Graduate Student Voice Use and Vocal Efficiency in an Opera Rehearsal Week: A Case Study

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Summary: The purpose of this case study was to document graduate voice students’ (N = 2) voice use before, during, and after an intense week of opera rehearsals through (1) acquired Ambulatory Phonation Monitor (APM) data, (2) daily surveys, (3) participant activity logs, (4) three administrations of the Singing Voice Handicap Index (SVHI), and (5) pre- and post-stroboscopic laryngeal examinations. Two female graduate students, both of whom were cast in a university production of Stravinsky’s The Rake’s Progress (stage names Anne and Baba) and both of whom served as graduate teaching assistants in voice, wore APMs during waking hours for 9 days, including two pretest baseline days, a 5-day intensive rehearsal week just before the opera production week, and 2 baseline days after opera performances were completed. Mean phonation time dose percentages (Dt) and daily distance dose averages (Dd) were similar between the pre- and posttest periods and the intensive week. Disaggregation of acquired data by four types of activities (opera rehearsals, personal practice time, voice teaching time, and nonrehearsal or teaching time) indicated that the highest mean Dts and Dds were acquired during personal practice time and voice teaching time. Daily surveys and SVHI data as well as the pre- and post-stroboscopies indicated no notable changes occurring in vocal health. Results indicated that these singers were conscious about their voice use during periods of extensive performance demands. However, high vocal doses during voice teaching times suggest that these individuals might benefit from teacher voice care education.

Key Words: Voice use–Singer voice use–Dosimeter–Ambulatory phonation monitor–Vocal dose.

Full-time graduate students in voice performance may engage in a variety of weekly activities, including teaching duties, opera rehearsals, voice lessons, choral ensemble rehearsals, solo practice times, and work and social obligations, which potentially could lead to high vocal doses. Optimal voice dose levels, as measured by both phonation duration and sound pressure levels, for persons engaged in various voice-intensive pursuits have not yet been determined. Yet one step in that direction is to gather data about current phonation behaviors of heavy voice users. This case study examines real-time data obtained through ambulatory phonation dosimeter units, along with results of stroboscopic examinations and various perceptual analyses of vocal health, to contribute to a more complete picture of voice use by graduate voice performance students who also teach voice.

Several studies have measured self-perception of singer voice use and health. A 1995 survey of singing teachers (N = 125) by Miller and Verdoneili about self-perceived voice problems indicated that more estimated hours of singing per day corresponded to fewer current self-reported voice problems by a factor of three. In another large survey analyzing risk factors for voice problems in teachers (N = 1878), Kooijman et al found that voice load and environment were less important risk factors for voice problems than were physical and psychoemotional factors. Bowers and Daugherty examined self-reports of voice use and health among high school students at a summer choral camp (N = 141). In pre- and posttests, students reported a significant increase in “vocal difficulty.” However, there was no significant change from the pre- to posttest regarding the question “I have taken good care of my voice this past week.”

To measure self-perceived handicap in singing, Cohen et al created and validated a Singing Voice Handicap Index (SVHI). The SVHI was based on the earlier Voice Handicap Index and consisted of 36 statements found to be statistically reliable. The statements used a five-point Likert scale, with a continuum between “never” (score of 0) and “always” (score of 4) that related to the physical, emotional, social, and economic impact of singing voice problems. Raw scores ranged from 0 to 144 and were scaled to range from 0 to 100. In a pilot study testing the index, a control group of singers reporting no dysphonia (N = 129) had a median SVHI score of 22 versus a median score of 61 among singer patients with a diagnosed vocal dysfunction.

Perceptual studies of voice use and health have not yet established a relationship between vocal health and vocal dose. A difficulty in establishing this relationship is that vocal dose has not been shown to correlate directly with vocal fatigue, which remains a subjective term. Some studies have suggested that there are no consistent correlations between acoustic measures of vocal sound and physical measures of vocal fatigue or singer perceptions of vocal fatigue. Welham and MacLagan reported, “There is a particularly critical shortage of data concerning the nature of vocal function changes following singing or acting performance.”

