

Voice Disorder, Job Stress, and COVID-19 in Teachers: Impacts in Times of Pandemic

Trastorno de la voz, estrés laboral y COVID-19 en profesores: repercusiones en tiempos de pandemia

Maria Madalena Ferreira do Bonfim¹  , Léslie Piccolotto Ferreira²  , Adriane Mesquita de Medeiros³  , Ana Carolina Constantini⁴  , Maria Lúcia Vaz Masson⁵  

¹ School of Human and Health Sciences; Pontifical Catholic University of São Paulo; São Paulo; Brazil.

² Department of Theory and Methods in Speech Therapy and Physiotherapy; School of Human and Health Sciences; Pontifical Catholic University of São Paulo; São Paulo; Brazil.

³ Department of Speech-Language-Hearing Sciences; Medical School; Federal University of Minas Gerais – UFMG; Minas Gerai; Belo Horizonte; Brazil.

⁴ School of Medical Sciences; State University of Campinas - UNICAMP; Campinas; Brazil.

⁵ Department of Speech-Language-Hearing Sciences Multidisciplinary; Institute of Rehabilitation and Health; Federal University of Bahia; Salvador; Brazil.



Correspondence

Maria Madalena Ferreira do Bonfim.
 Email: madabonfim@hotmail.com

Cite like this

Bonfim, Maria Madalena Ferreira do; Ferreira, Léslie Piccolotto; Medeiros, Adriane Mesquita de; Constantini, Ana Carolina; Masson, Maria Lúcia Vaz. (2024). Voice Disorder, Job Stress, and COVID-19 in Teachers: Impacts in Times of Pandemic. *Revista de Investigación e Innovación en Ciencias de la Salud*. 6(1), 8-23. <https://doi.org/10.46634/riics.231>

Received: 06/06/2023

Revised: 07/27/2023

Accepted: 10/19/2023

Editor

Fraidy-Alonso Alzate-Pamplona, MSc., 

Copyright

© 2024. María Cano University Foundation. The *Revista de Investigación e Innovación en Ciencias de la Salud* provides open access to all its content under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International \(CC BY-NC-ND 4.0\)](https://creativecommons.org/licenses/by-nc-nd/4.0/) license.

Abstract

Introduction. The conditions of teachers' work during the COVID-19 pandemic affected teachers' lives regarding voice disorder and stress, even in emergency remote classroom situation.

Objective. To analyze the relationship between the presence of voice disorder, job stress, and COVID-19 in teachers when in emergency remote classroom teaching situation at the time of the pandemic.

Method. This is a primary, exploratory, observational cross-sectional study with the use of survey forwarded online during the period of emergency classes after the arrival of COVID-19 pandemic in Brazil. The teachers answered the sociodemographic questions about the presence of COVID-19 and the following instruments: Condition of Vocal Production-Teacher [Condição de Produção Vocal - Professor (CPV-P)], Screening Index for Voice Disorder (SIVD), and Job Stress Scale (JSS).

Results. Of the 118 teachers analyzed, 94.1% were female; the average age was 44 years. The SIVD recorded the presence of voice disorder in 66.9% of the participants. Regarding the JSS, which are the findings related to stress at work in the demand domain, the teachers showed high levels, a fact which presupposes the existence of pressure of psychological nature to perform their work.

Declaration of interests

The authors have declared that there is no conflict of interest.

Data availability

All relevant data is in the article. For further information, contact the corresponding author.

Financing

CAPES - Coordination for the Improvement of Higher Education Personnel. Financing Code: 001-88887.509913/2020-00.

Disclaimer

The content of this article is the sole responsibility of the authors and does not represent an official opinion of their institutions or of the *Revista de Investigación e Innovación en Ciencias de la Salud*.

Contribution of the authors

Maria Madalena Ferreira do

Bonfim: Data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, writing – original draft, writing – review & editing.

Lésie Piccolotto Ferreira:

Conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, supervision, writing – original draft, writing – review & editing.

Adriane Mesquita de Medeiros:

Conceptualization, data curation, investigation, methodology, project administration, supervision, writing – review & editing.

Ana Carolina Constantini:

Conceptualization, data curation, investigation, methodology, project administration, supervision, writing – review & editing.

Maria Lúcia Vaz Masson:

Conceptualization, data curation, investigation, methodology, project administration, supervision, writing – review & editing.

Conclusion. The teachers self-reported the presence of voice disorder even in remote class situation, on the occasion of COVID-19, which were more common in older teachers. When comparing the presence of voice disorders, coronavirus symptoms, and stress domains in relation to demand, control, and social support, there was no significance. It is hoped that this study will help to reflect on the need to improve teachers' working conditions, strengthening work-related voice disorder actions and guiding actions for vocal care and well-being.

Keywords

Voice; school teachers; voice disorders; mental health; occupational health; occupational stress; COVID-19.

Resumen

Introducción. Las condiciones de trabajo de los profesores durante la pandemia de COVID-19 afectaron sus vidas en lo que respecta al trastorno de la voz y el estrés, incluso en situaciones de emergencia en aulas remotas.

Objetivo. Analizar la relación entre la presencia de trastorno de la voz, estrés laboral y COVID-19 en profesores cuando se encontraban en situación de emergencia de enseñanza en aulas remotas en la época de la pandemia.

