Voice Problems of Future Speech-Language Pathologists

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Summary

Students training to be educators frequently exhibit voice disorders prior to employment. To date, there exist no similar studies of future speech-language pathologists (SLPs). The study is designed as a prospective, nonrandomized survey. The objective of this study is to determine the voice problems of first year graduate students training to be SLPs. Participants were 104 first year graduate students majoring in speech-language pathology at two universities. The Quick Screen for Voice was administered. Participants who failed completed a questionnaire regarding voice problems, medical history, daily habits, and voice use. When responses further indicated voice-related problems, endoscopic examination was completed. Fourteen percent (N = 15) of the participants failed the screening by demonstrating two or more abnormal voice characteristics. These included persistent glottal fry (present in all who failed), low habitual pitch, juvenile resonance, hoarse, breathy, or strained phonation, abnormally low pitch on sustained vowels, and voice breaks during the frequency range. Twelve percent (N = 12) failed both the screening and follow-up questionnaire. Responses included self-reported dysphonia, medical history with voice-related side
effects, difficulty with excessive voice use, and voice problems occurring daily or weekly. Endoscopic evaluation showed one participant with bilateral vocal nodules. The results suggest that voice problems among future SLPs (12%) are more common than the 3–9% reported in the general population and similar to the 11% previously reported for teachers. However, future SLP voice problems are less frequent than those reported among education majors (21%) and all college students (17%). Faculty should identify students with voice problems and emphasize optimal voice use in classroom and clinical settings.

**Key Words:** Voice problems; Students; Speech-language pathologists

**Introduction**

It is estimated that 3–9%\(^1\) of the total population of the United States has a voice abnormality and that 25% or more of the US workforce relies on voice use to perform their jobs.\(^2\) Speech-language pathologists (SLPs) are among the professionals whose employment requires extensive daily voice use. SLPs use their voices in tasks such as therapy, counseling, conferencing, and public speaking. They must also provide appropriate models of voice use.

Teachers, like SLPs, are commonly recognized as professionals who rely on healthy voices. Roy et al.\(^3\) evaluated the prevalence of voice disorders, as it relates to age, in teachers and the general population. They defined prevalence as “the number of cases per population at risk at a specific time” (p. 281). Their findings revealed that teachers had a significantly higher prevalence of a voice problem than nonteachers (11% vs. 6.2%). Teachers were found to be significantly more likely to seek help from a physician or SLP for a voice disorder than nonteachers (14.3% vs. 5.5%). It has long been accepted that teachers are at an increased risk for voice disorders because of their occupation.

Unfortunately, many students training to be educators already exhibit voice problems. Simberg et al.\(^4\) conducted a study to assess the prevalence of voice disorders among education students. They found that 24% \((N = 226)\) of the students studying to be teachers had an abnormal voice quality or reported having experienced two or more symptoms of a voice disorder weekly or more often in the previous year. These
participants were evaluated by a laryngologist, and 89% (19% of the original sample) were diagnosed with laryngeal pathology. The most common diagnosis was laryngitis.

Simberg et al.\textsuperscript{5} conducted a follow-up study to determine whether students majoring in other fields besides education report a similar prevalence of voice problems. Their findings revealed that university students, as a whole, reported frequently occurring symptoms of voice disorders. However, education majors reported a significantly greater number of symptoms than noneducation majors on the variables of throat clearing or coughing; their voice becomes strained or tires; and there is difficulty being heard.

The aforementioned studies indicate that students training to be educators frequently exhibit voice disorders before they begin work in the classroom. It would be beneficial to determine if students training to be SLPs are also likely to exhibit voice problems early in their training. Students studying to be SLPs should be aware of a potential voice disorder to receive therapeutic intervention and develop habits conducive to vocal health. The purpose of the present study was to determine the voice problems of first year graduate students training to be SLPs.

**Methods**

**Participants**

The investigators evaluated first year students in the Master's degree programs in speech-language pathology from the University of Cincinnati and the Miami University of Ohio for two consecutive years. Students were told of the study and asked to participate in the fall of the first year, within their first month of graduate study. All students ($N = 104$) from the University of Cincinnati ($N = 56$) and the Miami University of Ohio ($N = 48$) agreed to participate. The participants' mean age was 24 years (range 21–48). Gender distribution was 94% female and 6% male. Racial distribution was 87% Caucasian, 7% African-American, 5% Asian, and 1% Hispanic. Seventy-seven percent of the students from non-Caucasian backgrounds attended the University of Cincinnati, and 23% attended the Miami University of Ohio.

