Risk factors for voice disorders in public school teachers in Cyprus

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Keywords
Voice disorders • Risk factors • Teachers, Cyprus

Introduction and literature review

Teachers belong to one of the occupational groups that tend to overuse their voice (i.e., repeatedly use their voice or require heavy voice use) for their work and consequently have a tendency to have a higher prevalence of voice disorders in comparison to the general population worldwide [1-4]. Many different studies all over the world that investigated teachers’ prevalence of voice disorders in different geographic areas and cultures indicated that teachers have a higher incidence of voice disorders. Roy et al. [1] explored the prevalence of voice disorders in elementary and secondary school teachers in comparison to the general population in the United States and revealed that teachers stated a significantly higher prevalence of having a present voice problem than nonteachers (11.0% for teachers vs. 6.2% for nonteachers). Behlau et al. [2] compared the frequency of occurrence of current voice disorders in Brazilian elementary and secondary school teachers and nonteachers that was found to be 11.6% for teachers and 7.5% for nonteachers. Trinite [5] investigated the prevalence of voice disorders in primary and secondary school teachers in Latvia and disclosed that 8% of the teachers self-reported that they currently had a voice disorder and 36.9% said they have experienced voice problems during the last 9 months. Seifpanahi et al. [3] compared the prevalence of voice disorders among teachers and nonteachers in Iran and found that 54.6% of teachers and 21.1% of nonteachers experienced vocal complaints. Devadas et al. [6] investigated the prevalence of voice problems among primary school teachers in India and discovered that 17.4% of the teachers self-reported voice problems. Lyberg-Ahlander [4] studied the prevalence of self-reported voice disorders in the general population in Sweden and revealed that the highest prevalence of voice problems was reported in teaching professions (19.3%).

Several recent studies identified risk factors that place teachers at risk for developing voice disorders in various countries. Rantala et al. [7] investigated associations between voice and postures used during teaching. Outcomes indicated that specific postures such as twisted head and torso and raised arms were associated with specific voice symptoms (e.g., voice breaks, aphonia etc.). Devadas et al. [6] investigated risk factors for voice problems among primary school teachers in India. Significant identified factors were: the number of years of teaching, high background noise levels while teaching, psychological stress while teaching, improper breath management (holding breath while speaking), upper respiratory tract infections, thyroid problems, and acid reflux. Bobbol et al. [8] studied risk factors for voice disorders among Egyptian school teachers. Significant risk factors pinpointed were the number of years of teaching, high background noise levels while teaching, psychological stress while teaching, improper breath management (holding breath while speaking), upper respiratory tract infections, thyroid problems, and acid reflux. Devadas et al. [6] investigated risk factors for voice problems among primary school teachers in India. Significant identified factors were: the number of years of teaching, high background noise levels while teaching, psychological stress while teaching, improper breath management (holding breath while speaking), upper respiratory tract infections, thyroid problems, and acid reflux. Bobbol et al. [8] studied risk factors for voice disorders among Egyptian school teachers. Significant risk factors pinpointed were the number of years of teaching, high background noise levels while teaching, psychological stress while teaching, improper breath management (holding breath while speaking), upper respiratory tract infections, thyroid problems, and acid reflux.
relation to noise in public and private schools in Upper Egypt and identified noise at work as being a risk factor for the development of voice disorders. Particularly, 82.2% of the teachers who reported moderate or severe dysphonia stated a feeling of sometimes or always being in noise during their working day and they needed to raise their voice. Alva et al. [10] explored various risk factors that influence the onset and progression of voice disorders in teachers in India and showed a statistically significant association between voice disorders and upper respiratory infections, Deviated Nasal Septum and gastroesophageal reflux disease. Trinite’s [5] research looked into voice risk factors in teachers in Latvia and found that the chances of a teacher having a voice disorder increase if the following risk factors exist: extra vocal load (duties of a coach, conductor of choir, etc), shunting, throat clearing, neglecting personal health (e.g., teaching with a sore throat), background noise, chronic upper respiratory tract infections, allergies, job dissatisfaction, and stress at work. Seifpanahi et al. [3] studied voice risk factors among teachers and nonteachers in Iran and pinpointed a significantly higher vocal load risk factor (e.g., number of pupils in the classroom, number of teaching years, number of teaching hours per week, etc.) for teachers (70.77%) in comparison with nonteachers (27.44%).

Given the existence of such challenges in high risk populations such as teachers, voice disorders may impact teachers’ life, as well as, their work such as affecting their work performance and attendance. Few investigations examined the specific occupational effects of voice disorders in teachers such as the effects on work attendance, work performance and future career choices. Van Houtte et al. [11] investigated voice related absenteeism in kindergarten, elementary and high school teachers and found that teachers experienced a significantly higher number of missed days of work because of their voice compared to the control group. More precisely, 34.6% of the teachers missed 1 day, 29.3% missed 1 week, 4.75% missed 2 weeks and 6.8% missed more than 2 weeks of work. Roy et al. [12] examined the effects of voice disorders on work performance and attendance in teachers and nonteachers and revealed that more than 43% of teachers had reduced activities or interactions for at least 1 day due to their voice problems. In addition, 18.3% of teachers versus 7.2% of non-teachers had missed at least 1 day of work and 3% of teachers versus 1.3% of nonteachers had missed more than 5 days of work due to their voice problems.

Taking into consideration the existing data on the high prevalence of voice disorders in teachers and the impact that voice disorders can have on their work, as well as, the abundance of data on examining risk factors for developing voice pathologies in teachers worldwide; the aim of this study is to investigate the prevalence and risk factors as well as the occupational impact of voice disorders in preschool-kindergarten and grade 1st-6th school teachers in Cyprus in order to determine the need for vocal hygiene education in this population.

Methods

DESIGN OF THE QUESTIONNAIRE

The questionnaire was uploaded online via a Survey Monkey website and was set up to not allow more than one completion from the same participant (Appendix A). It included 58 questions which were constructed based on the researchers’ clinical experience, feedback received from teachers who completed a preliminary pilot study and other questionnaires that exist in the voice disorder literature [13-15]. It consisted of five parts. One section was “Demographic Information” which consisted of questions 1-6 that inquired information about the participant’s age, gender, region of origin, region of work, etc. Another section was “Risk Factors for Voice Disorders” that included questions 7-51 and was divided into four parts, which included: 1) risk factors related to general health such as nasal allergies, gastroesophageal reflux, and upper respiratory infections; 2) risk factors related to voice use such as years of teaching, teaching grade, teaching subject, teaching hours per week; 3) risk factors related to lifestyle such as smoking, alcohol consumption, caffeine use, water intake, stress; and 4) risk factors related to the environment such as the physical size of the classroom, level and source of noise at work and air quality at work. Another section was the “Occupational Consequences of Voice Disorders” that consisted of questions 52-54 which requested information on work absenteeism and reduction of duties due to voice problems. One more part was “Vocal Hygiene Education” which entailed questions 55-56 that requested information on vocal hygiene education during teachers’ training and its usefulness. The other unit of the online questionnaire was the “Voice Disorder Index” (VDI) which was comprised of question 57. The VDI is a reliable instrument that portrays the subject’s perceived severity of his/her voice problem as it relates to his/her quality of life [16]. It entails twelve statements that are used in the Voice Handicap Index-30, four of those statements are also included on the Voice Handicap Index-10 [16, 17]. Its range of scores is 0-48. A score of 0-7 shows normal voice whereas a score of 8-48 signifies a voice which is slightly (i.e., scores 8-14), moderately (i.e., scores 15-22) or profoundly disordered (i.e., scores 23-48) [16] (F. Ingolf, personal communication, June 26, 2017).

PARTICIPANTS

An email with a link to an online questionnaire was sent to primary public school teachers in Cyprus via their school inspector, principle or speech therapist. Also, a message with a link to an online questionnaire was posted on teachers’ social media groups. Four hundred and forty-nine out of four thousand seven hundred questionnaires were completed, yielding about a 10% response rate. Participants were 25-60 years old and were preschool/kindergarten (n = 148) and grade 1st-6th (n = 301) public school teachers. They consisted of 422 females and 27 males who work in primary schools
in various geographic rural and urban regions of Cyprus (i.e., Nicosia (n = 158), Limassol (n = 186), Larnaca (n = 48), Famagusta (n = 20) and Paphos (n = 37)). Participants were divided into two groups (i.e., Group 1: VDI ≤ 7; n = 135 and Group 2: VDI > 7; n = 314) based on their VDI score. The participants’ mean and range score on their VDI were 13.49 and 48 respectively.

**Procedures**

The subsequent procedures were followed. In stage one, either an email with a link to an online questionnaire was sent to primary public-school teachers or/and a message with a link to the electronic questionnaire was posted on teachers’ social groups in Cyprus. In stage two, each subject was requested to complete questions 1 to 56 of the survey that inquired information on demographic information, voice disorder risk factors and occupational consequences, as well as, vocal hygiene education. In Step three, every participant was asked to complete question 57 which was the VDI. Subjects’ responses on question 57 were scored and were given a self-perceived severity of their voice problem (i.e., normal, slightly, moderately or profoundly disordered) as it relates to their quality of life. Subjects whose VDI score was normal were placed into the VDI ≤ 7 group which is defined as the group of teachers who sense that they do not have voice difficulties that impact their quality of life. Subjects whose VDI score was slightly, moderately or profoundly disordered were assigned to the VDI > 7 group which is defined as the group of teachers who feel that they have voice difficulties that impact their quality of life.