Titze et al refined measures for determining healthy levels of vocal dose by quantifying the safe continuous travel limit of the vocal folds. In analyzing spoken reading passages, they found that female vocal folds travel from about 0.5 to about 0.7 m/s of ongoing phonation. Comparing the limits of exposure to industrial calculations for hand-transmitted vibrations, they calculated a safety dose limit of 520 m, which would be reached in 17 minutes, given an average of 0.5 m/s of continuous phonation. However, this calculation of vocal dose did not
take into account the fact that singers rest quite frequently during all phonation or the unique makeup of human vocal folds. The authors hypothesized that this brief recovery time and the construction of the vocal folds allowed voices to significantly extend healthy phonation periods.

Recent studies have used APMs to begin to build a body of data about typical voice use in different situations. As teachers are among the population with the highest risk of voice disorders, teacher voice use has been the focus of numerous dosimeter studies to date.\textsuperscript{17–19} Titze et al.\textsuperscript{20} found that classroom teachers had an average of 23% time dose (Dt), or about 2 hours in an 8-hour weekday, and a 13% Dt during off-work hours, with a 12% Dt on weekends. These findings were in accordance with previous studies, which found teacher Dt to be 15–40%.\textsuperscript{21–24}

In a related study, Morrow and Connor\textsuperscript{25} found that elementary school music teacher vocal doses were significantly higher than that of other elementary school classroom teachers.

Several APM studies have also examined voice use among adolescent vocalists. Daugherty et al.\textsuperscript{26} combined perceptual and dosimetric data to examine student voice use during a 3-day all-state high school chorus event in a Midwestern state, including daily surveys of the student singers (N = 256) and vocal dose data from APM units worn by two students over 3 days. The study found significant deteriorating changes in self-reporting of five of seven vocal health indicators surveyed (tired voice, hoarseness, comfortable access to higher range, strained singing, and throat pain) and the question “right now, the overall quality of my singing voice is . . .” Despite these perceptions, almost 80% of the students believed they had “taken good care” of their voices. Both students wearing the APM units recorded Dt outside of rehearsal that approximated Dt in rehearsal. The female participant had a 20.92% rehearsal Dt compared with a 17.96% nonrehearsal Dt and a 17.14% Dt in pre/post-event periods. The male participant had a 24.34% rehearsal Dt, a 19.88% nonrehearsal Dt, and a 5.73% Dt in the pre/post-event periods. The authors suggested that proactive voice care education would be helpful in preventing vocal problems among young singers.

Two recent studies used APMs to analyze the habits of college and university voice students. Schlonegger\textsuperscript{27} analyzed two undergraduate women during an intensive rehearsal week in which both students were involved during nearly 40 rehearsal hours. Dt was 13.76–18.53% as compared with 6.94–10.86% during baseline weekend days. One student, an extrovert, accrued 17.3% Dt outside of rehearsal during the intensive week, whereas the other, an introvert, accrued 8.92% phonation time outside of rehearsal. Both students reported some declines in their perception of vocal health over the course of the intensive week; the introvert reported a decline of 26.4 points of 100 on the SVHI, whereas the extravert, though she accrued a higher vocal dose by all measures, reported an improvement of 4.9 points. The results of this case study suggested that these students could have benefited from voice care education and that more research is needed to examine the ways in which high vocal doses have varying effects on the vocal health of different individuals.

The purpose of this case study was to investigate graduate voice students’ (N = 2) voice use before, during, and after a scheduled period of vocal activity (an intense week of opera rehearsals) through (1) acquired APM data, (2) daily surveys, (3) participant activity logs, (4) three administrations of the SVHI, and (5) pre- and post-stroboscopic laryngeal examinations.

The following research questions guided this investigation: (1) What do APM data indicate about phonation time and distance doses acquired by participants during different periods of activity? (2) What do daily surveys and SVHI scores indicate about participant’s perceptions of vocal use? (3) Are there changes in pre- and post-videostroboscopic examinations?

**DEFINITIONS**

For the purpose of determining vocal dose measurements in this study, it is important to consider the following terminology.

- **Fundamental frequency (F0)** describes the rate at which the vocal folds vibrate, measured in Hertz. It is perceived as pitch.
- The APM records F0 mode (the F0 value at which most phonation occurred during a recorded period of time) and F0 average (the average F0 in the recorded data).
- Measures of vocal dose recorded by the APM reveal three data points and are based on formulas devised by Popolo et al.\textsuperscript{1,12} Phonation time dose (Dt) refers to the cumulative duration of time (hh:mm:ss) or the percentage of time the vocal folds have actually touched in a given period. A vibratory cycle is one complete sequence of opening and closing of the vocal folds. Cycle dose (Dc) refers to the accumulated number of such repetitive cycles in a particular time period. Distance Dose (Dd) is an estimate of “how far” vocal folds travel in a period of time incorporating total phonation time, F0, and amplitude into one dosage measure. Taken together, these measures provide a detailed picture of the volume and intensity of voice use.

