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Original Article

Artigo Original

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Condition of Vocal Production-Teacher questionnaire: comparison of responses on Likert scale and visual analog scale

Questionário Condição de Produção Vocal – Professor: comparação entre respostas em escala Likert e em escala visual analógica

Keywords

Voice Disorders
Scales
Questionnaires
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Evaluation of Research Programs and Tools
Research
Methods

ABSTRACT

Purpose: To compare the responses related to vocal symptoms in two versions of the Vocal Production Condition – Teacher (CPV-T) questionnaire, with responses on a Likert scale and a Visual Analog Scale (VAS), in order to evaluate which is the best measurement method. **Methods:** A cross-sectional observational study was conducted with teachers with voice disorders during the period from July 2011 to July 2012. All teachers answered the CPV-T in two versions: with answers on a 4-point Likert scale and on a 50-mm VAS. The answers related to vocal symptoms dimension were analyzed. **Results:** Most of the symptoms showed good (hoarseness, high-pitched voice, unstable voice, weak voice, effort when speaking, throat clearing, burning throat, and pain when speaking) or regular concordance (loss of voice, failing voice, low-pitched voice, vocal fatigue, dry throat, lump in the throat, secretion in the throat, pain when swallowing, difficulty swallowing, and dry cough). **Conclusion:** The CPV-T questionnaire with answers on Likert scale proved to be more suitable than the VAS owing to the ease of understanding and interpretation, in addition to facilitating the input of answers for the researcher. Therefore, the Likert scale was chosen for the CPV-T, considering it to be validated as the method to measure the answers. The dimension of vocal aspects evaluated in the present study, the Voice Disorder Screening Index (ITDV), can be used in epidemiological studies to estimate the prevalence of vocal symptoms and in the Speech-Language Pathology and Audiology clinic routine or in monitoring teachers throughout their careers.

Descritores

Distúrbios da Voz
Escalas
Questionários
Medidas em Epidemiologia
Avaliação de Programas e Instrumentos de Pesquisa
Pesquisa
Métodos

RESUMO

Objetivo: Comparar as respostas referentes aos sintomas vocais em duas versões do questionário Condição de Produção Vocal – Professor (CPV-P), com respostas em escala Likert e em escala visual analógica (EVA), para avaliar qual é a melhor forma de aferição. **Métodos:** Estudo observacional transversal realizado com professoras em atendimento por distúrbio de voz no período de julho de 2011 a julho de 2012. Todas responderam ao questionário CPV-P em duas versões: com respostas em escala Likert de quatro pontos e em escala analógico-visual em régua de 50 mm. Foram analisadas as questões referentes à dimensão de sintomas vocais. **Resultados:** A maioria dos sintomas apresentou concordância boa (rouquidão, voz fina, voz variando, voz fraca, esforço ao falar, pigarro, ardor na garganta, dor ao falar) ou regular (perda de voz, falha na voz, voz grossa, cansaço ao falar, garganta seca, bola na garganta, secreção na garganta, dor ao engolir, dificuldade engolir, tosse seca). **Conclusão:** O questionário CPV-P com respostas em escala Likert mostrou-se mais indicado em relação às respostas em EVA pela facilidade de compreensão e interpretação, bem como por facilitar o registro das respostas para o investigador. Pelo exposto, opta-se pela recomendação de manutenção das respostas em escala Likert para o questionário CPV-P, considerando-se validado quanto à maneira de aferição das respostas. A dimensão de aspectos vocais avaliada no presente estudo, que hoje constitui o Índice de Triagem de Distúrbio de Voz (ITDV), pode ser utilizada em estudos epidemiológicos para estimar a prevalência de sintomas vocais bem na clínica fonoaudiológica ou acompanhamento de professores ao longo da carreira.

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Conflict of interests: nothing to declare.

