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Vocal fatigue among Brazilian public teachers during remote teaching: a multicenter study

Fadiga vocal de professores brasileiros da rede pública durante o ensino remoto: estudo multicêntrico

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ABSTRACT

Purpose: To analyze teachers' self-perception of vocal fatigue and its relationship with the amount of the speech and loudness, vocal disorders, mask usage, and working conditions. **Methods:** A multicenter, exploratory, observational, analytical, and cross-sectional study of the web survey type during the period of emergency remote teaching. Convenience sampling was used, comprising 263 public school teachers from the cities of Belo Horizonte, Campinas, São Paulo and Salvador, working inEducation. The Google form was sent with sociodemographic, work and health questions, use of a face mask, in addition to self-assessment protocols and self-assessment Voice Disorder Screening Index (VDSI), Degree of Speech Quantity and Vocal Intensity (DSQVI), and Vocal Fatigue Index (VFI). **Results:** Most of the teachers showed a suspected vocal disorder (55.9%) and perceived vocal fatigue (83.7%), with good voice recovery after rest (74.5%). There was a statistical association between self-perceived vocal fatigue and suspected voice disorder (OR: 25.64 / CI: 95% 7.60-86.45) and working in high school (OR: 0.35 / CI: 95%: 0.16-0.76). **Conclusion:** Teachers reported a high prevalence of vocal fatigue, with satisfactory voice recovery while conducting online classes during the pandemic. The presence of vocal disorder increased the likelihood of self-perceived vocal fatigue symptoms, and working in high school reduced this likelihood.

Keywords: Voice; Fatigue; Covid-19; School teachers; Signs and symptoms; Personal protective equipment

RESUMO

Objetivo: analisar a autopercepção de fadiga vocal de professores e sua relação com a quantidade de fala e loudness, distúrbio vocal, uso de máscara e condições de trabalho. **Método:** estudo multicêntrico, exploratório, observacional, analítico e transversal, do tipo websurveys, no período do ensino remoto emergencial. Participaram 263 professores da rede pública das cidades de Belo Horizonte, Campinas, São Paulo e Salvador, que atuavam na educação básica. A coleta de dados foi entre fevereiro e agosto de 2021. O formulário do Google foi enviado com questões sociodemográficas, de trabalho e saúde, uso de máscara facial, além dos protocolos de autoavaliação Índice de Triagem para o Distúrbio de Voz, Grau de Quantidade de Fala e Intensidade Vocal e Índice de Fadiga Vocal. **Resultados:** a maioria dos professores apresentou suspeita de distúrbio vocal (55,9%) e percebeu fadiga vocal (83,7%), com boa recuperação da voz após repouso (74,5%). Houve associação estatística entre a fadiga vocal autopercebida com suspeita de distúrbio vocal (odds ratio:25,64 /intervalo de confiança: 95% 7,60-86,45) e trabalhar no ensino médio (odds ratio:0,35 / intervalo de confiança: 95%:0,16-0,76). **Conclusão:** os professores autorreferiram elevada prevalência de fadiga vocal, com recuperação satisfatória da voz ao ministrarem aulas on-line durante a pandemia. A presença de distúrbio vocal aumentou a chance de sintomas de fadiga vocal autopercebidos e trabalhar no ensino médio reduziu essa chance.

Palavras-chave: Voz; Fadiga; COVID-19; Professores escolares; Sinais e sintomas; Equipamento de proteção individual

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INTRODUCTION

The world faced several restrictions due to the state of emergency declared in March 2020 because of the COVID-19 pandemic. The most common symptoms of severe acute respiratory syndrome (SARS), caused by the coronavirus (SARS-coV-2), are fever, cough, fatigue, flu-like symptoms, and upper respiratory tract symptoms, which can be mild (without the need for hospital treatment) or more serious (with severe respiratory difficulty and severe pneumonia)[1]. Measures such as social isolation were necessary in the population's routine to contain the spread of COVID-19, and new working conditions were adopted[1,2].

One of the most widespread measures to prevent COVID-19 is using face masks. Studies show that face masks impair communication and can cause vocal impairments, such as increased self-reported vocal fatigue[3-5]. Many people wear face masks regularly, which have become common equipment for protecting the airways. However, their use is no longer mandatory in many cases after the pandemic.

