

The Effects of Preventive Vocal Hygiene Education on the Vocal Hygiene Habits and Perceptual Vocal Characteristics of Training Singers

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Summary: The purpose of the present study was to determine the effects of vocal hygiene education on the vocal hygiene behaviors and perceptual vocal characteristics of untrained singers. Eleven adult untrained singers served as subjects. They attended four 1-hour class sessions on vocal hygiene, including anatomy and physiology of the phonatory mechanism, vocally abusive behaviors, voice disorders commonly seen in singers, and measures to prevent voice disorders. Pre- and postinstruction surveys were used to record subjects' vocal abuses and their perceptions of their speaking and singing voice. They also rated their perceived value of vocal hygiene education. Results revealed minimal changes in vocal hygiene behaviors and perceptual voice characteristics. The subjects did report a high degree of benefit and learning, however. **Key Words:** Singers—Singing—Vocal hygiene—Prevention—Voice disorders.

The disciplines of vocal music and speech-language pathology began to overlap in 1855 when Manuel Garcia, a singing teacher, developed the first laryngoscope.^{1,2} Since then, professionals in both fields have maintained an insatiable curiosity about how

the voice works.³ Articles and books published in the latter half of this century have improved understanding of the mechanics and functioning of the vocal mechanism and the process of singing. Patients with voice disorders receive treatment from teams of laryngologists, speech-language pathologists, and voice teachers. Their combined knowledge about the vocal mechanism provides the most effective care possible.⁴

Many of the patients who complain of voice disorders are singers.⁵ Typically, they are at significant risk for vocal fatigue because they practice abusive behaviors.⁶ Through a survey of female university voice students, Sapir⁵ found vocal attrition to be

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prevalent. The symptoms he attributed to vocal attrition included hoarseness, reduced pitch range, vocal fatigue, sensations in the throat such as tightness, pressure, discomfort, dryness, or pain. Other reported vocal injuries among singers are strained phonatory quality, inadequate breath support, and loss of vocal flexibility or endurance.^{5,7} Sapir concluded that certain vocally abusive behaviors, including talking excessively, rapidly, loudly, and/or in a low pitch were significant if not the primary causes of voice problems among singers.⁵

Sapir also found that “vocal attrition has a significant impact on performance and career goals, and on the singer’s psychological well being.”^{5(p71)} Because professional singers rely on their voices for their livelihood, their vocal problems are more economically detrimental to them than those in nonsinging jobs.^{2,5,8,9} Braun-Janzen concurred that “singers place higher value on their singing voice and experience more voice-related anxiety than nonsingers.”^{9(p7)} Voice problems can ruin a singer’s career. Sapir reported that 20% of the students in his survey had quit performing, forgone an audition, or failed to take part in shows or concerts because of chronic voice problems.⁵

Despite their tendency toward voice problems, singers seldom seek professional help for a voice disorder until it develops into a severe pathology.⁴ Many researchers have indicated that it is imperative to educate singers about vocal hygiene to prevent the vocally abusive behaviors that can lead to functional vocal pathologies.^{5,10,11}

Preventive vocal hygiene education proved effective for kindergarten teachers, another group of professionals at risk for voice disorders, in a study conducted by Chan.¹² He found that kindergarten teachers improved their voices after a 1.5-hour workshop of vocal hygiene education that included explanations of the normal vocal mechanism and laryngeal pathology, vocal abuses and their consequences, examples of healthy voice use, and strategies to maintain classroom order without abusing the voice. After the workshop, the teachers who practiced their newly acquired vocal hygiene skills daily for 2 months kept a daily journal to monitor their daily vocal abuses and misuses. An analysis of the journals found that the teachers “significantly reduced these vocal abuses wherever possible.”^{12(p286)}

Many teachers of singing believe it is their responsibility to ensure the vocal health of their students.³ In a survey of professional and amateur singers, Braun-Janzen⁹ found high levels of interest among singers in the areas of anatomy and physiology, care of the voice, the speaking voice, voice disorders, and the role of the speech-language pathologist. Further, she assessed the singers’ existing knowledge level in these areas through a battery of 50 true-false questions. She found a significant paucity of knowledge across the groups in all areas. Sapir indicated a need for “intensive training in vocal hygiene as part of the (voice) student’s formal education.”^{5(p73)}

