Mandarin (Simplified) Chinese Version of the Voice Activity and Participation Profile: Adaptation and Validation

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Summary: Objective. The purpose of this study was to evaluate the reliability and validity of the Mandarin (simplified) Chinese version of Voice Activity and Participation Profile (MC-VAPP) in mainland China.

Methods. This study enrolled 786 subjects from February 2015 to March 2017, including 456 individuals with voice disorders (dysphonic group) and 330 vocally healthy individuals (nondysphonic group). The internal consistency (Cronbach alpha coefficient), test-retest reliability (intraclass correlation coefficient [ICC]), and differences in the MC-VAPP scores were compared between the two groups. Exploratory factor analysis was performed. The receiver operating characteristic curve and cutoff point were calculated.

Results. The MC-VAPP had a high internal consistency. Cronbach alpha coefficients for the subsection scores were from 0.86 and 0.96, with 0.98 for the total score. Test-retest reliability was high for the total score (ICC = 0.98). The four factors' cumulative contribution was determined to be 74.68%. The dysphonic participants displayed significantly higher total score and subsection scores than the nondysphonic participants ($P < 0.001$). There were significant differences in total activity limitation scores and the total participation restriction scores between the two groups ($P < 0.001$). The cutoff point for screening between the two groups was 36.5, with a sensitivity of 76.80% and specificity of 80.30%.

Conclusion. The MC-VAPP is a reliable and valid instrument for the evaluation of voice-related quality of life in Chinese-speaking individuals. It is also recommended that the MC-VAPP would be a useful tool for screening individuals with and without voice disorders based on the cutoff value of 36.5.

Key Words: Voice–Dysphonia–Speech language pathology–Quality of life–Validation.

INTRODUCTION

Verbal communication is a basic skill for daily life, and voice takes up the important roles of carrying the spoken information and conveying the emotional message.[1] However, voice disorders are very common; its reported prevalence rates vary from 8.12% to 21.1% in the general population,[2–4] and can be as high as 54.6% in professional voice users.[4] Currently, there are various methods for assessing voice quality and vocal function, including perceptual judgment, videostroboscopy, and acoustic analysis, as well as aerodynamic evaluation, but these approaches do not take into account the patient's perception of the impacts caused by the voice disorders.[5] In fact, quantifying the severity of voice disorders in dysphonic individuals could be very difficult.[6] Previous studies have reported that the patient's self-perceived quality of life play an important role in planning the intervention approaches and ensuring adherence to the treatment.[7,8]

Quality of life assessment covers physical, mental, and social well-being of individuals with a health-related problem.[9,10] A number of studies have reported that voice disorders can affect not only the voice quality but also individuals' voice-related quality of life.[7,11,12] There are several patient-completed voice-related quality of life instruments that were designed to capture the patients' perception about their voice disorder and reflect how the dysphonia impacts on the patient's daily life.[13] These include the Voice Handicap Index (VHI),[14] Voice-Related Quality of Life (V-RQOL),[6] Voice Outcome Survey,[15] and Voice Activity and Participation Profile (VAPP).[16] The Hong Kong version of the VAPP has been shown to be a reliable and valid instrument to measure the voice-related quality of life in patients with voice disorders.[16] Voice disorders, even with the same etiology and severity, may have different impacts on quality of life depending on cultures.[17,18] Nowadays, the Hong Kong version of the VAPP in Cantonese Chinese has been translated and validated into many languages, for example Finnish version,[19] Brazilian Portuguese version,[20] and Italian version.[21] Mandarin Chinese is the official language learned and used in mainland China with a population of 1.37 billion in China. There are Chinese versions of VHI and V-RQOL used in China for clinical work, but they do not cover the different aspects of quality of life described in the International Classification of Functioning, Disability and Health (ICIDH) framework. Therefore, it is necessary to develop and validate a questionnaire based on the ICIDH framework. Although the Cantonese Chinese is to a large extent linguistically similar to Mandarin Chinese, these two languages have indeed some differences in phonology, lexical tones, and grammatical structures. Additionally, the cultural and social economic contexts are different in mainland China and Hong Kong where these two languages or dialects are the lingua franca of each region, respectively.[22] Therefore, there is a need to establish a validated Mandarin (simplified) Chinese version of the VAPP (MC-VAPP). Hence, the first aim of the present study was to validate the MC-VAPP.