**Data Analysis**

The chi-squared test of goodness of fit was applied to investigate the differences in responses between the teachers with VDI ≤ 7 and those with VDI > 7 with regard to risk factors related to general health, voice use, lifestyle, and environment, as well as, occupational effects of voice disorders and vocal hygiene education. The significance level was appointed to 0.05 throughout. An adjusted residual analysis was further employed to identify groups for voice risk factors, occupational consequences and vocal hygiene education that were responsible for the significant chi-square statistic [18, 19]. A residual value greater than 1.96 or lower than -1.96 indicated that the group made a significant contribution to the chi-square statistic for a voice risk factor, occupational consequence, etc. The Statistical Package for the Social Sciences, Version 22 (SPSS Inc.) was used for all statistical analyses.

**Results**

The results of the present investigation indicate that the estimated prevalence of self-perceived voice problems in the sample of 449 preschool/kindergarten and grade 1st-6th public-school teachers investigated is 69.9%. Particularly, 314 out of 449 teachers examined received a VDI score 8-48 which indicates a voice that is slightly, moderately, or profoundly disordered.

The results of the current study additionally show that the risk for developing voice disorders in preschool/kindergarten and grade 1st-6th school teachers in Cyprus involves risk factors related to general health, voice use, lifestyle, and the environment. Tables I-IV show the significant risk factors detected and the adjusted residual values for each risk factor group.

**Risk Factors Related to General Health**

The significant risk factors recognized and the adjusted residual values for the risk factors associated to general health are displayed in Table I. The VDI > 7 class had significantly more individuals who had “frequently” (32.2% vs 23.0%, z = 2.0) experienced nasal allergies (e.g., nasal discharge, stuffy nose, sneezing) than the VDI ≤ 7 group, and significantly fewer participants who had “never” (7.3% vs 14.8%, z = -2.5) had nasal allergies [χ² (4, n = 449) = 10.81, p < 0.05]. A significantly higher number of participants in the VDI > 7 category reported to “frequently” (39.2% vs 21.5%, z = 3.6) and significantly fewer individuals declared to “never” (6.7% vs 12.6%, z = -2.1) and “infrequently” (19.4% vs 28.1%, z = -2.0) experience upper respiratory infections (e.g., pharyngitis and laryngitis) than the VDI ≤ 7 group [χ² (4, n = 449) = 19.78, p < 0.05].

**Risk Factors Related to Voice Use**

The significant risk factors identified and the adjusted residual values for the risk factors related to voice use are shown in Table II. A significantly higher number of participants in the VDI > 7 group reported to teach kindergarten (36.6% vs 26.7%, z = 2.5) voice in class than the VDI ≤ 7 group. In contrast, a significantly lower number of subjects in the VDI > 7 category who stated to “never” (4.1% vs 12.6%, z = -2.6) and “rarely” voice to discipline students was significantly lower than in the VDI ≤ 7 category and the number of participants in the VDI > 7 category who stated to “frequently” (49.4% vs 40.7%, z = 1.7) and “always” (21.0% vs 10.4%, z = 2.7) use their voice to discipline students was significantly lower.
Tab. I. Risk factors related to general health in teachers in the VDI ≤ 7 and VDI > 7 groups showing the percent of those responding to the statements.

| Risk factors          | VDI ≤ 7 teachers (n = 135) | VDI > 7 teachers (n = 314) | Adjusted residual | P-value¹ |
|-----------------------|----------------------------|-----------------------------|-------------------|----------|
|                       | N  | %   | N  | %   |                   |        |
| Nasal allergies       |    |      |    |      |                   |        |
| Never                 | 20 | 14.8 | 23 | 7.3  | 2.5              |        |
| Infrequently          | 35 | 25.9 | 64 | 20.4 | 1.3              |        |
| Sometimes             | 40 | 29.6 | 110| 35.0 | -1.1             | 0.029  |
| Frequently            | 31 | 23.0 | 101| 32.2 | -2.0             |        |
| Always                | 9  | 6.7  | 16 | 5.1  | 0.7              |        |
| Gastroesophageal reflux|    |      |    |      |                   |        |
| Never                 | 61 | 45.2 | 121| 38.5 | 1.3              |        |
| Infrequently          | 35 | 25.9 | 82 | 26.1 | 0.0              |        |
| Sometimes             | 24 | 17.8 | 62 | 19.7 | -0.5             | 0.595  |
| Frequently            | 10 | 7.4  | 36 | 11.5 | -1.3             |        |
| Always                | 5  | 3.7  | 13 | 4.1  | -0.2             |        |
| Upper respiratory infections |    |      |    |      |                   |        |
| Never                 | 17 | 12.6 | 21 | 6.7  | 2.1              |        |
| Infrequently          | 38 | 28.1 | 61 | 19.4 | 2.0              |        |
| Sometimes             | 49 | 36.3 | 94 | 29.9 | 1.3              | 0.001  |
| Frequently            | 29 | 21.5 | 123| 39.2 | -3.6             |        |
| Always                | 2  | 1.5  | 15 | 4.8  | -1.7             |        |

¹ Pearson’s Chi-Square test. Significant differences between teachers in the VDI ≤ 7 and the VDI > 7 groups are indicated in bold in the last column.

Tab. II. Risk factors related to voice use in teachers in the VDI ≤ 7 and VDI > 7 groups showing the percent of those responding to the statements.

| Risk factors          | VDI ≤ 7 teachers (n = 135) | VDI > 7 teachers (n = 314) | Adjusted residual | P-value¹ |
|-----------------------|----------------------------|-----------------------------|-------------------|----------|
|                       | N  | %   | N  | %   |                   |        |
| Age                   |    |      |    |      |                   |        |
| 25-34                 | 47 | 34.8 | 120| 38.2 | -0.7             |        |
| 35-44                 | 66 | 48.9 | 157| 50.0 | -0.2             |        |
| 45-54                 | 22 | 16.3 | 33 | 10.5 | 1.7              | 0.202  |
| 55-60                 | 0  | 00.0 | 4  | 1.3  | -1.3             |        |
| Teaching years        |    |      |    |      |                   |        |
| ≤ 5                   | 16 | 11.9 | 47 | 15.0 | -0.9             |        |
| 6-10                  | 34 | 25.2 | 74 | 23.6 | 0.4              |        |
| 11-20                 | 61 | 45.2 | 147| 46.8 | -0.3             | 0.705  |
| ≥ 21                  | 24 | 17.8 | 46 | 14.6 | 0.8              |        |
| Nature of employment  |    |      |    |      |                   |        |
| Teaching              | 112| 83.0 | 268| 85.4 | -0.6             |        |
| Teaching + duties     | 25 | 17.0 | 46 | 14.6 | 0.6              | 0.520  |
| Grade being taught    |    |      |    |      |                   |        |
| Kindergarten          | 36 | 26.7 | 115| 36.6 | -2.0             |        |
| 1                     | 17 | 12.6 | 42 | 13.4 | -0.2             |        |
| 2                     | 6  | 4.4  | 31 | 9.9  | -1.9             |        |
| 3                     | 7  | 5.2  | 21 | 6.7  | -0.6             |        |
| 4                     | 9  | 6.7  | 21 | 6.7  | 0.0              | 0.015  |
| 5                     | 8  | 5.9  | 17 | 5.4  | 0.2              |        |
| 6                     | 15 | 11.1 | 17 | 5.4  | 2.2              |        |
| None                  | 37 | 27.4 | 50 | 15.9 | 2.8              |        |
| Teaching a split-grade|    |      |    |      |                   |        |
| No                    | 118| 87.4 | 281| 89.5 | -0.6             |        |
| Yes                   | 17 | 12.6 | 33 | 10.5 | 0.6              | 0.520  |

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Tab. II. Risk factors related to voice use in teachers in the VDI ≤ 7 and VDI > 7 groups showing the percent of those responding to the statements.