In his study of the effects of vocal hygiene education on kindergarten teachers, Chan explained the normal vocal mechanism. He used pictures and models to teach basic information about laryngeal structure and function including the composition of muscles and cartilage, vibratory aspects of the folds, and basic positioning of the folds during various types of phonation.¹² Studies have shown that young singers benefit from information about their vocal anatomy and physiology, and the upper respiratory tract and laryngeal physiology.¹³ Once a conceptual framework is set for the singer, behavioral changes may be implemented to improve vocal technique and skill.¹³

Vocal hygiene education should include the identification and elimination of vocal abuse and misuse.^{2,14,15} Singers may not know which behaviors comprise “vocal abuse.” Chan taught the teachers to replace unhealthy vocal practices including loud talking, throat clearing, and forced whispering with more healthy practices.¹² Colton and Casper suggest healthy vocal behaviors by restricting voice use, loudness, and increasing liquid intake.¹⁶

Chan suggested behaviors specific to the teaching profession. He recommended using hand clapping and lighting control to gain students’ attention rather than vocal signals.¹² When instructing singers, it may be beneficial to include components specifically aimed at their needs such as “warm up every day” and “sing only in your correct range.”^{15(p15)}

Professional voice users are most susceptible to functional voice pathologies because of improper or excessive voice use.⁸ According to Edwin,¹¹ topics should include vocal fold hemorrhaging, nodules, polyps and chronic laryngitis. Vocal hygiene education should include the possible effects of vocal

abuse on the vocal folds and how voice quality is affected when practicing these behaviors. Singers should be taught better vocal technique for speaking.^{14,17} Voice professionals benefit from formal speaking voice training because many abuse their voice much more when they speak than when they sing.² Methods to improve the speaking voice may include instruction on breathing, the elimination of hard glottal attacks, and vertical focus. Also included may be range-of-motion exercises such as shoulder rolls, jaw relaxation, and tongue stretches.^{2,14}

This study was designed to provide a basic curriculum of vocal hygiene education for vocally-healthy untrained singers and to measure its effect on their vocal behaviors. Based on previous research, the curriculum was designed with the following elements: (1) the anatomy and physiology of the phonatory mechanism, (2) an outline of vocal abuses, (3) an overview of pathologies associated with abuses, and (4) instruction on proper vocal technique for speaking, including strategies to eliminate vocal abuses.^{2,3,6,12,13,15,17}

METHOD

Subjects

Subjects were 11 adult subjects (3 men, 8 women) who ranged in age from 18 to 22 years with an aver-

age of 18.55 years. All were undergraduate students at East Carolina University. All subjects had received less than 2 years of formal voice training and intended to pursue a career in vocal music. Table 1 illustrates the demographic data. Subjects were eligible if they had had no history of voice disorders, no history of previous speech therapy of any kind, no exposure to formal vocal hygiene training, and no more than 2 years of classical voice training. Subjects were not excluded for reasons related to physical condition (eg, smoking, allergies, asthma).

Procedures

Subjects attended four 1-hour classes that addressed the 4 vocal hygiene issues. All classes were taught by the first author. During the first session, they completed 2 surveys. The first was the Preinstruction Survey (see Appendix A) to determine their knowledge of vocal hygiene and to collect demographic information. The second, the Baseline Survey (see Appendix B), measured their daily vocal habits and abuses. This survey used a Likert-type scale to assess their perceptions of their speaking and singing voice. Subjects were told that the study was being conducted to assess the usefulness of vocal hygiene education for singers in training. Approximately 6 weeks after the final class, subjects completed the Baseline Survey a second time to collect postin-

TABLE 1. Demographic Data

Subjects	Age	Gender	Classification	Major	Minor	No. Hours Singing/Week
1	18	M	FR	VP		7.5
2	18	F	FR	VP		8.0
3	18	F	FR	VP		17.5
4	18	F	FR	MTH	ME	10.0
5	20	F	FR	ME		5.0
6	18	M	FR	VP		8.0
7	18	F	FR	ME		12.5
8	18	F	FR	ME /MTH		8.0
9	18	F	FR	MT	P	13.0
10	18	F	FR	MTH	P	12.0
11	22	M	SR	MTH		20.0

Abbreviations: FR: Freshman; JR: Junior; SR: Senior; F: Female; M: Male; VP: Vocal Performance; MT: Musical Theater; MTH: Music Therapy; ME: Music Education; P: Piano.

struction measurements of daily vocal habits and abuses.