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The literature has shown that self-assessment instruments are often useful as potential screening tools to distinguish between individuals with and without voice disorders.[23–25] However, the cutoff points for different cultures may be different on the VAPP. Therefore, the secondary aim was to identify the cutoff point of the total score in the MC-VAPP.

METHODS

This is a cross-sectional study. This study was approved by the Institutional Review Board of Sichuan University (No. 201788). All participants agreed to participate in this study and signed the consent form before participating.

Questionnaires

The MC-VAPP was used in this study. The translation process was as follows. The Hong Kong version of the VAPP was translated into Mandarin (simplified) Chinese by a native Mandarin Chinese speaker, who was fluent in both Mandarin and Cantonese. A focus group of 30 dysphonic patients was invited to complete this version of the questionnaire, and was consulted regarding the appropriateness of the expressions used. The final version was produced based on the focus group's feedback, and consisted of 28 questions across five sections (Appendix). The five sections are self-perceived severity (one question, maximum score = 10); effect on job (four questions, maximum score = 40); effect on daily communication (12 questions, maximum score = 120); effect on social communication (four questions, maximum score = 40); effect on emotion (seven questions, maximum score = 70). The maximum total score of the questionnaire is 280 points; the higher the score, the more severe the impairment on voice-related quality of life.

The MC-VAPP has two additional subscores for sections 2, 3, and 4: the section activity limitation score (ALS) and the section participation restriction score (PRS). ALS for each section (2, 3, and 4) is computed by adding up the scores of the first question in each question pair under each section. PRS for each section is computed from adding up the scores of the second question in each question pair under each section. The total ALS is the sum of the section ALS, and the total PRS is composed of the sum of section PRS.[16]

Statistical analysis

Statistical analyses were performed using SPSS version 22 (IBM Corp, Armonk, NY). The total score and section scores of the MC-VAPP between the two groups were compared using the Mann-Whitney *U* test. The internal consistency was assessed by Cronbach alpha coefficient. The test-retest reliability was assessed by intraclass correlation coefficient (ICC). The content reliability was analyzed using Pearson product-moment correlation. The construct reliability was assessed by exploratory factor analysis. P values < 0.05 were judged as significantly different.

Participants

A total of 856 native mainland Chinese individuals enrolled in this study. They were recruited from the Department of Otolaryngology, Head and Neck Surgery at West China Hospital from February 2015 to March 2017. There were 786 completed questionnaires with no missing data. This cohort consisted of 456 patients with voice disorders (dysphonic group), all of whom underwent videostroboscopic examination (XION, Berlin, Germany). The dysphonic group consisted of 331 female (72.6%) and 125 male (27.4%), and the mean age was 39.84 years (range 23–60 years). Table 1 provides a summary of these and other etiologies for the dysphonia found in this cohort. The 330 vocally healthy individuals who enrolled in this study (nondysphonic group) had no history of vocal complains and voice disorders; their status of vocal folds were confirmed by indirect laryngoscopy. This group included 174 female (52.7%) and 156 male (47.3%); the mean age was 34.19 years (range 20–59).

TABLE 1.
Diagnosis of Voice Disorders in the Dysphonic Group (n = 456)

Diagnosis	n	%
Chronic laryngitis	194	42.5
Vocal fold polyps	145	31.8
Vocal fold nodules	60	13.2
Sulcus vocalis	25	5.5
Reinke's edema	15	3.3
Vocal fold leukoplakia	6	1.3
Vocal fold cyst	4	0.9
Laryngeal cancer	4	0.9
Laryngeal papilloma	2	0.4
Unilateral vocal fold paralysis	1	0.2

Procedure

Internal consistency

The internal consistency of the MC-VAPP was assessed using Cronbach alpha coefficient. A value greater than 0.9 was considered excellent, a value between 0.8 and 0.9 was considered good, whereas a value greater than 0.7 was considered satisfactory.[26]

Test-retest reliability

A total of 30 patients with voice disorders completed the MC-VAPP twice with a period of approximately 2 weeks, during which they received no intervention. The test-retest reliability was examined by ICC. An ICC greater than 0.75 indicated good reliability.[27]

Content validity and construct validity

The coefficient value 0 indicated no linear relationship between two variables; the closer a correlation is to −1 or 1, the stronger is the linear association between the two variables when testing the content validity.[7] To assess the dimensionality of the retained questions, an exploratory factor analysis was performed.