Método. Se trata de un estudio primario, exploratorio, observacional de tipo transversal, con el uso de encuesta remitida online durante el periodo de clases de emergencia tras la llegada de la pandemia de COVID-19 en Brasil. Los profesores respondieron a las preguntas sociodemográficas sobre la presencia de COVID-19 y a los siguientes instrumentos: Condición de Producción Vocal-Profesor (CPV-P), Índice de Detección de los Trastornos de la Voz (SIVD) y Escala de Estrés Laboral (JSS).

Resultados. De los 118 profesores analizados, el 94,1% eran mujeres; la mediana de edad era de 44 años. El SIVD registró la presencia de trastorno de la voz en el 66,9% de los participantes. En cuanto a la JSS, que son los hallazgos relacionados con el estrés laboral en el dominio de la demanda, los profesores mostraron niveles elevados, hecho que presupone la existencia de presiones de naturaleza psicológica para realizar su trabajo.

Conclusión. Los profesores autoinformaron de la presencia de trastornos de la voz incluso en situación de clase a distancia, con ocasión del COVID-19, que fueron más frecuentes en los profesores de más edad. Al comparar la presencia de trastornos de la voz, los síntomas del coronavirus y los dominios de estrés en relación con la demanda, el control y el apoyo social, no hubo resultados significativos. Se espera que este estudio ayude a reflexionar sobre la necesidad de mejorar las condiciones de trabajo de los docentes, fortaleciendo las acciones de Trastorno de la voz relacionado con el trabajo (WRVD) y orientando acciones para el cuidado y bienestar vocal.

Palabras clave

Voz; maestros; trastornos de la voz; salud mental; salud laboral; estrés laboral; COVID-19.

Introduction

In December 2019, the world experienced a virus —which causes an infectious disease— called coronavirus that made its population change its routine. It first hit China, leaving the World Health Organization (WHO) on alert for the arrival of a pandemic, called COVID-19. In early 2020, the world's population faced severe changes, such as social isolation and lockdown [1]. In Brazil, these changes impacted, in addition to public health, on all other sectors of society [2]. COVID-19 is an infectious disease, which is caused by the SARS-CoV-2 —coronavirus— and the main symptoms of it are fever, tiredness, dry throat, and difficulty to breathe.

These symptoms were the most significant at the beginning of the pandemic and are the ones used in the questionnaire of this research. One out of six people infected by COVID-19 became seriously ill, developing severe pneumonia and difficulty in breathing. It is a highly transmissible and lethal disease [3]. The virus, upon reaching the respiratory system, can cause damage to the phonatory system and, consequently, changes the quality and production of voice [4]. The biosecurity measures imposed on the population to prevent COVID-19 are social distancing, use of alcohol gel, hand washing and, because it is a virus transmitted through secretions such as saliva and droplets of respiratory secretion, it is recommended to use face masks [2]. A recent study states that the use of a face mask impairs the communication, which may consequently lead to vocal damaging [5].

All these measures resulted in the greatest educational disruption known in History, forcing nearly 1.6 billion students to leave their classrooms in over 190 countries. This represents more than 90% of the student population worldwide [6]. Amidst the crisis, it is safe to say that education was one of the most affected areas and, in the middle of it, was the teacher, who was as much or even more impacted than the student, as they had their work routine compromised to carry out their activities remotely, triggering fear and instability in regards to the future.

With the closure of schools, teachers had to adapt to sudden changes, without any prior notice or time for training [7], and most of them did not have adequate computers and technical support to teach through remote classes. Some teachers had difficulties in holding classes, also reporting the effort to attract students and keeping their attention during lessons. In particular, on March 16, 2020, São Paulo's City Hall (SPCH), declared an emergency, through Decree No. 59.283/2020, for coping with the COVID-19 pandemic [8]. As a measure to reduce the risks of infection by COVID-19, vacations were anticipated and school recess took place from March 23 to April 9, 2020. After the recess, the emergency remote education (ERE) would take place through synchronous and asynchronous classes. It was decided that the learning process would happen by using printed materials, called Trails for Learning, and complemented in a cyber environment of a digital platform (Google Classroom). Professionals would have to comply with the telework regime (home office) until the end of the emergency period.

Even before the pandemic, studies from the most varied states of Brazil, with different situations and contexts, evidenced the occurrence of voice disorder (VD) in teachers. Among these, one example can be highlighted, a study carried out in Paraíba, with 183 public and private school teachers, revealed that hoarseness (79.2%), voice failure (60.1%), and voice thickness (50.8%) are the most reported vocal symptoms. Teachers from public schools report worse working conditions than those who teach at private schools, and there is also a higher occurrence of voice disorders [9].

Particularly, emphasizing data referring to São Paulo's City Hall (SPCH), this data collection research can be presented. It was held in 1998 and published in 2003, which included 422 teachers from the teaching network as subjects, with the aim of mapping the working conditions and vocal production.

Data showed that 60% of participants presented, in the present or past, voice alteration and symptoms that were mostly reported as dry throat (57.6%), hoarseness (53.2%), and tiredness when speaking (50.8%) [10]. It's important to point out that, during this period, there was not a validated instrument to screen voice disorders in teachers. Another survey [11] assessed 391 teachers from São Paulo, before taking the course "Promoting Teacher's Vocal Well-Being", and found out that the percentage of those who reported VD was 57.3%, which was close to that recorded in the 2003 research [10], and that older teachers self-reported VD more frequently ($p < 0.001$).