| Risk factors                                      | VDI ≤ 7 teachers (n = 135) | VDI > 7 teachers (n = 314) | Adjusted residual | P-value* |
|--------------------------------------------------|----------------------------|-----------------------------|-------------------|----------|
|                                                  | N  | %  | N  | %  |                      |       |
| Split-grade being taught                         |    |    |    |    |                      |       |
| N/A                                              | 118| 87.4| 286| 91.1| -1.2                 |       |
| 1-2                                              | 5  | 2.2| 11 | 3.5| -0.7                 |       |
| 2-3                                              | 5  | 3.7| 5  | 1.6| 1.4                  |       |
| 3-4                                              | 3  | 2.2| 5  | 1.6| 0.5 0.402            |       |
| 4-5                                              | 2  | 1.5| 1  | 0.3| 1.4                  |       |
| 5-6                                              | 4  | 3.0| 6  | 1.9| 0.7                  |       |
| Subject being taught                             |    |    |    |    |                      |       |
| Greek                                            | 77 | 57.0| 160| 51.0| 1.2                 |       |
| Math                                             | 3  | 2.2| 11 | 3.5| -0.7                 |       |
| Physics                                          | 6  | 4.4| 9  | 2.9| 0.9                  |       |
| English                                          | 5  | 3.7| 14 | 4.5| -0.4 0.090           |       |
| Music                                            | 7  | 5.2| 9  | 2.9| 1.2                  |       |
| Physical education                               | 0  | 0.0| 6  | 1.9| -1.6                 |       |
| Arts                                             | 7  | 5.2| 6  | 1.9| 1.9                  |       |
| Other                                            | 30 | 22.2| 99 | 31.5| -2.0                 |       |
| Teaching hours per week                          |    |    |    |    |                      |       |
| ≤ 23 x 40 min                                    | 27 | 20.0| 58 | 18.5| 0.4                 |       |
| 24-28 x 40 min                                   | 64 | 47.4| 129| 41.1| 1.2 0.283            |       |
| 29 x 40 min                                      | 44 | 32.6| 127| 40.4| -1.6                 |       |
| Teaching hours per week in the past              |    |    |    |    |                      |       |
| ≤ 23 x 40 min                                    | 24 | 17.8| 60 | 19.1| -0.3                |       |
| 24-28 x 40 min                                   | 27 | 20.0| 51 | 16.2| 1.0 0.624            |       |
| 29 x 40 min                                      | 84 | 62.2| 203| 64.6| -0.5                |       |
| Duration of most frequent classes                |    |    |    |    |                      |       |
| < 40 min                                         | 6  | 4.4| 24 | 7.6| -1.2                 |       |
| 40 min                                           | 7  | 5.2| 26 | 8.3| -1.2 0.211           |       |
| 80 min                                           | 122| 90.4| 264| 84.1| 1.8                 |       |
| Duration of most frequent classes in the past    |    |    |    |    |                      |       |
| < 40 min                                         | 14 | 10.4| 31 | 9.9| 0.2                  |       |
| 40 min                                           | 6  | 4.4| 29 | 9.2| -1.7 0.221           |       |
| 80 min                                           | 115| 85.2| 254| 80.9| 1.1                 |       |
| Duration of breaks between classes               |    |    |    |    |                      |       |
| 10 min                                           | 12 | 8.9| 45 | 14.3| -1.6                |       |
| 20 min                                           | 51 | 37.8| 139| 44.3| -1.3                |       |
| 21-60 min                                        | 40 | 29.6| 87 | 27.7| 0.4                 | 0.004 |
| 61-90 min                                        | 19 | 14.1| 56 | 11.5| 0.8                  |       |
| > 91 min                                         | 13 | 9.6| 7  | 2.2| 3.5                  |       |
| Duration of shortest break between classes       |    |    |    |    |                      |       |
| 10 min                                           | 118| 87.4| 284| 90.4| -1.0                |       |
| 20 min                                           | 9  | 6.7| 22 | 7.0| -0.1                |       |
| 21-60 min                                        | 7  | 5.2| 8  | 2.5| 1.4 0.221            |       |
| 61-90 min                                        | 1  | 0.7| 0  | 0.0| 1.5                  |       |
| Maximum number of students in classroom          |    |    |    |    |                      |       |
| ≤ 10                                             | 13 | 9.6| 17 | 5.4| 1.6                  |       |
| 11-15                                            | 12 | 8.9| 21 | 6.7| 0.8                  |       |
| 16-20                                            | 57 | 27.4| 69 | 22.0| 1.2 0.092           |
| 21-25                                            | 73 | 54.1| 207| 65.9| -2.4                 |       |

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Tab. II. Risk factors related to voice use in teachers in the VDI ≤ 7 and VDI > 7 groups showing the percent of those responding to the statements.

| Risk factors                                      | VDI ≤ 7 teachers (n = 135) | VDI > 7 teachers (n = 314) | Adjusted residual | P-value |
|---------------------------------------------------|-----------------------------|-----------------------------|-------------------|---------|
| Maximum number of students in classroom in the past|                             |                             |                   |         |
| ≤ 10                                              | 10                          | 13                          | 1.4               |         |
| 11-15                                             | 7                           | 20                          | -0.5              |         |
| 16-20                                             | 27                          | 49                          | 1.1               | 0.282   |
| 21-25                                             | 91                          | 232                         | -1.4              |         |
| Voice loudness in class                          |                             |                             |                   |         |
| Not loud                                          | 10                          | 2                           | 4.1               |         |
| Slightly loud                                     | 29                          | 37                          | 2.7               |         |
| Moderately loud                                   | 67                          | 154                         | 0.1               | 0.000   |
| Very loud                                         | 28                          | 106                         | -2.8              |         |
| Excessively loud                                  | 1                           | 15                          | -2.1              |         |
| Voice loudness in class in the past               |                             |                             |                   |         |
| Not loud                                          | 6                           | 8                           | 1.1               |         |
| Slightly loud                                     | 19                          | 28                          | 1.6               |         |
| Moderately loud                                   | 64                          | 159                         | 0.6               | 0.168   |
| Very loud                                         | 42                          | 122                         | -1.6              |         |
| Excessively loud                                  | 4                           | 17                          | -1.1              |         |
| Voice loudness outdoors (e.g., teaching physical education, supervising children during recess, etc.) | | | | |
| N/A                                               | 1                           | 2                           | 0.1               |         |
| Not loud                                          | 3                           | 8                           | -0.2              |         |
| Slightly loud                                     | 15                          | 22                          | 1.5               |         |
| Moderately loud                                   | 42                          | 75                          | 1.6               | 0.268   |
| Very loud                                         | 63                          | 167                         | -1.3              |         |
| Excessively loud                                  | 11                          | 40                          | -1.4              |         |
| Voice loudness at home                           |                             |                             |                   |         |
| Not loud                                          | 39                          | 84                          | 0.5               |         |
| Slightly loud                                     | 53                          | 112                         | 0.7               |         |
| Moderately loud                                   | 38                          | 98                          | -0.6              | 0.576   |
| Very loud                                         | 5                           | 16                          | -0.6              |         |
| Excessively loud                                  | 0                           | 4                           | -1.3              |         |
| Singing in the classroom                         |                             |                             |                   |         |
| Never                                             | 20                          | 25                          | 2.2               |         |
| Infrequently                                      | 26                          | 58                          | 0.2               |         |
| Sometimes                                         | 35                          | 72                          | 0.7               | 0.098   |
| Frequently                                        | 28                          | 71                          | -0.4              |         |
| Always                                            | 26                          | 88                          | -2.0              |         |
| Vocally discipline students                       |                             |                             |                   |         |
| Never                                             | 4                           | 2                           | 2.0               |         |
| Infrequently                                      | 17                          | 15                          | 3.3               |         |
| Sometimes                                         | 45                          | 78                          | 1.9               | 0.000   |
| Frequently                                        | 55                          | 155                         | -1.7              |         |
| Always                                            | 14                          | 66                          | -2.7              |         |
| Using microphone when teaching                    |                             |                             |                   |         |
| Never                                             | 134                         | 300                         | 2.0               |         |
| Infrequently                                      | 1                           | 7                           | -1.1              |         |
| Sometimes                                         | 0                           | 3                           | -1.1              | 0.365   |
| Frequently                                        | 0                           | 2                           | -0.9              |         |
| Always                                            | 0                           | 2                           | -0.9              |         |

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Tab. II. Risk factors related to voice use in teachers in the VDI ≤ 7 and VDI > 7 groups showing the percent of those responding to the statements.

| Risk factors                              | VDI ≤ 7 teachers (n = 135) | VDI > 7 teachers (n = 314) | Adjusted residual | P-value† |
|------------------------------------------|-----------------------------|----------------------------|-------------------|----------|
| **Using microphone when teaching in the past** |                             |                            |                   |          |
| Never                                    | 134 (99.3)                  | 301 (95.9)                 | 1.9               |          |
| Infrequently                              | 1 (0.7)                     | 8 (2.5)                    | -1.3              | 0.284    |
| Sometimes                                 | 0 (0.0)                     | 4 (1.3)                    | -1.3              |          |
| Always                                    | 0 (0.0)                     | 1 (0.3)                    | 0.7               |          |
| **Teaching above students talking**       |                             |                            |                   |          |
| Never                                    | 43 (31.9)                   | 69 (22.0)                  | 2.2               |          |
| Infrequently                              | 45 (33.3)                   | 92 (29.3)                  | 0.9               |          |
| Sometimes                                 | 23 (17.0)                   | 63 (20.1)                  | 0.7               |          |
| Frequently                                | 22 (16.3)                   | 73 (23.2)                  | -1.7              |          |
| Always                                    | 2 (1.5)                     | 17 (5.4)                   | -1.9              |          |
| **Speaking over a natural breath cycle**  |                             |                            |                   |          |
| Never                                    | 26 (19.3)                   | 16 (5.1)                   | 4.7               |          |
| Infrequently                              | 47 (34.8)                   | 70 (22.3)                  | 2.8               |          |
| Sometimes                                 | 54 (39.7)                   | 114 (36.3)                 | -2.3              | < 0.001  |
| Frequently                                | 25 (18.5)                   | 96 (30.6)                  | -2.6              |          |
| Always                                    | 3 (2.2)                     | 18 (5.7)                   | -1.6              |          |
| **Coughing during the day**               |                             |                            |                   |          |
| Never                                    | 18 (13.3)                   | 11 (3.5)                   | 3.9               |          |
| Infrequently                              | 47 (34.8)                   | 81 (25.8)                  | 1.9               |          |
| Sometimes                                 | 49 (36.3)                   | 131 (41.7)                 | -1.1              | < 0.001  |
| Frequently                                | 19 (14.1)                   | 80 (25.5)                  | -2.7              |          |
| Always                                    | 2 (1.5)                     | 11 (3.5)                   | -1.2              |          |
| **Clearing throat during the day**        |                             |                            |                   |          |
| Never                                    | 52 (38.8)                   | 52 (16.6)                  | 1.8               |          |
| Infrequently                              | 36 (26.7)                   | 84 (26.8)                  | 0.0               |          |
| Sometimes                                 | 41 (30.4)                   | 69 (22.0)                  | 1.9               | 0.012    |
| Frequently                                | 22 (16.3)                   | 93 (29.6)                  | -3.0              |          |
| Always                                    | 4 (3.0)                     | 16 (5.1)                   | -1.0              |          |
| **Yelling**                               |                             |                            |                   |          |
| Never                                    | 7 (5.2)                     | 3 (1.0)                    | 2.8               |          |
| Infrequently                              | 56 (41.7)                   | 57 (11.8)                  | 3.9               |          |
| Sometimes                                 | 61 (45.2)                   | 125 (39.8)                 | 1.1               | < 0.001  |
| Frequently                                | 29 (21.5)                   | 132 (42.0)                 | -4.2              |          |
| Always                                    | 2 (1.5)                     | 17 (5.4)                   | -1.9              |          |

†: Pearson’s Chi-Square test. Significant differences between teachers in the VDI ≤ 7 and the VDI > 7 groups are indicated in bold in the last column.

