

# Reliability and Validity of the Turkish Version of the Screening Index for Voice Disorder (SIVD-TR)

\*<sup>1</sup>Emel Arslan-Sarimehmetoğlu, <sup>†,2</sup>Yetkin Tuuç, and <sup>‡,3</sup>Rahşan Çınar, \*<sup>†‡</sup>Ankara, Turkey

**Summary: Objectives.** We investigated the reliability and validity of the Turkish version of the Screening Index for Voice Disorder (SIVD-TR).

**Methods.** The original SIVD<sup>1</sup> translated into Turkish, followed by a translation back into English by a linguist. The text was finalized by an evaluation committee. This translated version was then administered to a cohort of 223 teachers in Ankara, Turkey, encompassing both those with and without voice disorders (WVD and WOVD). After a duration of 7–14 days, a random selection of 53 teachers underwent the questionnaire once more. Statistical analyses were conducted to evaluate the reliability and validity of the index. Cronbach's alpha and test-retest methods were used to scale the reliability. A cutoff point was determined to decide the risk of a voice disorder, by using a Receiver Operating Characteristic curve. The validation process is concluded by computing sensitivity and specificity values, comparing mean scores between WVD and WOVD subjects, and finally examining correlations between SIVD-TR and the Turkish version of the Voice Handicap Index (VHI-10).

**Results.** The internal consistency reliability exhibited high significance, with Cronbach's alpha measuring at 0.872. The test-retest correlation coefficient for the total scores was 0.80. The SIVD-TR consists of 12 symptoms, each accounting for 1 point on the scale. The identified cutoff for identifying the risk of a voice disorder is 4 (four) symptoms, with a sensitivity of 55.2%. A correlation of 69% was observed between SIVD-TR and VHI-TR. A significant association was noted between the risk of having a voice disorder and the actual presence of a voice disorder. Subjects with a voice disorder exhibited higher mean SIVD scores, providing further evidence of the questionnaire's discriminative validity.

**Conclusion.** The Turkish adaptation of SIVD demonstrated both reliability and validity, establishing itself as a robust tool for identifying voice disorders.

**Key Words:** Voice–Voice quality–Voice disorders–Questionnaires.

## INTRODUCTION

Voice disorders are the deficiencies and disorders that occur during voice production in terms of voice quality, intensity, pitch, resonance, and periodicity.<sup>1</sup> Voice disorders are common and frequent among professional voice users such as teachers.<sup>2,3</sup> The prevalence of voice disorders among teachers varies in different studies, ranging from 20%<sup>4</sup> to 50%<sup>5</sup> and even reaching up to 70%.<sup>6–9</sup> Problems such as hoarseness, vocal fatigue, roughness and phonatory breaks, throat-clearing, deteriorating voice quality, throat pain, dryness, sensitivity, difficulty in hearing one's voice, and insufficient breath during speaking are the most commonly observed symptoms in teachers.<sup>2,9</sup> Teachers frequently encounter voice disorders in their professional careers due to occupational demands that threaten vocal

hygiene, such as working environment, long working hours, poor acoustics in classrooms, overcrowded classes, consumption of diuretic and/or carcinogenic substances, and speaking loudly.<sup>8,10–12</sup> Despite experiencing voice problems due to the intensive use of their voices during the day, individuals in Turkey with high occupational voice demands are seen not to seek professional help, unless these problems significantly impact their lives or worsen significantly.<sup>13</sup> Teachers' voices are of immense importance in their work as they affect relationships with their students and other teachers. The quality of a teacher's voice is important in gaining respect and attention, as well as capturing the audience's attention.<sup>14</sup> One could argue that the voice is one of the most important tools needed in the teaching profession, and thus high vocal endurance would be considered a desirable asset. Voice disorders should be diagnosed and treated early, even before an individual begins their teaching career.<sup>9</sup> Sustainable voice function is of great importance both for individual vocal health and for professional reasons. Teachers would likely benefit from voice training and vocal health education.<sup>15,16</sup> Self-assessment indices are used in the evaluation of voice disorders. There are limited scales/questionnaires available in Turkish that allow individuals to assess themselves regarding voice disorders. The Turkish Voice Handicap Index (VHI) is one of them. The VHI is a questionnaire consisting of 30 items. It has three subgroups, each containing 10 items: Functional (F), Physical (P), and

Accepted for publication July 17, 2024.

From the \*Department of Speech and Language Therapy, Ankara Medipol University, Ankara, Turkey; †Department of Statistics, Ankara University, Ankara, Turkey; and the ‡Health Ministry of Turkish Republic, General Directorate of Public Health, Department of Child and Adolescent Health, Ankara, Turkey

<sup>1</sup> Orcid No: 0000-0002-8601-7836

<sup>2</sup> Orcid No: 0000-0001-6590-3233

<sup>3</sup> Orcid No: 0000-0002-2154-3077.

Address correspondence and reprint requests to Emel Arslan-Sarimehmetoğlu, Department of Speech and Language Therapy, Ankara Medipol University, Altındağ, Ankara, Turkey. E-mail: arslan.emel@hotmail.com

Journal of Voice, Vol xx, No xx, pp. xxx–xxx

0892-1997

© 2024 The Voice Foundation. Published by Elsevier Inc. All rights are reserved, including those for text and data mining, AI training, and similar technologies.