Work-related voice disorder (WRVD) also affects life outside work, which means social relationships can be impaired by voice problems, resulting in suffering, anxiety, and anguish. Add up to this, fear, shame, and judgments result in attrition in personal relationships [12].

The link between voice disorders and mental illnesses/stress were also proven in research carried out before the pandemic [13,14]. In a study performed in 2020, with teachers from elementary public schools in Montes Claros (MG), using instruments to evaluate depression and voice disorder scale, the authors concluded that teachers had a high prevalence of depressive symptoms (48.8%), being associated with voice disorder (42.7%) and lack of vocal warm-up [15]. Few studies have been found at the time of the pandemic, particularly with basic education teachers. Among these is a study of university teachers from 14 colleges in Israel ($n = 313$) that assessed emotional stress and vocal symptoms during remote classes because of the COVID-19 pandemic. The authors concluded that stress was associated with high levels of vocal symptoms [16]. A study carried out in Chile with teleworking teachers showed that the vast majority of participants reported an increase in vocal discomfort and symptoms (dry throat, vocal fatigue) in conjunction with a higher level of stress, which can, in the long term, lead to voice disorders [17].

In view of these data, it is possible to assume that, at the time of pandemic, psychosocial issues were more pronounced in as a result of social isolation and stress in the face of uncertainties caused by it. Therefore, it is important to look further the relationship between voice disorder and job stress for teachers during the period of remote classes. It should be noted that this research is part of a multicenter study involving, in addition to teachers from the teaching network counties of São Paulo studied here, other important capitals of Brazil (Salvador - BA and Belo Horizonte - MG) as well as the City of Campinas - SP.

Through this study, in particular, it was decided to bring up only the data referring to teachers in São Paulo. This option is justified in reason for the partnership established between LaborVox (Voice Laboratory) of Pontifical Catholic University of São Paulo (PUC-SP) and professionals from São Paulo's City Hall, signed since late 90s.

Thus, this study aimed to analyze the relationship between the presence of voice disorder, stress at work and COVID-19 in teachers, when in situation of teaching emergency remote classes, on the occasion of the pandemic.

Method

This is a primary, observational, exploratory and cross-sectional study with the use of a survey sent online during the emergency classes period, after the arrival of the COVID-19 pandemic in Brazil. Because it is a multicenter study, the research was approved by the coordinating center, to namely, the Federal University of Bahia (UFBA) and the other Institutions of Higher Education involved (Federal University of Minas Gerais – UFMG and State University of Campinas – UNICAMP), and received approval from the Ethics Research Committee (ERC) of Pontifical Catholic University of São Paulo – PUC-SP, under Opinion number 4.681.514/2021. According with ethical patterns advocated for research with living beings, this research was joined by the subjects, who agreed and signed in the Informed Consent Form (ICF).

The research included basic education teachers from public schools in São Paulo, active at all levels of education. It was initiated through invitations, triggered from telephone records and e-mails from teachers, assisted in the Voice Program of the Municipal Public Servant Hospital of São Paulo. As soon as these teachers had access to the invitations and answered the instruments, they were asked to send it to another colleague, following the so-called snowball strategy [18]. It was also published in social media for a wider range of participants. It was established as inclusion criteria to act as a teacher in schools in São Paulo and to be 18 years old or older. The determined exclusion criterion was “teachers who were not teaching during the data collection period” and were over 60 years of age, due to a greater predisposition to psychological distress and the presence of presbyphonia. At the end, teachers had access to a booklet with guidelines on vocal protection measures to assist in voice care, made by the research group TRASSADO/UFBA. All participants answered the questionnaire with questions about sociodemographic characteristics and on the presence of COVID-19, considering the results of test and symptoms.

Three instruments were applied. 1) Teacher’s Vocal Production Condition (CPV-P) [19], which, for this study, were taken in account questions that indicated sociodemographic aspects, for example, age, gender, color of skin and level of education, workload and place of work. 2) Screening Index for Voice Disorder (SIVD) [20], which proposes a screening that is easy to apply for identifying the presence of vocal alterations, under the investigation of 12 vocal symptoms (hoarseness, voice loss, breaking voice, low-pitched voice, phlegm, dry cough, cough with secretion, pain when speaking, pain when swallowing, secretion/phlegm in throat, dry throat and strained speech) self-reported by the individuals, with response scales ranging from never, rarely, sometimes, and always. Indicating five or more symptoms in frequency of “sometimes” or “always” implies referring the subject to a more accurate diagnostic evaluation. 3) Job Stress Scale (JSS), which assesses the stress at work through the interaction between the association of demand and control, considering social support. Demand is any kind of pressure of psychic nature to carry out a work, quantitative or qualitative. Control is the possibility for the worker to use intellectual skills to carry out his work and the authority he possesses to make decisions. The third dimension refers to social support in the work environment, and the lack of this social interaction can result in negative consequences for the worker’s health. The short version, adapted to Portuguese, with 17 questions was used [21].

The questions were presented to be answered with reference to the last semester of remote teaching. All questions were answered between the months of February and July, 2021. In the end, the total number of teachers who signed the ICF and accepted participating in the study was n=139. However, n=21 teachers were excluded due to not having answered the questionnaire up until the end or because they were not teaching classes at the moment of the research (exclusion criteria).