The number of subjects in the VDI > 7 group who noted to “never” (3.5% vs 13.3%, z = -3.9) cough during the day was significantly less and the number of participants who stated to “frequently” (25.5% vs 14.1%, z = 2.7) cough was significantly greater than in the VDI ≤ 7 group [χ² (4, n = 449) = 24.41, p < 0.001]. A significantly greater number of subjects in the VDI > 7 category reported to “frequently” (29.6% vs 16.3%, z = 3.0) clear their throat throughout the day than in the VDI ≤ 7 party [χ² (4, n = 449) = 12.80, p < 0.05].

The number of participants who testified to “never” (1.0% vs 5.2%, z = -2.8) yell was significantly less in the VDI > 7 group and the number of subjects who reported to “frequently” (42.0% vs 21.5%, z = 4.2) yell was significantly greater than in the VDI ≤ 7 group [χ² (4, n = 449) = 35.68, p < 0.001].
Tab. III. Risk factors related to lifestyle in teachers in the VDI ≤ 7 and VDI > 7 groups showing the percent of those responding to the statements.

| Risk factors                          | VDI ≤ 7 teachers (n = 135) | VDI > 7 teachers (n = 314) | Adjusted residual | P-value¹ |
|---------------------------------------|-----------------------------|----------------------------|--------------------|----------|
|                                       | N   | %   | N   | %   |                |          |
| Smoking                               |     |     |     |     |                |          |
| Never                                 | 99  | 73.3| 245 | 78.0| -1.1           |          |
| Infrequently                          | 9   | 6.7 | 11  | 3.5 | 1.5            |          |
| Sometimes                             | 1   | 0.7 | 19  | 6.1 | -2.5           | 0.020    |
| Frequently                            | 16  | 11.9| 22  | 7.0 | 1.7            |          |
| Always                                | 10  | 7.4 | 17  | 5.4 | 0.8            |          |
| Smoking in the past                   |     |     |     |     |                |          |
| Current smoker                        | 18  | 13.5| 14  | 4.5 | 3.4            |          |
| Never                                 | 82  | 60.7| 191 | 60.8| 0.0            |          |
| Infrequently                          | 7   | 5.2 | 29  | 9.2 | -1.4           |          |
| Sometimes                             | 11  | 8.1 | 40  | 12.7| -1.4           | 0.006    |
| Frequently                            | 12  | 8.9 | 20  | 6.4 | 1.0            |          |
| Always                                | 5   | 3.7 | 20  | 6.4 | -1.1           |          |
| When did former smoker stopped smoking|     |     |     |     |                |          |
| N/A                                   | 115 | 85.2| 267 | 85.0| 0.0            |          |
| <1                                    | 2   | 1.5 | 5   | 1.6 | -0.1           |          |
| 1-3                                   | 3   | 2.2 | 8   | 2.5 | -0.2           | 0.720    |
| 3-5                                   | 6   | 4.4 | 7   | 2.2 | 1.3            |          |
| > 5                                   | 9   | 6.7 | 27  | 8.6 | -0.7           |          |
| Drinking alcohol                      |     |     |     |     |                |          |
| Never                                 | 21  | 15.6| 71  | 22.6| -1.7           |          |
| Infrequently                          | 70  | 51.9| 135 | 43.0| 1.7            |          |
| Sometimes                             | 35  | 25.9| 88  | 28.0| -0.5           | 0.349    |
| Frequently                            | 8   | 5.9 | 19  | 6.1 | -0.1           |          |
| Always                                | 1   | 0.7 | 1   | 0.3 | 0.6            |          |
| Drinking caffeine                     |     |     |     |     |                |          |
| Never                                 | 4   | 3.0 | 9   | 2.9 | 0.1            |          |
| Infrequently                          | 11  | 8.1 | 25  | 8.0 | 0.1            |          |
| Sometimes                             | 21  | 15.6| 34  | 10.8| 1.4            | 0.472    |
| Frequently                            | 58  | 43.0| 126 | 40.1| 0.6            |          |
| Always                                | 41  | 30.4| 120 | 38.2| -1.6           |          |
| Taking medications                    |     |     |     |     |                |          |
| Never                                 | 21  | 15.6| 43  | 13.7| 0.5            |          |
| Infrequently                          | 68  | 50.4| 125 | 39.8| 2.1            |          |
| Sometimes                             | 22  | 16.3| 80  | 25.5| -2.1           | 0.106    |
| Frequently                            | 18  | 13.3| 42  | 13.4| 0.0            |          |
| Always                                | 6   | 4.4 | 24  | 7.6 | -1.2           |          |
| Drinking water                        |     |     |     |     |                |          |
| ≤ 2 glasses per day                   | 19  | 14.1| 44  | 14.0| 0.0            |          |
| 3-5                                   | 54  | 40.0| 109 | 34.7| 1.1            |          |
| 6-8                                   | 34  | 25.2| 100 | 31.8| -1.4           | 0.529    |
| > 8                                   | 28  | 20.7| 61  | 19.4| 0.3            |          |
| Having stress and anxiety             |     |     |     |     |                |          |
| Never                                 | 4   | 3.0 | 2   | 0.6 | 2.0            |          |
| Infrequently                          | 11  | 8.1 | 15  | 4.1 | 1.7            |          |
| Sometimes                             | 44  | 32.6| 78  | 24.8| 1.7            | 0.021    |
| Frequently                            | 55  | 39.5| 153 | 48.7| -1.8           |          |
| Always                                | 23  | 17.0| 68  | 21.7| -1.1           |          |
| Daily hours of sleep                  |     |     |     |     |                |          |
| ≤ 6 hours                             | 52  | 38.5| 122 | 38.9| -0.1           |          |
| 7                                     | 63  | 46.7| 153 | 48.7| -0.4           |          |
| 8                                     | 16  | 11.9| 54  | 10.8| 0.3            | 0.787    |
| > 8                                   | 4   | 3.0 | 5   | 1.6 | 1.0            |          |

¹: Pearson’s Chi-Square test. Significant differences between teachers in the VDI ≤ 7 and the VDI > 7 groups are indicated in bold in the last column.
The significant risk factors distinguished and the adjusted residual values for the risk factors related to lifestyle use are revealed in Table III.

The VDI > 7 category had significantly more participants who noted to “sometimes” (6.1% vs 0.7%, z = 2.5) smoke than the VDI ≤ 7 category [χ² (4, n = 449) = 11.61, p < 0.05].

The significant detected risk factors and the adjusted residual values for the risk factors related to the environment are displayed in Table IV.

| Risk factors                                      | VDI ≤ 7 teachers (n = 135) | VDI > 7 teachers (n = 314) | Adjusted residual | P-value¹ |
|---------------------------------------------------|-----------------------------|-----------------------------|--------------------|----------|
| Physical size of the most frequent classroom in workday |                             |                             |                    |          |
| Small                                             | 34  25.2                     | 85  27.1                     | -0.4               |          |
| Medium                                            | 84  62.2                     | 202 64.3                     | -0.4               | 0.421    |
| Large                                             | 17  12.6                      | 27  8.6                      | 1.3                |          |
| Physical size of the most frequent classroom in workday in the past |                             |                             |                    |          |
| Small                                             | 33  24.4                     | 85  27.1                     | -0.6               |          |
| Medium                                            | 82  60.7                     | 200 63.7                     | -0.6               | 0.215    |
| Large                                             | 20  14.8                      | 29  9.2                      | 1.7                |          |
| Air moisture in classroom                          |                             |                             |                    |          |
| Not at all moist                                   | 85  63.0                     | 160 51.0                     | 2.3                |          |
| Moderately moist                                   | 48  35.6                     | 145 46.2                     | -2.1               | 0.057    |
| Very moist                                         | 2  1.5                       | 9  2.9                       | -0.9               |          |
| Air dryness in classroom                           |                             |                             |                    |          |
| Not at all dry                                     | 30  22.2                     | 55  17.5                     | 1.2                |          |
| Moderately dry                                     | 88  65.2                     | 208 66.2                     | -0.2               | 0.377    |
| Very dry                                           | 17  12.6                      | 51  16.2                     | -1.0               |          |
| Dust exposure in classroom                         |                             |                             |                    |          |
| Not at all                                        | 7  5.2                       | 7  2.2                       | 1.7                |          |
| Small amount                                       | 24  17.8                     | 48  15.3                     | 0.7                |          |
| Moderate amount                                    | 47  34.8                     | 118 37.6                     | -0.6               | 0.194    |
| Large amount                                       | 49  36.3                     | 106 33.8                     | 0.5                |          |
| Excessive amount                                   | 8  5.9                       | 35  11.1                     | -1.7               |          |
| Noise from passing airplanes and/or street        |                             |                             |                    |          |
| Not at all noisy                                   | 42  31.1                     | 65  20.7                     | 2.4                |          |
| Slightly noisy                                     | 46  34.1                     | 123 39.2                     | -1.0               |          |
| Moderately noisy                                   | 38  28.1                     | 74  23.6                     | 1.0                | 0.011    |
| Very noisy                                         | 7  5.2                       | 46  14.6                     | -2.9               |          |
| Extremely noisy                                    | 2  1.5                       | 6  1.9                       | -0.3               |          |
| Outside noise                                      |                             |                             |                    |          |
| (e.g., construction, lawnmowers, industrial activity) |                             |                             |                    |          |
| Not at all noisy                                   | 51  37.8                     | 81  25.8                     | 2.6                |          |
| Slightly noisy                                     | 49  36.3                     | 119 37.9                     | -0.3               |          |
| Moderately noisy                                   | 17  12.6                     | 77  24.5                     | -2.8               | 0.009    |
| Very noisy                                         | 14  10.4                     | 54  10.8                     | -0.1               |          |
| Extremely noisy                                    | 4  3.0                       | 3  1.0                       | 1.6                |          |