<https://doi.org/10.1016/j.jvoice.2024.07.021>

Emotional (E). The patient assigns a value between 0 and 4 to each item, with a maximum total score of 120. The purpose of the questionnaire is not to differentiate between different pathologies but to enable the patient to assess their problem. VHI was investigated for Turkish validity and reliability by Kılıç et al, and its short form, VHI-10, which provides ease of application, was introduced to Turkish. The VHI-10 questionnaire is designed to evaluate any type of voice disorder. It can be self-administered, and it can be quickly scored during assessment.<sup>10</sup> It is important to evaluate the voice disorder as well as to diagnose the existing dysphonia early. Screening is also of great importance in early diagnosis. They need to be aware of the precautions necessary to preserve their vocal health and should not hesitate to self-assess, ensuring timely diagnosis and treatment when needed. Ghirardi et al developed the Screening Index for Voice Disorders (SIVD) scale that is a reliable and valid tool for identifying voice disorders among teachers, particularly for use in screenings.<sup>17</sup> SIVD consists of 12 items encompassing voice symptoms, each corresponding to a score of 1 on the scale. The threshold for determining the risk of voice disorder is set at five symptoms. Despite the existence of this questionnaire scoring system and has not yet been studied in large populations, it is argued that it could serve for screening and early detection of voice disorders.<sup>17</sup> There is no validated questionnaire for screening voice disorders in Turkey. Accordingly, this study aimed to evaluate the validity and reliability of the Turkish version of the SIVD forms, which is specifically designed for screening voice disorders.

## METHODS

### Translation

Permission to use the questionnaire was obtained via e-mail from Ghirardi, the first author of the original study on the development of SIVD.<sup>17</sup> In the initial stage of translation, four researchers independently translated the original SIVD forms into Turkish. The translations were evaluated by an academic in the field of speech and language therapy (Author 1), an expert in voice studies from the Ministry of Health in Turkey (Author 3), and two academics from the Department of Ear, Nose, and Throat Diseases, including an otolaryngologist. To ensure accuracy, a four-person committee reviewed all translated versions of the survey, resolving inconsistencies and preparing a preliminary-final version. A linguist then back-translated the index into English, comparing the translations with the original items. Following this, a pilot study version of the scale was developed and tested for clarity with 25 participants. Feedback was collected regarding any expressions that were difficult to understand. Based on the pilot study results, the final version of the scale was created without any further modifications.

### Subjects and data collection

Following the structure of the original SIVD,<sup>17</sup> the Turkish version (SIVD-TR) included 12 symptoms, with each

participant reporting the frequency of each symptom on a 4-point Likert scale. Responses of “never” and “sometimes” were coded as 0, indicating the absence of the symptom, while “almost always” and “always” were coded as 1, indicating the presence of the symptom.

Participants were recruited through an online announcement system targeting teachers in Ankara, Turkey, who volunteered for the study. Demographic and health information was obtained using the patient-reported outcome method. The study included 223 teachers from the public-school system in Ankara, Turkey, comprising individuals with and without voice disorders (WVD and WOVD).

The inclusion criteria were: (1) being an adult over the age of 18, (2) speaking Turkish as their primary language, (3) being a teacher in Ankara, (4) having or not having a voice disorder complaint, (5) if there is a voice complaint, having a documented diagnosis from the Ear, Nose, and Throat Department within the last 2 years, and (6) the voice disorder is not an emergency or a condition requiring immediate intervention. Exclusion criteria included: (1) having a neurological disease and (2) if there is a voice complaint, the voice disorder has not been diagnosed. Participants with voice disorders provided diagnostic information from various hospitals within the last 2 years.

All participants completed a form prepared by the researchers that included demographic information, voice perception, and disorder diagnosis information. Subsequently, they completed the SIVD-TR and VHI-10 forms. To assess test-retest reliability, the questionnaire was readministered to a randomly selected subset of 53 subjects after an interval of 7–14 days.

The Kolmogorov-Smirnov test was used to determine whether the data conformed to the normal distribution assumption. Parametric techniques were applied to data that met the normality assumption, while nonparametric techniques were used for data that did not conform to this assumption.

In the reliability analysis, Cronbach's alpha coefficients were computed for the total score, and corrected item-total correlation coefficients were determined for each item. The test-retest reliability between the questionnaire test scores was assessed through Pearson correlation.

The validity of the survey was established through subsequent analyses. To determine whether subjects with voice disorders achieved higher SIVD-TR means, the means of total SIVD-TR scores were compared using the Mann-Whitney *U* test. To establish a cutoff point for the SIVD-TR scores, a Receiver Operating Characteristic (ROC) curve with sensitivity and specificity values was conducted, thus evaluating the risk of having a voice disorder according to the SIVD-TR.

For a more comprehensive assessment of validity, it was considered useful to calculate the correlation between SIVD and VHI. To this end, the Pearson correlation coefficients between the total scores and individual items of SIVD-TR and the Turkish version of the Voice Handicap

Index-10 (VHI-10)<sup>18</sup> was calculated. Also, Wilcoxon test is performed. Although VHI and SIVD are two different measurement tools, Ghirardi et al showed a strong correlation between these two measurements in their study. These two tools can complement each other in terms of scale, as the individual's complaint often includes medical symptoms not anticipated in the VHI.

Data from this study were entered into the SPSS (Statistical Package for the Social Sciences) spreadsheet, and analysis was carried out using SPSS for Windows Software, version 23 (IBM SPSS Inc., Chicago, IL). Throughout the analysis, *P* values < 0.05 were considered statistically significant.

