

## Validity and reliability of the pediatric voice handicap index: Thai version

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### ABSTRACT

**Background:** Pediatric Voice Handicap Index (pVHI) is one of the most widely used self-assessment tools for pediatric voice disorders which is completed by the children's parents. pVHI has been translated into several languages, but not in Thai.

**Objectives:** This study was conducted in order to translate pVHI into Thai and to assess the validity and reliability of the Thai version of pVHI.

**Materials and methods:** The original pVHI has been translated into Thai using the World Health Organization's (WHO) backward standard translation approach. Thai-pVHI was administered to 30 parents whose children had voice disorders. Two qualified speech-language pathologists and two translation experts verified the content validity. Internal consistency was determined using Cronbach's alpha coefficient, and the test-retest reliability of Thai-pVHI was calculated using intraclass correlation coefficient.

**Results:** The result showed that Thai-pVHI had excellent internal consistency on both total subscales ( $\alpha=0.855$ ) and functional subscale ( $\alpha=0.851$ ), strong internal consistency on the physical subscale ( $\alpha=0.747$ ) and the emotional subscale ( $\alpha=0.716$ ). Moreover, Thai-pVHI also had excellent test-retest reliability on its subscales: total (ICC=0.917), functional (ICC=0.973), physical (ICC=0.896), and emotional (ICC=0.914).

**Conclusion:** Thai-pVHI met the acceptance criteria for psychometric evidence relative to internal consistency and test-retest reliability. This suggests that this instrument might be used as a Thai parental proxy for measuring the severity of children's voice disorders, impact on a child's quality of daily life, and efficacy of treatments in pre- and post-interventions.

### Introduction

Human beings use their voice to communicate and sing as well as to express their thoughts, emotions, and feelings. Consequently, voice is vital to individuals of all ages. Children express what they feel and think by speaking. If there is an abnormality in their voice, it will have negative effects on their communication and quality of life. Voice

handicaps in children refer to a change in their sound, pitch, loudness, and voice quality, generally impeding their communication capability.<sup>1-3</sup> Incidence rate of voice handicaps in children is between 6% and 23%.<sup>4-6</sup> Children with voice handicaps encounter negative effects regarding communication, social relationships, self-esteem, participation in school activities, as well as negative feedback from adults and their peers.<sup>2, 7-12</sup> There are now available number of instruments used to evaluate voice handicaps in children. For example, abnormalities of vocal structure can be assessed using traditional endoscopic imaging. However, this technique can not provide information about the effects of voice handicaps on the quality of the children's lives.

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Moreover, some instruments for assessing the effects of voice handicaps in children are available, including Pediatric Voice Related Quality of Life (PVRQOL),<sup>13</sup> Pediatric Voice Outcome Survey (PVOS),<sup>14</sup> Pediatric Voice Symptom Questionnaire (PVSQ),<sup>15</sup> Children's Voice Handicap Index-10 for Parents (CVHI-10-P),<sup>16</sup> and Pediatric Voice Handicap Index (pVHI).<sup>17</sup>

Parents use Pediatric Voice Handicap Index (pVHI)<sup>17</sup> to assess voice handicap indices of their children and to evaluate the effects of their voice handicaps. This index was developed and validated in the United States by Zur et al.<sup>17</sup> and was adapted from an index used for adults.<sup>18</sup> The index is composed of 23 question items scoring from 0 to 4 on a Likert-type rating scale. The question item responses assess the severity levels of the effects of voice handicaps in the following three aspects: seven items for functional aspect (F), nine items for physical aspect (P) and seven items for emotional aspects (E).<sup>17</sup> This index is widely utilized and is accepted in pediatrics because it is used friendly with fewer items for evaluation and full coverage of the three aspects. Moreover, its validity and reliability are at high levels. The index has been translated into many languages such as Italian,<sup>19</sup> Korean,<sup>7</sup> Arabic,<sup>20</sup> Malayalam<sup>21</sup> and Turkish.<sup>22</sup> However, in the Thai context, pVHI has not yet been translated or validated, and reliable evaluation indices for assessing voice handicaps in Thai children had thus far not been available in Thai. As a consequence, the objectives of this research were to translate the Pediatric Voice Handicap Index (pVHI) from English into Thai and to investigate the validity and reliability of the translated index by using internal consistency and test-retest reliability.

