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Reliability and Validity of The Danish Pediatric Voice Handicap Index

Katrine Schneider^a, Camilla Slot Mehlum^b, Christian Grønhøj^a, Thomas Kjærgaard^c, Charlotte Lange Møller^d, Christian von Buchwald^a and Thomas Hjuler^a

^a Department of Otorhinolaryngology, Head and Neck Surgery and Audiology, Rigshospitalet, Blegdamsvej 9, University of Copenhagen, Denmark

^b Department of Otorhinolaryngology - Head & Neck Surgery and Audiology, Odense University Hospital, J.B. Winsløvsvej 4, University of Southern Denmark.

^c Department of Otorhinolaryngology, Head and Neck surgery, Aarhus University Hospital, Palle Juul-Jensens Boulevard 165, Denmark

^d Center for Communication Disorders, Rygårdsallé 45, Capital Region of Denmark

Corresponding author

Katrine Schneider, E-mail: katrine.schneider@regionh.dk

Department of Otorhinolaryngology, Head and Neck Surgery and Audiology, Rigshospitalet, University of Copenhagen, Blegdamsvej 9, 2100 Copenhagen, Denmark

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Abstract

Background: The pediatric voice handicap index (pVHI) questionnaire was developed in 2006 to provide parental information regarding the impact of a voice disorder on their child's life.

Objectives: The aim of this study was to make a Danish version of the original American pVHI and to validate the Danish pVHI by evaluating its internal consistency and reliability.

Materials and Methods: The original version of the pVHI was translated into Danish. Nineteen parents of dysphonic children, diagnosed in a tertiary otolaryngology hospital department, and 43 parents of children without known voice disorder (control group) completed the questionnaire. The internal consistency, content validity including comparisons of the scores in the two groups and the test-retest reliability were assessed through statistical analysis.

Results: The total pVHI scores significantly differed between the group of parents with dysphonic children and the group of parents with children without known voice disorder ($p < 0.001$). The internal consistency showed an excellent consistency (Cronbach's $\alpha > 0.9$) of the three subdomains score and the total pVHI score. The test-re-test reliability of the total pVHI score was "strong" with a Pearson's correlation coefficient of 0.97.

Conclusions and significance: The Danish pVHI is a valid and reliable instrument to assess the parents' perception of the impact of a voice disorder on a child's physical, social and emotional well-being.

1. Introduction

The prevalence of voice disorders in children is estimated to 6% [1,2] mainly related to vocal fold nodules, laryngeal papillomatosis, laryngotracheal stenosis and vocal fold paralysis. Speech therapists and otolaryngologists rely on several measures to classify the severity of voice disorders i.e. endoscopic imaging of the laryngeal structures, perceptual assessment and computer assisted voice analysis. Several voice-related quality of life scales have been developed for patient-reported assessment such as the pediatric voice outcome survey[3], the pediatric voice symptom questionnaire[4], the pediatric voice-related quality-of-life survey[5], and more recently the pediatric voice handicap index (pVHI)[6]. The pVHI is derived from the voice handicap index questionnaire for adults [7] and modified in content and language to reflect a parent's response about his or her child. The pVHI includes a visual analog scale (VAS) of the overall voice severity, a talkativeness scale and a questionnaire with 23 questions divided into three subdomains: functional, physical and emotional, aimed to assess communication difficulties related to dysphonia, voice perturbations such as hoarseness and psychological consequences of voice disorder.

According to several adaptations in the literature, the pVHI is reproducible and shows high clinical validity [8–14]. Thus, the purpose of this study was to adapt the original American-language version of the pVHI into Danish and assess its validity and reliability.

2. Material and methods

2.1 Development of the Danish Version of the pVHI

The original English version of the pVHI was first translated into Danish by a speech therapist (CLM) and three otolaryngologists (CG, TH, CSM), and the wording and the meaning of each item

in the pVHI were discussed between the authors to assure a vocabulary consistent with daily Danish language. The pVHI was then translated back into English and compared to the original items by a professional bilingual translator. The final version of the Danish pVHI questionnaire is provided as Appendix A.