INTRODUCTION

Research in the professional use of voice began in the clinical practice by the demand from workers who use their voice intensely in their professional activities and develop vocal symptoms. The 1980s saw the first Brazilian studies in Speech-Language Pathology and Audiology, with descriptions of preventive measures and clinical case reports, which indicated a relationship between voice disorders and some occupations[1]. By the late 1990s, this perception is shared by Speech-Language pathologists who work with professionals from various segments and realize the need for knowledge about the reality of these professionals' activities[2].

In order to identify the professional use of vocal in different contexts, a group of Speech-Language Pathologists and doctors in the area began to elaborate, in 1998, a questionnaire in order to survey epidemiologic data related to voice and professional activities[3]. The population chosen initially was teachers, for representing a large number of workers and being the professional category most affected by voice disorders[4].

The questionnaire prepared, "Vocal Production Condition – Teacher" (*Condição de Produção Vocal – Professor*, or CPV-P, in Portuguese), was originated based on the complaints of teachers during clinical care and became an important tool to characterize the vocal profile of teachers, in addition to the working conditions in schools. Initially applied in teachers from the city of São Paulo[5], it gave rise to several surveys conducted in São Paulo and other Brazilian states, also conducted with other professional categories, with the necessary adjustments[6].

From its creation, it has undergone several adaptations and validation processes. Specifically regarding the category of vocal aspects, reproducibility studies were carried out[7], and a screening tool for voice disorders was developed, the "Voice Disorder Screening Index" (*Índice de Triagem de Distúrbio de Voz* [ITDV]), which has high sensitivity for the mapping of voice disorders in teachers through self-report of the presence of 12 vocal symptoms[8]. Participants reporting five or more symptoms should be referred to the otorhinolaryngology and Speech-Language Pathology and Audiology in order to undergo a more specific assessment for diagnosis.

The ITDV was incorporated into the CPV-P, and its current version consists of 62 questions divided into the following categories: sociodemographic data (identification of the interviewee and professional status), aspects of the teaching activity (characteristics of the school environment and of the teacher's work organization), vocal aspects (vocal use, habits, and lifestyle), and vocal symptoms through the ITDV.

Regarding the answers, the main change was proposed by Simões and Latorre[9], in a study on the prevalence of voice disorders in daycare teachers, which, initially, were "yes" and "no" and were then transferred to a Likert scale (never, rarely, sometimes, always, and I do not know), which extended the possibilities for analysis of the results.

This study constitutes one more step in the systematization, construct consolidation, and validation of the CPV-P, by comparing responses related to vocal symptoms in two scales, Likert and Visual Analog Scale (VAS), which consists of a linear scale in millimeters (mm), with or without constant division marks along the axis[10]. It is used in nursing, especially for determining the intensity of the patient's pain and its evolution, to analyze the effectiveness of the procedures used[11]. In the field of voice, some studies propose the use of VAS for voice evaluation[12,13].

This study, therefore, aimed to compare the responses related to vocal symptoms in two versions of the CPV-T questionnaire, with responses on a Likert scale and a VAS, in order to evaluate which is the best measurement method.

METHODS

This is a cross-sectional observational study. All teachers from municipal schools in the city of São Paulo with voice disorders who started Speech-Language therapy at Hospital do Servidor Público Municipal de São Paulo between July 2011 and July 2012 were invited to participate. All patients received information about the study's purpose and clarifications on filling out the questionnaires. The study was approved by the Research Ethics Committee of Hospital do Servidor Público Municipal de São Paulo (221/2010) and by the Research Ethics Committee of Pontifícia Universidade Católica de São Paulo (321/2011), and the teachers who agreed to participate signed an informed consent form. To maintain the confidentiality of identities, their names were not included in the database but only an identification number.

The participants answered the CPV-P questionnaire in two versions: with answers on a four-point Likert scale (never, rarely, sometimes, and always) and on a VAS with a 50-mm ruler (extreme left represents "never" and the extreme right, "always", as shown in Figure 1).