**The Quick Screen for Voice**
The Quick Screen for Voice is a screening tool designed to be administered live (face-to-face) in 5–10 minutes. It may be used for speakers of all ages, from preschool through adult. Perceptual characteristics that are commonly associated with disorders of respiration, phonation, resonance, and vocal flexibility are included in the tool. Definitions of each perceptual characteristic are provided in the examiner's guide. Judgments are made primarily during conversational speech. Additional specific tasks assessing nonverbal voice range and flexibility are included. Habitual pitch and loudness are assessed by having participants count from 1 to 10, then count from 1 to 3 and briefly sustain the vowel /i/ in “three” at a comfortable pitch. Maximum phonation time is assessed by having participants take a deep breath and sustain the vowel /a/ for as long as possible. Pitch range is assessed by having participants glide from the lowest to the highest pitch and from the highest to the lowest pitch. Information about construct validity has been previously documented. The tool was field tested on over 3000 preschool and elementary school children and adults.

**Procedures**

Each participant was scheduled for a 10-minute screening evaluation in a quiet room. Informed consent was obtained.

Two faculty members with American Speech-Language-Hearing Association (ASHA) certification and expertise in voice, one ASHA-certified doctoral student, and one second year SLP master's student administered the *Quick Screen for Voice*. If either graduate student administered the screening, 100% faculty supervision was provided to confirm the student's rating.

Evaluators administered the Quick Screen according to instructions provided in the examiner's guidelines. Participants failed the screening evaluation if they presented with two or more abnormal voice characteristics.

Students who failed the screening were asked to complete a questionnaire and were interviewed by the faculty member. Students answered questions regarding their voice characteristics, medical history, daily voice use, and frequency of occurrence of voice problems. Questions about voice characteristics included past experiences with voice problems and self-reports of dysphonia. Medical history questions targeted information
about respiratory disorders, surgical history, allergies, reflux, eating or swallowing difficulties, medications, injuries to the head and chest, and previous laryngeal pathologies. Questions regarding daily habits included smoking, alcohol and caffeine consumption, voice use, recreational habits, and eating habits. Participants were asked to rank frequency of occurrence of vocal symptoms such as throat clearing, vocal fatigue, hoarseness, difficulty being heard, voice breaks, and aphonia. Students demonstrating signs of a voice problem following the interview were asked to complete an endoscopic examination of the larynx.

Videoendoscopic images were collected in the standard fashion using a Kay Elemetrics 70° angle rigid laryngoscope (Model 9100; KayPENTAX, Lincoln Park, NJ), Panasonic camera (GpK5152; Panasonic Corporation, Secaucus, NJ), Mitsubishi professional SVHS VCR (BV 2000; Mitsubishi Digital Electronics America, Inc., Irvine, CA), and Sony television monitor (Sony Corporation, New York, NY). Tape-recorded examinations were reviewed for laryngeal health and function by two SLPs with over 10 years of experience evaluating videostroboscopic examinations. An otolaryngologist evaluated any endoscopic examination considered outside the range of normal structure and function by the SLPs.

Results

Quick screen evaluation

Of the 104 total participants, 86% ($N = 89$) passed the screening evaluation, and 14% ($N = 15$) failed (demonstrated two or more characteristics of an abnormal voice). Twelve of the students were from the University of Cincinnati, and three were from Miami University of Ohio. All were female and Caucasian.

Table 1 contains a list of the voice characteristics exhibited by those who failed the screening test. Six characteristics were observed during conversational speech (persistent glottal fry; low habitual pitch; hoarse, breathy, or strained phonation; and juvenile resonance). Two characteristics were observed during the nonverbal tests for voice range and flexibility (abnormally low pitch on sustained vowel; abnormal voice breaks while producing the frequency range). The most commonly identified abnormal voice characteristic was persistent (occurring frequently throughout the voice sample).
glottal fry, which was present in all of the participants who failed the screening. Glottal fry is defined in the Quick Screen for Voice examiner's guide as “Rough, low-pitched, tense voice quality that often occurs at the end of sentences, reflecting tightly approximated vocal folds with flaccid edges vibrating at a low fundamental frequency.”

Table 1.