2.2 Study Design and Population

The Danish pVHI was analyzed using data obtained from a group of 19 parents of dysphonic children compared to a control group of 43 parents of children without a known voice disorder. The children in the dysphonic group were patients aged from three to 17 years, referred with dysphonia to a tertiary Otolaryngology hospital department at two sites, Copenhagen and Odense. The control group consisted of children without known voice disorder recruited from pediatric consultations and area schools.

The parents completed the first pVHI questionnaire in the presence of one of the investigators. To evaluate test-retest reliability, a second questionnaire was sent by email or letter after an interval of two to seven weeks, and parents were asked to complete it again. The parents had no access to their previous response from the first questionnaire at this time.

2.3 Statistical Analysis

The content validity of continuous variables was analyzed using the Mann-Whitney *U* test and categorical variables were analyzed using the Chi-squared test. The internal consistency of the pVHI was assessed by Cronbach's alpha coefficient. A value between 0.70 and 0.80 was considered 'acceptable', between 0.81 and 0.90 'good', and a value greater than 0.9 was considered 'excellent'[15]. The test-retest reliability was evaluated by determining the level of agreement between the individual results of the first and second pVHI with the Pearson's correlation coefficient. A value between 0.40 and 0.60 was considered 'fair', a value between 0.61 and 0.75

was considered ‘good’ and a value greater than 0.76 was considered ‘strong’[16]. To clarify the test re-test analysis scatterplots of each domain were performed.

3. Results

A total of 62 parents participated in this study and were included from May 2018 through November 2018. Among the responders 19 were parents of children with voice disorders and 43 were parents of children without voice disorders. The group of dysphonic children and the control group were comparable with regards to age ($p=0.65$) and gender ($p=0.27$) (Table 1). A variety of voice disorders were diagnosed among children with dysphonia including vocal fold nodules ($n=7/19$ patients), papillomatosis ($n=2/19$ patients), edema ($n=4/19$ patients), stenosis ($n=2/19$ patients), chronic laryngitis ($n=1/19$ patients), incomplete posterior glottic closure ($n=1/19$), paresis ($n=1/19$) and laryngeal cleft ($n=1/19$ patients).

The pVHI scores of both groups and the content validity, assessed by Mann Whitney U test, are presented in table 2. Data was stratified by age and divided into three subpopulations: age 3-7, age 8-12, age 13-17. There was a significant difference between the dysphonic group and the control group in both the VAS score ($p<0.01$), the mean total pVHI score ($p<0.01$) and the mean subscales scores for functional ($p<0.05$), physical ($p<0.01$) and emotional ($p<0.05$) domains. There was no significant difference between the groups in talkativeness ($p=0.88$, $p=0.71$, $p=0.12$).

Table 3 shows the results for the internal consistency for each of the subscales and the total pVHI score with a statistically excellent internal consistency for all three domains and the total score.

For the test re-test analysis parents of eight dysphonic children completed the pVHI twice with an interval of 14 to 49 days. The test re-test reliability showed a strong correlation, and the Pearson correlation coefficients are shown in table 3. The strong correlation is furthermore illustrated in scatterplots for each subdomain (Figure 1).

4. Discussion

The validation of the Danish pVHI shows an excellent internal consistency and a strong test-retest reliability. Parents of children with dysphonia reported significantly higher scores in the pVHI questionnaire (subdomains, total pVHI score and VAS score) when compared to the control group. However, we found no difference in the talkativeness. This is similar to Veder et al. [13], who suggests it may imply that children do not hold back talking despite their voice problem. Therefore, one could question the talkativeness scales' value in the pVHI. Also, the Danish translation and meaning of the English word 'talkative' was debated among the authors since the use of the word varies nationally. Another linguistic challenge was the translation of the sentence: 'The quality of my child's voice is unpredictable'. We agreed that the word 'unpredictable' could be interpreted differently among parents and chose 'the quality of my child's voice is alternately good or bad' even though it's not an exact translation.