The procedure was performed individually at the time they were called for therapy, before the therapy process began. Initially, the participants responded to the questionnaire in its classic version with answers on a Likert scale, with the instruction to answer according to the degree they judged adequate: never, rarely, sometimes, or always. Soon after, the same questionnaire was presented, with answers on a VAS and the instruction to trace a vertical line on the grading point they judged adequate between never and always. The average time of completion for the two questionnaires was 20 minutes.

In both scales, only the issues related to self-reported symptoms were analyzed: hoarseness, loss of voice, failing voice, shortness of breath while talking, high-pitched voice, low-pitched voice, unstable voice varying between high- and low-pitched voices, weak voice, effort when speaking, vocal fatigue, dry throat, huskiness, lump in the throat, sandy throat, sore throat, secretions in the throat, pain when speaking, pain when swallowing, difficulty swallowing, dry cough, and cough with phlegm. Each symptom was analyzed

Figure 1. Visual analog scale of 50 mm used to answer for each symptom

in two categories: present and absent, and was considered present when the answer was sometimes/always on the Likert scale or greater than 1.5 mm on the VAS.

The data collected were entered twice, and the databases were compared (validate) through the Epi Info software (version 7.0). After checking the data for consistency, the statistical analyzes were performed using SPSS (version 10.0). Descriptive analysis was performed, and the kappa test was applied for the description of the correlation of responses between the two versions of the instrument. The kappa results were considered according to the following criteria: perfect correlation = equal to 1.00; excellent correlation = from 0.81 to 0.99; good correlation = from 0.61 to 0.80; regular correlation = from 0.41 to 0.60; tolerable correlation = from 0.21 to 0.40; weak correlation = from 0.00 to 0.20; and poor correlation = less than 0.00[10]. In addition, boxplots were prepared to compare, graphically, the distribution and dispersion of certain symptoms in both types of responses.

RESULTS

Study participants were 65 teachers. Most were aged between 40 and 60 years (52.4%), were married (50.8%), were university graduates (95.4%), worked more than 30 hours per week (50.7%), in teaching activity (76.9%), for an average of 16.42 years, with standard deviation (SD) of 8.11 years, with a defined class (64.6%), and acted in two schools (58,5%). The distribution of the sample according to sociodemographic and professional characteristics is detailed in Table 1.

Table 2 shows the reliability measures of vocal symptoms in both response formats. There was significant correlation for all symptoms.

Most symptoms showed good (kappa = 0.61–0.80: hoarseness, high-pitched voice, unstable voice, weak voice, effort when speaking, huskiness, sore throat, and pain when speaking) or regular correlation (kappa = 0.41–0.60: loss of voice, failing voice, low-pitched voice, vocal fatigue, dry throat, lump in the throat secretions in the throat, pain when swallowing, difficulty swallowing, and dry cough). The breathlessness symptom showed perfect correlation (kappa = 1.00) and sandy throat and cough with phlegm showed tolerable correlation (kappa = 0.21–0.40).

Figure 2 shows the dispersion in the VAS points of the responses in the Likert scale for the symptoms of hoarseness, loss of voice, vocal fatigue, huskiness, pain when speaking, and dry throat.

The graphs in Figure 2 show that the median of responses increase according to the severity of the symptoms, and the median of the points in the ruler are similar to the answers "never" and "rarely," except for the symptom "vocal fatigue". However, the variability of the measurements on the ruler (minimum and maximum answers) is very large in the intermediate answers "rarely" and "sometimes," between 0 and 50 mm, i.e., the full extent of the ruler. It is noteworthy that no participant marked the answer never for hoarseness, which is expected considering that they were undergoing early Speech-Language therapy for presenting a voice disorder.

DISCUSSION

Because they result from the interaction of personal and social factors, voice disorders are a dynamic and functional manifestation, and, therefore, the measurement of vocal symptoms is a complex issue.