**METHOD**

**Participants**

Participants (N = 2) in this study were two female graduate voice performance students at a major Midwestern university, both of whom also served as graduate teaching assistants in voice. Both students were double cast in principal roles of
a university production of Stravinsky’s opera *The Rake’s Progress*, as Anne Trulove and Baba the Turk. The leading soprano role of Anne Trulove is particularly demanding, as the singer must negotiate Stravinsky’s jagged vocal lines and high tessitura over the course of a full evening. Baba the Turk is a shorter supporting role but is nonetheless vocally demanding with a heavy orchestration during the character’s signature aria. The participants will hereafter be referred to by their stage names.

The Monday–Friday before the opera production week was selected for dosimeter monitoring. This period was selected (1) because the week before production often involves the most intensive singing requirements and (2) to avoid costuming and singer comfort issues in the production and performance weeks. These singers did not rehearse as frequently as they would have in a single-cast production and often sang on stage only every other day. Nonetheless, their other singing and teaching responsibilities continued unabated throughout the rehearsal and production period.

### Procedures

After protocols were approved by an institutional review board, the participants agreed to wear APMs (APM model 3200; KayPENTAX, Lincoln Park, NJ) for three study periods consisting of two baseline days before the intensive rehearsal week (PreBaseline), 5 days during the intensive rehearsal week, and 2 baseline days during the week immediately after the opera production’s completion (PostBaseline). Each participant provided written consent and completed a pre- and post-stroboscopic examination with a qualified laryngologist. In addition, the participants completed daily activity logs, a daily voice health survey, and the SVHI evaluation at the end of each of the three study periods.

### Phonation monitors

The APMs consisted of a small accelerometer transducer attached to the anterior base of participants’ necks at the sternal notch (ie, below the larynx and directly above the sternum). The accelerometer sensed phonation vibrations and captured raw data at a rate of 20 samples per second. A cable conveyed these data to a battery-powered microprocessor unit worn in a waist pack. The microprocessor stored and calculated information including dose time (Dt), distance dose (Dd), fundamental frequency ($F_0$), and voice amplitude levels (SPL, dB). A sound pressure level calibration was completed each time the APM was started by attaching the APM to a computer loaded with KayPentax APM software and a microphone situated 15 cm from the participant’s mouth. The calibration was accepted if at least 10 data points were collected. A best-fit line for determining SPL (dB) was calculated using the following formula:

$$\text{SPL} = \frac{(\text{ACC} - X)}{Y} + \text{cal factor}$$

This allowed the APM to develop an estimate of SPL (dB) by measuring the intensity of vibrations collected by the accelerometer. Average percent error of phonation time estimates has been estimated at 5% for 40 hours of monitoring. Average percent error of $F_0$ and vocal intensity monitoring estimates has been estimated at 2% after 10–15 hours of monitoring. The participants in this study wore the APM units for a total of 97.6–100.7 hours.

Data were obtained over the entire course of each day. The participants met the researcher early each morning to download the previous day’s data and attach and calibrate the APMs according to the manufacturer’s protocols. The participants wore the monitors 10–14 hours each day, removing the monitors just before retiring for the evening. The researcher remained available by phone throughout the study periods in the event that APM units became unattached and needed reattachment and recalibration.

PreBaseline monitoring days ($N = 2$) occurred during non-opera rehearsal days shortly before the intensive week. PostBaseline monitoring days ($N = 2$) occurred during the week immediately after the opera production’s completion.

### Activity logs

To determine what activities occurred during each recorded phonation period, the participants completed daily activity logs, documenting each significant activity throughout the day and the time each activity commenced and ended (Appendix 1). Activities listed ranged from “opera rehearsal” and “teaching voice lesson” to “driving” and “talking with friends.” The logs were used to separate and calculate voice use during different activities.

### Daily vocal health surveys

At the end of each monitored day, both participants completed a Vocal Dosage Case Study Daily Survey (Appendix 2). The participants recorded their hours of sleep from the previous night, the time they left their home, and the overall quality of their singing voice. They also responded to 10 vocal health statements using a Likert scale with a range of 1–7, with 1 being *strongly disagree*, 4 being *not sure*, and 7 being *strongly agree*. The statements ranged from “I am doing a good job taking care of my voice today” to various indicators of perceived vocal stress, including comfortableness of high range, throat clearing, airiness/breathiness, strain, fatigue, throat pain, hoarseness, wobble/shaky voice, and singing pain.