Our findings are consistent with numerous translated versions of the pVHI which have been assessed as reliable and valid as the original English-language one [8–14]. The high score we observed in the physical domain compared to the functional and emotional domains is also a common finding [9,13,14,17]. This may imply that physical symptoms are more often noticed and perceived by parents.

Voice-related problems require an interdisciplinary collaboration between otolaryngologists, speech therapists, and parents. The pVHI is intended as a supplementary working tool for professionals to describe and evaluate the impact of a child's voice-related problem more uniformly. Our study confirms that the Danish pVHI is a reliable and valid tool to provide insight into the parents' perception of their child's voice related well-being. This new knowledge is relevant for those engaged in patient treatment, and for others interested in research-based development of the laryngological field (e.g. laryngological medical societies and speech therapist's associations).

We acknowledge the limitations in our study. Children included in the dysphonic group consisted only of patients referred to a tertiary department of otorhinolaryngology which may hamper the generalizability of our findings. Also, our study group is very small, due to the low prevalence of dysphonic children in our hospital setting, which is a clearly limitation of this study. However, previously studies have also based their findings on a small study group [9,18]. Despite these limitations, our results are comparable to previous studies and we suggest that the use of the pVHI is extended, not only in tertiary hospital settings, but also implemented upfront in the primary assessment and treatment of children with voice problems

5. Conclusion

The Danish version of the pVHI is a valid, reliable and useful instrument facilitating a better understanding of pediatric voice problems. The questionnaire is complementary to other applied assessment methods and can easily be introduced as a routine evaluation of a dysphonic child.

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None

Disclosure of interest

The authors report no conflict of interests.

Table 1

Demographic characteristics of 62 children with parents fulfilling the Danish pVHI.

	Dysphonic group (n=19)	Control group (n=43)	p-value
Age (years)	9.28 (\pm 3.85)	8.80 (\pm 3.8)	0.65
Gender			0.27
Boys	13 (68 %)	23 (53 %)	
Girls	6 (32 %)	20 (47 %)	

Table 2

Comparisons of the scores in talkativeness, pVHI scores including scores for each subdomain and VAS score of the pVHI, obtained from the parents of the dysphonic group and the control group.

	Dysphonic group (n=19)		Control group (n=43)		p-value
	Mean \pm SD	Range	Mean \pm SD	Range	
Talkativeness					
Age 3-7	5.14 \pm 0.90	4-6	5.26 \pm 1.05	4-7	p = 0.88
Age 8-12	5.14 \pm 0.69	4-6	5.85 \pm 0.99	4-7	p = 0.71
Age 13-17	4.33 \pm 0.58	4-5	5.60 \pm 1.14	4-7	p = 0.12
Functional					
Age 3-7	10.00 \pm 4.90	3-15	1.77 \pm 1.88	0-6	p <0.001
Age 8-12	4.00 \pm 3.16	0-10	0.77 \pm 1.09	0-3	p <0.01
Age 13-17	10.50 \pm 9.54	0-23	0.50 \pm 1.07	0-3	p = 0.04
Physical					
Age 3-7	17.86 \pm 6.04	10-27	0.55 \pm 1.06	0-4	p <0.001
Age 8-12	12.38 \pm 5.63	4-23	1.92 \pm 3.75	0-10	p <0.001
Age 13-17	13.00 \pm 4.55	9-19	1.00 \pm 2.83	0-8	p <0.01
Emotional					
Age 3-7	7.71 \pm 5.41	0-14	0.50 \pm 1.34	0-5	p <0.001
Age 8-12	2.38 \pm 2.56	0-7	0.23 \pm 0.60	0-2	p = 0.01
Age 13-17	9.35 \pm 11.47	0-26	0.13 \pm 0.35	0-1	p = 0.02
Total pVHI					
Age 3-7	35.57 \pm 14.66	14-55	2.82 \pm 3.13	0-10	p <0.001
Age 8-12	18.75 \pm 9.66	6-35	2.92 \pm 4.52	0-13	p <0.001