The changing work environment posed challenges to individuals not used to digital settings[2]. People working from home had a high prevalence of dysphonia and a combination of self-perceived dysphonia and vocal tract discomfort in a remote environment, due to vocal use in audio and video calls[6]. Professionals, especially teachers from different countries, reported symptoms such as vocal fatigue, hoarseness, throat clearing, laryngeal symptoms, and increased vocal intensity when teaching synchronous classes (i.e., classes via video calls)[7,8].

Teachers working from home who did not teach synchronous remote classes probably did not use their voices as often to work. A group of Brazilian teachers reported better vocal quality in emergency remote teaching compared to in-person teaching. However, the group noticed symptoms of dry throat, vocal effort, and hoarseness associated with online classes, in addition to difficulty using headphones[9].

Before this advent, the literature had been showing that vocal disorders are among the main reasons for absence and illness in teachers[10]. A meta-analysis states that being female, reporting upper airway problems, speaking loudly, having more classes per week, and being dismissed due to voice problems are the main risk factors for vocal disorders in teachers[11].

Vocal fatigue is a common symptom among teachers, which may indicate an early voice disorder and accompany recovery after vocal rest, or manifest as a symptom resulting from a long-term vocal disorder, both with greater vocal demand. Self-perception of vocal fatigue can be quantified using the Vocal Fatigue Index (VFI)[12], validated in Brazil[13].

A literature review with teachers showed that the prevalence of vocal fatigue ranged from 42% to 92%. Vocal fatigue at work was related to high noise levels in classrooms and intense use[14]. Self-reported vocal fatigue is an individual characteristic and consists of a self-perceived disorder and/or physiological deficit, triggered by vocal demand in a given location to convey the intended message. The attempt to respond to this vocal demand is related to how the voice will be produced, determined by physiological and psychological factors that result in vocal effort felt by the speaker in a communicative situation[15].

The characteristics of the work environment and the teachers' health conditions can influence vocal production at work and outside their work, hence the importance of understanding teachers' voices in emergency remote teaching. Based on this assumption, this study aimed to analyze teachers' self-perception of vocal fatigue related to the amount of speech and loudness, vocal disorders, use of masks, and working conditions.

METHODS

This is a multicenter, exploratory, observational, analytical, cross-sectional, web-survey study with Brazilian basic education teachers.

The project was registered on Plataforma Brasil under CAAE no. 35899020.6.1001.5662 and approved by the Research Ethics Committee of the originating institution (Federal University of Bahia - UFBA) under evaluation report no. 4.309.005/2020, ratified by the co-participating centers (Federal University of Minas Gerais - UFMG, State University of Campinas - UNICAMP, Pontifical Catholic University of São Paulo - PUC-SP). All participants signed an online informed consent form, agreeing to the implementation and dissemination of this research and its results, complying with Resolution no. 466/2012.

Teachers who taught public basic education in the Brazilian cities of Belo Horizonte, Campinas, Salvador, and São Paulo and had access to the Internet were eligible for the study. They were recruited through a virtual snowball strategy. Teachers selected for the study invited friends and acquaintances from their network of contacts to participate. The study was disseminated through social media. The study excluded those who were not classroom teachers or who taught only in private or higher education.

Data were collected online via Google Forms@ between February and August 2021. The online questionnaire consisted of the following instruments: Voice Disorder Screening Index (ITDV, in Portuguese)[16], Voice Production Condition – Teachers (CPV-P, in Portuguese)[17], Degree of Speech Quantity and Voice Intensity (GQFIV, in Portuguese)[18], and Vocal Fatigue Index (VFI)[13]. The study also collected information about COVID-19, upper airway symptoms, and emergency remote classes. The responses referred to the first semester of 2021.

The ITDV[16] was developed and validated for Brazilian Portuguese. It is an easy-to-apply screening tool for identifying voice disorders based on the investigation of 12 vocal symptoms self-reported by individuals, with response scales ranging from "never" to "always". The indication of five or more symptoms with a frequency of "sometimes" or "always" implies a possible vocal disorder, which should be further investigated[16].