Voice Characteristics for Participants who Failed the Quick Screen for Voice ($n = 15$)

<table>
<thead>
<tr>
<th>Voice Characteristic</th>
<th>$n$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glottal fry</td>
<td>15</td>
</tr>
<tr>
<td>Low conversational pitch</td>
<td>5</td>
</tr>
<tr>
<td>Hoarse phonation</td>
<td>4</td>
</tr>
<tr>
<td>Breathy phonation</td>
<td>3</td>
</tr>
<tr>
<td>Strained phonation</td>
<td>1</td>
</tr>
<tr>
<td>Juvenile resonance characteristics</td>
<td>2</td>
</tr>
<tr>
<td>Abnormally low pitch on sustained vowel</td>
<td>8</td>
</tr>
<tr>
<td>Abnormal voice breaks during frequency range</td>
<td>5</td>
</tr>
</tbody>
</table>

*Notes: Some participants demonstrated more than one characteristic.*

**Questionnaire/interview**

The 15 students who failed the screening test were further evaluated by questionnaire and interview. The interviewers indicated that three participants who failed the screening test did not need further testing, because abnormal voice characteristics exhibited in the screening evaluation did not occur on a regular basis and did not consistently affect voice use.

Twelve participants (12%) who failed the screening test revealed information on the questionnaire that signaled the need for further testing. Table 2 lists the problems identified within the topics of self-reported dysphonia, medical history indicating voice-related side effects, difficulty with activities requiring excessive voice use, and voice
problems occurring daily or weekly. Participants reporting voice-related problems in at
least one of the categories were given an endoscopic evaluation. All but one of the
participants reported difficulties in two or more of the categories. The participant
reporting difficulty in only one category (weekly vocal fatigue) had four voice quality
deviations on the screening test.

Table 2.

Most Frequently Reported Problems on the Questionnaire

<table>
<thead>
<tr>
<th>Self-reported Voice Problems</th>
<th>Medical History</th>
<th>Daily Activities</th>
<th>Frequency of Occurrence of Voice Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported voice was</td>
<td>Reported difficulty with allergies, asthma, heartburn, and/or taking medications with voice-related side effects</td>
<td>Reported difficulty with participation in activities that require loud talking, yelling, or singing</td>
<td>Reported daily and/or frequent throat clearing, vocal fatigue, hoarseness, and voice breaks</td>
</tr>
<tr>
<td>characterized by hoarseness, breathiness, low pitch, strain, fatigue, and/or shortness of breath</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Participants failing the screening reported voice-related problems in at least one of the categories. All but one of the participants reported difficulties in two or more of the categories.

Endoscopy

The 12 participants who failed the screening and questionnaire were evaluated by videoendoscopy. Eleven participants exhibited normal laryngeal structure and function. One participant was referred to an otolaryngologist and diagnosed with bilateral vocal fold nodules.

Discussion

The definition of a voice “disorder” spans a continuum from listener-identified to speaker-identified. Historically, professionals have defined a voice as disordered solely
on the basis of differences in perceived characteristics from what may be expected, based on the speaker's age and sex. Specifically, Boone et al\textsuperscript{2} stated that “when one or more aspects of voice such as loudness, pitch, quality, or resonance are outside of the normal range for the age, gender, or geographic background of the speaker, we say a voice disorder exists” (p. 51). Instrumental measures help quantify the perceptual signs and further define the voice difference. Roy et al\textsuperscript{3} defined a voice disorder as “any time the voice does not work, perform, or sound as it normally should, so that it interferes with communication” (p. 283). Expansion of the definition of a voice disorder to one that interferes with communication takes it beyond the listener's perception to encompass the speaker's voice use. That is, a voice difference becomes a disorder if the individual finds it handicapping in some way. Verdolini and Ramig\textsuperscript{1} stated that a voice disorder “is explicitly or implicitly defined as a condition of sufficient concern for the bearer to report it, register functional disruption because of it, and/or seek treatment because of it” (p. 26). Similarly, Simberg et al\textsuperscript{4} defined a voice disorder as “abnormal voice quality, or two or more vocal symptoms weekly or more often during the previous year” (p. 233). Thus, these authors implied that the speaker should be the one to define a voice disorder, leaving the clinician to describe its characteristics.