Age 13-17	32.75 ± 25.03	10-68	1.63 ± 4.21	0-12	p < 0.01
VAS					
Age 3-7	4.67 ± 1.86	2-7	0.05 ± 0.21	0-1	p < 0.001
Age 8-12	3.19 ± 1.22	2-5	0.42 ± 0.64	0-2	p < 0.001
Age 13-17	5.25 ± 2.87	3-9	0.25 ± 0.46	0-1	p < 0.01

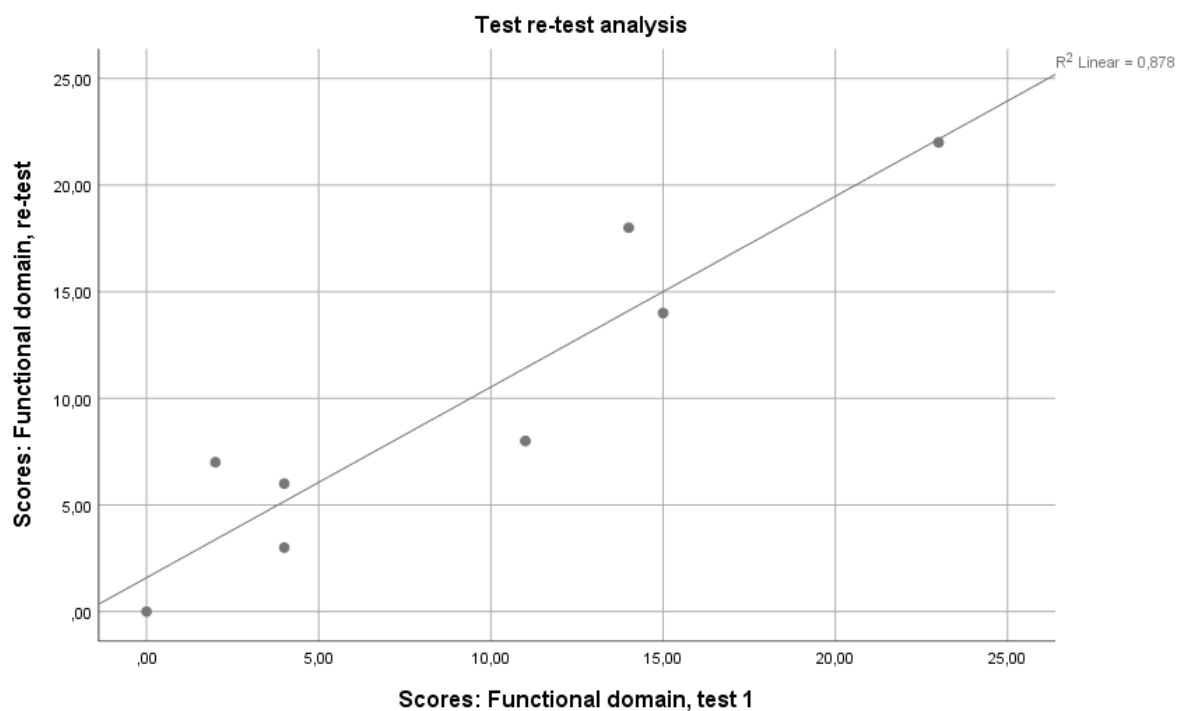