The CPV-P and GQFIV were developed by Brazilian speech-language-hearing pathologists, but they have not been validated yet. The CPV-P[17] aims to understand teachers' vocal use conditions and is used as a diagnostic and awareness-raising element in a program developed by the City Government of São Paulo. This used the following variables: age, gender (female, male, and not reported), city of residence/work, time working as a teacher, and education level. The GQFIV[18] aims to assess the individual's perception of the amount of speech and voice intensity in two different situations, at work and outside of work. Since it does not objectively measure intensity, the term loudness was used to characterize the teachers' perception of the intensity of voice use. The instrument has a 7-point scale, ranging from 1 (a quiet, non-talkative person who speaks very softly) to 7 (an extremely talkative person who speaks at a high volume). A score of up to 4 for quantity and loudness of voice indicates adequate communication, without vocal effort, and

was considered the cutoff for dichotomizing speech quantity and loudness at work and outside of work[19].

The VFI[13] is a self-assessment instrument, validated and adapted for Brazilian Portuguese, and aims to verify self-perceived vocal fatigue symptoms and vocal recovery after rest. It has 17 questions and an answer key ranging from 0 (never) to 4 (always), investigating vocal fatigue in four domains: fatigue and vocal limitation, with seven questions and a cutoff of 4.5; vocal restriction, with three questions and a cutoff of 3.5; physical discomfort associated with voice, with four questions and a cutoff of 1.5; recovery with vocal rest, with three questions and a cutoff of 8.5. In the first three domains, the higher the results, the worse the evaluation – the exception is the recovery with vocal rest, whose values above the cutoff indicate good vocal recovery after vocal rest. A total score above 16.5 indicates greater self-perception of vocal fatigue[13].

The descriptive analysis of the study variables was reported in two different ways: qualitative variables were presented in frequency tables with absolute values and percentages. Age and teaching experience, as they are quantitative and have a normal distribution confirmed by the Shapiro-Wilk test, were summarized as means and standard deviations.

Logistic regression analysis was performed to assess the influence of the variables on vocal fatigue. This model has the characteristic of assessing whether a set of independent variables significantly increases or reduces the presence of a condition (in this case, vocal fatigue) through dichotomization, considering the cutoff of the total VFI score.

Univariate analyses were initially performed, in which each of the selected variables generated a different model in combination with the VFI, observing whether the isolated effects of each independent variable were present. After the univariate analysis, all those with a p-value ≤ 0.2 were pre-selected for a multivariate model, which was reduced using the stepwise method until only significant variables remained ($p \leq 0.05$). The logistic regression model fit was assessed with the Hosmer-Lemeshow test, with a p-value greater than 0.05 indicating a good fit of the model. The analyses were performed using the IBM Statistical Package for the Social Sciences – SPSS, version 25.

RESULTS

The study included 263 teachers, with a minimum age of 24, a maximum of 68 years, and a mean age of 45 years (standard deviation = 9.01), most of whom were from São Paulo. The mean teaching experience was 18 years (standard deviation = 9.18). Most teachers were females, worked in a school, and taught in municipal elementary schools, followed by preschool. All teachers were working remotely, and 16% of them also reported teaching in person. More than half of the teachers taught synchronously online (Table 1).

Most teachers reported speaking a certain amount in their usual environment and at work, indicating a risk of developing vocal disorders; however, the occurrence was even higher at work (home or school). Regarding voice intensity, most teachers reported a perception of high volume in the work environment. As for mask use and communication, there were many reports of communication barriers, with the main complaints being having to strain their voice to make it out (57.79%) and difficulty being understood in noisy places when wearing a mask (53.23%). A little over half reported five or more vocal symptoms as "almost always" and "always" in the ITDV, indicating a possible vocal disorder (Table 2).

The prevalence of self-perceived vocal fatigue symptoms among teachers was 83.65% (score above 16.5). In the VFI

Table 1. Description of sociodemographic and work characteristics of public basic education teachers in the cities of Belo Horizonte, Campinas, São Paulo, and Salvador, Brazil

Variable		n	%
Gender	Females	231	88.17
	Males	31	11.83
	Not reported	1	-
City	São Paulo	117	44.49
	Belo Horizonte	85	32.32
	Campinas	21	7.98
	Salvador	40	15.21
Teaching level	Preschool		
	No	157	59.70
	Yes	106	40.30
	Elementary school		
	No	179	68.06
	Yes	84	31.94
	Middle school		
	No	171	65.02
	Yes	92	34.98
	High school		
	No	195	74.14
	Yes	68	25.86
	Adult education		
	No	230	87.45
	Yes	33	12.55
Administrative system	Municipal		
	No	61	23.19
	Yes	202	76.81
	State		
	No	172	65.40
	Yes	91	34.60
	Federal		
	No	261	99.24
	Yes	2	0.76
	Private		
	No	254	96.58
	Yes	9	3.42
Number of schools	One	160	60.84
	Two	99	37.64
	Three	4	1.52
Teaching experience (in years)	Up to 10	85	25.60
	11 to 20	129	38.86
	21 to 30	93	28.01
	31 to 47	25	7.53%
Online teaching	No	74	28.14
	Yes	189	71.86
In-person teaching	No	221	84.03
	Yes	42	15.97
TOTAL		263	100