Continues
Tab. IV. Risk factors related to the environment in teachers in the VDI ≤ 7 and VDI > 7 groups showing the percent of those responding to the statements.

| Risk factors                                      | VDI ≤ 7 teachers (n = 135) | VDI > 7 teachers (n = 314) | Adjusted residual | P-value¹ |
|--------------------------------------------------|----------------------------|-----------------------------|-------------------|----------|
|                                                  | N  | %  | N   | %  |                        |        |
| Noise from children playing outside              |    |    |     |    |                        |        |
| Not at all noisy                                 | 22 | 16.3 | 33  | 10.5 | 1.7                 |        |
| Slightly noisy                                   | 51 | 37.8 | 75  | 23.9 | 3.0                 |        |
| Moderately noisy                                 | 30 | 22.2 | 99  | 31.5 | -2.0                | 0.004  |
| Very noisy                                        | 27 | 20.0 | 86  | 27.4 | -1.7                |        |
| Extremely noisy                                  | 5  | 3.7  | 21  | 6.7  | -1.2                |        |
| Noise from children having physical education outside |    |    |     |    |                        |        |
| Not at all noisy                                 | 28 | 20.7 | 46  | 14.6 | 1.6                 |        |
| Slightly noisy                                   | 52 | 38.5 | 101 | 32.2 | 1.3                 |        |
| Moderately noisy                                 | 31 | 23.0 | 93  | 29.6 | -1.4                | 0.122  |
| Very noisy                                        | 21 | 15.6 | 57  | 18.2 | 0.0                 |        |
| Extremely noisy                                  | 3  | 2.2  | 17  | 5.4  | -1.5                |        |
| Noise from inside the building (e.g., classrooms, hallways) |    |    |     |    |                        |        |
| Not at all noisy                                 | 23 | 17.0 | 38  | 12.1 | 1.4                 |        |
| Slightly noisy                                   | 68 | 50.4 | 127 | 40.4 | 1.9                 |        |
| Moderately noisy                                 | 34 | 25.2 | 101 | 32.2 | -1.5                | 0.042  |
| Very noisy                                        | 8  | 5.9  | 37  | 11.8 | -1.9                |        |
| Extremely noisy                                  | 2  | 1.5  | 11  | 3.5  | -1.2                |        |
| Noise from inside the classroom (e.g., children talking, chairs scraping on the floor) |    |    |     |    |                        |        |
| Not at all noisy                                 | 7  | 5.2  | 3   | 1.0  | 2.8                 |        |
| Slightly noisy                                   | 60 | 44.4 | 77  | 24.5 | 4.2                 |        |
| Moderately noisy                                 | 42 | 31.1 | 94  | 29.9 | 0.2                 |        |
| Very noisy                                        | 21 | 15.6 | 104 | 33.1 | -3.8                | 0.000  |
| Extremely noisy                                  | 5  | 3.7  | 36  | 11.5 | -2.6                |        |
| Noise from heating or air conditioning           |    |    |     |    |                        |        |
| Not at all noisy                                 | 83 | 61.5 | 156 | 49.7 | 2.3                 |        |
| Slightly noisy                                   | 35 | 25.9 | 100 | 31.8 | -1.3                |        |
| Moderately noisy                                 | 14 | 10.4 | 41  | 13.1 | 0.8                 | 0.173  |
| Very noisy                                        | 2  | 1.5  | 13  | 4.1  | -1.4                |        |
| Extremely noisy                                  | 1  | 0.7  | 4   | 1.3  | -0.5                |        |
| Electronic noise (e.g., computers, lights)       |    |    |     |    |                        |        |
| Not at all noisy                                 | 67 | 49.6 | 117 | 37.3 | 2.4                 |        |
| Slightly noisy                                   | 57 | 42.2 | 131 | 41.7 | 0.1                 |        |
| Moderately noisy                                 | 8  | 5.9  | 43  | 13.7 | -2.4                | 0.012  |
| Very noisy                                        | 2  | 1.5  | 15  | 4.8  | -1.7                |        |
| Extremely noisy                                  | 1  | 0.7  | 8   | 2.5  | -1.3                |        |
| Echo in the classroom when speaking              |    |    |     |    |                        |        |
| Not at all noisy                                 | 111| 82.2 | 208 | 66.2 | 3.4                 |        |
| Slightly noisy                                   | 19 | 14.1 | 68  | 21.7 | -1.9                |        |
| Moderately noisy                                 | 4  | 3.0  | 25  | 8.0  | -2.0                | 0.007  |
| Very noisy                                        | 0  | 0.0  | 9   | 2.9  | -2.0                |        |
| Extremely noisy                                  | 1  | 0.7  | 4   | 1.5  | -0.5                |        |
| Noise from public address system (e.g., microphones, speakers) |    |    |     |    |                        |        |
| Not at all noisy                                 | 83 | 61.5 | 157 | 50.0 | 2.2                 |        |
| Slightly noisy                                   | 42 | 31.1 | 104 | 33.1 | -0.4                |        |
| Moderately noisy                                 | 8  | 5.9  | 36  | 11.5 | -1.8                | 0.062  |
| Very noisy                                        | 2  | 1.5  | 15  | 4.8  | -1.7                |        |
| Extremely noisy                                  | 0  | 0.0  | 2   | 0.6  | -0.9                |        |

¹: Pearson's Chi-Square test. Significant differences between teachers in the VDI ≤ 7 and the VDI > 7 groups are indicated in bold in the last column.
A significantly higher number of subjects in the VDI > 7 group proclaimed to hear a large amount of noise (14.6% vs 5.2%, z = 2.9) and a significantly fewer number of participants stated to hear no noise at all (20.7% vs 31.1%, z = -2.4) generated from the passage of airplanes and/or from the road at their workplace than the VDI ≤ 7 group [χ²(4, n = 449) = 13.00, p < 0.05]. The VDI > 7 category had significantly more subjects who reported to hear “moderate” (24.5% vs 12.6%, z = 2.8) and significantly fewer subjects who stated to hear “no” (25.8% vs 37.8%, z = -2.6) external noise derived from construction sites, lawnmowers, industrial activity, etc. at their workplace in comparison to the VDI ≤ 7 category [χ²(4, n = 449) = 13.55, p < 0.05].

The number of participants in the VDI > 7 category who stated to hear “moderate” noise that originated (31.5% vs 22.2%, z = 2.0) from children playing outside in their workplace was significantly greater than the VDI ≤ 7 group. The number of participants who noted to hear a “small” (23.9% vs 37.8%, z = -3.0) amount of noise from this source was significantly lower in the VDI > 7 category group than the VDI ≤ 7 group [χ²(4, n = 449) = 15.42, p < 0.05]. A significantly higher number of subjects in the VDI > 7 group reported to hear an “excessive” (11.5% vs 3.7%, z = 2.6) and “great” (33.1% vs 15.6%, z = 3.8) amount of noise within the classroom (e.g., children who talk, chairs that scrape on the floor) and a significantly fewer number of subjects stated to hear “small” (24.5% vs 44.4%, z = -4.2) and “no” (1.0% vs 5.2%, z = -2.8) noise within the classroom than the VDI ≤ 7 group [χ²(4, n = 449) = 36.60, p < 0.001].

A significantly higher number of teachers in the VDI > 7 group, reported hearing a “moderate” (13.7% vs 5.9%, z = 2.4) amount of noise and significantly lower percentage stated hearing “no” (37.3% vs 49.6%, z = -2.4) noise from electronic devices (e.g., computers and lights) than the VDI ≤ 7 group [χ²(4, n = 449) = 12.79, p < 0.05]. The VDI > 7 group had significantly more subjects who stated to hear a “great” (2.9% vs 0.0%, z = 2.0) and “moderate” (8.0% vs 3.0%, z = 2.0) amount of echo in class when they teach and significantly fewer subjects who declared to hear “no” (66.2% vs 82.2%, z = -3.4) echo in the classroom compared with the VDI ≤ 7 group [χ²(4, n = 449) = 13.96, p < 0.05].

**Voice Disorders Occupational Consequences and Usefulness of Vocal Hygiene Program**

The outcomes of the survey show the consequences of voice disorders on teachers’ occupation and the helpfulness of vocal education seminars. The significant consequences of voice disorders and vocal hygiene valuations are pinpointed in Tables V and VI along with their residual values.