This study aimed to compare two ways to evaluate the responses to vocal symptoms in the CPV-P questionnaire: one in a Likert scale and the other in a VAS. It intended to evaluate the best measurement criteria and to advance in construct consolidation and instrument validation. In seeking the best way to measure these subjective perceptions, it was considered, at first, that the responses on the ruler could contemplate the nuances of the subjects' responses and be a better measurement method.

Table 1. Sample distribution according to sociodemographic and functional variables

Variables	n	%
Age (years)		
26–34	14	22.2
35–39	16	25.4
40–49	25	39.7
50–60	8	12.7
Did not respond	2	3.1
Marital status		
Single	22	33.8
Married	33	50.8
Divorced/widowed	10	15.4
Education		
Incomplete superior education	3	4.6
Complete superior education and over	62	95.4
Hours/week with students		
Up to 10 h	14	21.5
11–20 h	1	1.5
21–30 h	8	12.3
31–40 h	14	21.5
41 h and over	19	29.2
Does not work with students	9	13.8
Number of schools		
One	27	41.5
Two	38	58.5
Works in another place		
No	62	95.4
Did not answer	3	4.6
Employment/function		
Teacher with defined class	42	64.6
Substitute teacher	2	3.1
In temporary readaptation	10	15.4
Principal	1	1.5
Others	1	1.5
Did not respond	9	13.8
Activity		
Teaches	50	76.9
Does administrative work	2	3.1
Monitors the recess/entrance	1	1.5
Is responsible for library	1	1.5
Others	4	6.2
Did not answer	7	10.8

The results show good correlation in both forms of measurement of vocal symptoms, especially those that give the respondent a clear definition, such as shortness of breath, hoarseness, or huskiness, and showed better consistency in the responses. However, it is noticeable that this correlation is observed in extreme responses (never and always). The great variability of grade values measured by the ruler in the categories "rarely" and "sometimes" points out the individual's difficulty in quantifying a subjective phenomenon, even though the concept was clearly defined. This issue is aggravated when analyzing the symptoms with a greater degree of subjectivity in their definition, such as sandy throat or cough with phlegm, which showed a poorer degree of correlation.

During the administration of the questionnaire, a high degree of difficulty was observed by several participants in understanding how they should respond in a continuous line with no divisions. Many chose to register their responses nearer to 0 = "never" or "always" = 5, disregarding the ruler's intermediary space, which may have favored the presence of responses at odds with what the participant would like to have answered. With answers through the Likert scale, all participants readily answered the questions using all of the grades.

This fact is highlighted in a study with children, which points to a systematic bias in questionnaires using answers on a VAS by the high percentage of records at the ends of the ruler, unlike that seen in the Likert scale responses, in which respondents make use of intermediate responses more frequently[14]. The authors add that the answers on a Likert scale had fewer blank questions than on the VAS and consider that the least amount of losses is an important indicator for the feasibility of application of an instrument.

Similarly, an Australian study comparing the response in VAS and Likert scale to a question on anxiety points out that, although both forms have provided reliable prediction measures, 11% of respondents incorrectly completed the VAS responses, which limited its usefulness[15]. Another study comparing the answers on a seven-point Likert scale with a VAS in a questionnaire to assess quality of life in chronic lung disease highlights that, although the two choices of answer presentation methods show comparable responsiveness, the Likert scale has ease of administration, while the VAS has greater variability of responses[16]. In Brazil, a study comparing two forms of measuring of the Voice Activity and Participation Profile (VAPP), on a VAS and numerical scale[17], highlighted that respondents verbally expressed their preference for responding on a Likert scale, considering it easier to understand. The authors point out that, without the support of categories or division, some people feel insecure when filling out the instrument. Furthermore, there is a difference between the use of a VAS in self-assessment protocols and in analyses carried out by professionals trained to use consistently a visual scale.

The studies cited point to the crucial question of measurement in epidemiological surveys. A major difficulty in research is to prepare and evaluate an instrument for achieving the proposed objective[10], which is aggravated by the object in question, vocal symptoms, a subjective perceptual phenomenon of complex quantification.