Clinical validity

The total score and section scores of MC-VAPP were compared between the dysphonic and nondysphonic groups. The ALS and PRS were compared between the two groups, as well as

across the sections of job, daily communication, and social communication in the dysphonic group.

Receiver operating characteristics (ROC) curve

The ROC curve test was used to study the clinical utility of the MC-VAPP based on the sensitivity and specificity. The area under the ROC curve (AUC) was assessed; values over 0.7 were considered satisfactory, values between 0.8 and 0.9 were good, and values from 0.9 to 1.0 were excellent.[28,29] In addition, the cutoff point was calculated, which could screen the participants as likely to be either dysphonic or nondysphonic.

RESULTS

Reliability

The Cronbach alpha coefficient was excellent (Cronbach $\alpha = 0.98$) for the MC-VAPP total scores, and sections had good to excellent internal consistency ranging from 0.86 to 0.96 (job = 0.86; daily communication = 0.96; social communication = 0.92; emotion = 0.94).

The ICC was 0.98 for the overall MC-VAPP score, and the values of ICC for the sections were good; 0.76 for self-perceived severity, 0.88 for effect on job, 0.98 for effect on daily communication, 0.91 for effect on social communication, and 0.89 for effect on emotion (Table 2).

TABLE 2.
Interclass Correlation Coefficient Results for Test-retest Reliability

		95% CI		
Sections	ICC	Lower	Upper	*P*
Self-perceived severity	0.76	0.50	0.89	<0.001
Job	0.88	0.80	0.94	<0.001
Daily communication	0.98	0.97	0.99	<0.001
Social communication	0.91	0.85	0.95	<0.001
Emotion	0.89	0.81	0.94	<0.001
Total score	0.98	0.97	0.99	<0.001

Abbreviations: ICC, intraclass correlation coefficient; CI, confidence interval.

Validity

Pearson correlation coefficients between the total score and section scores showed moderate to strong correlation; 0.69, 0.84, 0.96, 0.92 and 0.93 for the self-perceived severity, effect on job, effect on daily communication, and effect on emotion scales, respectively. Correlation coefficients among the section scores indicated a moderate to strong correlation ($P < 0.01$), ranging from 0.59 to 0.86 (Table 3).

There were four factors with an eigenvalue greater than 1 in the analysis, accounting for 74.68% of the cumulative variance of the MC-VAPP (Table 4). The first factor accounted for 22.64% of the variance with an eigenvalue of 17.29. This factor was related to the effect on daily communication section; the second factor accounted for 21.21% of the variance with eigenvalue of 1.41; the third factor accounted for 20.52% of the variance with an eigenvalue of 1.15. This factor was related to the effect on social communication and effect on emotion sections. The fourth factor accounted for 10.31% of the variance with an eigenvalue of 1.05. This factor was related to the participation restriction of effect on job (Table 4).

Table 5 shows that the total score and sections scores of the MC-VAPP were significantly higher for the dysphonic group than for the nondysphonic group ($P < 0.001$). The dysphonic group was most impaired in daily communication, which demonstrated

TABLE 3.
Person Correlation Coefficients Among Total Score and Subscales Scores of the MC-VAPP in the Dysphonic Group

Sections	Job	Daily Communication	Social Communication	Emotion	Total
Self-perceived severity	0.62*	0.64*	0.59*	0.63*	0.69*
Job	—	0.74*	0.71*	0.75*	0.84*
Daily communication	—	—	0.86*	0.83*	0.96*
Social communication	—	—	—	0.85*	0.92*
Emotion	—	—	—	—	0.93*

* Correlation is significant at the 0.01 level (two-tailed).
Abbreviation: MC-VAPP, Mandarin (simplified) Chinese version of the Voice Activity and Participation Profile.