It is not surprising that the definition of a voice disorder appears to have evolved from one based solely on listener judgment to one that encompasses patient perception and the functional aspects of voice use in daily life. Professionals have become more attuned to patient perceptions as efficacy of therapeutic management includes voice signs and symptoms as well as quality of life issues. The investigators of the present study defined a voice problem according to two criteria: first, the speaker needed to exhibit two or more abnormal perceptual characteristics of voice quality (fifteen of 104 students (14%) failed the screening test based on this criterion); second, the quality deviations needed to affect the life of the voice user. Three of the 15 students passed following the questionnaire and interview because they did not meet this criterion, leaving 12 students (12%) with voice-related problems that were detected by both the listener and speaker. Of these, one had a laryngeal pathology.

Comparison with previous prevalence figures is somewhat mired by the issue of how a voice disorder was defined. A universally agreed upon definition is needed to report prevalence with reliability and validity, and this has yet to be achieved. However, the
results of the present investigation suggest that the voice-related problems detected among future SLPs (12%) are higher than the 3–9% reported prevalence of voice disorders in the general population. Additionally, these findings are higher than the estimated 6.2% prevalence of voice disorders among professionals not in the teaching field and similar to the estimated 11% among teachers.

College students, in general, appear to have a higher prevalence of voice disorders than the general population. Simberg et al. found that approximately 20% of future teachers needed voice therapy and/or medical care. In their follow-up study, Simberg et al. found the prevalence of voice disorders among students majoring in education to be 21% and students majoring in other fields to be 17%. The prevalence of voice problems among the future SLPs in the present study was less than that reported in the studies of Simberg et al for any of their participant groups.

Some variations among the prevalence outcomes may be attributed, at least in part, to personality and/or voice use dissimilarities among students in different programs, universities, or geographical locations. The study by Roy et al. selected participants from Utah and Iowa. The studies by Simberg et al. involved participants from Finland. Voice use may vary across locations, just as do dialects and languages. Additionally, the 12 participants who failed both the screening and questionnaire were from the University of Cincinnati. The University of Cincinnati is a large, urban institution, whereas the Miami University of Ohio is a mid sized, suburban university, possibly accounting for some disparity. Further investigation into voice-use differences among students from other geographic areas, university settings, and ethnic backgrounds is warranted. Prevalence differences between the studies that examined students in fields other than speech-language pathology and the present investigation may also be attributed to awareness of voice disorders. It is possible that students training to be SLPs may have the benefit of education regarding voice disorders and vocal hygiene in their undergraduate programs.

The most commonly identified voice quality deviation in the present study was persistent glottal fry. This was observed in the 15 students who failed the screening and an additional 16 of those who passed because it was their only identified problem. Some students commented that they felt use of glottal fry was very common in the culture of teens and young adults, and that it may be indicative of voice misuse. However, half of
the students with persistent glottal fry had other voice quality deviations, and it is
generally accepted that persistent glottal fry may be considered abusive and lead to
further voice problems. Research on the long-term effects of glottal fry in this
population is needed.

Simberg et al\textsuperscript{4} stated that a questionnaire alone may not be sufficient to diagnose a
potential voice disorder. Results of the present investigation suggest that a screening test
combined with a follow-up questionnaire may be an efficient and successful way for
university programs to identify students. The screening identified voice differences; the
follow-up questionnaire identified how those differences affected voice use in daily life
and indicated the need for further evaluation.

The lower prevalence of voice problems among speech-language pathology students
compared with students in other programs may be reassuring to faculty and students in
this field, particularly because only one had a laryngeal pathology. However, for those
12 students with voice-related difficulties, resolution may be essential for a successful
professional voice career. Differences in voice use between student life and professional
employment are not yet identified, but are necessary to determine if the students will be
at more or less risk for future development of a laryngeal pathology. Although it may be
hypothesized that some types of vocal abuse may diminish following graduation, the
daily voice usage of a professional SLP is extensive. It would be interesting to follow
students who exhibited some characteristics of voice differences and those with an
identified voice disorder as they enter full time practicum or employment settings. This
type of study would enable researchers to track long-term effects of these voice
characteristics as the students become professionals.

Results of the present investigation indicate that university programs should implement
methods to identify students with a voice problem. Voice quality could be evaluated as
part of any formal speech and hearing screening conducted with incoming students. If
formal screenings are not conducted, instructors of courses in voice disorders could
identify students in need of formal evaluation. Some students may need voice therapy.
Additionally, voice care and optimal voice use should be emphasized, not only in
courses but also in clinical training. Students need to provide appropriate models of
voice use across all clinical settings. The literature suggests that vocal hygiene should
be a part of health education for all students, particularly for those who need to meet the
demands of professional voice use.

References

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