Table 3

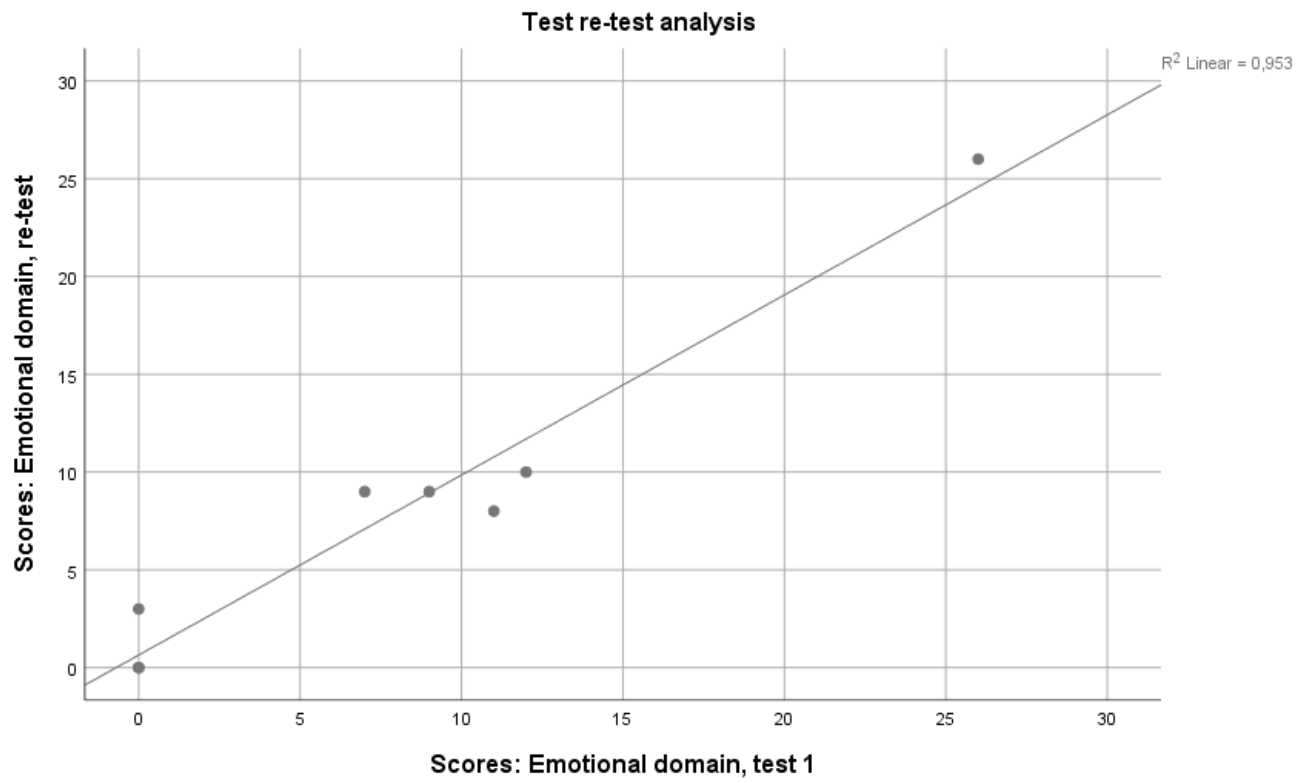
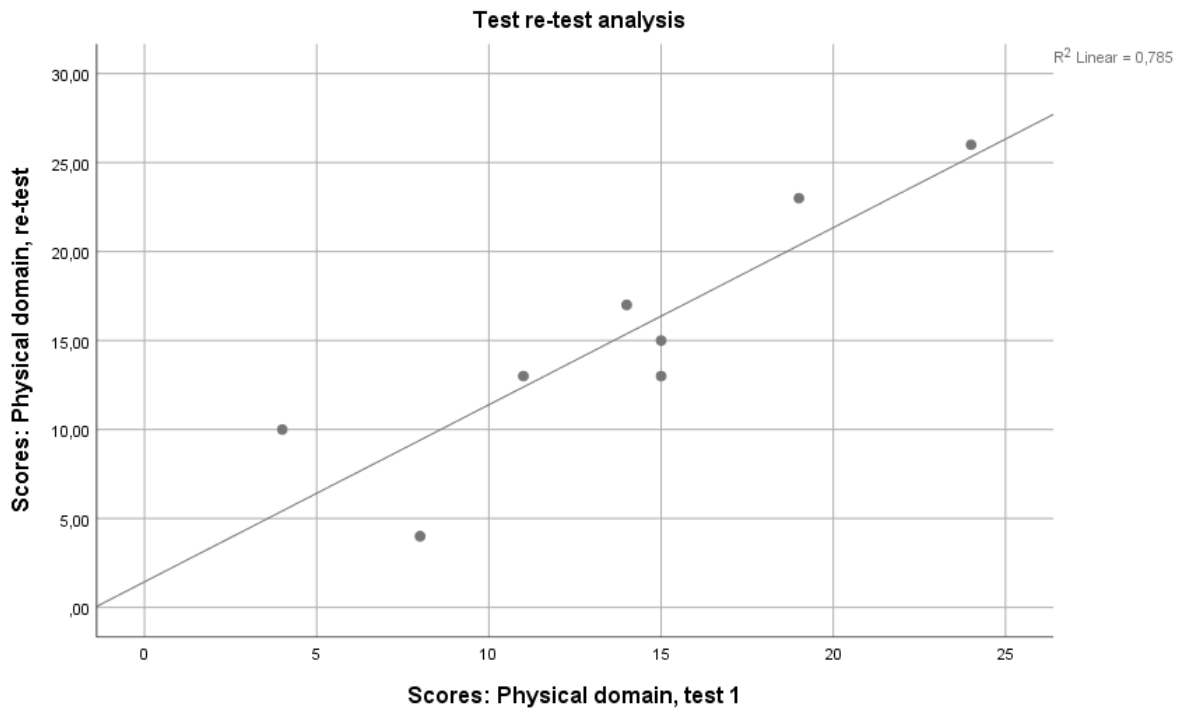
Internal consistency assessed by Cronbach's alpha coefficient and test-re-test reliability assessed by Pearson's *r* for each of the three domains and the total pVHI score.