Class instruction

At the first session, the instructor explained the purpose of the study and the students completed the consent forms and the survey. Models and photographs were used in the lecture on the anatomy and physiology of the phonatory mechanism. The second session began with a review and continued with the concept of vocal abuse and misuse. Singers were asked to consider the anatomy of the larynx and discuss why some vocal behaviors would be considered abusive. The instructor explained the extent to which each behavior would need to be taken to cause significant vocal damage.

After a brief review, the third session continued with an explanation of laryngeal pathology secondary to vocal abuse, and the difference between organic and functional pathologies. The lecture covered the etiology of disorders, the effects on phonation, and an overview of typical treatments for various disorders. Slides were used to illustrate each pathology. The fourth session began with a review of the previous sessions, followed by instruction on speaking voice technique with specific focus on the replacement of vocally abusive behaviors with healthy alternatives. Therapy procedures that improve speaking voice were also discussed. All sessions ended with a question and answer period. During each class, the instructor handed out written material for individual review. See Appendix C for the 4-session curriculum.

RESULTS

The study measured the subjects' perceptions of their vocal quality and vocal hygiene behaviors. The following dependent variables were defined: (1) the quantity of performance of 7 vocal abuses and 4 misuses of substances that could lead to vocal damage, (2) the quantity of performance of appropriate vocal hygiene behaviors, (3) the perceptions of their singing and speaking voice qualities, and (4) the perceptions of use of vocal hygiene knowledge during singing and nonsinging activities. Data are presented with means and standard deviations. Repeated measures two-tailed *t* tests for the Likert scores were used to determine if a significant change occurred for each variable. To handle family-wise error due to multiple

t tests with the data obtained from the Likert scales, a Bonferroni correction was applied. This changed the alpha level necessary for significance from .05 to .002. The alpha level for all other analyses was .05.

Vocally abusive behaviors

In the Baseline Survey, the subjects were asked to quantify the occurrence of the following 7 vocal abuses: (1) verbal arguing, (2) coughing, (3) talking in noise, (4) talking in smoke, (5) throat clearing, (6) coaching, and (7) waiting tables. They also quantified performance of 4 misuses of substances that may lead to abuse of the voice: (1) liquid caffeine intake, (2) solid caffeine intake, (3) alcohol intake, and (4) tobacco intake.

No significant differences in behavior were observed postinstruction although a trend was evident. Some of the vocal abuses and substance misuses decreased in quantity over the course of time from pre-test to post-test. These were not statistically significant changes, however. One behavior, talking in noisy places, displayed a significant increase from 3.22 to 14.83 hours per week. When individual data were examined, it became apparent that one subject's response of 72 hours/week had a large effect on the mean. Table 2 illustrates these data.

Vocal hygiene behaviors

For the Baseline Survey, subjects were asked to estimate their time (in minutes) spent in vocal warm-up before group rehearsals, private voice lessons, and solo performances. They were also asked to estimate their daily water intake (Table 3). Analysis of the data demonstrated no significant changes in warm-up time following the vocal hygiene education sessions. The subjects did demonstrate an increase in warm-up time before both group rehearsals and solo performances, but this change was not statistically significant. Also, a decrease in warm-up time before private voice lessons was observed; this, too, was not statistically significant. An increase in water intake was also observed postinstruction, although this increase was not statistically significant.