TABLE 4.
Eigenvalues and Contributions in MC-VAPP

Factor	Items	Eigenvalue	Contribution (%)	Cumulative Proportion (%)
One	Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q16, Q17, Q21	17.29	22.64	22.64
Two	Q1, Q2, Q14, Q15, Q22, Q23, Q25, Q26	1.41	21.21	43.85
Three	Q18, Q19, Q20, Q23, Q24, Q27, Q28	1.15	20.52	64.37
Four	Q3, Q4, Q5	1.05	10.31	74.68

Abbreviation: MC-VAPP, Mandarin (simplified) Chinese version of the Voice Activity and Participation Profile.

TABLE 5.
The comparison of the MC-VAPP in the Dysphonic and Nondysphonic Groups

	Dysphonic Group		Nondysphonic Group			
Sections	Mean	SD	Mean	SD	Z	*P*
Self-perceived severity	5.49	2.77	1.89	1.90	−16.85	<0.001
Job	15.07	11.19	2.80	3.35	−17.30	<0.001
Daily communication	45.49	33.98	10.30	14.89	−15.82	<0.001
Social communication	13.59	12.32	2.58	5.27	−14.29	<0.001
Emotion	25.49	20.78	4.71	8.19	−15.79	<0.001
Total scores	105.14	74.69	22.29	29.76	−17.10	<0.001

Abbreviations: SD, standard deviations; MC-VAPP, Mandarin (simplified) Chinese version of the Voice Activity and Participation Profile.

the highest mean section score (45.49), and then followed by the emotion and job sections.

Relationship between the ALS and PRS

The total and section ALS and PRS were significantly higher in the dysphonic group than in the nondysphonic group ($P < 0.001$) (Table 6). Table 7 shows that the total ALS and job section ALS were significantly higher than the corresponding PRS in the dysphonic group ($P < 0.001$). In the daily communication section, the PRS was significantly higher than the corresponding ALS ($P < 0.001$). However, there was no significant difference between the ALS and the PRS in the social communication section ($P > 0.05$).

ROC and cutoff

The ROC analysis of the MC-VAPP showed that AUC was 0.86 (95% CI = 0.83–0.88, $P < 0.001$) (Figure 1). The cutoff score

TABLE 6.
Relationship Between Activity Limitation Scores and Participation Restriction Scores in the Dysphonic and Nondysphonic Groups

	Dysphonic Group		Nondysphonic Group			
Sections	Mean	SD	Mean	SD	*Z*	*P*
Total ALS	38.25	27.74	8.27	11.09	−16.73	0.000
Total PRS	35.90	27.36	7.41	11.12	−15.95	0.000
Job						
ALS	9.44	6.07	2.08	2.74	−17.51	0.000
PRS	5.63	6.35	0.72	1.35	−12.01	0.000
Daily communication						
ALS	22.01	17.33	5.01	7.15	−14.98	0.000
PRS	23.48	17.73	5.29	8.28	−15.67	0.000
Social communication						
ALS	6.80	6.34	1.18	2.60	−14.64	0.000
PRS	6.79	6.34	1.40	2.90	−13.28	0.000

Abbreviations: SD, standard deviations; ALS, activity limitation subscores; PRS, participation restriction subscores.

TABLE 7.
Relationship Between ALS and PRS in the Dysphonic Group

	ALS		PRS			
Sections	Mean	SD	Mean	SD	*Z*	*P*
Job	9.44	6.07	5.63	6.35	−13.23	0.000
Daily communication	22.01	17.33	23.48	17.73	−3.45	0.000
Social communication	6.80	6.34	6.79	6.34	−0.19	0.985
Total	38.25	27.74	35.90	27.36	−4.84	0.000

Abbreviations: SD, standard deviations; ALS, activity limitation subscores; PRS, participation restriction subscores.