Descriptive analyzes are presented in two different ways: qualitative variables were shown as absolute and relative numbers (percentage) and quantitative variables passed the normality test of Shapiro-Wilk, who identified a non-normal distribution of data ($p < 0.05$). As a result, the variables are presented as median and quartiles. The variable SIVD has the classification of less than five symptoms and five or more symptoms, thus being a qualitative variable. Age, number of days teaching remote class and total JSS score, on the other hand, are quantitative variables and, therefore, for this comparison, the Mann-Whitney test was used, which compares two groups with non-normal quantitative data. The same happens with JSS domains, when compared to age and number of online classes.

To associate SIVD symptoms with the presence of COVID-19, Chi-square test was used, since the two variables are qualitative. The same happened to associate JSS domains with COVID-19. Control demand model has four response options and therefore the comparison between age and working days with this variable was carried out using the test of Kruskal-Wallis and post-test of Bonferroni. The purpose was to identify if any of the quadrants showed difference regarding the variables of age and days of work compared to others. For association with presence of COVID-19, the use of the Chi-Square test was maintained. Analyzes were made in Statistical Package for Social Science for Windows (SPSS, version 25) and the significance standard level adopted was 5%.

Results

This study had the participation of 118 teachers, all of them working as teachers in basic education in public schools in São Paulo. Women are the majority (94.1%), white color predominant (46.6%), and the most common marital status answered was married (61.3%). With regard to schooling, 61% have completed graduate studies and 33.1% have completed higher education (Table 1).

As for age, it ranges from 26 to 64 years old (being 44 the average). Regarding teaching time, 50% of them have less than 17 years of work and 25% of them have more than 23 years of work. Among the participating teachers, the teaching network of the majority (83.9%) is city network and most work in a single school (61.0%). A little more than half teach in kindergarten (55.1%), which represents the trend of teachers in public school in São Paulo. The majority (78.8%) experienced teaching classes at home, remotely, on the occasion of data collection (Table 2).

Regarding remote teaching, 81.4% taught classes in the academic semester at the moment of the search. Of this group, 72.3% did it five times a week and 6.4% did it seven times a week (Table 3).

Of the total number of respondents, 58.5% had at least one of the symptoms of COVID-19. The most common was fatigue or tiredness (36.4%) and the less frequent was coughing up phlegm (7.6%). About the test, 75.4% took it and the result was positive for 10.2%. Out of $n=13$ people who responded about the conditions of treatment of COVID-19, nine of them (69.2%) only took care of themselves at home and four (30.8%) required medical assistance. Number of people who tested positive were $n=12$ (Table 4).

SIVD recorded the presence of voice disorders in 66.9% of participants. The most referred symptoms, with the highest percentage registered in the frequency always, were dry throat (18.6%), tiredness when speaking (17.8%), and, in the same percentage, hoarseness and deep voice (14.4%), as shown in Table 5.

Table 1. Description of sociodemographic data (n=118). São Paulo, Brazil.

Variable		N	%
At the present time, are you working as at a teacher in basic school public education?	Yes	118	100
	Gender		
	Woman	111	94.1
	Man	7	5.9
Skin Color	White	55	46.6
	Brown	40	33.9
	Black	18	15.3
	Yellow	5	4.2
Marital status	Married	72	61
	Divorced	14	11.9
	Single	30	25.4
	Widower	2	1.7
Schooling	Postgraduate degree completed	72	61
	Higher education	39	33.1
	Incomplete graduation degree	6	5.1
	Incomplete higher education	1	0.8

Note. n: number of individuals; %: percentage.

Table 2. Description of teacher's functional situation (n=118). São Paulo, Brazil.

		Median	Q1 – Q3
For how many years have you been teaching?		17	11 – 22,5
How many schools do you teach at?		N	%
	One	72	61
	Two	44	37.3
	Three	2	1.7
Teaching network	City	99	83.9
	State	5	4.2
	More than one	14	11.9
Level of education	Kindergarten	65	55.1
	Preschool	39	33.1
	Elementary School	33	28
	High school	12	10.2
	Youth and Adult Education	10	8.5
	Others	1	0.8
Workplace	At home	86	72.9
	School	25	21.2
	Both	7	5.9

Note. n: number of individuals; %: percentage.

Table 3. Description of remote classes conditions (n=118). São Paulo, Brazil.

Variable		N	%
Did you teach online classes during this school semester?	No	22	18.6
	Yes	96	81.4
How many days off the week do you take to teach online classes? (n = 94)	1	7	7.4
	2	5	5.3
	3	4	4.3
	4	2	2.1
	5	68	72.3
	6	2	2.1
	7	6	6.4

Table 4. Description of COVID-19 questions (n=118). São Paulo, Brazil.

Variable		N	%
Symptoms	Did not show any symptoms	49	41.5
	Had symptoms	69	58.5
Which symptoms	Fever	12	10.2
	Dry cough	28	23.7
	Cough with phlegm	9	7.6
	Shortness of breath	16	13.6
	Fatigue or tiredness	43	36.4
	Sore throat	35	29.7
	Nasal congestion	38	32.2
Took the Covid Test?	No	29	24.6
	Yes	89	75.4
Did the result show positive?	No	77	65.3
	Yes	12	10.2
	Did not take the test	29	24.6
If you took a Covid-19 test, what's your scenario? (n = 13)	Took care of myself at home	9	69.2
	Needed medical assistance	4	30.8

Note. n: number of individuals; %: percentage.