Subjects' perceptions of their singing and speaking voices

For the Preinstruction Baseline Survey, the subjects were asked to rate their perceptions of their

TABLE 2. Group Data for Subjects' Performance of Vocal Abuses and Substance Misuses Pre- and Postinstruction

Abuse	Preinstruction			Postinstruction			t value*
	Mean	(Range)	SD	Mean	(Range)	SD	
Verbal arguing (m/w)	44.86	(4-180)	63.77	32.50	(5-60)	22.97	.415
Coughing (i/d)	2.77	(0.4-6)	2.32	2.45	(0.13-3)	1.82	.970
Throat clearing (i/d)	5.83	(1-10)	3.18	3.22	(1-6)	1.46	.055
Talking in noisy places (h/w)	3.22	(1-5.5)	3.99	14.83	(1-72)	28.14	.371
Talking in smoky places (h/w)	3.69	(1-14)	5.41	4.0	(1-8)	2.92	.732
Liquid caffeine (s/d)	2.20	(1-6)	2.16	2.25	(1-6)	1.83	.423
Solid caffeine (s/d)	1.25	(1-1.5)	0.48	2.88	(0.5-2)	3.47	.480
Alcohol intake (s/w)	3.00	(1-5)	3.54	4.50	(3-6)	2.12	.705
Tobacco intake	0.00			0.00			n/a
Coaching	0.00			0.00			n/a
Waiting tables	0.00			0.00			n/a

Abbreviations: SD: Standard Deviation; m: minutes; w: week; i: instances; d: day; h: hours; s: servings.

* nonsignificant.

TABLE 3. Group Data for Subjects' Performance of Vocal Hygiene Behaviors Pre- and Postinstruction

Abuse	Preinstruction			Postinstruction			t value*
	Mean	(Range)	SD	Mean	(Range)	SD	
Warm-up prior to group rehearsal (#/m)	10.32	(2.5-15.5)	6.33	10.68	(2.2-15.5)	8.02	.840
Warm-up prior to private lesson (#/m)	13.50	(2.5-25)	7.66	12.36	(2.5-25)	8.27	.562
Warm-up prior to solo performance (#/m)	11.09	(2.5-25)	6.19	14.86	(2.5-25)	7.77	.163
Water intake (#/s)	4.05	(2-11)	2.63	4.77	(2-6.5)	1.82	.411

Abbreviations: SD: Standard Deviation; #/m: number of minutes; #/s: number of eight-ounce servings per day.

* nonsignificant.

singing and speaking voices on a 7-point Likert scale using the following 9 descriptors: (1) my voice sounds breathy, (2) my voice stops in a phrase, (3) my voice fatigues easily, (4) my voice is too loud, (5) my voice is too soft, (6) my voice sounds clear, (7) my voice cracks, (8) it is hard to maintain a single pitch, and (9) my voice is consistent on a daily basis. For the postinstruction Baseline Survey, they were asked to rate the same perceptions of their voices (Table 4). None of the variables revealed a statisti-

cally significant change for the subjects' singing or speaking voices.

Subjects' perceptions of their use of vocal hygiene knowledge

On the pre- and postinstruction surveys, the subjects were asked to rate how often they independently considered their vocal anatomy and physiology when singing. They were also asked to what extent their knowledge of vocal abuse played a role in their

TABLE 4. Group Means of Likert Ratings of Subjects' Perceptions of Their Singing and Speaking Voices Pre- and Postinstruction

	Singing Voice			Speaking Voice		
	Pre-Mean	Post-Mean	t value*	Pre-Mean	Post-Mean	t value
My Voice:						
sounds breathy	4.55	5.09	.052	6.00	6.00	1.00
stops in a phrase	5.09	6.18	.010	6.27	6.09	.676
fatigues easily	4.18	4.82	.046	6.00	5.82	.690
is too loud	4.54	5.09	1.00	4.82	5.18	.221
is too soft	5.00	5.18	.724	5.55	6.08	.192
sounds clear	2.64	2.73	.756	2.45	2.00	.053
cracks	5.36	5.45	.821	6.00	6.09	.779
is consistent on a daily basis	2.64	3.36	.257	2.27	2.27	1.00
My throat hurts	4.34	4.91	.277	5.55	5.27	.192

Likert Scale: 1: Always, 2: Usually, 3: Frequently, 4: Sometimes, 5: Infrequently, 6: Rarely, 7: Never.