This study obtained approval from the Ethics and Research Committee of Ankara Medipol University under protocol number 20.06.2023/76. All subjects provided informed consent, agreeing to the use of their data for scientific research. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

## RESULTS

The study's participant pool covered a total of 223 individuals, of which 175 (78.5%) were female and 48 (21.5%) were male teachers. The average age of the participants was 43.58, ranging from a minimum age of 22 to a maximum age of 65, resulting in a range of 43 years. In terms of the teachers' years of service, the average was 19 years, with a minimum of 1 year and a maximum of 46 years, thus yielding a working year range of 46. Within the 223 subjects, 95 (42.6%) reported being diagnosed with at least one voice-related disease (WVD), while 128 (57.4%) indicated that they were not diagnosed with a voice-related disease (WOVD). Among the subjects, 49 (22%) revealed being frequent smokers, while 174 (78%) identified themselves as nonsmokers. The respondents were queried regarding their current perceptions of their own voices, and the detailed responses have been consolidated and presented in Table 1.

Participants were asked questions prepared by the researchers regarding their voice perception and diagnostic information. Participants' responses to the question of how they found their own voices are shown in Table 1. The

**TABLE 1.**  
**Voice Definitions of the Participants**

Definition	Frequency	Percent
Bad	58	26.0
Well	130	58.3
Very well	23	10.3
Perfect	12	5.4
Total	223	100.0

**TABLE 2.**  
**Diagnostic Distribution of the Participants by Gender**

Diagnostics	Gender		Total (n)
	Female (n)	Male (n)	
Reflux status	54	13	67
Respiratory allergy	44	10	54
Nodules	37	7	44
Hoarseness	37	4	41
Polyp	4	2	6
Edema in the vocal cords	3	1	4
Pharyngitis	3	4	7
Vocal cord paralysis	7	3	10
Voice cracking	3	1	4
Operation	2	0	2

gender distribution of the results of the voice diagnostics reported by the participants is given in Table 2.

The SIVD-TR comprises the same 12 items as those derived from the original study.<sup>17</sup> The components of the SIVD-TR scale comprise hoarseness, voice loss, breaking voice, low-pitched voice, phlegm, dry cough, cough with phlegm, pain when speaking, pain when swallowing, secretion/phlegm in the throat, dry throat, and strained speech. The subjects, on average, reported a mean number of 2.4 symptoms (SD 2.7), with a median of two symptoms.

Each symptom reported as occurring "almost always" or "always" contributes 1 point to the scale, resulting in a final score obtained by summing all points accrued, indicating the number of present symptoms. Thus, the final score ranges from 0 (minimum) to 12 (maximum).

SIVD participants include a set of 12 standard items that represent potential conditions that may be associated with voice-related problems in Table 3. The internal consistency reliability of the SIVD-TR scale was measured using the

**TABLE 3.**  
**Corrected Item-Total Correlations and Item-Deleted Cronbach's Alphas**

SIVD-TR items	Corrected item-total correlation	Cronbach's alpha if item-deleted
Hoarseness	0.63	0.85
Voice loss	0.51	0.86
Breaking voice	0.57	0.86
Low-pitched voice	0.59	0.86
Phlegm	0.60	0.86
Dry cough	0.52	0.86
Cough with secretion	0.62	0.85
Pain when speaking	0.45	0.86
Pain when swallowing	0.38	0.87
Secretion/phlegm in the throat	0.45	0.86
Dry throat	0.63	0.85
Strained speech	0.72	0.85

**TABLE 4.**  
**Test-Retest Results with Pearson Correlation and Wilcoxon**

SIVD-TR items	Pearson correlation	Wilcoxon <i>P</i> value
Hoarseness	0.46	0.10
Voice loss	0.62	0.13
Breaking voice	0.49	0.40
Low-pitched voice	0.66	1.00
Phlegm	0.94	0.04
Dry cough	0.81	0.09
Cough with secretion	0.87	0.65
Pain when speaking	0.79	0.70
Pain when swallowing	0.71	0.20
Secretion/phlegm in the throat	0.86	0.52
Dry throat	0.47	0.13
Strained speech	0.44	0.23

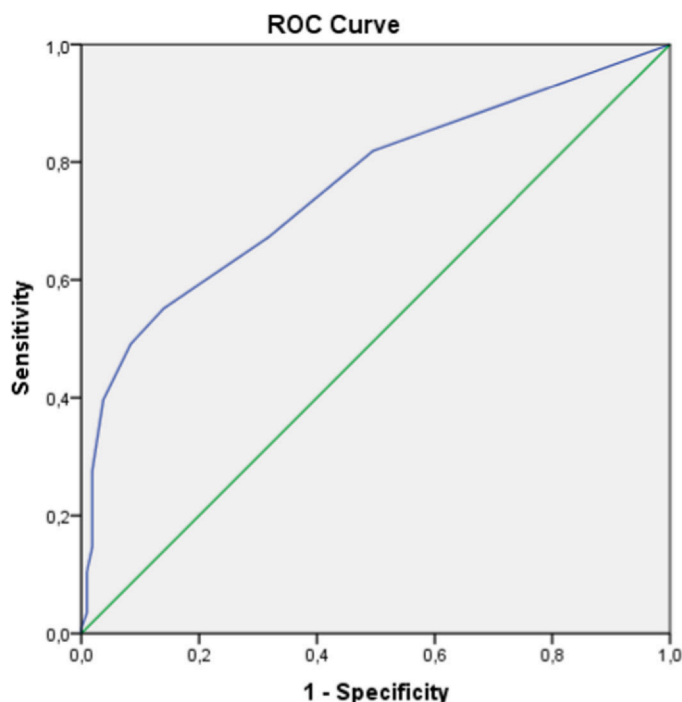
Cronbach's alpha method, yielding an alpha value of 0.872. This signifies a high level of consistency among the 12 symptoms incorporated into the scale. The corrected item-total correlations reported in Table 3, showcasing the relationships between individual items and the overall scale, ranged between 0.379 and 0.724.

