.00	8.73	60
Total Score	27.88	27.00	0.00	65.00	15.70	120

VoiSS=Voice Symptom Scale. Mín.=Minimum; Max.=Maximum; SD=Standard deviation
*Moreti et al., 2014

The results obtained from the IFV provide a more detailed understanding of vocal fatigue characteristics and their potential implications for the vocal health of the Pedagogy students in this study. Regarding total VFI scores, the sample mean exceeded the cutoff point, indicating vocal fatigue among participants. When analyzed separately: Factor 1 (Fatigue and Vocal limitation), Factor 2 (Vocal restriction), and Factor 3 (Physical Discomfort related to voice use) had mean scores above the cutoff points. However, Factor 4 (Recovery with vocal rest) was below the threshold (Table 4).

Table 4. Descriptive Analysis of Scores on the Vocal Fatigue Index Among Brazilian Pedagogy Students, 2024 (n=75)

VFI Factors	Mean	Median	Min.	Max.	SD	Cutoff points*
Factor 1	7.06	6.00	0.00	26.00	6.64	4.5
Factor 2	3.79	4.00	0.00	12.00	3.24	3.5
Factor 3	2.62	1.00	0.00	12.00	3.04	1.5
Factor 4	7.37	9.00	0.00	12.00	4.58	8.5
Total VFI	18.17	17.00	1.00	43.00	11.36	11.5

VFI=Vocal Fatigue Index. Factor 1= Tiredness and voice impairment;
Factor 2= Avoidance of voice use; Factor 3= Physical discomfort;
Factor 4= Improvement of voice symptoms with rest; Total VFI=Total score.
Mín.=Minimum; Max.=Maximum; SD=Standard deviation
*Zambon *et al*., 2022

As shown in Table 2, 17.3% (n=13) of participants were classified as at risk for voice disorders, based on the SIVD. When participants were stratified by academic semester to better understand how voice disorders may emerge throughout academic training, a high prevalence was already observed in the first semester of the program (Table 5).

Table 5. Stratification of Screening Index for Voice Disorders Scores by Year of Study Among Brazilian Pedagogy Students, Dichotomized by the Cutoff Point, 2024 (n=75)

Academic Term	SIVD Score (<5)	SIVD Score (≥5)
First (n=18)	14 (77.8%)	4 (22.2%)
Second (n=5)	5 (100%)	-
Third (n=11)	8 (72.2%)	3 (27.8%)
Fourth (n=8)	7 (87.5%)	1 (12.5%)
Fifth (n=33)	28 (84.8%)	5 (15.2%)
Total (n=75)	62 (82.7%)	13 (17.3%)

SIVD=Screening Index for Voice Disorders

Discussion

This study, which analyzed symptoms, vocal fatigue, and the risk of developing voice disorders among Pedagogy students, faced some relevant limitations. The restricted, non-probabilistic, and convenience-based sample prevented the generalization of results. The snowball sampling method helped increase the sample size but may have hindered control and introduced selection bias by including specific groups that do not represent the broader Brazilian population. Despite these limitations, the findings offer valuable insights into the vocal health of Pedagogy students, shedding light on the reality experienced in Brazil.

Regarding gender, all studies that provided this information reported a majority of female students[6-10,12], with percentages ranging from a minimum of 59.57% in a study conducted in the interior of Rio Grande do Sul (RS)[10] to a maximum of 85% among students with voice problems in a Swedish vocal training group[12].

In Brazil, preliminary data from the 2023 Educational Census[19] indicate that there are 2,354,194 teachers in Basic Education, with 79.5% being women. Their distribution follows an inverse proportionality across educational stages: 96.2% in early childhood education, 77.6% and 66.2% in elementary education I and II, respectively, and 58.6% in high school. The predominance of women in the early years of schooling, compared to more advanced educational levels, reflects a gender-based division of labor, where women are traditionally assigned caregiving roles while men take on provider roles[20]. Although this pattern is evolving toward a more balanced perspective, women continue to bear the greater burden of unpaid domestic work, often combined with professional responsibilities that involve lower salaries, caregiving tasks, and reduced decision-making power[20].

Regarding age, a notable finding was the high average age (31 years), especially considering the maximum age of 63 years in this study. In Finland, students enrolled in teacher education programs had a lower average age of 24 years (ranging from 19 to 47 years)[6]. In Sweden, students with voice problems in a teacher training program had a slightly higher average: 26 years (ranging from 10 to 41 years) for the intervention group (vocal education program) and 27 years (ranging from 18 to 40 years) for the control group, compared to 22 years (ranging from 18 to 45 years) among students without vocal alterations at the start of the study[12].

In Brazil, the average age of higher education students at federal institutions was 23 years until 2010, increasing to 24.5 years in 2014[21]. Similarly, other studies have reported lower average ages, such as 21.25 years (ranging from 17.8 to 39.9 years)[8]; among first-year humanities students at a private university in São Paulo, 22.17 years (ranging from 19 to 37 years)[9] among higher education/technical students in the interior of Rio Grande do Sul whose professions required significant voice use, and 21.86 years (ranging from 18 to 47 years) among education students in the interior of Paraná[10].

A higher average age was observed among education students at the Federal University of Goiás – Jataí[7], with an average of 27 years (ranging from 20 to 30 years). Undergraduate education students at a public university in São Paulo had ages ranging from 19 to 56 years, "demonstrating the heterogeneity of the population in terms of social integration and prior professional experience before entering university" (Siqueira *et al*., 2015, p. 1.958)[11].