* non-significant t statistics

singing and nonsinging behavior. They rated their responses on a 7-point Likert scale (Table 5). Data analysis indicated no significant changes in their responses. A general trend of increased use of vocal hygiene knowledge was apparent; however, these changes were not statistically significant.

Subjects' perceived value of vocal hygiene education

On the second Baseline Survey, the subjects were asked to assess the vocal hygiene class sessions by rating the value of each of the 4 class parameters: (1) anatomy and physiology, (2) vocal abuses, (3) vocal pathologies/voice disorders, and (4) preventive vocal hygiene measures. These parameters were rated on a 7-point scale based on the following three statements: (1) The information covered in the vocal hygiene class was applicable to my singing career; (2) I learned about concepts/strategies/ideas to which I had not been exposed before; and (3) the information covered in the class is important for all singers to know (Table 6). Results indicated that all subjects agreed or strongly agreed with all three statements. It appears that the subjects valued the knowledge gained through the vocal hygiene education.

The subjects were also asked to rate statements regarding whether they would recommend a similar

class to a fellow singer and if they had a better understanding of their vocal instrument after the class was completed than they did before implementation. Again, all subjects either agreed or strongly agreed with the statements.

DISCUSSION

Subjects' practice of vocal abuse

The results revealed no significant decrease in the number of vocally abusive behaviors by the subjects. As indicated in the literature, the singers exhibited various vocal abuses, and misuses of substances which may cause vocal abuse. Of the 7 vocal abuses and 4 substance misuses measured, the subjects denied practicing three altogether: coaching, waiting tables, and using tobacco products. They reported practicing the remaining 8 vocally abusive behaviors although the amount varied. Several vocal abuses and substance misuses were reported to occur minimally (eg, coughing was only reported to take place an average of 2.77 times per day) thus making these abuses less likely to decrease significantly postinstruction. Although statistically nonsignificant, some of the behaviors did show a decrease in quantity, including verbal arguing, coughing, throat clearing, and alcohol intake. Ideally, these initial minor de-

TABLE 5. *Group Ratings of the Use of Vocal Hygiene Knowledge During Singing and Nonsinging Activities*

Perception of Use	Preinstruction Mean	Postinstruction Mean
Independent consideration of vocal anatomy and physiology while singing	3.73	2.36
Knowledge of vocal abuse and misuse plays a role in singing and nonsinging behaviors	2.91	2.00

Likert Scale: 1: Always; 2: Usually; 3: Frequently; 4: Sometimes; 5: Infrequently; 6: Rarely; 7: Never.

TABLE 6. *Group Ratings of Subjects' Perceived Value of Vocal Hygiene Education*

Statement	Anatomy/Physiology	Vocal Abuse/Misuse	Voice Disorders	Prevention
The information covered in the class was applicable to my singing career.	1.64	1.09	1.27	1.27
I learned about concepts to which I had not been exposed before.	1.45	1.45	1.36	1.55
The information covered in the class is important for all singers to know.	1.37	1.09	1.27	1.82
I would recommend a class like this to a fellow singer.			Mean:	1.64
I have a better understanding of my vocal instrument now than I had before the class began.			Mean:	1.46

Likert Scale: 1: Always; 2: Usually; 3: Frequently; 4: Sometimes; 5: Infrequently; 6: Rarely; 7: Never.

creases in vocally abusive behavior are predictive of significant decreases in the future. The time between the first and second survey administration was 6 weeks. This time period may have been too brief to adopt significantly different behavioral patterns. But, of course, without adequate reinforcement during this period, it is possible that over time, some may forget the information the farther away from the instruction they become.

Data analysis revealed an increase in 4 vocally abusive behaviors: (1) talking in noisy places; (2) talking in smoky places; (3) liquid caffeine intake; and (4) solid caffeine intake. These behaviors occurred minimally in preinstruction measurements. Therefore, a slight increase may be representative of typical patterns in a normal range of performance of these behaviors. In addition, it is also likely that the education may have increased the subjects' awareness of these abusive behaviors. Therefore, in the post-test they re-

ported more instances of these behaviors than they were able to perceive in the pretest.