Subtitle: n = Number of individuals; % = Percentage

Table 2. Description of the Voice Disorder Screening Index, the Degree of Speech Quantity and Voice Intensity, and mask use by Brazilian teachers of public basic education in Belo Horizonte, Campinas, São Paulo, and Salvador, Brazil

Variable		n	%
Amount of speech in usual settings (GQFIV)	Less talkative	107	40.68
	More talkative	156	59.32
Voice intensity in usual settings (GQFIV)	Lower loudness	138	52.47
	Higher loudness	125	47.53
Amount of speech at work (GQFIV)	Less talkative	51	19.39
	More talkative	212	80.61
Voice intensity at work (GQFIV)	Lower loudness	71	27.0
	Higher loudness	192	73.0
Mask use	No	4	1.52
	Yes	259	98.48
Difficulties being heard while wearing a mask	No	137	52.09
	Yes	126	47.91
Difficulties being understood in noisy settings with a mask	No	123	46.77
	Yes	140	53.23
Need to strain for the voice to come out when wearing a mask	No	111	42.21
	Yes	152	57.79
Unable to predict when the voice will be clear	No	179	68.06
	Yes	84	31.94
Voice disorder (ITDV)	No	116	44.11
	Yes	147	55.89
TOTAL		263	100

Subtitle: n = Number of individuals; % = Percentage; GQFIV = Degree of Speech Quantity and Voice Intensity; ITDV = Voice Disorder Screening Index

domains, most individuals reported fatigue and vocal limitation (83.65% - score above 4.5), vocal restriction (68.44% - score above 3.5), and physical discomfort associated with voice (70.34% - score above 1.5). Also, 74.52% of participants reported recovery with vocal rest (score above 8.5).

The univariate analysis – assessing the relationship between vocal fatigue and each variable independently – found a positive statistical association with teaching elementary school and a negative association with the city of Belo Horizonte and teaching high school (Table 3).

The respondents related "I feel like I have to strain my voice to come out" – a communication barrier caused by mask use – to vocal fatigue. The report of straining their voices to come out while wearing the mask increased the chance of vocal fatigue, as did the possible presence of a vocal disorder identified in the ITDV (Table 4).

The final model found that working in high school reduced the chance of perceiving vocal fatigue compared to those who did not work at this level of education. Suspected vocal disorder (more than five symptoms) increased by 26 times the chance of having vocal fatigue when compared to those with fewer reports of vocal symptoms (Table 5). The final model had a good fit (p-value = 0.4314).

DISCUSSION

At the beginning of the second year of the COVID-19 pandemic (first half of 2021), all teachers in this study worked partially or fully in emergency remote teaching. They identified a high prevalence of perceived vocal fatigue, which was higher among those with suspected vocal disorders and lower for those who taught high school. Vocal fatigue is a prevalent symptom among this population, associated with the vocal demands of teaching[14].

The results of this study showed that teachers used high loudness and a greater amount of speech more often at work than outside of it. This result confirms a study with preachers[20], reinforcing the vocal loading that work demands in some professions. It was verified that the amount of speech and loudness in emergency remote teaching remained high. An online questionnaire applied to 1,126 Brazilian teachers confirmed that greater vocal use at high intensity and difficulty in using the voice during online classes are aspects related to vocal worsening[9].

The self-perception of vocal fatigue among Brazilian teachers in this study was significant. Most participants reported fatigue, vocal limitation and restriction, and physical discomfort associated with voice, but with vocal recovery after rest. In the univariate analysis, Belo Horizonte was less likely to have reported a perception of vocal fatigue than São Paulo, highlighting the importance of knowing the context of each Brazilian region. However, this statistical difference did not remain in the final model.

Most teachers reported some difficulty communicating while wearing a face mask to protect against COVID-19. The blocking effect of the face mask leads to difficulties in breathing in air and excessive force when phonating, which increases loudness and hinders vocal projection, thus impairing sound quality and intelligibility[4]. Considering that they taught predominantly through remote communication, the responses about mask use referred mainly to activities outside of work – although 15.97% of the teachers used their voices in person in hybrid classes.