### Singing Voice Handicap Index

The participants also completed the SVHI (Appendix 3) at the end of each of the three monitored periods of the study: PreBaseline, intensive week, and PostBaseline. The SVHI gave a more complete and comparable indication of the participants’ perception of vocal health. The SVHI was scored on a single scale of 0–100, with a higher score indicating more voice handicap.

### Pre- and post-stroboscopic examinations

Each participant received PreBaseline and PostBaseline videostroboscopic examinations of the vocal folds from a qualified laryngologist. PreBaseline test occurred on the first day of PreBaseline APM monitoring. The PostBaseline occurred the day
after the final opera performance, just before the 2 PostBaseline APM monitoring days.

RESULTS

Voice use data

Both participants wore the APM units for an average of 11.02 hours each day over the course of 9 monitoring days, with a range of 4.68–13.98 hours. Over the course of monitoring, there were three occurrences of the APM monitor shutting off, necessitating recalibration by the researcher. The first occurred for Anne during the intensive week, and the unit was restarted and recalibrated after about 1 hour. The remaining two occurred for both Anne and Baba during one of their Post-Baseline test days. In these cases, circumstances prevented a meeting for recalibration; so each participant completed only about 5 hours of monitoring.

Table 1 displays overall phonation data for the PreBaseline, intensive week and PostBaseline periods. Both participants used their voices in dosages similar to the baseline days during the intensive week, with Baba having her lowest average Dt during the intensive week. This occurred partially because Baba stayed home sick 1 day during the intensive week. When this rest day was removed for comparison, however, Baba’s average daily Dt was 13.66%, a Dt that remained less than the baseline periods.

Over the course of the intensive week, the participants participated in 4–12 hours of opera rehearsal time. Each singer sang outside of opera rehearsal for 1.5–6.33 hours and taught voice lessons for 4–7 hours. Table 2 shows the APM data for the different activity periods throughout the intensive week. Dt was the highest for Anne during her other singing times (which included 1 hour of choral rehearsal and 5.5 hours of private practice time). Baba also had a comparatively high dose time for her private rehearsal time (28.3%) but actually registered her highest phonation percentage (29.45%) during her 7 hours of teaching. By contrast, opera rehearsals consisted of much less time than expected and comparatively small vocal doses Dt (12.74% and 11.28%). Nonrehearsal times consisted of different activities, including, among others, class, social activities, drive time, study time, and napping.

The participants phonated less in nonrehearsal time during the intensive rehearsal week than they did during the baseline periods. Anne’s intensive week nonrehearsal Dt was 5.90% as opposed to 9.61% during the rehearsal time.

<table>
<thead>
<tr>
<th>Measure</th>
<th>PreBaseline (2 d)</th>
<th>Intensive Week (5 d)</th>
<th>PostBaseline (2 d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of monitoring (hh:mm)</td>
<td>11:26</td>
<td>11:51</td>
<td>7:48</td>
</tr>
<tr>
<td>Phonation % (Dt)</td>
<td>15.72</td>
<td>14.13</td>
<td>12.95</td>
</tr>
<tr>
<td>F0 mode (Hz)</td>
<td>196</td>
<td>177</td>
<td>177</td>
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<tr>
<td>F0 average (Hz)</td>
<td>308</td>
<td>337</td>
<td>223</td>
</tr>
<tr>
<td>Average A (SPL, dB)</td>
<td>73.91</td>
<td>75.68</td>
<td>71.16</td>
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<tr>
<td>Dc (thousands)</td>
<td>2011</td>
<td>2111</td>
<td>981</td>
</tr>
<tr>
<td>Dd (m) (Daily average)</td>
<td>4481</td>
<td>4488</td>
<td>2010</td>
</tr>
<tr>
<td>Dd (m/s)</td>
<td>0.66</td>
<td>0.82</td>
<td>0.44</td>
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</table>

* Indicates total for entire 5-day period.
Because activity logs indicated that schedules in the intensive week and baseline days were somewhat similar, vocal doses were also disaggregated by activity for the entire study period. Figure 1 shows the average Dt for each activity over 9 days of monitoring, Figure 2 shows overall Dd for each activity over 9 days of monitoring, and Figure 3 shows the overall percentage of voicing by activity over 9 days of monitoring.