Table 2. Reliability measures of vocal symptoms in the Vocal Production Condition – Teacher questionnaires on a Likert scale and on a Visual Analog Scale

Symptom	Correlation		Crude correlation, n (%)	Kappa coefficient	p-value
	Absence n (%)	Presence n (%)			
Hoarseness	4 (6.6)	53 (86.9)	57 (93.5)	0.64	<0.001
Loss of voice	19 (30.6)	30 (48.4)	49 (79.0)	0.57	<0.001
Failing voice	5 (7.8)	50 (78.1)	55 (85.9)	0.44	<0.001
Shortness of breath	18 (58.1)	13 (41.9)	31 (100.0)	1.00	<0.001
High-pitched voice	38 (59.4)	17 (26.6)	55 (86.0)	0.69	<0.001
Low-pitched voice	10 (16.1)	39 (62.9)	49 (79.0)	0.46	<0.001
Unstable voice	22 (34.4)	32 (50.0)	54 (84.4)	0.68	<0.001
Weak voice	8 (13.1)	46 (75.4)	54 (88.5)	0.63	<0.001
Effort when speaking	4 (6.3)	55 (85.9)	59 (92.2)	0.57	<0.001
Vocal fatigue	6 (9.4)	49 (76.6)	55 (86.0)	0.47	<0.001
Dry throat	7 (10.8)	51 (78.5)	58 (89.3)	0.60	<0.001
Huskiness	13 (20.3)	42 (65.6)	55 (85.9)	0.65	<0.001
Lump in the throat	18 (27.7)	33 (50.8)	51 (78.5)	0.55	<0.001
Sandy throat	36 (55.4)	12 (18.5)	48 (73.9)	0.40	0.001
Sore throat	13 (20.3)	41 (64.1)	54 (84.4)	0.62	<0.001
Secretions in the throat	15 (23.8)	36 (57.1)	51 (80.9)	0.57	<0.001
Pain when speaking	18 (28.6)	35 (55.6)	53 (84.2)	0.66	<0.001
Pain when swallowing	30 (46.9)	20 (31.3)	50 (78.2)	0.55	<0.001
Difficulty swallowing	31 (49.2)	16 (25.4)	47 (74.6)	0.47	<0.001
Dry cough	20 (31.3)	30 (46.9)	50 (78.2)	0.55	<0.001
Cough with phlegm	23 (35.9)	19 (29.7)	42 (65.6)	0.34	0.003