A significantly higher number of subjects in the VDI > 7 group declared to “frequently” (29.3% vs 7.4%, z = 5.1) and significantly fewer number of subjects noted to “rarely” (22.0% vs 36.3%, z = -3.2) and “never” (7.0% vs 15.6%, z = -2.8) allow their voice problems to limit their ability to perform certain tasks in the workplace (e.g., teaching, etc.) than in the VDI ≤ 7 group [χ²(4, n = 449) = 43.54, p = 0.001]. The number of participants in the VDI > 7 category who reported to have reduced their activities (e.g., teaching) or interactions annually due to voice problems “3 to 4 days” (25.5% vs 11.1%, z = 3.4) and “5 or more days” (19.1% vs 5.9%, z = 3.6) was significantly greater than in the VDI ≤ 7 category. The number of participants in the VDI > 7 category who stated to have reduced their activities or interactions annually because of voice issues “0 days” (24.2% vs 40.0%, z = -3.4) was significantly lower in the VDI > 7 category than in the VDI ≤ 7 category [χ²(4, n = 449) = 44.06, p < 0.001].

A significantly higher number of participants in the VDI > 7 group declared that voice hygiene seminars during their training would have been useful to them (98.4% vs 92.6%, z = 3.1) and significantly fewer subjects stated that voice hygiene seminars would not have been useful (1.6% vs 7.4%, z = -3.1) than in the VDI ≤ 7 category [χ²(1, n = 449) = 9.89, p < 0.05].

**Discussion**

The present investigation, which represents the first survey that investigated prevalence, risk factors and occupational consequences of self-perceived voice problems in Cypriot public school teachers, revealed that the estimated prevalence of self-reported voice problems in the sample of 449 preschool-kindergarten and grade 1-6th public school teachers investigated is 69.9%. This outcome may be partly attributable to the fact that the survey may have attracted teachers who have voice problems. Nevertheless, this finding corroborates with previously reported research which indicated that the prevalence of self-reports voice disorders in one hundred and four elementary, secondary and high school teachers in Iran was 54.6% [3]. On the other hand, it contradicts other earlier reported studies which revealed that the prevalence of voice disorders was 11.0% for elementary and secondary school teachers in the State of Iowa and Utah [1], 11.6% for Brazilian elementary and secondary school teachers [2], 8% for primary and secondary school teachers in Latvia [5] and 17.4% for primary teachers in India [6].

The current research study also revealed that teachers with a VDI > 7 were more likely to frequently experience upper respiratory infections (e.g., pharyngitis, laryngitis, etc.) and less likely to have never or infrequently experienced this health condition than the teachers with a VDI ≤ 7. These results are consistent with previously reported findings which indicated that teachers with VD (Voice Disorders) were more likely to experience upper respiratory tract infections than teachers with NVD (No Voice Disorders) [5, 6, 10, 20].
Moreover, the results of our study showed that the VDI > 7 class had significantly more individuals who had “frequently” experienced nasal allergies (e.g., nasal discharge, stuffy nose and sneezing) and significantly fewer participants who have “never” had allergies compared to the VDI ≤ 7 group. The current finding is in sync with Trinite’s [5] research that reported that the primary and secondary teachers in Latvia who suffer from respiratory allergies are 5.5 times more likely to have voice problems than the ones without allergies. Furthermore, Roy et al. [12] also indicated that the prevalence of VD was significantly higher for participants with respiratory allergies, and the outcomes of Simberg’s et al. [21] investigation also suggested that participants with allergies had more voice disorders symptoms than those without allergies. In contrast, Devadas et al. [6] revealed that nasal allergies are not a significant risk factor in Indian teachers with self-reported voice problems in comparison with teachers with no voice problems. Another significant finding of the survey disclosed that a significantly higher number of participants in the VDI > 7 group reported to teach kindergarten and fewer subjects reported to teach 6th grade than in the VDI ≤ 7 group. This result agrees with Munier’s & Kinsella’s [22] investigation, which reported that teachers of the junior classes were more vulnerable to develop a voice problem as vocal fatigue and dry throat were reported more frequently by teachers of the junior classes in comparison with teachers of the senior classes.
In contrast, this result disagrees with Da Rocha et al.’s [23] investigation, which reported that teachers in Brazil who lectured in the fourth grade and below presented with a lower risk (20% less) of having a perceived voice disorder than the teachers who lectured in the fifth grade and up. Also, this outcome is inconsistent with Houtte’s, Claey’s, Wuyts’ & van Lierde’s [11] findings which found that there was no significant difference in teaching different grade levels between the Belgian teachers with voice problems when comparing them to teachers without voice problems.

Another key finding of this study revealed that there were more teachers in the VDI > 7 group who reported using “very loud” and “excessively loud” voice in class and fewer subjects who stated to use “not at all loud” and “slightly loud” voice compared to the VDI ≤ 7 group. Similarly, Bolbol, Zalat, Hammam, and Elnakeb [8] identified that high voice loudness is a significant voice disorder risk factor that affects elementary, middle, and high school teachers’ voice in Egypt. Sathyanarayan, Boominathan and Nallamuthu [24] found that speaking in an uncomfortable loud voice was identified as one of the vocal abuse or misuse behaviors frequently used by teachers in India. Moreover, Ferreira et al. [25] found that speaking loudly was significantly associated with hoarseness and vocal fatigue in Brazilian teachers. On the other hand, Devadas et al. [6] found no significant difference between teachers with voice disorders and the ones with no voice disorders who used soft, loud or too loud vocal loudness while teaching.

One more outcome that the research indicated is that there were fewer participants in the VDI > 7 category who stated to “never” and “rarely” and more participants who stated to “always” use their voice to discipline students than in the VDI ≤ 7 group. This result supports the findings of De Alvear, Javier Barón & Ginés Martínez-Arquero [26] that revealed that children’s indiscipline significantly increased the chances of kindergarten and elementary school teachers in Spain having vocal problems.

The results additionally showed that teachers with VDI > 7 were less likely to “never” and “rarely” and more likely to “sometimes” and “frequently” speak over a natural breath cycle (i.e., they say the last words of a sentence when they do not have sufficient air) than the teachers with VDI ≤ 7. Our investigation is the first study that investigated the factor speaking over a natural breath cycle in teachers and identified it as a significant risk factor for voice disorders among preschool-kindergarten and grade 1st-6th school teachers in Cyprus. Furthermore, more teachers in the VDI > 7 group stated “frequently” coughing, clearing their throat and yelling throughout the day than those in the VDI ≤ 7 party. Likewise, Trinite [5] identified that throat clearing had a statistical significant impact on teachers’ voice as 18.3% of the teachers in the voice disorder group had the habit of clearing their throats compared to 8% in control group. Also, Seifpanahi et al. [3] reported that Iranian teachers with voice complaints were more likely to experience coughing and throat clearing than teachers without voice complaints. Similarly, Devadas et al. [6] revealed that teachers with voice problems were more likely to yell in the classroom than teachers with no voice problems.

An additional significant finding of the survey disclosed that there were more teachers in the VDI > 7 category who reported to “sometimes” currently smoke than teachers in the VDI ≤ 7 category. This finding is in accordance with the findings of Priciado-Lopez et al. [27] which reported that significantly more dysphonic teachers smoke compared with non-dysphonic ones. Conversely, Trinite [5] did not confirm any statistically significant correlation between smoking and the occurrence of voice disorders in Latvian teachers. Also, Devadas et al. [6] found no significant relationship between teachers reporting voice problems and smoking. Likewise, de Medeiros et al. [20] revealed that smoking was not statistically associated with probable dysphonia in Brazilian female public school teachers.

Another important result of this study showed that teachers in the VDI > 7 group were less likely to report “never” having stress and anxiety than those in the VDI ≤ 7 group. A similar tendency is observed in Trinite’s [5] research who stated that the likelihood of voice problems increased in teachers who felt regular stress in their working place for various reasons. Specifically, 62.1% of teachers with voice disorders considered that children generated stress, and 51.5% of them mentioned that overloading caused stress. Likewise, Devadas et al. [6] indicated that a higher percentage of teachers in the voice disorder (VD) group reported that they were stressed while teaching than the teachers in the no voice disorder (NVD) group. In contrast, Pereira [28] examined stress symptoms and its impact on voice in teachers with dysphonia compared with teachers with no voice changes and found no significant association between dysphonia and stress.

Other key findings of this investigation demonstrated that there were more teachers in the VDI > 7 category who reported to hear “moderate” or “great” and fewer subjects who stated to hear “no” or “small” noise generated from construction sites, lawnmowers and industrial activity, as well as, children playing outside in their place of work and echo in the classroom when speaking than the teachers in the VDI ≤ 7 category. Conversely, Priciado-Lo´pez et al. [27] indicated that there were no statistically significant differences between the normal and the dysphonic teachers’ responses with regards to the amount of noise that originates from construction work and children playing in the school yard.

One other crucial outcome of this investigation is that teachers in the VDI > 7 group were more likely to hear a large amount of noise and less likely to hear no
noise at all generated from the passage of airplanes and/or from the road at their workplace than the teachers in VDI ≤ 7 group. This result agrees with Phadke’s [29] research which revealed a significant correlation between classroom location being close to main traffic roads and the frequency of laryngeal and neck pain in teachers. In contrast, Preciado-Lopez et al. [27] indicated that there were no statistically significant differences between the normal and the dysphonic teachers’ responses with regards to the amount of noise that comes from the road in their classrooms.

Another significant finding of our investigation disclosed that there were more teachers in the VDI > 7 group who reported to hear an “excessive” and “great” amount of noise within the classroom (e.g., children who talk and moving chairs) and fewer who stated to hear “small” and “no” noise within the classroom than in the VDI ≤ 7 group. Similar to the current study, Preciado-Lopez et al. [27] indicated that there were statistically significant differences between the normal and the dysphonic teachers’ responses with respect to the amount of noise that comes from inside the classroom (i.e., the murmur of the students and the students moving chairs and tables). Also, Devadas et al. [6] disclosed that a significantly higher percentage of teachers in the voice problem group reported a higher level of student noise in the classroom than the teachers in the no voice problem group.