There is a high (0.80) and significant ( $P < 0.001$ ) correlation of test-retest reliability established for the total score of SIVD-TR. The outcomes of individual test-retest correlations and Wilcoxon analyses for the 12 items of SIVD-TR are presented in Table 4.

Figure 1 shows a ROC curve that reveals the optimal cutoff point for identifying individuals at risk for voice disorders. The area under the curve determined at 0.758 (95% confidence interval [CI]: 0.695, 0.821) ( $P < 0.001$ ) located the cutoff point at three (3) symptoms. This established cutoff value gave a sensitivity of 0.552 and a specificity of 0.860. Individuals who scored 4 or higher (four or more symptoms) were henceforth considered to be at risk of having a voice disorder.

Furthermore, a significant correlation was observed between the total SIVD-TR score and the total VHI-TR score ( $r = 0.685$ ,  $P < 0.001$ ), highlighting the validity of the SIVD-TR scale with the established Voice Handicap Index in Turkish (VHI-10).

Also, a Mann-Whitney  $U$  test was performed to discriminate potential differences between subjects WVD and those WOVD concerning their total SIVD scores. The analysis revealed a significantly higher median score of 4 among participants with voice diseases compared with a median score of 0 in participants without voice diseases ( $P < 0.001$ ). This result underlines that subjects with higher SIVD scores are at a more risk of experiencing voice-related diseases. Figure 2 illustrates the means and corresponding 95% CIs of the total SIVD scores, revealing



Diagonal segments are produced by ties.

**FIGURE 1.** Receiver Operating Characteristic (ROC) curve of SIVD.

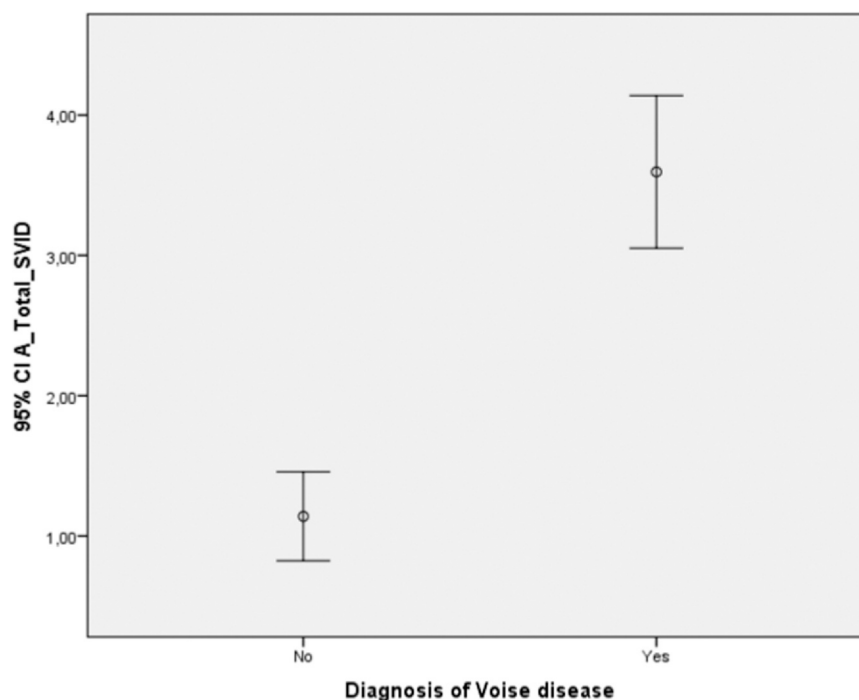
that individuals WVD exhibited a higher mean score compared with those WOVD.

Kolmogorov-Smirnov test was conducted for all educational settings to determine the normality assumption. At all educational settings, it was determined that the samples were not normally distributed ( $P < 0.001$ ). Accordingly, Kruskal-Wallis test was performed to determine whether the SIVD-TR scores of the participants varied according to the educational settings. SIVD-TR scores are significantly different depending on the educational setting ( $P = 0.019$ ). According to the pairwise comparison test results, SIVD-TR scores were significantly different between teachers working at primary and secondary school levels. From Table 5 and Figure 3, it was seen that this difference was due to primary school teachers having higher SIVD-TR scores than secondary school teachers ( $P = 0.039$ ).

On the other hand, it was observed that there is no significant difference in terms of SIVD-TR scores between those working at secondary school and high school levels ( $P = 0.091$ ) and between teachers working at primary and high school levels ( $P = 1.000$ ).

From Table 6, a significant linear correlation of 15.6% is detected ( $P = 0.019$ ) between the participants' SIVD-TR scores and their ages. Similarly, a significant linear relationship of 15.2% is detected ( $P = 0.023$ ) between the participants' SIVD-TR scores and their years of experience.