Subjects' practice of vocal hygiene

Statistical analysis of the data did not demonstrate significant changes in the subjects' practice of vocal hygiene behaviors, including vocal warm-up time and water intake. Increases that were statistically nonsignificant were noted in the subjects' time spent in vocal warm-up before both group rehearsals and solo performances. Perhaps if more time had been allotted between surveys for the singers to further adopt improved vocal hygiene practices these increases would have been statistically significant. Additionally, this may have been a variable more influenced by the actual recommendation of the voice teacher. Changes may have been the result of the student singer following the voice teacher's instructions. Interestingly, a minor decrease in time spent in vocal

warm-up before individual lessons was observed (1.14 minutes).

The subjects reported an increase in water intake that was statistically nonsignificant. The group mean for water intake after vocal hygiene education was relatively low postinstruction at 4.77 eight-ounce servings per day. The known positive effects of consuming 8 eight-ounce servings of water per day should be emphasized to a greater extent in future studies of this kind.¹⁶

Subjects' perceptions of their singing and speaking voices

The data results revealed that none of the subjects' perceptions of their singing or speaking voices were significantly changed. A general trend toward improvement of the perceptual vocal characteristics was evident. For example, *my voice sounds breathy* increased from 4.55 to 6.00 on the scale (1 = always, 7 = never). These changes may have occurred because the vocal hygiene class heightened their awareness of their singing voices. Being exposed to vocal anatomy and physiology, vocal abuses and misuses, vocal pathologies, voice disorders, and preventive vocal hygiene measures may have taught the subjects to scrutinize their singing voices to a greater extent. It is possible that the slight improvements in reducing vocally abusive behaviors began to facilitate slight improvements in their vocal productions. For example, a minor decrease in the group mean verbal arguing time may have led to voices that fatigue less easily and sound less breathy, as perceived by the subjects. Further application of these appropriate behaviors may result in continued improvement in vocal production as perceived by the subjects. Because all the subjects were singers in training, it is likely that their ability to self-monitor their vocal productions may not be fully developed.

The improvement of the subjects' voices across the two aforementioned parameters must be considered carefully. The reported improvements were the result of their perceptions only. Objective measures, such as instrumental analyses, would provide concrete data of changes in vocal production that may have occurred.

No significant changes in their perceptions of their speaking voices were observed. Contrary to the literature that states that singers tend to speak more abusively than they sing,² the subjects of the present

study reported perceptions of healthier speaking voices than singing voices. For the most part, they reported better ratings for the same parameters relative to their speaking voices than their singing voices. This may be attributed to the selection of subjects who were all singers at the beginning of their vocal careers and who may have been more critical of their singing voices than their speaking voices. Further, they may have perceived their speaking voice as "normal," just as the "normal" voices of their non-singing peers or family members. But, because they are in training to develop their singing voices, they may already have classified their singing voice as "below normal" because their ideal of a "normal" singing voice is likely well above novice skill.

Subjects' perceptions of their use of vocal hygiene knowledge

Statistical analysis revealed no significant changes in the subjects' perceptions of their use of vocal hygiene knowledge during singing and nonsinging activities. The slight increase observed, which was not statistically significant, may be the beginning of the transformation singers need to make in learning to apply this knowledge throughout their training. Further research should assess the long-term impact of vocal hygiene education.

Singers' perceived value of vocal hygiene education

During post-testing, the subjects were asked to assess the general value of vocal hygiene education according to the 4 topics taught in the classes. The results indicated highly positive reactions (1.0-2.0 on a 1-5 scale) indicating the respondents "strongly agreed" or "agreed" with all statements. This is concurrent with the literature that suggests singers maintain a high level of interest in how the vocal instrument functions, care of the voice, and functional voice disorders.^{3,9} Additionally, the positive reactions of the subjects paralleled the reactions reported by the kindergarten teachers in Chan's study.¹² Although the dependent variables did not exhibit significant changes in the present study, vocal hygiene education served as a positive experience for the subjects.