In general research studies indicate that teachers who experience noise at their workplace generated from different sources such as airplanes, roads, construction sites, children playing outside and children’s murmur in the classroom may be more perceptible to voice disorders. Devadas [6] revealed that teachers who experienced high background noise in the classroom (generated from student noise, external noise and fan or air conditioning noise) were found to be at a 4.4 times higher risk of developing voice problems than teachers who did not experience high background noise. A possible rationale is that speaking in high background noise increases the vocal loading because the speaker automatically increases the loudness level of a voice signal so that he/she can be heard. An increase in loudness may increase the medial compression of the vocal folds that may increase the risk of vocal fatigue [6] and lead to voice pathologies. Furthermore, our investigation did not find any significant correlation between noises generated from inside the building such as other classrooms, hallways, etc. and noise resulting from computers and projectors. This result may be attributable to the facts that the primary schools in Cyprus usually are not designed to have inside hallways and the projectors and computers may not always be turned on. In contrast, Phadke [29] showed a significant association between frequent laryngeal or neck pain symptoms and noise from other classrooms. Out of 44.8% of teachers who declared to hear noise from neighboring classrooms, 13.5% stated experiencing a daily recurrence and 9.4% experienced a monthly recurrence of laryngeal pain. Additionally, Trinite [5] identified a statistically significant association between noise generated from computers and projectors and the occurrence of voice problems in teachers.

Other substantial findings that this survey disclosed is that there were more teachers in the VDI > 7 group who declared that “often” their voice problems limited their ability to perform certain tasks in their workplace (e.g., teaching etc.) and reduced their activities (e.g., teaching etc.) or interactions “3 to 5 or more days” annually than teachers in the VDI ≤ 7 group. The results from this study are in general agreement with the outcomes from an earlier report by Roy et al. [12] which revealed that teachers were significantly more likely to report that their voice limited their ability to do certain tasks at their job and experienced a significantly higher number of days in which they intentionally reduced their activities or interactions because of their voice problems than nonteachers. Particularly, 43% of teachers versus 16.0% of nonteachers stated that they reduced activities or interactions for at least 1 day because of their voice problems.

An additional significant result of the survey disclosed that more teachers (98.4% vs 92.6%) in the VDI > 7 group declared that voice hygiene seminars during their training would have been useful and fewer subjects (1.06% vs 7.4%) stated that voice hygiene seminars would not have been useful compared with teachers in the VDI ≤ 7 category. Similarly, Yiu (2002) stated that more than 50% of practicing and prospective teachers believed that information on breathing exercises and vocal hygiene strategies would help them prevent voice problems.

Conclusions/implications of conclusions

The present survey is the first study to investigate risk factors that may lead to self-perceived voice disorders in public-school teachers in Cyprus. The results of the study concluded that health (i.e., nasal allergies and upper respiratory infections), voice use (e.g., teaching lower grades, having shorter breaks between classes, using loud voice, etc.), lifestyle (i.e., smoking and stress), and environmental factors (e.g., teaching in a noisy environment where noise is generated from the passage of airplanes and/or roads, children playing outside, children talking within the classroom etc.) are job related risk factors that may contribute to the development of voice disorders in public school teachers in Cyprus. The results of the current investigation also determined the occupational impact of voice disorders on teachers which is that voice problems often limit teachers’ ability to perform certain tasks in their job (e.g., teaching) and obligate them to reduce their activities (e.g., teaching) or interactions 3-5 or more days annually. The outcomes of the present research also showed that the estimated prevalence of self-reported voice problems in four
hundred and forty-nine preschool-kindergarten and grade 1–6th public school teachers surveyed is 69.9%. Additionally, the results revealed that more participants in the VD group felt that vocal hygiene seminars during their training would have been useful. These conclusions infer that the development and implementation of a preventative voice hygiene program is recommended. The voice hygiene program can provide guidelines to current and future teachers to inhibit them from developing voice disorders and consequently improve their occupational performance. The results of the investigation disclosed that the strategies of the voice hygiene program should aim to promote optimal voice production and to eliminate abusive voice behaviors and may include:
1. consulting a doctor for experiencing gastroesophageal reflux and nasal allergies;
2. consulting teachers to have at least an hour and a half of a break between classes;
3. modeling techniques such as the silent cough and or the sip of water to reduce throat clearing;
4. receiving voice therapy training that focuses on eliminating talking over a natural breath cycle (e.g., instruct the teacher to say as many numbers as possible in one breath and stop before he/she feels any strain);
5. counseling teachers to use a microphone when teaching;
6. encouraging teachers to eliminate smoking and yelling [30, 31];
7. advising them to close classroom windows and doors to eliminate outside noise;
8. advising them to wait until the noise within the classroom (e.g., students murmur, moving chairs) stops before they start or continue talking [30, 32].

Acknowledgements

We are grateful to the school principals and inspectors as well as our colleagues and friends for raising awareness of this study and we would like to extend our gratitude to the four hundred and forty-nine teachers that volunteered to partake in this study. The project received bioethics approval from the National Bioethics Committee.

Funding sources: this research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest statement

The authors declare no conflict of interest.

Authors’ contributions

The individual contributions of authors to the manuscript should be specified in this section.

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Appendix A: risk factors for voice disorders questionnaire

Please note the answer that is most appropriate for you. Answer all questions. Please note that there is no right or wrong answer.

1. DEMOGRAPHIC DATA

1. How old are you?

| 25-34 years old | 35-44 | 45-54 | 55-60 |
|----------------|-------|-------|-------|
| ☐              | ☐     | ☐     | ☐     |

2. What is your gender?

| Male | Female |
|------|--------|
| ☐    | ☐      |

3. What position do you hold?

| Preschool/Kindergarten Teacher | Teacher | Assistant Director | Director | Substitute Kindergarten Teacher | Substitute Teacher |
|-------------------------------|---------|---------------------|--------|------------------------|-------------------|
| ☐                            | ☐       | ☐                   | ☐      | ☐                      | ☐                 |

4. From which geographical region of Cyprus do you come from?

| Nicosia | Limassol | Larnaca | Famagusta | Paphos |
|---------|----------|---------|------------|-------|
| ☐       | ☐        | ☐       | ☐          | ☐     |

5. Where is the school you work for?

| City | Village |
|------|---------|
| ☐    | ☐       |

6. In which geographical region of Cyprus do you work?

| Nicosia | Limassol | Larnaca | Famagusta | Paphos |
|---------|----------|---------|------------|-------|
| ☐       | ☐        | ☐       | ☐          | ☐     |

2. RISK FACTORS FOR VOICE DISORDERS

RISK FACTORS RELATED TO GENERAL HEALTH

7. Do you have nasal allergies (e.g., runny nose, stuffy nose, sneezing, etc.)?

| Never | Infrequently | Sometimes | Frequently | Always |
|-------|--------------|-----------|------------|--------|
| ☐     | ☐            | ☐         | ☐          | ☐      |

8. Do you have gastroesophageal reflux (i.e., backflow of stomach fluid into your esophagus and mouth)?

| Never | Infrequently | Sometimes | Frequently | Always |
|-------|--------------|-----------|------------|--------|
| ☐     | ☐            | ☐         | ☐          | ☐      |

9. Do you have upper respiratory tract infections (e.g., pharyngitis and laryngitis)?

| Never | Infrequently | Sometimes | Frequently | Always |
|-------|--------------|-----------|------------|--------|
| ☐     | ☐            | ☐         | ☐          | ☐      |

RISK FACTORS RELATED TO VOICE USE

10. How many years have you been teaching?

| ≤ 5 | 6-10 | 11-20 | ≥ 21 |
|-----|------|-------|------|
| ☐   | ☐    | ☐     | ☐    |

11. What is the nature of your work?

| Teaching | Teaching and administrative duties | No teaching and administrative duties |
|----------|-----------------------------------|--------------------------------------|
| ☐        | ☐                                 | ☐                                    |

12. Which class do you teach most of your teaching time?

| 1st | 2nd | 3rd | 4th | 5th | 6th | I’m not responsible for a class |
|-----|-----|-----|-----|-----|-----|-------------------------------|
| ☐   | ☐   | ☐   | ☐   | ☐   | ☐   | ☐                             |

13. Does your school have combined-grade classrooms?

| No | Yes |
|----|-----|
| ☐  | ☐   |

14. Which combined-grade class do you teach (e.g., 1st and 2nd grade)?

| Greek | Mathematics | Natural Sciences | English | Music | PE | Art | Other |
|-------|-------------|-----------------|--------|-------|----|-----|-------|
| ☐     | ☐           | ☐               | ☐      | ☐     |    |     |       |

15. What subject do you teach most of the time?

| ☐     | ☐     | ☐     | ☐     | ☐     | ☐     | ☐     | ☐     | ☐     | ☐     |

| Greek | Mathematics | Natural Sciences | English | Music | PE | Art | Other |
|-------|-------------|-----------------|--------|-------|----|-----|-------|
| ☐     | ☐           | ☐               | ☐      | ☐     |    |     |       |
16. How many teaching hours per week do you have?

| < 23 x 40 minutes per week | 24-28 x 40 minutes per week | 29 x 40 minutes per week |
|----------------------------|-----------------------------|--------------------------|
|                            |                             |                          |

17. How many teaching hours per week did you have 5 years ago?

| < 40 minutes | 40 minutes | 80 minutes |
|--------------|------------|------------|
|              |            |            |