When normality tests were performed separately for participants with and without a diagnosis of voice disease, it was determined that both samples did not comply with normal distribution ( $P < 0.001$ ). Accordingly, the Mann-Whitney

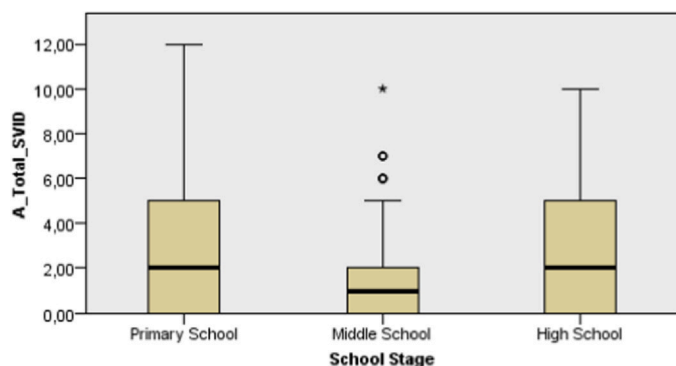


**FIGURE 2.** Mean error bars of total SIVD for WOVD and WVD.

**TABLE 5.**  
SIVD-TR Kruskal-Wallis Test Results for Different Educational Settings

	Primary school	Middle school	High school
Count (%)	51 (22.9%)	99 (44.4%)	73 (32.7%)
Mean rank	125.94	98.94	119.97
Range	12	10	10

$P = 0.019$ .



**FIGURE 3.** Boxplots of SIVD-TR scores for school stages.

$U$  test was applied to test whether there was a difference in SIVD scores between participants with ( $n = 107$ ) and without ( $n = 116$ ) voice diagnosis. There is a significant difference in terms of SIVD-TR scores between participants diagnosed with voice disease (mean rank = 139.58, range = 12) and participants without a voice disease (mean rank = 82.10,

**TABLE 6.**  
Correlation Coefficients

		SIVD
Age	Pearson Corr.	0.156*
	$P$ value	0.019
Years of experience	Pearson Corr.	0.152*
	$P$ value	0.023

\* Significant correlation.

range = 10) ( $P < 0.001$ ). From [Figure 4](#), this difference is due to the fact that the SIVD-TR scores of participants diagnosed with voice disease are higher than those of participants without a diagnosis.

To examine whether there was a difference in SIVD-TR scores between the genders of the participants, a normality test was applied to the SIVD-TR scores of women ( $n = 175$ ) and men ( $n = 48$ ) separately, and it was found that both samples did not comply with normal distribution ( $P < 0.001$ ). Therefore, Mann-Whitney  $U$  test was performed and no significant difference was found between female participants (mean rank = 114.49, range = 12) and male participants (mean rank = 102.93, range = 7) in terms of SIVD-TR scores ( $P = 0.260$ ). The distribution of gender result can be seen in [Figure 5](#).

[Table 7](#) shows the descriptive statistics of the participants' ages and their distribution according to whether they have a diagnosis of voice disease or not.

From [Table 8](#), people with voice disorders have been found to be associated with higher SIVD-TR scores ( $P < 0.001$ ). About 86.4% of the participants with voice disease

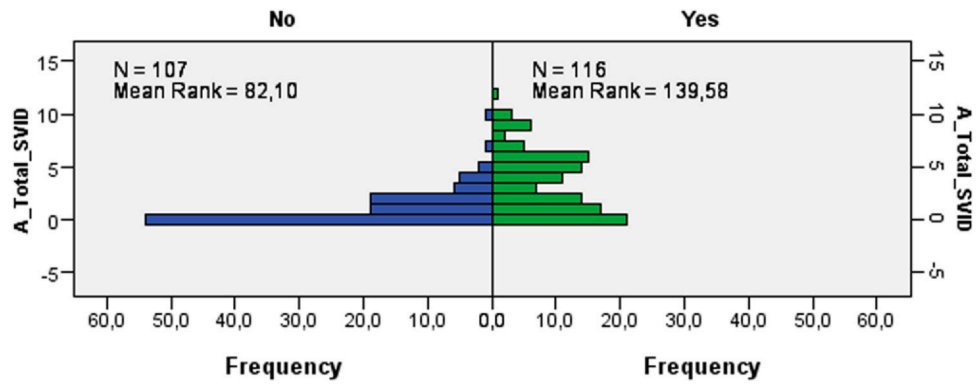


FIGURE 4. Diagnosis of voice disease distribution of SIVD-TR frequency.

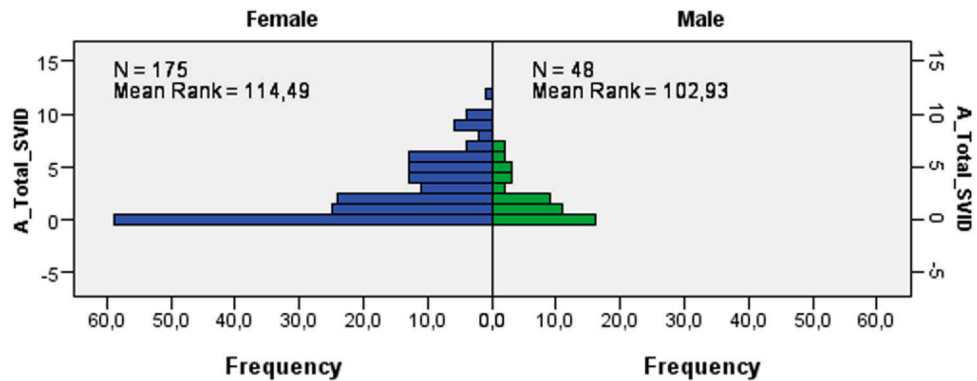


FIGURE 5. Gender distribution of SIVD-TR frequency.