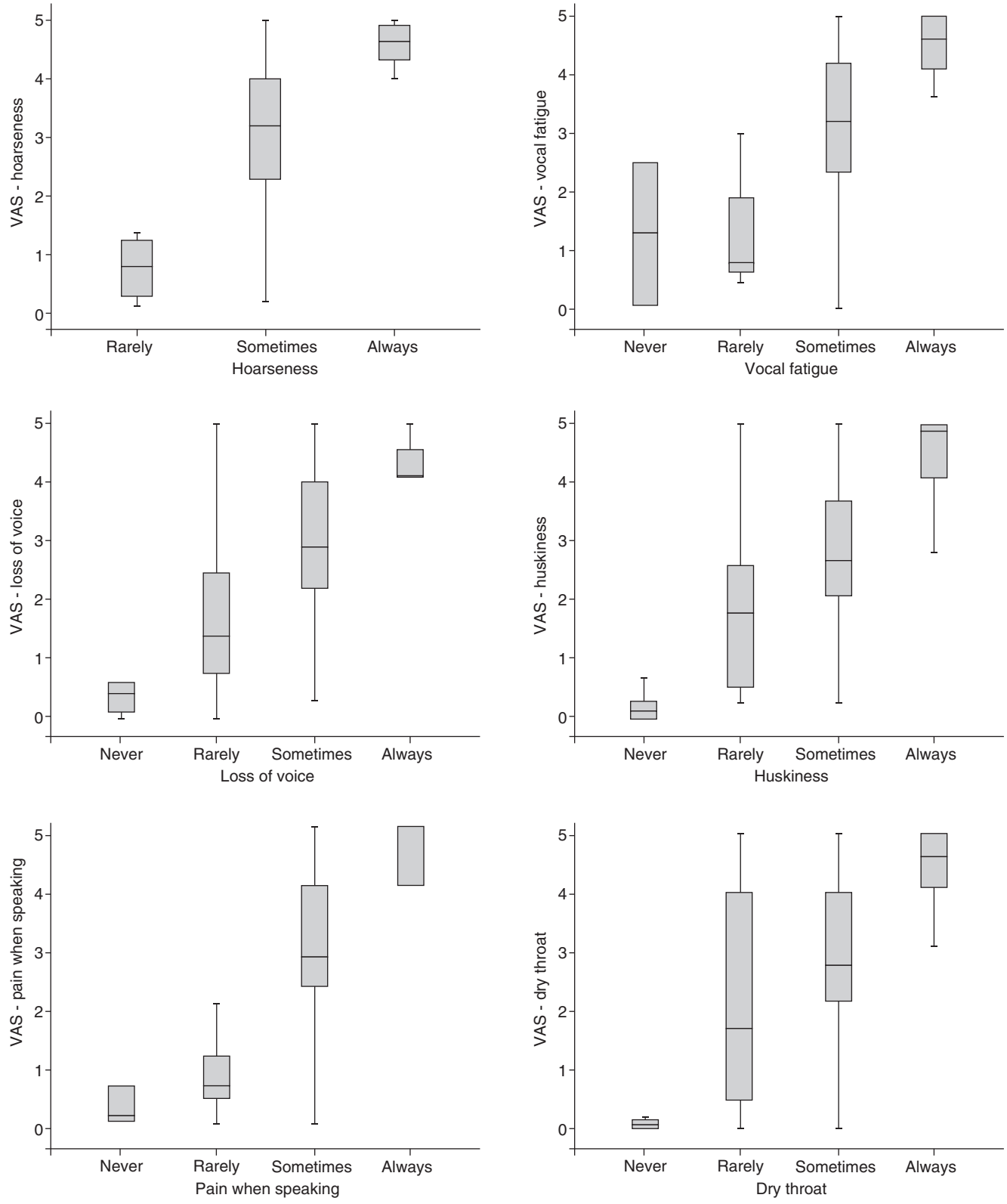

Figure 2. Boxplot with points scattered over the ruler (0–5 mm) for the responses on the Likert scale (never, rarely, sometimes, and always) to the symptoms of hoarseness, loss of voice, vocal fatigue, huskiness, pain when speaking, and dry throat

In addition to the discussion of the methodological aspects involved in data collection, the difficulty in the registration process is also highlighted. The construction of the VAS database is also a laborious process, since, before typing, the researcher need to measure the responses given to each question with a ruler, which can add a bias. In this study, to minimize possible error, two researchers made this measurement, and an average of the two measures was calculated. The whole process increases the time of development of the database and involves an additional professional in this phase. With the Likert scale, typing can be done directly without need for concern with this bias.

CONCLUSION

The CPV-P questionnaire with answers on a Likert scale was more appropriate in relation to the responses given on a VAS for its ease of understanding and interpretation by the respondents, in addition to facilitating the recording of answers for the investigator.

For these reasons, the recommendation is to maintain the responses to the CPV-P questionnaire on a Likert scale, considering it validated as the way of measuring responses in the category of vocal aspects. The instrument is suitable for use in epidemiological studies to survey sociodemographic and environmental aspects, as well as those related to the teaching activities, the vocal use, habits, and lifestyle, in question distributed in its five categories, and it also allows the estimation of the prevalence of vocal symptoms through the vocal aspects category, now constituted by ITDV. The CPV-P is also recommended as a screening tool for voice disorders, through ITDV, as a routine procedure in public and private services, and for the monitoring of teachers throughout their career.

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