Table 5. Description of the occurrence of teachers' symptoms presented on SIVD instrument (n=118). São Paulo, Brazil.

Symptoms	Never	Rarely	Sometimes	Always
Hoarseness (%)	12.7	22	50.8	14.4
Voice loss (%)	25.4	43.2	29.7	1.7
Breaking voice (%)	11	23.7	53.4	11.9
Low-Pitched voice (%)	28	16.9	40.7	14.4
Phlegm (%)	13.6	24.6	45.8	16.1
Dry cough (%)	11	33.9	45.8	9.3
Cough with secretion (%)	29.8	38.1	28	4.2
Pain when speaking (%)	32.5	29.7	30.5	7.6
Pain when swallowing (%)	33.9	33.1	25.4	7.6
Secretion/Phlegm in throat (%)	32.2	24.6	33.9	9.3
Dry throat (%)	10.2	18.6	52.5	18.6
Strained speech (%)	11	23.7	47.5	17.8

With respect to JSS, in the demand domain, which represents any type of pressure of a psychic nature to carry out a job, 52.5% of participants have high demand for work. In the control domain, which is the possibility for the worker to use his skills on carrying out the work and autonomy to make decisions, 56.8% have low control. For the social support, 58.5% of participants have low social support (Table 6).

Table 6. Description of JSS domains.

	Demand	Control	Social support
Low	47.5%	56.8%	58.5%
High	52.5%	43.2%	41.5%

Starting from demand and control association, a model was suggested: low wear (low demand and high control), passive work (low demand and low control), active work (high demand and high control), and high wear (high demand and low control). The results of these combinations recorded that the distribution between the four quadrants of the model is quite balanced. High strain was registered in 28.8% of teachers and passive work in 28.0% of the responses. Active work comes next with 23.7% of cases and low wear is present in 19.5% of participants (Table 7).

Table 7. Demand Model – Control.

	N	%
Low wear	23	19.5
Passive work	33	28.0
Active work	28	23.7
High wear	34	28.8
Total	118	100.0

When we compare SIVD with age, online workdays and JSS (total scoring), we notice a difference in age ($p = 0,004$), which means people with VD are statistically older. About the number of days worked, that difference does not exist ($p = 0,851$), so as JSS's total score ($p = 0,287$). Also, there is no difference on the percentage of people who had COVID-19 symptoms among participants, with or without VD ($p = 0,056$), as it can be seen in Table 8.

Table 8. Comparison of SIVD symptoms with age, work days, JSS (Total), and COVID symptoms.

	Absence of VD	Presence of VD	value p
Age*	41 (37 - 47)	48 (40 - 54)	0,004
Online work days of week*	5 (3.5 - 5)	5 (5 - 5)	0,851
JSS (Total)	29 (25 - 33)	30 (28 - 33)	0,287
COVID symptoms**	46.2%	64.6%	0,056

Note. *Mann-Whitney test of comparison; **Chi-Square.

Regarding the dimensions of JSS —demand, control and social assistance—, they are associated with age and days of work online, but in none of them this relationship was recorded ($p > 0.05$). On the other hand, there is a difference when the presence of COVID-19 symptoms are taken in account. ($p < 0.05$). Low demand group has a higher percentage of symptomatic patients than the high demand group does. In the dimensions of control and social aid, the highest percentage of symptomatic patients is between high control and high support (Table 9).

Table 9. Comparison of dimensions of JSS with age, work, and COVID symptoms.

	Low	High	value p
Demand			
Age*	44 (39.3 - 51.8)	45.5 (40 - 54)	0,436
Days of the week in remote working*	5 (5 - 5)	5 (5 - 5)	0,415
COVID symptoms**	67.9%	50.0%	0,049
Control			
Age*	44 (40 - 54)	45 (40 - 50)	0,786
Days of the week in remote working*	5 (5 - 5)	5 (5 - 5)	0,892
COVID symptoms**	56.7%	60.8%	0,657
Social Support			
Age*	46 (40,5 - 53.5)	43 (37 - 50)	0,082
Days of the week in remote working*	5 (5 - 5)	5 (4.3 - 5)	0,712
COVID symptoms**	50.7%	69.4%	0,043

Note. *Mann-Whitney test of comparison; **Chi-Square Test.

Discussion

The main goal of this study is to analyze how voice disorders, stress at work, and COVID-19 are related and how they reflect in teachers from São Paulo's basic public school network.

It's part of a multicenter study involving cities of Salvador, Belo Horizonte, and Campinas, but only data referring to São Paulo teachers were selected for this research.

Dynamics used (snowball) ended up including some teachers from the state education network that taught classes during the period analyzed ($n = 5$).

It is important to highlight that this research was carried out on the occasion of restrictions imposed by the pandemic, meaning, in remote classes emergency, stressing, given the reality of the city of São Paulo, in which teachers had multiple tasks to perform, both in pedagogical activities, synchronous and asynchronous, as well as at home.

Regarding the characterization of the sample, there was a predominance of women (94.1%), which is a fact in this profession, and this predominance is mentioned in several surveys carried out with teachers in different geographic regions [9,10,22,23]. About marital status, more than half are married, and 46.6% call themselves white, similar to the profile of

teachers according to National Household Sample Survey [24]. Teachers have an average age of 44 years, data like those described in the work that investigated the presence of vocal alteration in teachers of São Paulo [25]. Regarding on the level of education, more than half are in early childhood education and these data are correlated to research with public school teachers in São Paulo, performed in two other moments.