TABLE 7. Descriptive Statistics for Age Distributed by Diagnosis of Voice Disease

	Diagnosis of voice disease	
	WVD (n = 116, 52.01%)	WOVD (n = 107, 47.99%)
Age		
Min	22	23
Max	65	64
Mean	45.67	41.31
Median	46	41
SD	12.54	8.95
Range	43	41

TABLE 8. Association Between the Presence of Voice Disorder and SIVD Score

SIVD-TR	WVD n (%)	WOVD n (%)	Total n (%)
0-3	59 (37.6)	98 (62.4)	157 (100)
4-12	57 (86.4)	9 (13.6)	66 (100)
Total	116 (52)	107 (48)	223 (100)
<i>P</i> < 0.001			

had a SIVD-TR score between 4 and 12, while 13.6% of the participants without voice disease had a SIVD-TR score between 4 and 12.

**DISCUSSION**

Voice disorders have serious effects on every aspect of an individual’s life. Therefore, early detection and diagnosis are important to prevent its progression and increase the effectiveness of treatment.<sup>16</sup> Screening for voice disorders is one way to identify a potential voice disorder. The indispensable requirements of a screening tool are ease of

application, wide usability, speed, low cost, and the ability to provide effective and satisfactory responses.<sup>19</sup> Since diagnosing voice disorders requires time, financial resources, and expert professionals, conducting a comprehensive voice assessment procedure is not always possible. Screening tests help identify individuals who are at risk of developing the disease.

Before employing any scale designed to report results from self-assessment tools in clinical settings, it must be adapted to meet the psychometric standards of usability, validity, reliability, and sensitivity accepted in the target language and culture.<sup>20,21</sup> The SIVD, developed by Ghirardi et al, aimed to be validated and established as the Screening Index for Voice Disorder in Turkish (SIVD-TR). In our study, the internal consistency reliability of the scale was measured using Cronbach’s alpha, yielding a value of

0.87. In Ghirardi et al's study, the internal consistency reliability of the scale was also measured using Cronbach's alpha, with a value of 0.86.

An ROC curve was plotted to determine whether the SIVD scores of 130 individuals ( $n = 130$ : 85 with voice disorders and 45 without) could distinguish between those with and without voice disorders and to determine the optimal cutoff point. The area under the curve was found to be 0.826 ( $P < 0.001$ ), and the cutoff point was set at five (5) symptoms, with a sensitivity of 0.94 and specificity of 0.664. Therefore, individuals with a score of 5 or higher were considered to be at risk of experiencing voice disorders.

In our study, the area under the curve was found to be 0.758 (95% CI: 0.695, 0.821) ( $P < 0.001$ ), and the cutoff point was determined to be four (4) symptoms. This cutoff point exhibited a sensitivity of 0.552 and specificity of 0.860. Consequently, individuals with a score of 4 or higher were evaluated to be at risk of voice disorders.

Furthermore, a significant correlation was observed between SIVD-TR scores and total VHI-TR scores in our study ( $r = 0.685$ ,  $P < 0.001$ ), highlighting the validity of the SIVD-TR scale in Turkish to the established Turkish Voice Handicap Index (VHI).

In a study conducted by Mota et al with 208 teachers (160 women, 48 men), it was reported that 64.4% of teachers had potential voice disorders based on SIVD scores. Teachers with potential voice disorders reported experiencing dryness in the throat, hoarseness, and difficulty speaking the most.<sup>22</sup> According to our study, potential voice disorders were detected in 35.4% of 223 teachers. Among teachers with potential voice disorders, dryness in the throat, hoarseness, and voice hoarseness were reported most frequently.

Mota et al reported that teachers with over 15 years of experience had nearly twice the likelihood of experiencing voice disorders.<sup>22</sup> Sazan conducted a study to examine the opinions of teachers working in primary schools in Turkey regarding voice health and protection. According to the study, as the years of teaching experience increased (16 years and above), teachers tended to be more careless about their voice usage and protection. They were found to smoke more, pay less attention to their food and drink intake, avoid less-polluted environments, and strain their voices.<sup>23</sup> In various studies, it has been found that the risk of voice disorders is higher for teachers who have worked for more than 15 years or more than 20 years compared with those who have worked for less than 15 years.<sup>7,24</sup> In our study, a significant linear relationship was found between years of teaching experience and SIVD scores. This means that as years of teaching experience increase, the risk of voice disorders also increases.

In our study, 86.4% of participants with a voice-related illness had SIVD-TR scores between 4 and 12, while only 13.6% of participants without a voice-related illness had SIVD-TR scores between 4 and 12. In the analysis, a significant difference was detected between the SIVD scores of participants with and without a diagnosis of voice disorder.