## Materials and methods

### 1. Translation of Thai-pVHI

Initially, permission to translate the three aspects of pVHI into Thai was granted by the copyright owners, the copyright office of the American Speech, Language and Hearing Association (ASLHA), and the International Journal of Pediatric Otorhinolaryngology. Afterwards, the index was forward-translated and back-translated based on an adaptation of WHO articles.<sup>23</sup> The steps of forward-translation and back-translation were as follows: (I) Translation of English index into Thai was conducted by a speech therapist who was proficient in both Thai and English. Thus, the first Thai version of the index was provided; (II) Back-translation of Thai version into English was done by a proficient translator who did not have any knowledge regarding the index. Accordingly, a verified back-translated version of the index was provided; (III) determination of content validity and reliability of forward-translated and back-translated Thai versions of the index were conducted by the researcher, her supervisor, and two translators who were not the same individuals as in step II. Purpose of this step was to analyze and improve the accuracy of the index items. Thus, a second translated Thai version of the index was available; (IV) The second Thai version was pilot tested for its content validity with five participants who were parents of 3-to 12-year old children in December 2017. They completed the assessment

index and were interviewed for their understanding and responses on the items of each topic. After that, improvements were made and the final Thai version of the index with adequate content validity and reliability was completed. It contained 23 question items with scores ranging from 0 (never) to 4 (always). This index assessed the severity of the effects of voice handicaps of children relative to three aspects: seven items for functional aspect, nine items for physical aspect, and seven items for emotional aspect (Appendix A).

## 2. Participants

The participants were parents of 30 children, aged 3-12 years, who had been diagnosed by otorhinolaryngologists. They suffered from voice handicaps without a hearing impairment. They received medical treatment at the Department of Otolaryngology, Faculty of Medicine, Chiang Mai University, during December 2017 to March 2018. Parental participants volunteered and were willing to participate in this research study by completing a written consent form.

## 3. Evaluation of psychometric properties

### 3.1 Content validity

Question items of the index were validated after completion of forward- and back-translation process. The consensus was reached among researcher, her major thesis advisor, and two translation specialists in order to improve the accuracy of index and determine its content validity.

### 3.2 Reliability

Internal consistency of the index was computed using Cronbach's alpha coefficient and test-retest reliability of the final Thai version was determined using intraclass correlation coefficients (ICC). Moreover, ICC model (3, 1) was used again with the same sample participants two weeks after the first administration.

### 3.3 Statistical analysis

SPSS Version 25 was used to analyze the index data relative to frequencies, percentages, and means. Descriptive statistics were used to analyze the general information of the participants. Cronbach's alpha coefficient, with a 95% confidence interval, was used to determine the internal consistency. Intraclass correlation coefficient, based on the ICC model (3, 1), with a 95% confidence interval, was used to determine test-retest reliability of the index.

## Results

### Demographic characteristics

Table 1 contains general information of the 30 participants involved in this study. They were parents of children who were diagnosed as having a voice handicap without hearing impairment. These children included 17 males (56.67%) and 13 females (43.33%) with ages ranging from 3 to 12 years. Most of the participants, 11 children or

36.67%, were diagnosed as having subglottic stenosis and one child diagnosed as having a vocal nodule was an exception. 28 of them, 93.33%, had undergone a tracheostomy. However,

**Table 1** Demographic characteristics and diagnoses of voice disorders of the participating children.

| Characteristics                            | Children (n = 30) |
|--|-------------------|
| <b>Gender</b>                              | <b>n (%)</b>      |
| Male                                       | 17 (56.67)        |
| Female                                     | 13 (43.33)        |
| <b>Age</b>                                 |                   |
| 3-3.11 years                               | 4 (13.32)         |
| 4-4.11 years                               | 6 (20.00)         |
| 5-5.11 years                               | 8 (26.67)         |
| 6-6.11 years                               | 2 (6.67)          |
| 7-7.11 years                               | 2 (6.67)          |
| 8-8.11 years                               | 2 (6.67)          |
| 9-9.11 years                               | 0 (0.00)          |
| 10-10.11 years                             | 3 (10.00)         |
| 11-12 years                                | 3 (10.00)         |
| <b>Types of diseases</b>                   |                   |
| Subglottic stenosis                        | 11 (36.67)        |
| Tracheal stenosis                          | 5 (16.67)         |
| Tracheomalacia                             | 2 (6.67)          |
| Bilateral true vocal cords paralysis       | 2 (6.67)          |
| Bilateral true vocal cords impaired mobile | 1 (3.33)          |
| Vocal nodules                              | 1 (3.33)          |
| Subglottic web                             | 1 (3.33)          |
| Tracheal papilloma                         | 1 (3.33)          |
| Laryngeal papilloma                        | 1 (3.33)          |
| Frontoethmoidal encephalomeningocele       | 1 (3.33)          |
| Lymphatic malformations                    | 1 (3.33)          |
| Micrognathia                               | 1 (3.33)          |
| Supraglottic swelling                      | 1 (3.33)          |
| Posterior glottic stenosis                 | 1 (3.33)          |