Considering that most teachers (78.8%) taught classes from home, added to the reality that most students did not have access to the internet, it can be compared to a study performed with basic education teachers throughout Brazil [26], in which it was recorded that the main difficulty of teachers was trying to interact with students and their families to get to know the real situation they were living in. This was probably the reality of teachers from public schools in Brazil.

Particularly, in the analysis of this data survey here presented, it was found that 81.4% (n=96) taught online classes (regime of the emergency remote education), which means the others had difficulties to minister classes, even with the support presented by the Department of Education of São Paulo's City Hall. It was recorded that more than half (66.9%) of teachers in this research showed a probable voice disorder, even in times of a pandemic in which there was a probable reduction of vocal demand. It should be noted that the percentage is slightly higher than those found in two surveys carried out with the same target audience: in the 2003 survey (a representative sample), the record was 60% and in the 2021 survey the record was 57.3% [11]. The data shows that although most public-school teachers do not use voice teaching classes, because pedagogical activities were carried out through printed material and only a few teachers recorded lessons, their vocal behavior and the symptoms remained.

It is noteworthy that the data are very similar, in completely different contexts experienced by teachers. Among teachers who have VD symptoms, the most common symptoms mentioned were dry throat, tiredness when speaking, and in equal percentage hoarseness and deep voice, the same registered in the surveys of 2003 and 2021 [10,11], performed with teachers from the same basic education network in São Paulo. When these data are compared with surveys carried out in the pre-pandemic moment from different regions of the Brazil, close results are also recorded [9,27].

Regarding to the findings related to stress at work, in the demand domain, teachers had high levels, a fact that presuppose the existence of pressures of a psychological nature to carry out their job.

About to the control domain, more than half of the teachers had low levels, indicating a low possibility of using their abilities to carry out the work and autonomy to make decisions. As for social support, which corresponds to the levels of social interactions existing at work, involving coworkers and different hierarchical [28] levels, low levels were recorded, certainly as a result of the social impact that distancing imposed by the pandemic caused.

Regarding the result of the four quadrants of demand and control combined, namely low wear, passive work, active work and high wear it is noticed that there is a balance between the results.

However, the combination of high wear (28.8%), which is the most harmful for health, because there are massive psychological demands with low control about the process of work, presents the highest percentage. When compared with a study from 2012 [29], which investigated voice illnesses and stress in the teaching environment, with a case-control group of teachers from the same network (SPCH), high levels were also found in the high quadrant wear in the control group (35.6%) and case group (45.1%), thus confirming the association between VD in public school teachers and stress in teaching environments. These results demonstrate that there is a similarity with this research, which means stress remains, even with teachers experiencing another way of organizing work, that is, at home. Teachers who presented voice disorders are statistically higher in age ($p = 0.004$), which was confirmed by data in a study carried out in the same network of teaching in a pre-pandemic moment.

Other studies concluded that teachers are more prone to develop a voice disorder as age increases [21,30]. The associations of the dimensions of demand, control, and social aid with age, days of the week worked, and presence and symptoms of COVID-19, showed that there is a difference between teachers with low demand and high social support with the presence of COVID-19. It is understood that the highest percentage of symptomatic people, who had COVID-19, did not have pressure of any psychological nature, but autonomy and family support and perhaps also from the pedagogical team, even though they were at home. It is noticed that by contributing for reception and good recovery, we emphasize the importance of a good social management to try and minimize the damage caused to health [31].

Other study with teachers from SPCH [32], which analyzed two groups from manifestation of worsening or enhancement in work ability, also found this fact: teachers who showed improvement in work ability were those who reported having autonomy and support from colleagues and school management. It is common knowledge that, unfortunately, new pandemics similar to COVID-19 will be announced and experienced by Brazilians, and this study was carried out amidst many restrictions. However, it stands out the relevance for new actions and reflections regarding the health of the teachers, and the vision of the speech therapist with regard to stress and teacher's voice disorder, considering usual and modified contexts due to the pandemic.

In conclusion, it is important to highlight that despite the different actions carried out with professors from São Paulo's City Hall, in partnership with LaborVox, analyzed through research at different times and situations, these do not translate into improvement in VD indexes, since they remain high. Encourage reflections on this is necessary. It should also be noted that the intention is to compare the findings in surveys performed by the multicenter group, in other publications, considering the specificities of the different collections and the data recorded in times of pandemic.

Conclusion

The present study shows us that basic education teachers in the public-school system, in the city of São Paulo, presented voice disorders even during remote classes, due to COVID-19, which is more common in older teachers. When comparing the presence of the vocal disorder, COVID symptoms and stress domains in relation to demand, control, and social support, no significant results were found. However, the highest percentage of teachers who got COVID-19 did not experience pressure of any psychological nature, but rather they received encourage for autonomy and support from family and the pedagogical team, even while teaching from home.

Analyzing the dimensions related to the presence of stress at work, no major differences were recorded. However, it is relevant to highlight that passive work and high wear, which are harmful to health when added together, reveal that teachers are having worse working conditions, which is bad to the worker, even in remote working conditions. We stress the relevance of this study for new actions and reflections regarding teachers' health, and the speech therapist's view of teacher stress and voice disorders, considering usual contexts and those modified due to the pandemics.