One possible explanation for the higher average age is the legal requirement for a higher education degree to teach in Basic Education, established by the LDB *[Law of Directives and Bases of National Education]*[22]. According to Article 62, as revised by Law No. 13,415/2017[23]:

> The training of teachers for Basic Education shall take place at the higher education level, in a full licensure program, with a minimum qualification for teaching in early childhood education and the first five years of elementary education being the training provided at the secondary level in the normal modality (Brazil, 2017).

In this study, 42.35% of participants were working while pursuing their Pedagogy degrees. A similar trend was observed in other studies, which found that a majority of students were already employed, with employment rates ranging from 32% to 65%[7,11,24]. Therefore, a significant portion of Pedagogy students were professionally active and exposed to risk factors for developing VDs, which may explain their simultaneous exposure to these risks during their training. Similarly, academic activities and internships may also contribute to the development of voice disorders, although with lower exposure compared to simultaneous employment.

Regarding the vocal health of students, research highlights that a considerable percentage of future teachers experience voice disorders, with a high prevalence of symptoms such as vocal fatigue[6], hoarseness, throat clearing, throat pain/irritation, and globus sensation[6,24-26] - symptoms commonly reported by teachers[1-5].

The lack of specific guidance during teacher training is another critical issue, suggesting an urgent need to include coursework on voice care in the curriculum as a strategy for preventing voice disorders in teaching careers.[6,7,26]. Although this recommendation is common in studies on teachers, only two intervention studies testing vocal education programs were identified.

The first was a quasi-experimental pilot intervention conducted with a single group of Pedagogy students at a public university in the interior of São Paulo during a pedagogical workshop[27]. The intervention consisted of a three-hour theoretical-practical workshop, beginning with a lecture covering topics such as vocal physiology, voice care, risk factors in the teaching work environment, and vocal expressiveness, followed by a practical session on vocal warm-up and cool-down exercises. The results showed a significant reduction in discomfort, with a greater impact on vocal-related aspects[27].

The second study was a three-year longitudinal randomized clinical trial with education students from two Swedish universities[12]. In the first semester, students in the vocal education program received individual coaching from a speech-language pathologist to increase awareness of vocal ergonomics and develop long-term strategies for professional voice improvement. In the second semester, they underwent 12 hours of vocal training, with a follow-up evaluation at the end of the course. Although voice problems decreased, the results showed no significant difference between the training and control groups. However, further analysis revealed significantly greater improvement in students who fully participated in the program. In contrast, students who had no vocal alterations at the beginning of the course experienced worsening voice conditions[12].

Although inconclusive, these studies provide valuable insights for developing interventions aimed at Pedagogy students[12-27]. Key points include: 1) the need for full participant engagement to achieve the intended benefits; 2) the importance of implementing interventions during teacher training to protect the voices of future educators from potential disorders; 3) the need to consider broader and collective aspects, such as risk factors and vocal ergonomics, which are crucial in the development of voice disorders among teachers. Thus, beyond individual factors (such as vocal habits and voice use), attention must be directed toward the work environment and organizational conditions in which these students are placed, like studies on teachers[3,4,5]

The VoiSS scores obtained in this study were high, which aligns with literature findings[9,10,25] and indicates the presence of vocal symptoms in future teachers from the outset of their training. The emotional subscale showed a low impact, unlike studies on teachers, which report a higher relative risk of common mental disorders (CMD) among educators with vocal impairments[28]. This raises the question of whether pre-existing vocal symptoms may also be an exposure factor for CMD in future teachers.

Regarding vocal fatigue, the total score and Factors 1 to 3 were above the cut-off points. In contrast, Factor 4 – Improvement of voice symptoms with rest – was below, indicating scores closer

to those of dysphonic individuals than those with healthy voices. No studies on Pedagogy students using the VFI were found. However, research on teachers has also shown that average scores are closer to those of dysphonic individuals, with greater intensity after a week of teaching[29]. Notably, even after vocal rest, Pedagogy students maintained scores closer to those of dysphonic individuals, suggesting that they generally do not experience complete symptom recovery with rest, which may indicate persistent vocal fatigue.

Regarding the SIVD, 17.3% of students in this study scored above the cut-off point, whereas a higher percentage (35.7%) was observed among final-year education students at a public university in Goiás[7]. In contrast, public and private school teachers from the municipal education system of João Pessoa (PB) self-reported an even higher prevalence of voice disorders (86.89% among public school teachers and 63.93% among private school teachers). The median score on the SIVD was 5 points for public school teachers, with smoke, echo, humidity, and classroom acoustics identified as the most detrimental environmental factors in both networks[30]. Although studies on teachers generally report higher prevalence rates, the value observed in this study may be attributed to the students' initial engagement in teaching, which involves vocal demands related to academic responsibilities, as well as their exposure to environmental and organizational factors when beginning internships and/or practical teaching experiences. This also applies to those who are already actively working as teachers.

Conclusion

The Pedagogy students in this study were predominantly female, had a relatively high mean age, and exhibited elevated scores across all instruments, indicating the presence of vocal symptoms and vocal fatigue during their training. Although a smaller percentage of participants demonstrated indications of a probable voice disorder, practical activities, academic internships, and the teaching profession itself may expose students to environmental and organizational factors that are key determinants of voice disorders. Further research is necessary to better understand the influence of these factors on the development of voice disorders, enabling early detection and informing public policies aimed at improving teachers' working conditions.

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