The present study demonstrated that vocal hygiene education did not have statistically significant effects on the dependent variables. Trends were apparent,

however. One must consider, though, that the subjects demonstrated very low values of abusive behaviors in the pretest; therefore, significant change of behavior may not be realistic. Most importantly, they reported that they had been exposed to new information that they believed to be essential for their careers and well-being as a singer. Additionally, all subjects found the information applicable to their singing careers. Clinically, the present study suggests important implications.

Vocal hygiene education should be used as a tool to prevent voice disorders in professional singers. Traditional voice therapy provided by a speech-language pathologist often concentrates on teaching the elimination of vocally abusive behaviors and the implementation of vocal hygiene behaviors. These concepts were emphasized in the present study's curriculum. Providing vocal hygiene education to singers who are in the early stages of their careers may decrease the likelihood that they will develop voice disorders later in their careers. Therefore, the significant findings of this study are the subjects' perception of gains rather than the actual gains that may or may not have occurred due to potential confounding variables. Not only would vocal hygiene education implemented early in singers' careers serve to prevent possible voice disorders, it would also provide singers with important information about their instrument. Understanding the normal structure and function may enable them to determine when intervention is necessary to prevent mild disorders from progressing into severe ones.

Future research should measure the long-term effects of studies such as the present one. An analysis of these subjects in, for example, 1, 2, and 3 years to determine if any voice disorder or pathology has developed would be an indicator of the preventive nature of this education. Also, these subjects were not required to complete a journal of their daily activities related to vocal abuse and hygiene. It is likely that more rigorous activities outside of the classes are necessary to document any statistically significant changes. Other formats of education for the training singer may be more appropriate, as well. For example, infusion of the material into singing lessons on a weekly basis for an entire semester may encourage long-term recall and application of the concepts. Exactly how much of this information would prevent a vocal disorder is unknown. Longitudinal studies would help to answer these questions. Additionally, future research should address the acknowledged limitations of this study including the small sample size and differences in the numbers of men and women.

In conclusion, the subjects reported a great deal of satisfaction with the vocal hygiene education. It is likely that they will use their newly acquired knowledge to their benefit throughout their careers.

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APPENDIX A

Preinstruction Survey

Personal Information:

Name: Age: Year in School:

Major: Minor: Vocal Range:

Current singing activities:

Do you intend to pursue a career in vocal performance? YES NO

According to the following scale, please circle the number which most accurately describes your beliefs.

1= Always, 2 = Usually; 3 = Frequently; 4 = Sometimes; 5 = Infrequently; 6 = Rarely; 7 = Never

- 1. I have: allergies 1 2 3 4 5 6 7 colds 1 2 3 4 5 6 7
asthma 1 2 3 4 5 6 7 laryngitis 1 2 3 4 5 6 7

If you circled 1-3 for any of the above, please indicate (1) when the symptoms began, (2) how you have controlled them, and (3) the severity on a 1-5 scale with 1 being mild and 5 being severe.

Three horizontal lines for handwritten responses.

2. Briefly describe your singing experience (choral, musical theater, solo, etc)

Three horizontal lines for handwritten responses.

3. Are you currently receiving vocal training? YES NO

4. How many hours per week are your lessons? _____

5. On average, how many hours do you spend singing per week? (include voice lessons, choir practices, play rehearsals, studio classes, individual practice, etc).

One horizontal line for handwritten response.

APPENDIX B

Baseline Survey

According to the following scale, please circle the number which most accurately describes you.

1= Always; 2=Usually; 3=Frequently; 4=Sometimes; 5=Infrequently; 6=Rarely; 7=Never

1. In general, when singing:

my voice sounds breathy.	1	2	3	4	5	6	7
my voice stops in a phrase.	1	2	3	4	5	6	7
my voice fatigues easily.	1	2	3	4	5	6	7
my voice is too loud.	1	2	3	4	5	6	7
my voice is too soft.	1	2	3	4	5	6	7
my voice sounds clear.	1	2	3	4	5	6	7
my voice cracks.	1	2	3	4	5	6	7
my voice is consistent on a daily basis.	1	2	3	4	5	6	7
my throat hurts.	1	2	3	4	5	6	7