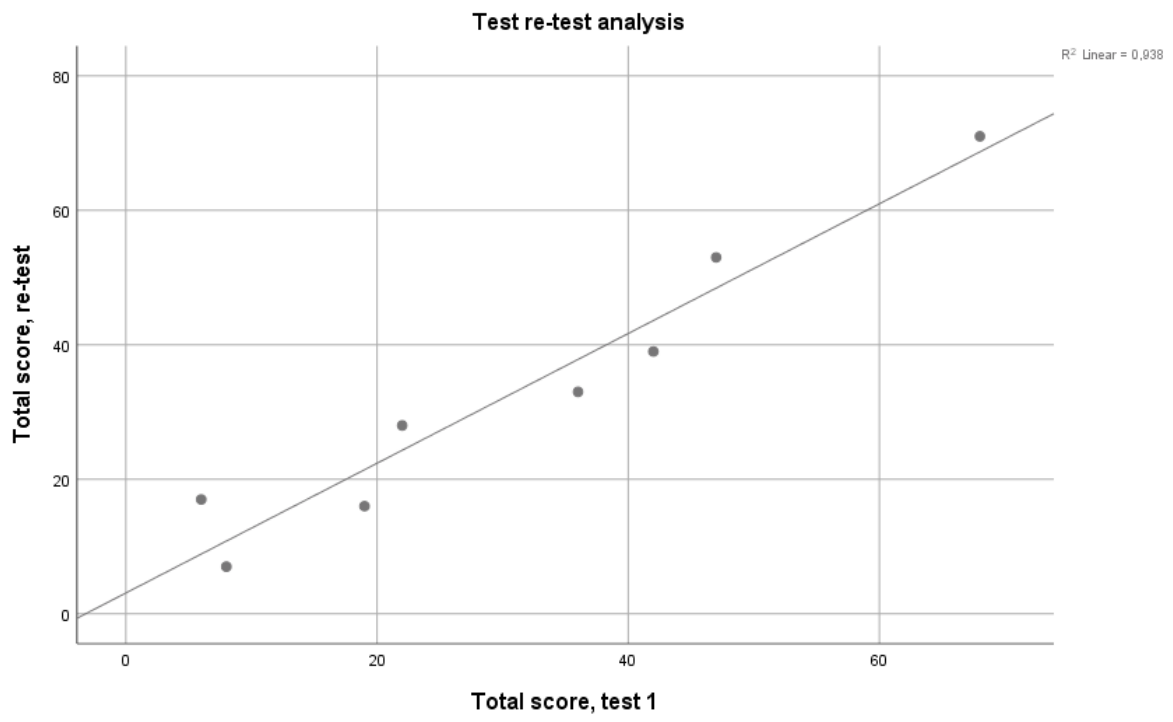
	Cronbach's alpha (α) (n=62)	Pearson's <i>r</i> (n=8)
Functional	0.927	0.959
Physical	0.930	0.944
Emotional	0.931	0.973
Total	0.965	0.983