#### Internal consistency

Total internal consistency of Thai version of the index had an excellent Cronbach's alpha coefficient ( $\alpha=0.855$ ). The functional aspect also had an excellent level ( $\alpha=0.851$ ) while the physical aspect had a high level ( $\alpha=0.747$ ) similar to the emotional aspect which also had a high level ( $\alpha=0.716$ ). These results are in Table 2.

#### Test-retest reliability

Total test-retest reliability was at an excellent level (ICC=0.917). The functional, physical and emotional aspects were all at the excellent level; ICC=0.973, ICC=0.896 and ICC=0.914, respectively, as shown in Table 2.

**Table 2** Distribution of the undergraduate students with physical or locomotion disability on self-esteem.

| Domain     | No. of items | Internal consistency (Cronbach's alpha) | Test-retest reliability (ICC) |
|------------|--------------|---|-------------------------------|
| Total      | 23           | 0.855                                   | 0.917                         |
| Functional | 7            | 0.851                                   | 0.973                         |
| Physical   | 9            | 0.747                                   | 0.896                         |
| Emotional  | 7            | 0.716                                   | 0.914                         |

## Discussion

The study findings showed that total internal consistency and functional aspect of the Thai version of pVHI were at the highest levels. The internal consistencies of physical and emotional aspects were at a high level (Table 2) and are within the acceptable criteria. These findings may be due to quality of the original English index which had undergone reliability assessments and internal consistency assessments. These results indicated that its reliability was at a high level and were considered acceptable.<sup>17</sup> Moreover, specialists in the effects of voice handicaps of children directed the development of the original index, which was adapted from the Voice Handicap Index (VHI) for adults.<sup>18</sup> The VHI, upon which the pVHI is based, has been standardized and its validity and reliability determined using various sample groups with different cultural backgrounds.<sup>24-26</sup> These results reported that the original pVHI was standardized and that pVHI is useful in thoroughly assessing the effects of voice handicaps in children. When Thai language version pVHI underwent the systematic forward-translation and back-translation processes of the WHO,<sup>23</sup> the results indicated that the original concepts and contents were well matched. The assessment methods for Thai version were consistent with those of the original pVHI. Additionally, translators in each translation step were highly qualified and proficient in both Thai and English, resulting in Thai-version index having an internal consistency at the highest level. These findings indicate that Thai index is consistent with the original pVHI and evaluates the same aspects: functional, physical, and emotional, respectively. The analysis results of test-retest reliability showed that ICC of the three aspects were between 0.896 and 0.973, and total ICC was 0.917. From consideration of the reliability coefficient criteria,<sup>27</sup> these findings were between 0.75 and 1.00, which means the highest levels of reliability of Thai-pVHI. This finding may be due to the fact that two-week interval between assessments was suitable<sup>28</sup> and that interval did not change the effects of voice handicaps of children. Furthermore, the assessments were behavioral observations and the scoring was given by the same parents, which were more consistent than if the assessments had been administered and analyzed by different evaluators. This finding further confirmed test-retest reliability of the original pVHI as reported by Zur et al.<sup>17</sup> It was found that the reliability was at a high level, indicating that Thai-pVHI demonstrated an evaluation quality consistent with the original. Simply stated, no matter how many times the test-retest assessment was conducted, results remained the same. These consistent results may have also been due to the consistency of evaluators and the short interval between the first and second evaluations, resulting in the evaluation results being consistent and virtually unchanged.

One limitation of this research was that before administering this index, the evaluators needed to ensure that the procedures of index were clearly understood. This extra step was required because some items may have been difficult to understand since the original item words were matched during translation process. Another limitation of the present study was its small sample size.

## Conclusion

Based upon the results of this study, the validity and reliability of Thai-pVHI were acceptable. Therefore, Thai-pVHI can be used to evaluate the severity and effects of voice handicaps of children reported by their parents. These assessments can also be used to evaluate pre- and post-training effectiveness of therapy programs designed for each child with a voice handicap.

## Conflict of interest statement

The authors declare no conflict of interest to report.

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## Appendix A. The Thai version of the pVHI

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