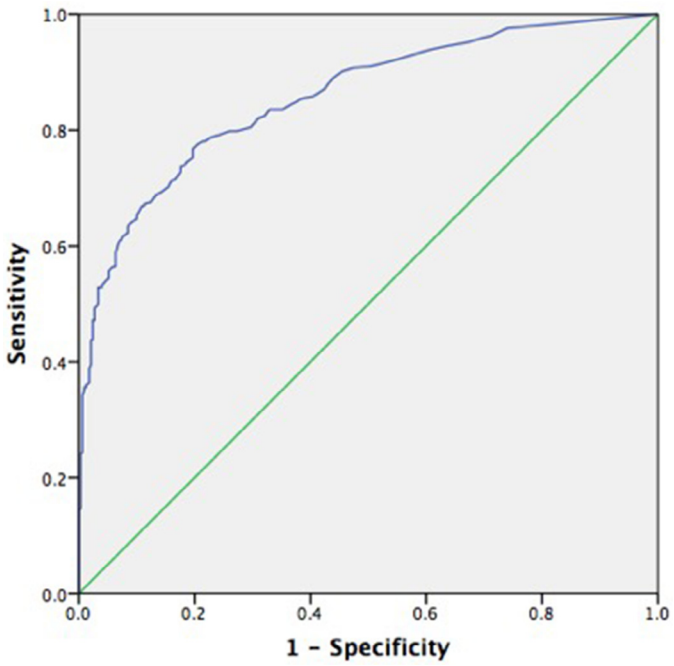

FIGURE 1. Receiver operating characteristic curve of the total score in the Mandarin (simplified) Chinese version of the Voice Activity and Participation Profile.

was determined as 36.5 with a sensitivity of 76.80% and specificity of 80.30%.

DISCUSSION

This study was to validate the MC-VAPP. The results show that the MC-VAPP has strong internal consistency for patients with voice disorders; the Cronbach alpha coefficient value was high ($\alpha = 0.98$) for total score. The finding is in agreement with the Hong Kong version of the VAPP,[16] indicating satisfactory internal consistency of the questionnaire. In addition, the Pearson correlation coefficients between the total score and sections scores were strong, suggesting that all sections reflect an overall change in voice-related quality of life. Moreover, the MC-VAPP had excellent test-retest reliability for both the total score and the sections scores, which suggested that the MC-VAPP is a reliable questionnaire for the assessing of voice-related quality of life.

In this study, correlation coefficients between the sections scores and the total score of the MC-VAPP indicated good content validity. Furthermore, construct validity results suggest that there are four factors in the questionnaire. The eigenvalues of the four factors ranged from 1.05 to 17.29, and the four components accounted for 74.68% of variance, indicating that the instrument is acceptable for capturing the attributes of the MC-VAPP among the sampled respondents. The four factors identified encompassed questions and sections that measured the effects of dysphonia on four major components of voice-related quality of life, which is in agreement with the Hong Kong version of the VAPP of which this current Mandarin (Simplified) Chinese version is based on.[16]

Higher scores in the VAPP reflect more severe limitations of daily activities related to voice use. In the present study, the dysphonic group had significantly higher scores in the sections related to communication at work, daily communication, social communication, and emotional functioning than the nondysphonic group. In addition, the total ALS and total PRS in the dysphonic group were significantly higher than the nondysphonic group. These findings are in agreement with previous validation studies of other language versions of the VAPP,[19,20] which indicates that the MC-VAPP is a sensitive tool that may be used to identify the severity of activity limitation and participation restriction imposed by voice disorders among speakers of Mandarin Chinese. In the Hong Kong version of the VAPP,[16] it was found that the ALS under the job section was significantly higher than the PRS, but there was no significant difference between the total ALS and PRS, and also in the daily communication, social communication sections ALS and PRS. However, in the present study, the total ALS was significantly higher than the total PRS in the dysphonic group, which may imply that voice disorders may have a greater impact on activity limitation than participation restriction. The impact on job was the same as for the original Hong Kong version. In addition, in this study, the ALS was significantly lower than the PRS in the effect on daily communication section, which means that the patients may be influenced more seriously in participation restriction than activity limitation by voice disorders in daily communication. Additionally, there was no significant difference between the ALS and PRS in the effect on social communication section. Therefore, because of the different scores of the ALS and PRS for the most sections of the MC-VAPP, it would be important to assess them separately, which is in agreement with the results from previous studies validating the VAPP.[16,19,30]