Having to strain their voices while wearing a mask, reported by teachers who self-perceived vocal fatigue, may be related to how the mask blocks the mouth and nose – although, the statistical difference did not remain in the final model. This may be due to the predominance of teachers in emergency remote teaching and the need to wear masks in extra-work situations, which was restricted during the study period.

It can be said that the mask, as a communication barrier, generates an increase in vocal effort, which is related to voice fatigue. The attempt to amplify the voice using greater force when speaking is a response to vocal demand[7]. Vocal fatigue symptoms may occur due to excessive phonatory effort to cope with the difficulty of emitting intelligible speech while wearing a face mask[21]. Other studies that evaluate the use of masks in in-person teaching are important to further clarify the use of this health protection resource, still used in some situations, such as by individuals with flu-like symptoms.

In the final multivariate model, vocal disorders remained associated with self-perception of vocal fatigue. The investigation of vocal fatigue among university professors, using the VFI, showed lower vocal fatigue among those who reported better voice-related quality of life, and vice-versa[22]. Dysphonic professors who sought speech-language-hearing therapy had higher VFI scores than those without vocal complaints[23]. University professors in remote teaching reported vocal fatigue, and those who had more than two vocal signs and symptoms had a greater perception of vocal fatigue[24]. The comparison of professors' self-perception of vocal fatigue before and during the pandemic showed lower vocal fatigue during remote teaching[25]. In the same study, professors with vocal complaints had a

Table 3. Univariate association of self-perceived vocal fatigue with sociodemographic and work characteristics of public basic education teachers in Belo Horizonte, Campinas, São Paulo, and Salvador, Brazil

Variable		OR	p-value	95% CI
Gender	Females	1		
	Males	0.29	0.003*	0.13-0.67
City	São Paulo	1		
	Belo Horizonte	0.36	0.013*	0.16-0.81
	Campinas	0.33	0.067**	0.10-1.08
	Salvador	0.42	0.083**	0.15-1.12
Teaching level	Preschool			
	No	1		
	Yes	1.17	0.651	0.60-2.29
	Elementary school			
	No	1		
	Yes	2.31	0.045*	1.02-5.23
	Middle school			
	No	1		
	Yes	1.01	0.988	0.51-2.00
	High school			
	No	1		
	Yes	0.36	0.003*	0.18-0.71
	Adult education			
	No	1		
	Yes	1.48	0.485	0.49-4.45
Administrative system	Municipal			
	No	1		
	Yes	1.78	0.115**	0.87-3.63
	State			
	No	1		
	Yes	0.55	0.075**	0.28-1.06
	Federal			
	No	1		
	Yes	-	-	-
	Private			
	No	1		
	Yes	0.67	0.630	0.14-3.36
Number of schools	One	1		
	Two	0.94	0.846	0.48-1.83
	Three	-	-	-
Teaching experience (in years)	Up to 10	1		
	11 a 20	1.38	0.763	0.49-2.63
	21 a 30	1.05	0.909	0.42-2.63
	31 a 47	0.64	0.464	0.19-2.12
Online teaching	No	1		
	Yes	0.86	0.684	0.41-1.80
In-person teaching	No	1		
	Yes	2.04	0.200**	0.69-6.03

Subtitle: n = Number of individuals; % = Percentage; OR = Odds ratio; CI = confidence interval

greater perception of vocal effort, vocal signs and symptoms, and vocal fatigue[25].

The VFI scores indicate that teachers are more likely to report vocal fatigue, vocal restriction, and physical discomfort in voice than healthy adults, and are an instrument for identifying early voice problems and/or monitoring recovery[12]. In this study, teachers showed good recovery from vocal fatigue after rest, a result that differs from another study also carried out in remote teaching[25]. Therefore, the prevalence of self-perceived vocal fatigue in this study was high and may indicate a possible risk of vocal change in the study sample, and even be responsible for the persistence of the vocal disorder. Perceived vocal fatigue should be viewed carefully, as it is a multifactorial symptom, independent of the individual's physiological state or response[15].