Daily surveys of vocal health

In response to the 11 vocal health statements in the daily survey, both singers reported generally good vocal health throughout the study periods. Both singers reported similar amounts of sleep, with Anne averaging 7.19 hours nightly and Baba 7.78 hours nightly during the study periods. In response to the question “I am doing a good job taking care of my voice today,” Anne had a mean response of 6.0 on a scale of 1–7 (with 1 being strongly disagree and 7 being strongly agree) during the intensive week (standard deviation [SD]: 0.71) and a mean response of 5.0 during the baseline periods (SD: 0.82). Baba had a mean response of 6.6 during the intensive week (SD: 0.55) and 6.75 during the baseline periods (SD: 0.5).

In response to the remaining nine statements on various aspects of vocal health, both singers reported a perception of generally good health throughout the study period (Figure 4), with Anne reporting the most negative scores during the PostBaseline period, after the opera performance. On a scale of 1–7, with higher numbers indicating more perceived vocal difficulty, Anne reported mean scores of 2.22 on the for the

SVHI scores

SVHI responses are compiled and placed on a continuum of 0–100, with a higher score indicating greater perceived vocal difficulty. The SVHI scores indicated that both singers maintained a perception of excellent vocal health throughout the study period. Anne’s scores ranged from 5.6 to 7.6, with her lowest (most positive) score occurring at the end of the intensive week. Baba’s scores ranged from 2.1 to 2.8. Neither singer reported a score other than “never” or “almost never” on any of 36 statements on any administration of the index.

Average Daily Voice Survey Results

PreBaseline days, 1.58 for the intensive week, and 3.94 for the PostBaseline days. Baba reported mean scores of 1.50 for the PreBaseline days, 1.66 during the intensive week and 1.28 for the PostBaseline days. Of the nine vocal health statements, the only mean scores of 5 or higher (scores including the word “agree”) for the study period were in response to the statement “Today, my voice feels tired.” Anne reported this answer during the PostBaseline period (a score of 7 on both days as compared with a mean score of 3.6 during the intensive week). Baba reported that her voice felt tired during the intensive week when she was fighting illness (mean score of 5.6) but felt less tired during the PreBaseline (mean score of 2) and PostBaseline periods (mean score of 3).
Stroboscopic examinations
Both singers received a stroboscopic examination from a laryngologist at the beginning of the study period during the Pre-Baseline study days. Each then received a follow-up examination the day after the opera production was completed during the Post-Baseline study days (Figures 5 and 6). Both examinations revealed voices in good overall health. At the initial stroboscopy, Anne showed no problems with the vocal folds and mild hyperfunction in the speaking voice. Following the post-stroboscopy, the laryngologist reported mild Reinke’s edema likely because of laryngopharyngeal reflux but no significant changes that appeared to be because of voice use. Baba’s initial stroboscopy revealed mild hyperfunction in the speaking voice and evidence of laryngopharyngeal reflux. No changes were noted at the post-stroboscopy.

DISCUSSION
One purpose of this study was to add to a limited body of data regarding real-time voice use and voice care among graduate school singers. It is hoped that ongoing data collection will lead to the development of baselines of voice use and guidelines for healthy vocal doses. The vocal doses recorded in this study corresponded with other studies of student singers and music teachers completed to date.25–28 It is notable that in the present study, opera rehearsal played a relatively minor role in the total vocal load, both in terms of rehearsal hours and in terms of the vocal doses during rehearsal (Table 2, Figures 1–3). It is interesting to note that higher Dts were recorded in personal singing practice and teaching (Figure 1). Average Dds were similar or higher during teaching, and in the case of Anne, much higher during personal practice than in opera rehearsal (Figure 2).

An important finding of several dosimeter studies to date was that voice use outside of rehearsal played a large part in overall voice use and care.26,27 Results of the present study of graduate students were in contrast to earlier studies of less experienced student singers who sometimes phonated as much or more outside of rehearsals than in rehearsals in spite of the perception that their voices were tiring. These experienced graduate students demonstrated careful attention to the load placed on their voices during busy periods or periods when they were fatigued. Both participants phonated less in the nonrehearsal times of the intensive week before the opera production than they did during the baseline periods (Table 1). Baba took a sick day (not as a result of any vocal issues) during the intensive week in which her Dt was only 2.69%. Anne reported being very tired vocally after the opera performances and showed effects of acid reflux in the posttest stroboscopy. She did not sing during the PostBaseline days and accumulated a Dt of only 2.69%, considerably less than the averages of more than 4400 m that she accrued on the other days (Table 1).