The ROC curve is a simple analytical procedure for the comparison of several diagnostic tests. The present study showed that the MC-VAPP would be able to discriminate between the individuals with and without voice disorders. In general, a screening instrument would provide a cutoff point that identifies individuals with a specific disorder. Cutoff points of other translated versions of the VAPP have been published.[23,31] Zambon et al[31] reported the cutoff point to be 4.5 (sensitivity = 95.8%, specificity = 90.9) in a nonteachers group and 14.6 (sensitivity = 91.7%, specificity = 75.9%) in a teachers group. In the present study, the cutoff point of 36.5 was found to differentiate between the two groups with high values of sensitivity (76.80%) and specificity (80.30%). This is similar to the cutoff point of 37.45 reported in the Italian version of the VAPP.[23] The results show satisfactory stability of the MC-VAPP, which suggests that this translated version is valid and reliable and should be adopted as a clinical assessment tool to be used in China.

It should be noted that the participants in this study were only recruited from a single hospital in Chengdu. Chengdu is highly populated with 15,981 million inhabitants, including migrants from all over the country. The West China Hospital is the largest hospital in the Southwest China receiving patients from all over the area. Recruiting participants from this site thus seems to cover a large cross section of the Chinese-speaking population; therefore, the data can be seen to represent the West China population well. Further studies should expand the scope and size of samples to different regions of China. VAPP has 28 items and therefore

would require a considerable time to complete. The high number of VAPP items may be the reason for the 70 noncompliant participants that did not complete the questionnaires in the present study. For this reason, we propose a short version of the MC-VAPP for clinical use, which is now underway in the hospital.

CONCLUSIONS

Based on the results of this study, the MC-VAPP has a good reliability and validity when applied to dysphonic Mandarin Chinese speakers, and can be used as a self-assessment tool for patients with voice disorders in this population. It can also be used as a screening tool to identify those who may be suffering from voice disorders, and help clinicians to understand the reasons for why patients seek help for their voice, which can be useful in making clinical decisions.

Acknowledgments

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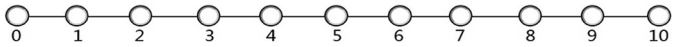
APPENDIX. THE MANDARIN (SIMPLIFIED) CHINESE VERSION OF VOICE ACTIVITY AND PARTICIPATION PROFILE

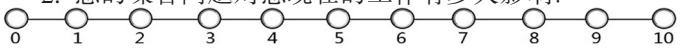
请根据您的自身情况回答以下问题，并在您认为适当的数字圆圈上画上“√”，以表示受影响的程度。线的左边（0）表示没有受影响；线的右方（10）表示问题非常严重。

1. 您觉得您目前的嗓音问题的严重程度有多少?

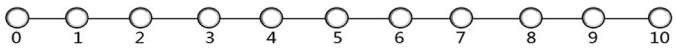


第一部分 嗓音问题对工作的影响

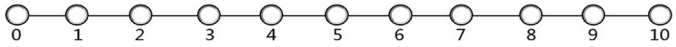
2. 您的嗓音问题对您现在的工作有多大影响?



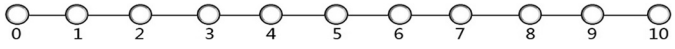
3. 在过去半年内，您有没有因为嗓音问题而考虑或尝试换工作?



4. 您有没有因嗓音问题而使工作压力增加?

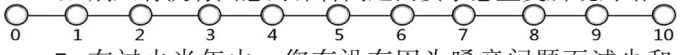


5. 在过去半年内，您的嗓音问题有没有影响您对未来职业的选择?

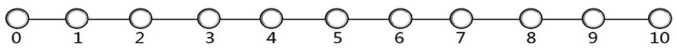


第二部分 嗓音问题对沟通的影响

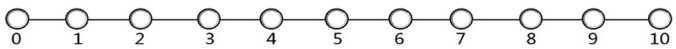
6. 别人有没有因您的嗓音问题而要求您重复所说的话?



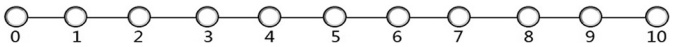
7. 在过去半年内，您有没有因为嗓音问题而减少和别人说话?