It is hoped that this work will help to reflect the need to improve teachers' labor conditions, strengthening actions on Work-Related Voice Disorder (WRVD) and guiding welcoming and vocal well-being actions.

References

1. World Health Organization. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. World Health Organization [Internet]. 2020 Mar 11. Available from: <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>
2. Organização Pan-americana da saúde. Folha informativa COVID-19 - Escritório da OPAS e da OMS no Brasil. Organização Pan-americana da saúde [Internet]. 2021 [cited 2021 June]. Available from <https://www.paho.org/pt/covid19>
3. Wu Z, Mc Googan JM. Characteristics of and Important Lessons from the Coronavirus Disease 2019 (COVID-19) outbreak in China. JAMA [Internet]. 2020 Feb 24;323(13):1239-42. doi: <http://doi.org/10.1001/jama.2020.2648>
4. Asiaee M, Vahedian-azimi A, Atashi SS, Keramatfar A, Nourbakhsh M. Voice Quality Evaluation in Patients With COVID-19: An Acoustic Analysis. J Voice [Internet]. 2022;36(6):879.e13-878.e19. doi: <https://doi.org/10.1016/j.jvoice.2020.09.024>
5. Ribeiro VV, Dassie-leite AP, Pereira EC, Santos ADN, Martins P, Irineu RA. Effect of Wearing a Face Mask on Vocal Self-Perception during a Pandemic. J Voice [Internet]. 2022 Sep 30;36(6):878.e1-878.e7. doi: <https://doi.org/10.1016/j.jvoice.2020.09.006>
6. UNESCO. Impacto da COVID-19 na Educação. UNESCO [Internet]. 2020 [cited 2021 Sep]. Available from: <https://pt.unesco.org/covid19/educationresponse>
7. Oliveira DA, Jr Pereira E. Desafios para ensinar em tempos de pandemia: as condições de trabalho docente. In: Oliveira DA, Pochmann M, organizers. A devastação do trabalho. A classe do labor na crise da pandemia. Brasília-DF: Gráfica e Editora Positiva; 2020. p. 207-228. Available from: <https://gestrado.net.br/livros/a-devastacao-do-trabalho-a-classe-do-labor-na-crise-da-pandemia/>
8. Cidade de São Paulo. Secretaria Municipal de Educação [Internet]. São Paulo; 2020 [16 Março 2020]. Available from: <https://educacao.sme.prefeitura.sp.gov.br>
9. Freitas CNJ, Almeida AA, Ferreira DAH, Medeiros CMA, Silva MFBL. Condições de trabalho e de voz em professores de escolas públicas e privadas. Audiol Commun Res [Internet]. 2019;24:1-7. doi: <https://doi.org/10.1590/2317-6431-2019-2151>

10. Ferreira LP, Giannini SPP, Figueira S, Silva EE, Karmann DF, de-Sousa TMT. Condições de produção vocal de professores da rede do Município de São Paulo. *Distúrbios Comum* [Internet]. 2003;14(2):275-307. Available from: <https://revistas.pucsp.br/index.php/dic/article/view/11333/22703>
11. Ferreira LP, da Silva MP, Rusig J, Junior AT, de Souza TMT, Fonseca TP, et al. Sintomas vocais autorreferidos por professores da rede municipal de São Paulo. In: Castro LHA, organizer. *Ciências da Saúde: pluralidade dos aspectos que interferem na saúde humana*. 5. Ponta Grossa-PR: Atena Editora; 2021. p. 183-97. doi: <https://doi.org/10.22533/at.ed.792211309>
12. Paparelli R, Almeida TB. Capítulo 8: Saúde mental e distúrbio de voz relacionados ao trabalho: notas introdutórias. In: Ferreira LP, Andrada e Silva MA, organizers. *Distúrbio de voz relacionado ao trabalho. Conquistas e desafios na América Latina*. São Paulo: Sintropia-PUC/SP; 2022. p. 121-30. Available from: https://www.pucsp.br/laborvox/dicas_pesquisa/downloads/ebooks/Disturbio-de-Voz-Relacionado-ao-Trabalho-Conquistas-e-Desafios-na-America-Latina.pdf
13. Cutiva LCC, Vogel I, Burdorf A. Voice disorders in teachers and their associations with work-related factors: A systematic review. *J Commun Disord* [Internet]. 2013;46(2):143-55. doi: <https://doi.org/10.1016/j.jcomdis.2013.01.001>
14. Mota AFB, Giannini SPP, de Oliveira IB, Paparelli R, Dornelas R, Ferreira LP. Voice disorder and Burnout syndrome in teachers. *J Voice* [Internet]. 2019;33(4):581.e7-581.e16. doi: <https://doi.org/10.1016/j.jvoice.2018.01.022>
15. Rodrigues LGS, Silva JO, Ribeiro KML, Medeiros DS, Barbosa-Medeiros MR, Rossi-Barbosa LAR. Prevalência de sintomas depressivos em professores e fatores associados. *Res Soc Dev* [Internet]. 2022;11(6):1-11. doi: <https://doi.org/10.33448/rsd-v11i6.28564>
16. Besser A, Lotem S, Zeigler-Hill V. Psychological Stress and Vocal Symptoms Among University Professors in Israel: Implications of the Shift to Online Synchronous Teaching During the COVID-19 Pandemic. *J Voice* [Internet]. 2020;36(2):291.e9-291.e16. doi: <https://doi.org/10.1016/j.jvoice.2020.05.028>
17. Cabrera GJ, Saavedra CF, Valdebenito DM, Sandoval FC. Vocal Repercussions after Occupational Voice Use and Stress in Primary School Teachers under the Teleworking Modality in Temuco City. A Pilot Study. *Rev Investig Innov Cienc Salud* [Internet]. 2023;5(1):6-28. doi: <https://doi.org/10.46634/riics.176>
18. Costa BRL. Bola de neve virtual: o uso das redes sociais virtuais no processo de coleta de dados em uma pesquisa científica. *Rev Inter de Gestão Social* [Internet]. 2018;7(1):15-37. Available from: <https://periodicos.ufba.br/index.php/rigs/article/view/24649>
19. Ferreira LP, Giannini SPP, Latorre MRDO, Zenari MS. Distúrbio da voz relacionado ao trabalho: proposta de um instrumento para avaliação de professores. *Distúrb Comum* [Internet]. 2007;19(1):127-36. Available from: <https://revistas.pucsp.br/dic/article/view/11884/8601>
20. Ghirardi ACAM, Ferreira LP, Giannini SSP, Latorre MRDO. Screening Index for Voice Disorder (SIVD): Development and Validation. *J Voice* [Internet]. 2013;27(2):195-200. doi: <https://doi.org/10.1016/j.jvoice.2012.11.004>