It is notable that correspondingly, both singers remained vocally healthy, both in objective and perceptual terms, throughout the opera production/study periods.

One area of future concern for both singers is in the arena of teaching. A notable finding was that both participants displayed high vocal doses for the periods in which they were teaching private voice lessons over 9 days of monitoring, with Anne having a Dt of 25.60% during almost 9 hours of monitored teaching and Baba having a Dt of 28.41% over almost 8 hours of monitored teaching. During the intensive week, Baba actually had a higher Dt during teaching (29.45%) than in her own practicing (28.3%). The results suggest that both teachers engaged in a heavy amount of teacher talk and vocal modeling during their

FIGURE 5. Pre- (left) and post-stroboscopic images (right) of Anne’s vocal folds.

FIGURE 6. Pre- (left) and post-stroboscopic images (right) of Baba’s vocal folds.
teaching. These doses did not appear to have had a harmful affect on these preservice voice teachers who were operating under student schedules, with available vocal rest time built into each day. However, the vocal doses accumulated by these teachers, particularly the Dts (25.25% and 29.45%), were as high or higher than vocal doses recorded in other studies of teachers (Titze, Morrow, etc.). Teachers of all types have been repeatedly shown to be of especially high risk for vocal problems because of the demands placed on their voices. If these singers moved to full-time teaching schedules and continued the same phonation patterns in teaching, they could be putting their voices at risk for future problems. This result, though it involves only two participants, suggests that voice teacher training in terms of voice care and use could be helpful to preservice teaching assistants.

Despite this concern, it is heartening to note that the two singers analyzed in this case study appeared to be aware of their overall vocal health and limitations. They adjusted their phonation activity based on their vocal health and the demands placed on their voices and maintained generally good vocal health throughout an intensive period in which many vocal responsibilities were balanced. This case study, along with other recent dosimeter studies, has begun to provide the field with a frame of reference for preprofessional voice use. Further studies are needed so that valid baseline data for healthy singers can be established and compared with singers demonstrating some type of dysphonia. Continued additions to his body of data will help determine what constitutes a healthy vocal dose and what constitutes overuse.

REFERENCES

Appendix 1

Vocal Dosage Case Study
Daily Activity Log

Name _____________
Date _____________

At three times during each day you wear the APM unit (noon, late afternoon, prior to bedtime), please record the type and duration of activities during which you used your voice (speaking or singing) for periods exceeding five minutes, e.g., a rehearsal, a social event, a meeting, a ballgame, a discussion class, etc.

<table>
<thead>
<tr>
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Appendix 2. Vocal Dosage Case Study Daily Survey

Your responses to this anonymous survey will college faculty assess various aspects of the opening week schedule. Please respond HONESTLY and CANDIDLY.

PART ONE:  
Name: ____________________________  Age: ______

Last night I got ______ hours of sleep.  I left my home at ______ a.m. today.

PART TWO:  
For statements 1-7 below, please circle your agreement or disagreement with each statement, using the following scale:

1 strongly disagree  2 disagree  3 somewhat disagree  4 not sure  5 somewhat agree  6 agree  7 strongly agree

1. I am doing a good job taking care of my voice today.

   1  2  3  4  5  6  7

2. Today, I can comfortably sing the higher notes of my voice range.

   1  2  3  4  5  6  7

3. Today, I find myself clearing my throat more than I typically do.

   1  2  3  4  5  6  7

4. Today, I sense airiness/breathiness in the sound of my voice.

   1  2  3  4  5  6  7

5. Today, I feel like I’m straining when I sing.

   1  2  3  4  5  6  7


   1  2  3  4  5  6  7

7. Today, my throat hurts when I sing.

   1  2  3  4  5  6  7

8. Today, my voice is hoarse.

   1  2  3  4  5  6  7


   1  2  3  4  5  6  7


    1  2  3  4  5  6  7

11. Right now, the overall quality of my singing voice is (circle one):

    Very Poor  Poor  Average  Good  Excellent

Appendix 3

To find the tool for the Singing Voice Handicap Index the reader is referred to Cohen et al.