18. What is the longest duration of continuous teaching time without a break in your daily workday?

| < 40 minutes | 40 minutes | 80 minutes |
|--------------|------------|------------|
|              |            |            |

19. What was the longest duration of continuous teaching time without a break in your daily workday 5 years ago?

| 10 minutes | 20 | 21-60 | 61-90 | > 90 |
|------------|----|-------|-------|------|
|            |    |       |       |      |

20. What is the duration of your longest break between classes?

| 10 minutes | 20 | 21-60 | 61-90 | > 90 |
|------------|----|-------|-------|------|
|            |    |       |       |      |

21. What is the duration of your shortest break between classes?

| ≤ 10 | 11-15 | 16-20 | 21-25 |
|------|-------|-------|-------|
|      |       |       |       |

22. What is the maximum number of students in your class?

| ≤ 10 | 11-15 | 16-20 | 21-25 |
|------|-------|-------|-------|
|      |       |       |       |

23. What is the maximum number of students in your class for the last 5 years?

| Not at all loud | Slightly loud | Moderately loud | Very loud | Excessively loud |
|-----------------|---------------|------------------|-----------|-----------------|
|                 |               |                  |           |                 |

24. How loud are you using your voice in the classroom the current school year?

| Not at all loud | Slightly loud | Moderately loud | Very loud | Excessively loud |
|-----------------|---------------|------------------|-----------|-----------------|
|                 |               |                  |           |                 |

25. How loud were you using your voice in the classroom 3 years ago?

| N/A | Not at all loud | Slightly loud | Moderately loud | Very loud | Excessively loud |
|-----|-----------------|---------------|------------------|-----------|-----------------|
|     |                 |               |                  |           |                 |

26. How loud do you use your voice outdoors (e.g., physical education and children supervision during recess, etc.)?

| Not at all loud | Slightly loud | Moderately loud | Very loud | Excessively loud |
|-----------------|---------------|------------------|-----------|-----------------|
|                 |               |                  |           |                 |

27. How loud do you use your voice at home?

| Not at all loud | Slightly loud | Moderately loud | Very loud | Excessively loud |
|-----------------|---------------|------------------|-----------|-----------------|
|                 |               |                  |           |                 |

28. Do you sing in the classroom?

| Never | Infrequently | Sometimes | Frequently | Always |
|-------|--------------|-----------|------------|--------|
|       |              |           |            |        |

29. Do you use your voice to discipline students?

| Never | Infrequently | Sometimes | Frequently | Always |
|-------|--------------|-----------|------------|--------|
|       |              |           |            |        |

30. Do you use a microphone when teaching?

| Never | Infrequently | Sometimes | Frequently | Always |
|-------|--------------|-----------|------------|--------|
|       |              |           |            |        |

31. Did you use a microphone when teaching for the last 5 years?

| Never | Infrequently | Sometimes | Frequently | Always |
|-------|--------------|-----------|------------|--------|
|       |              |           |            |        |

32. Do you teach above students talking?

| Never | Infrequently | Sometimes | Frequently | Always |
|-------|--------------|-----------|------------|--------|
|       |              |           |            |        |

33. Do you speak over a natural breath cycle (e.g., Do you squeeze out the last word when you do not have enough air)?

| Never | Infrequently | Sometimes | Frequently | Always |
|-------|--------------|-----------|------------|--------|
|       |              |           |            |        |

34. Do you cough throughout the day?

| Never | Infrequently | Sometimes | Frequently | Always |
|-------|--------------|-----------|------------|--------|
|       |              |           |            |        |
35. **Do you clear your throat throughout the day?**

|   | Never | Infrequently | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
|   |   |   |   |   |   |

36. **Do you scream?**

|   | Never | Infrequently | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
|   |   |   |   |   |   |

### RISK FACTORS RELATED TO LIFESTYLE

37. **Do you currently smoke?**

|   | Never | Infrequently | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
|   |   |   |   |   |   |

38. **Have you smoked in the past?**

| Current smoker | Never smoked | Infrequently | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
|   |   |   |   |   |   |

39. **If you are a former smoker, when did you stop smoking?**

|   | N/A | < 1 year ago | Before 1-3 years | Before 3-5 years | > 5 years |
|---|---|---|---|---|---|
|   |   |   |   |   |   |

40. **Do you drink alcohol?**

|   | Never | Infrequently | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
|   |   |   |   |   |   |

41. **Do you drink caffeine (e.g., coffee, tea, and coke)?**

|   | Never | Infrequently | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
|   |   |   |   |   |   |

42. **Are you taking medications?**

|   | ≤ 2 glasses per day | 3-5 glasses | 6-8 glasses | > 8 glasses |
|---|---|---|---|---|
|   |   |   |   |   |

43. **Do you drink water?**

|   | Never | Infrequently | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
|   |   |   |   |   |   |

44. **Do you have stress and anxiety?**

|   | ≤ 6 hours | 7 hours | 8 hours | > 8 hours |
|---|---|---|---|---|
|   |   |   |   |   |

45. **How many hours do you sleep daily?**

|   |   |   |   |   |
|---|---|---|---|
|   |   |   |   |

### RISK FACTORS RELATED TO THE ENVIRONMENT

46. **What is the size of the classroom that you use frequently?**

|   | Small (< 40 m²) | Medium (40-50 m²) | Large (> 50 m²) |
|---|---|---|---|
|   |   |   |   |

47. **What was the size of the classroom that you used most frequently the last 5 years?**

|   | Small (< 40 m²) | Medium (40-50 m²) | Large (> 50 m²) |
|---|---|---|---|
|   |   |   |   |

48. **Do you consider the air to be humid in the classroom where you usually teach?**

|   | Not humid at all | Moderately humid | Very humid |
|---|---|---|---|
|   |   |   |   |

49. **Do you consider the air to be dry in the classroom where you usually teach?**

|   | Not dry at all | Moderately dry | Very dry |
|---|---|---|---|
|   |   |   |   |

50. **To what extent are you exposed to dust in your workplace?**

|   | Not at all | Small amount | Medium amount | Large amount | Excessive amount |
|---|---|---|---|---|---|
|   |   |   |   |   |   |

51. **To what extent do you experience noise from the following source?**

| a. Passing airplanes and/or road noise | Not at all | Small amount | Medium amount | Large amount | Excessive amount |
|---|---|---|---|---|---|
|   |   |   |   |   |   |

| b. Outside noises such as construction, lawnmowers, industrial activity, etc. | Not at all | Small amount | Medium amount | Large amount | Excessive amount |
|---|---|---|---|---|---|
|   |   |   |   |   |   |

| c. Children playing outside. | Not at all | Small amount | Medium amount | Large amount | Excessive amount |
|---|---|---|---|---|---|
|   |   |   |   |   |   |

| d. Children having physical education outside or inside. | Not at all | Small amount | Medium amount | Large amount | Excessive amount |
|---|---|---|---|---|---|
|   |   |   |   |   |   |

| e. Noises from inside the building (e.g., classrooms, hallways, etc.) | Not at all | Small amount | Medium amount | Large amount | Excessive amount |
|---|---|---|---|---|---|
|   |   |   |   |   |   |
f. Noises from inside the classroom (e.g., children talking, chairs sliding on flooring, etc.)

| Class | Time | 0 days | At least 1 day | At least 2 days | At least 3 days | At least 4 or more days |
|-------|------|--------|---------------|----------------|-----------------|-------------------------|
|       |      |        |               |                |                 |                         |

g. Heating or air conditioning noises.

h. Electronic noises (e.g., computers, lights, etc.)

i. Echoing in the classroom when you speak.

j. Public address system (e.g., microphones, speakers, etc.)

3. OCCUPATIONAL CONSEQUENCES OF VOICE DISORDERS

52. How many missed days of work did you have yearly due to voice problems (e.g., sore throat)?

|          | N/A | 0 days | At least 1 day | At least 2 days | At least 3 days | At least 4 or more days |
|----------|-----|--------|----------------|----------------|-----------------|-------------------------|
|          |     |        |                |                |                 |                         |

53. Do you voice problems limit your ability to perform certain tasks in your workplace (e.g., teaching, etc.)?

|          | N/A | Never | Infrequently | Sometimes | Frequently |
|----------|-----|-------|--------------|-----------|------------|
|          |     |       |              |           |            |

54. How many days have you reduced your activities (e.g., teaching, etc.) or your interactions yearly because of your voice problems?

|          | N/A | 0 days | 1-2 days | 3-4 days | 5 or more days |
|----------|-----|--------|---------|---------|----------------|
|          |     |        |         |         |                |

4. VOCAL HYGIENE EDUCATION

55. Have you received any vocal hygiene education during your training?

|          | No | Yes |
|----------|----|-----|
|          |    |     |

56. Do you think seminars on vocal hygiene education during your training would have been beneficial to you?

|          | No | Yes |
|----------|----|-----|
|          |    |     |

5. VOICE DISORDER INDEX

57. These are statements that many people have used to describe their voices and the effects of their voices on their lives. Circle the response that indicates how frequently you have the same experience. 0=never, 1=almost never, 2=sometimes, 3=almost always, 4=always

- The clarity of my voice is unpredictable.
- My voice is worse in the evening.
- I feel as though I have to strain to produce voice.
- I am less outgoing because of my voice problem.
- I tend to avoid groups of people because of my voice.
- I feel left out of conversations because of my voice.
- People have difficulty understanding me in a noisy room.
- My family has difficulty hearing me, when I call them through the house.
- My voice makes it difficult for people to hear me.
- I feel embarrassed when people ask me to repeat.
- I feel annoyed when people ask me to repeat.
- I’m ashamed of my voice problem.