21. Alves MGM, Chor D, faerstein E, Lopes CS, Werneck GL. Versão resumida da “Job Stress Scale”: adaptação para o português. Rev Saúde Pública [Internet]. 2004;38(2): 164-71. doi: <https://doi.org/10.1590/S0034-89102004000200003>
22. Silva GJ, Almeida AA, Lucena BTL, de Lima Silva MFB. Sintomas vocais e causas autorreferidas em professores. Rev CEFAC [Internet]. 2016 Jan-Fev;18(1):158-66. doi: <https://doi.org/10.1590/1982-021620161817915>
23. Cavalcante MS, Santos RM, Morais EPG, Toia PVS, Porto VFA. Relação entre estresse, ambiente de trabalho e voz em professores do ensino infantil e ensino fundamental I. Rev Dist Comunicação [Internet]. 2020;32(4):626-37. doi: <https://doi.org/10.23925/2176-2724.2020v32i4p626-637>
24. Gatti BA, de Sá Barretto EB, coordinators. Professores do Brasil: impasses e desafios. Brasília: UNESCO; 2009. 294 p. Available from: <https://unesdoc.unesco.org/ark:/48223/pf0000184682>
25. Pizolato RA, Mialhe FL, Cortellazzi KL, Ambrosano GMB, Rehder MIBC, Pereira AC. Avaliação dos fatores de risco para distúrbios de voz em professores e análise acústica vocal como instrumento de avaliação epidemiológica. Rev CEFAC [Internet]. 2013;15(4):957-66. doi: <https://doi.org/10.1590/S1516-18462013000400025>
26. Instituto Península. Sentimento e percepção dos professores brasileiros nos diferentes estágios do Coronavírus no Brasil. Resultados 2020. São Paulo: Instituto Península; 2020. 26 p. Available from: <https://www.institutopeninsula.org.br/wp-content/uploads/2021/05/Diagrama%C3%A7%C3%A3o-Pulso.pdf>
27. Jesus MTA, Ferrite S, Araújo TM, Masson MLV. Distúrbio de voz relacionado ao trabalho: revisão integrativa. Rev bras saúde ocup [internet]. 2020;45:1-14. doi: <https://doi.org/10.1590/2317-6369000040218>
28. Karasek RA. Job Demand, Job Decision Latitude and Mental Strain: Implications for Job Redesign. Adm Sci Q [Internet]. 1979;24(2):285-308. doi: <https://doi.org/10.2307/2392498>
29. Giannini SPP, Latorre MRDO, Ferreira LP. Distúrbio de voz e estresse no trabalho docente: um estudo caso-controle. Cad Saúde Pública [Internet]. 2012;28(11):2115-24. doi: <https://doi.org/10.1590/S0102-311X2012001100011>
30. Ortiz E, Costa EA, Spina AL, Crespo AN. Proposta de modelo de atendimento multidisciplinar para disfonias relacionadas ao trabalho: estudo preliminar. Rev Bras Otorrinolaringol [Internet]. 2004;70(5):590-96. doi: <https://doi.org/10.1590/S0034-72992004000500003>
31. Barbosa LNF, Melo MCB, Cunha MCV, Albuquerque EN, Costa JM, Silva EFFD. Frequência de sintomas de ansiedade, depressão e estresse em brasileiros na pandemia COVID-19. Rev Bras de Saúde Mater Infant [Internet]. 2021;21(suppl2):413-19. doi: <https://doi.org/10.1590/1806-9304202100S200005>
32. Biserra MP, Giannini SPP, Paparelli R, Ferreira LP. Voz e trabalho: estudo dos condicionantes das mudanças a partir do discurso de docentes. Saúde soc [Internet]. 2014;23(3):966-78. doi: <https://doi.org/10.1590/S0104-12902014000300019>