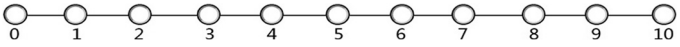
8. 在打电话时，对方有没有因为您的嗓音问题，而不明白您的意思?



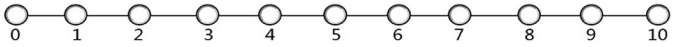
9. 在过去半年内，您有没有因嗓音问题而减少打电话?



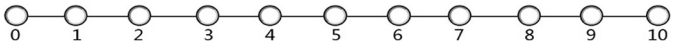
10. 在特别安静的环境下，您有没有因嗓音问题而影响您与别人沟通?



11. 在过去半年内，您有没有因嗓音问题而避免在特别安静的环境下说话?

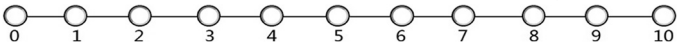


12. 在嘈杂的环境下，您有没有因嗓音问题而影响您与别人沟通?

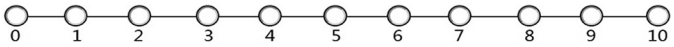


13. 在过去半年内，您有没有因嗓音问题而避免在嘈杂的环境下说话?

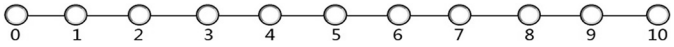
14. 您有没有因嗓音问题而影响您面对一大群人说话?



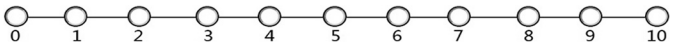
15. 在过去半年内，您有没有因嗓音问题而影响您面对一大群人说话?



16. 您有没有因嗓音问题而影响您表达自己的意思?

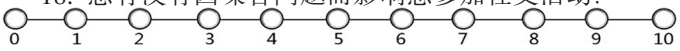


17. 在过去半年内，您有没有因嗓音问题而避免说话?

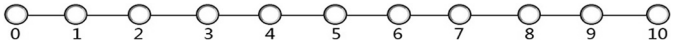


第三部分 嗓音问题对社交的影响

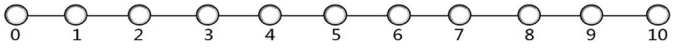
18. 您有没有因嗓音问题而影响您参加社交活动?



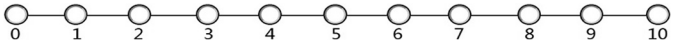
19. 在过去半年内，您有没有因嗓音问题而减少或避免参与社交活动?



20. 您有没有因嗓音问题而令您的家人、朋友或同事感到困扰?

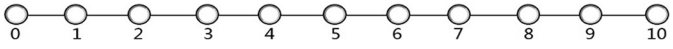


21. 在过去的半年内，您有没有因您的嗓音问题而减少与家人、朋友或同事沟通?

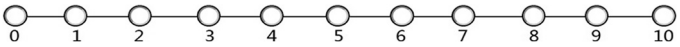


第四部分 嗓音问题对个人的影响

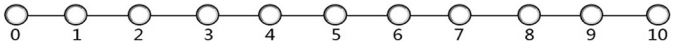
22. 您有没有因嗓音问题而感到不快?



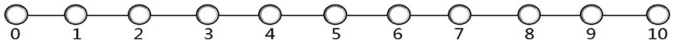
23. 您有没有因嗓音问题而感到尴尬?



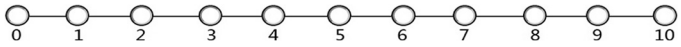
24. 您有没有因嗓音问题而感到自卑?



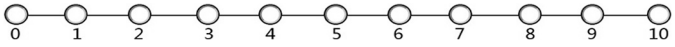
25. 您有没有因嗓音问题而感到忧虑?



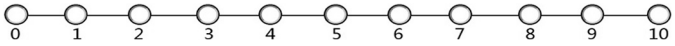
26. 您有没有因嗓音问题而感到不满?



27. 您有没有因嗓音问题而影响您的性格?



28. 您有没有因嗓音问题而影响您的形象?



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