The fact that high school teachers had lower self-perception of vocal fatigue may be related to the greater demand for voice use in teaching younger children. The univariate analysis found that elementary school teachers were more likely to report vocal fatigue. However, this aspect did not remain in the final model. Another study did not find a difference in the total vocal

Table 4. Univariate association of self-perceived vocal fatigue with the results of the Degree of Speech Quantity and Voice Intensity, the Voice Disorder Screening Index, and mask use by public basic education teachers in Belo Horizonte, Campinas, São Paulo, and Salvador, Brazil

Variable		OR	p-value	95% CI
Amount of speech in usual settings	Less talkative	1		
	More talkative	1.19	0.610	0.61-2.30
Voice intensity in usual settings	Lower loudness	1		
	Higher loudness	1.47	0.253	0.76-2.87
Amount of speech at work	Less talkative	1		
	More talkative	1.12	0.780	0.50-2.52
Voice intensity at work	Lower loudness	1		
	Higher loudness	1.21	0.602	0.59-2.48
Mask use	No	1		
	Yes	0.58	0.641	0.59-5.72
Difficulties being heard while wearing a mask	No	1		
	Yes	1.34	0.386	0.69-2.59
Difficulties being understood in noisy settings with a mask	No	1		
	Yes	0.88	0.711	0.46-1.70
Need to strain for the voice to come out when wearing a mask	No	1		
	Yes	2.73	0.004*	1.39-5.37
Unable to predict when the voice will be clear	No	1		
	Yes	1.95	0.095**	0.89-4.29
Voice disorder (ITDV)	No	1		
	Yes	25.26	<0.001*	7.57-84.36

*p-value ≤ 0.05; **p-value ≤ 0.20
Subtitle: n = Number of individuals; % = Percentage; OR = Odds ratio; CI = confidence interval; IDTV = Voice Disorder Screening Index

Table 5. Final multivariate model of the association of variables with self-perceived vocal fatigue

Variable	OR	Standard error	z	p-value	95% CI
Teaching high school	0.35	0.139	-2.65	0.008	0.16-0.76
Having a vocal disorder	25.64	15.900	5.23	<0.001	7.60-86.45

Logistic regression model
Subtitle: OR = Odds ratio; CI = confidence interval; z = score

fatigue score of teachers at different levels of education during remote teaching[25].

A comparative study with teachers from different basic education levels showed no difference in vocal self-assessment regarding the frequency of vocal tract discomfort and vocal symptoms, despite the constant presence of vocal tract discomfort among teachers[26]. Brazilian teachers who work from elementary to high school were absent from work more often due to voice problems than those who work with young adults and professional education – although, the statistical difference was not maintained in the final multivariate model[10]. Thus, results are divergent and scarce when comparing different education levels. Caution should be exercised when interpreting the results, considering that vocal self-perception has been assessed with different instruments.

The limitations of the study include its cross-sectional design, not allowing us to state whether the vocal disorder is the cause or effect of the vocal fatigue symptoms. It should be considered that teachers who responded about education levels in this study could be working in more than one at the same time. Moreover, despite the inclusion of teachers over the age of 60, with possible presbyphonia, there was no difference in vocal fatigue between age groups.

Given that this study is characterized as a web survey, limitations are expected[27]. It does not have external validity, since the sampling was non-probabilistic and only teachers with Internet access were able to respond to the questionnaire. The abrupt change in teaching activities, with different adaptations, and the lack of instruction on how to develop remote teaching in different regions of the country made it difficult to better understand how teachers developed their work and the impacts on their physical and mental health.

Online questionnaires provide quick and practical data collection in times of social restrictions. The advantages of this study include the possibility of collecting information from a specific audience in different regions in the same way and the feasibility of conducting a multicenter study. Studies like this are important for understanding work-related voice disorders, highlighting that teachers had a high prevalence of self-perception of vocal fatigue in remote and hybrid classes and that face mask use must be considered a new habit that can aggravate or trigger voice disorders. The study helped

speech-language-hearing pathologists in clinical practice to consider the particularities of teachers who need to maintain remote teaching or online activities, such as those working in distance learning (EaD), and provide guidelines on how to minimize the negative effect of communication/voice with a face mask when use is necessary.

CONCLUSION

Teachers perceived a high prevalence of vocal fatigue with good recovery after rest during emergency remote teaching. Vocal demand conditions, such as the use of a face mask associated with vocal use and vocal disorder, were related to symptoms of self-reported vocal fatigue. Working in high school, compared to other levels of basic education, reduced the chance of self-perceived vocal fatigue.

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