2. In general, when speaking:

my voice sounds breathy.	1	2	3	4	5	6	7
my voice stops in a phrase.	1	2	3	4	5	6	7
my voice fatigues easily.	1	2	3	4	5	6	7
my voice is too loud.	1	2	3	4	5	6	7
my voice is too soft.	1	2	3	4	5	6	7
my voice sounds clear.	1	2	3	4	5	6	7
my voice cracks.	1	2	3	4	5	6	7
my voice is consistent on a daily basis.	1	2	3	4	5	6	7
my throat hurts.	1	2	3	4	5	6	7

3. How often do you independently consider your vocal anatomy and physiology when singing?

1 2 3 4 5 6 7

4. Does your knowledge of vocal abuse play a role in your singing and nonsinging behavior?

1 2 3 4 5 6 7

5. Please **check** any of the following behaviors that apply to you. For any that you check, please **numerically** estimate how often these behaviors occur in the space provided.

_____ verbal arguing _____ minutes/week

_____ liquid caffeine intake (coffee, tea, soda)	_____ number of 8 oz. drinks/day
_____ solid caffeine intake (eg, chocolate)	_____ number of servings/day
_____ coughing	_____ number of instances/day
_____ talking in noisy places (eg, sports events, bars)	_____ hours/week
_____ talking in smoky places	_____ hours/week
_____ water intake	_____ number of 8 oz. servings/day
_____ throat clearing	_____ number of instances/day
_____ use of alcohol	_____ drinks/week
_____ smoking	_____ number of cigarettes/cigars/pipes/day
_____ coaching (aerobics, soccer, etc)	_____ hours/week
_____ waiting tables	_____ hours/week
_____ other	_____ number/time per week

6. How many minutes do you spend in warm-up prior to choir/play/solo practice?

0-5 6-10 11-20 20-30 other:

7. How many minutes do you spend in warm-up prior to a voice lesson?

0-5 6-10 11-20 20-30 other:

8. How many minutes do you spend in warm-up prior to a solo performance?

0-5 6-10 11-20 20-30 other:

APPENDIX C

Vocal Hygiene Curriculum

Session One: Anatomy and Physiology

1. Signing of informed consent form, administer Preinstruction Survey and Baseline Survey.
2. Explain requirements of study: Subjects must attend all four sessions and will complete a survey 6 weeks after last class.
3. Introduction to the anatomy and physiology of the laryngeal mechanism.
 - a. Definition of respiration.
 - b. Definition of phonation.
 - c. Explanation of cartilages and bone of larynx (with visual aids).
 - d. Explanation of intrinsic and extrinsic muscles.
 - e. Explanation of Body-Cover Theory.
 - f. Explanation of Bernoulli Effect.
4. Facilitating question: How do you think this information pertains to you as a singer?
5. Question and answer.

Session Two: Vocal Abuse and Misuse

1. Review session one.
2. Introduce subject of vocal abuse and misuse.
3. Have each individual create list of potential vocal abuses/misuses present in their lives. Compare individual lists to master list of 23 abuses discussed in literature.
4. Explain each abuse:
 - a. Based on anatomy and physiology, why is this behavior abusive?
 - b. How consistently does the behavior need to be performed in order to cause vocal damage?
 - c. What optimal/healthy behaviors can replace the abuses?
5. Question & answer.

Session Three: Vocal Pathologies and Voice Disorders

1. Review of session one and two.
2. Discuss difference between organic and functional disorders. Highlight etiology, effect on phonation, and overview of treatments for various disorders.
 - a. Organic Disorders: vocal nodules, vocal polyps, Reinke's Edema/Polypoid Corditis, Vocal Cysts, Granuloma, Leukoplakia, Vocal Hemorrhaging, Laryngitis.
 - b. Functional Disorders: Muscle Tension Dysphonia.
3. Question and answer.

Session Four: Proper Vocal Technique

1. Review all previous sessions.
2. Review healthful behaviors that can replace abuses.
3. Discuss healthy vocal technique: low abdominal breathing, relaxation, easy onsets, mask resonance, vocal rest.
4. Instruct on how to establish their "at risk" status—to what extent do vocal abuses need to be performed or exhibited in order to cause a disorder. Discuss balance in life to allow for optimal vocal production/performance.
5. Question and answer.

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