Figure 1

Scatterplots showing the test re-test analysis for each subdomain of the questionnaire: Functional, physical, emotional and total score of the pVHI.







Appendix A

Patient nr.: _____

Dato: _____

Hvor snakkesalig er dit barn? (sæt ring om din besvarelse)							Udfyldes af personalet:				
1	2	3	4	5	6	7	F=				
Slet ikke		Gennemsnitlig			Ekstremt		P=				
							E=				
<p>Vejledning: Nedenstående er udsagn, som ofte bruges af folk til at beskrive deres stemme, og hvordan deres stemme påvirker deres liv. Sæt ring om det svar, som bedst angiver, hvor ofte dit barn har haft samme oplevelse.</p> <p>0=aldrig 1=næsten aldrig 2=indimellem 3=næsten altid 4=altid</p>											
<u>Del I – F</u>											
1.	Det er svært for andre at høre mit barns stemme						0	1	2	3	4
2.	Folk har svært ved at forstå mit barn i et støjfyldt lokale						0	1	2	3	4
3.	Derhjemme har vi svært ved at høre vores barn, når han/hun kalder gennem huset						0	1	2	3	4
4.	Mit barn har tendens til at undgå at kommunikere på grund af sin stemme										
5.	Mit barn taler mindre med venner eller familie på grund af sin stemme						0	1	2	3	4
6.	Folk beder mit barn om at gentage, hvad han/hun siger, selv når de taler ansigt til ansigt						0	1	2	3	4
7.	Mit barns stemmeproblemer begrænser personlige, uddannelsesmæssige og sociale aktiviteter						0	1	2	3	4
<u>Del II - P</u>											
1.	Mit barn løber tør for luft, når han/hun taler						0	1	2	3	4
2.	Lyden af mit barns stemme varierer i løbet af dagen						0	1	2	3	4
3.	Folk spørger: "Hvad er der galt med dit barns stemme?"						0	1	2	3	4
4.	Mit barns stemme lyder tør, ru og/eller hæs						0	1	2	3	4
5.	Mit barns stemmekvalitet er skiftevis god eller dårlig						0	1	2	3	4
6.	Mit barn bruger meget energi på at tale (f.eks. anstrenger sig)						0	1	2	3	4
7.	Mit barns stemme er dårligst om aftenen						0	1	2	3	4
8.	Mit barns stemme kan pludseligt forsvinde når han/hun taler						0	1	2	3	4
9.	Mit barn er nødt til at råbe, for at andre kan høre ham/hende						0	1	2	3	4
<u>Del III - E</u>											
1.	Mit barn virker anspændt når han/hun taler med andre på grund af sin stemme						0	1	2	3	4
2.	Folk virker irriterede over mit barns stemme										
3.	Jeg oplever, at andre ikke forstår mit barns stemmeproblem						0	1	2	3	4
4.	Mit barn er frustreret over sit stemmeproblem						0	1	2	3	4
5.	Mit barn er mindre udadvendt på grund af sit stemmeproblem						0	1	2	3	4
6.	Mit barn bliver irriteret, når folk beder ham/hende om at gentage						0	1	2	3	4
7.	Mit barn bliver flov, når folk beder ham/hende om at gentage						0	1	2	3	4
Overordnet vurdering af dit barns stemmeproblem											
(Sæt et X et sted på linjen for at angive sværhedsgraden af dit barns stemmeproblem; beskrivelsen under linjen er vejledende)											

Intet stemmeproblem							Alvorligt stemmeproblem				

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