This difference was due to the higher SIVD scores observed in participants with voice disorders. This supports the possibility of a voice-related illness in individuals with high SIVD scores. In the literature, while in some studies the educational setting has not been considered as a risk factor, different results have been obtained in others. In Russell et al's<sup>25</sup> study, school types were broadly classified as pre-school, primary school, middle school, and field schools, and no relationship was found between teachers' voice problems and their educational setting. Similarly, in the study conducted by Kooijman et al,<sup>26</sup> no significant difference was reported between the voice complaints of teachers working at primary and middle school levels. In another study by Kooijman et al, while 60.70% of primary school teachers reported voice complaints, this rate was found to be 57.60% among middle school teachers, and the difference between them was not statistically significant.<sup>27</sup> On the other hand, there are studies suggesting that the risk of developing voice disorders in teachers increases with younger students.<sup>10</sup> Furthermore, there are studies indicating that the risk of voice disorders is higher among primary school and preschool teachers compared with middle school teachers.<sup>4,8,28</sup> Additionally, some studies have found that teachers instructing in fourth grade and below have a lower risk of voice disorders compared with those teaching from fifth grade onward,<sup>29</sup> while another study found that the risk of voice disorders among primary school teachers is higher than that of high school teachers.<sup>4</sup> In our study, the SIVD scores of teachers were compared according to the grade level they teach. It was found that primary school teachers had higher SIVD-TR scores than those of middle school teachers. However, no significant difference was observed in SIVD-TR scores among teachers working at middle and high school levels, and among teachers working at primary and high school levels. Primary school teachers are particularly vulnerable to voice disorders due to limited opportunities for vocal rest throughout the working day.<sup>24</sup> Historically, research has focused on medical, individual, psychological, and emotional factors contributing to the development of voice disorders.<sup>30,31</sup> It is now recognized that primary school teachers may experience increased vocal load due to factors such as managing large groups of young students, frequent communication with parents, and the necessity of using their voices in a strained manner.

## CONCLUSIONS

The results of this study indicate that the proposed translation of the SIVD is valid and reliable as a screening tool and has validity and reliability values comparable to the original screening tool. According to this study, the SIVD-TR form is a useful tool for individuals to evaluate themselves and to take the necessary precautions or seek medical examination if a suspicious situation is detected. The scale is also important for mass screening, especially among teachers, and for the development of effective prevention

and education programs for people at risk of voice disorders. The SIVD-TR scale helps prevent these situations by detecting teachers with potential voice disorders early. The SIVD-TR is a valid and reliable screening measurement tool for teachers in Turkish. Its short length is seen as advantageous in terms of time, making it a quick method for voice disorder screening. In future studies, it is recommended to examine the validity and reliability of voice disorder screening tools, especially in different professions. It is considered beneficial to adapt the SIVD to different cultures and languages. This study has several limitations. The first limitation is that additional voice assessment data, such as aerodynamic and acoustic voice analyses, were not collected from the participants. The final limitation is that videostroboscopy examinations by researchers were not conducted on the participants. It is recommended that future studies examine the validity and reliability of SIVD in different languages and cultures. In addition, it is recommended to use voice disorder screening scales for different occupational groups.

**Funding:** No funds, grants, or other support was received.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Acknowledgments

We would like to express our sincere gratitude to the editor, and the associate editor, for their invaluable guidance and support throughout the review process. We also extend our heartfelt thanks to the two anonymous reviewers for their insightful comments and constructive feedback, which significantly improved the quality of our paper. We also would like to thank Professor Çağıl Gökdoğan and Associate Professor Ozan Gökdoğan for their contribution to the English revision of the paper. We express our sincere gratitude to all the participants who generously dedicated their time and contributed to this study.

#### Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.jvoice.2024.07.021](https://doi.org/10.1016/j.jvoice.2024.07.021).

#### References

- Çakan M, Gül G. Ses Eğitiminde Kullanılan Nefes ve Ses Egzersizlerinin Konuşma Bozuklukları giderilmesinde Kullanılabilirliği. *Afyon Kocatepe Üniv Akad Müzik Araştırmaları Derg.* 2018;4:50–63. <https://doi.org/10.5578/amrj.67099>.
- Smith E, Gray SD, Dove H, et al. Frequency and effects of teachers' voice problems. *J Voice.* 1997;11:81–87. [https://doi.org/10.1016/s0892-1997\(97\)80027-6](https://doi.org/10.1016/s0892-1997(97)80027-6).
- Sala E, Laine A, Simberg S, et al. The prevalence of voice disorders among day care center teachers compared with nurses: a questionnaire and clinical study. *J Voice.* 2001;15:413–423. [https://doi.org/10.1016/S0892-1997\(01\)00042-X](https://doi.org/10.1016/S0892-1997(01)00042-X).
- Leão SHd.S, Oates JM, Purdy SC, et al. Voice problems in New Zealand teachers: a national survey. *J Voice.* 2015;29:645.e1–645.e13. <https://doi.org/10.1016/j.jvoice.2014.11.004>.
- Vertanen-Greis H, Löyttyniemi E, Uitti J. Voice disorders are associated with stress among teachers: a cross-sectional study in Finland. *J Voice.* 2020;34:488.e1–488.e8. <https://doi.org/10.1016/j.jvoice.2018.08.021>.
- Lee SY, Lao XQ, Yu IT. A cross-sectional survey of voice disorders among primary school teachers in Hong Kong. *J Occup Health.* 2010;52:344–352. <https://doi.org/10.1539/joh.L10015>.
- Roy N, Merrill RM, Thibeault S, et al. Prevalence of voice disorders in teachers and the general population; 2004. [https://doi.org/10.1044/1092-4388\(2004\)042](https://doi.org/10.1044/1092-4388(2004)042).
- Martins RHG, Pereira ERBN, Hidalgo CB, et al. Voice disorders in teachers. A review. *J Voice.* 2014;28:716–724. <https://doi.org/10.1016/j.jvoice.2014.02.008>.
- Simberg S, Laine A, Sala E, et al. Prevalence of voice disorders among future teachers. *J Voice.* 2000;14:231–235. [https://doi.org/10.1016/S0892-1997\(00\)80030-2](https://doi.org/10.1016/S0892-1997(00)80030-2).
- Angelillo M, Di Maio G, Costa G, et al. Prevalence of occupational voice disorders in teachers. *J Prev Med Hyg.* 2009;50:26–32.
- Behlau M, Dos Santos Ld.MA, Oliveira G. Cross-cultural adaptation and validation of the voice handicap index into Brazilian Portuguese. *J Voice.* 2011;25:354–359. <https://doi.org/10.1016/j.jvoice.2009.09.007>.
- Cutiva LCC, Vogel I, Burdorf A. Voice disorders in teachers and their associations with work-related factors: a systematic review. *J Commun Disord.* 2013;46:143–155. <https://doi.org/10.1016/j.jcomdis.2013.01.001>.
- Doğan M. Profesyonel ses kullanıcılarının seslerinin değerlendirilmesinde subjektif testlerin yeri ve önemi. 2004:35–41.
- Jardim R, Barreto SM, Assunção AÁ. Voice disorder: case definition and prevalence in teachers. *Rev Bras Epidemiol.* 2007;10:625–636.
- Uzuner A, Kaya HT, Akman M, et al. Öğretmenlerin sağlık durumuna bir bakış: Kesitsel bir çalışma. *J Turk Fam Physician.* 2015;6:1–10.
- Awan SN, Roy N, Zhang D, et al. Validation of the Cepstral Spectral Index of Dysphonia (CSID) as a screening tool for voice disorders: development of clinical cutoff scores. *J Voice.* 2016;30:130–144. <https://doi.org/10.1016/j.jvoice.2015.04.009>.
- Ghirardi ACAM, Ferreira LP, Giannini SPP, et al. Screening index for voice disorder (SIVD): development and validation. *J Voice.* 2013;27:195–200. <https://doi.org/10.1016/j.jvoice.2012.11.004>.
- Kılıç MA, Okur E, Yıldırım İ, et al. Ses handicap endeksi voice handicap index Türkçe versiyonunun güvenilirliği ve geçerliliği. *Turk J Ear Nose Throat.* 2008;18:139–147.
- Pernambuco Lda. Prevalência e fatores associados à alteração vocal em idosos institucionalizados com capacidade cognitiva preservada; 2015.
- Şirin S, Ögüt MF, Bilgen C. Reliability and validity of the Turkish version of the Vocal Fatigue Index. *Turk J Med Sci.* 2020;50:902–909. <https://doi.org/10.3906/sag-1908-105>.
- Fava G, Paolillo NP, Oliveira G, et al. Cross-cultural adaptation of the Italian version of the Voice Activity Participation Profile. *SciELO Brasil.* 2014;26:252–255. <https://doi.org/10.1590/2317-1782/201420140302>.
- De Brito Mota AF, Giannini SPP, de Oliveira IB, et al. Voice disorder and burnout syndrome in teachers. *J Voice.* 2019;33:581.e7–581.e16. <https://doi.org/10.1016/j.jvoice.2018.01.022>.
- Sazak N. İlköğretim okullarında görev yapan öğretmenlerin ses sağlığı ve korunmasına ilişkin görüşleri. *İnönü Üniv Eğitim Fak Derg.* 2007;7:69–86.
- Devadas U, Bellur R, Maruthy S. Prevalence and risk factors of voice problems among primary school teachers in India. *J Voice.* 2017;31:117.e1–117.e10. <https://doi.org/10.1016/j.jvoice.2016.03.006>.
- Russell A, Oates J, Greenwood KM. Prevalence of voice problems in teachers. *J Voice.* 1998;12:467–479.



26. Kooijman PG, Thomas G, Graamans K, et al. Psychosocial impact of the teacher's voice throughout the career. *J Voice*. 2007;21:316–324. <https://doi.org/10.1016/j.jvoice.2005.12.007>.
27. Kooijman P, De Jong F, Thomas G, et al. Risk factors for voice problems in teachers. *Folia Phoniatr Logop*. 2006;58:159–174. <https://doi.org/10.1159/000091730>.
28. Pizolato RA, Mialhe FL, Cortellazzi KL, et al. Evaluation of risk factors for voice disorders in teachers and vocal acoustic analysis as an instrument of epidemiological assessment. *Rev CEFAC*. 2013;15:957–966. <https://doi.org/10.1590/S1516-18462013000400025>.
29. da Rocha LM, de Lima Bach S, do Amaral PL, et al. Risk factors for the incidence of perceived voice disorders in elementary and middle school teachers. *J Voice*. 2017;31:258.e7–258.e12. <https://doi.org/10.1016/j.jvoice.2016.05.018>.
30. McHugh-Munier C, Scherer KR, Lehmann W, et al. Coping strategies, personality, and voice quality in patients with vocal fold nodules and polyps. *J Voice*. 1997;11:452–461. [https://doi.org/10.1016/S0892-1997\(97\)80042-2](https://doi.org/10.1016/S0892-1997(97)80042-2).
31. Morrison MD, Rammage LA, Belisle GM, et al. Muscular tension dysphonia. *J Otolaryngol*. 1983;12:302–306.