Prevalence and Epidemiology of the Vocal Problems of Music Teachers in Alabama, Florida, Georgia, Mississippi, and Tennessee

by

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Abstract

A cross-sectional survey was designed to determine the prevalence, psychosocial impact, and contributory factors of voice disorders in general music teachers, choral directors, band directors, and orchestra directors in Alabama, Florida, Georgia, Mississippi, and Tennessee.

One hundred and two teachers completed the computerized survey. The questionnaire contained 68 demographic items to gather information on daily habits and routines of participants and the 30-item Voice Handicap Index (VHI). Thirty-three (32.35%) participants indicated a positive diagnosis of a vocal problem by a medical professional. Forty-two participants (41.18%) indicated they experienced vocal problems a minimum of a few times per year or more without seeking medical help. It was found that the positive habit of drinking water was practiced by several of those diagnosed with a vocal problem. Seven percent of variance in lack of daily water intake scores could be explained by whether or not a person had received a positive diagnosis of a vocal problem. No other significant differences in environmental factor scores between those receiving a positive diagnosis and those having problems with no diagnosis were noted. Only small effect sizes were revealed between the two groups in the years teaching score ($\eta^2 = .01$), daily reasons for raising the voice score ($\eta^2 = .02$), daily coffee intake ($\eta^2 = .01$) and daily alcohol intake ($\eta^2 = .01$). Seven percent of the variance in the total VHI scores could be explained by whether or not the participants experienced vocal problems. General music teachers ($n = 49$) made up more than 54% of the total vocal problems group ($n = 37$, 54.4% of TVP).

Seventeen general music teachers (n = 17) had received a positive diagnosis of a vocal problem, which accounts for 56.7% of the entire population indicating a positive diagnosis of vocal problems (n = 30). Thirty-seven out of 49 general music teachers (75.5%) did report either a positive diagnosis or reported experiencing vocal problems during their careers. However, statistical analysis indicated that no one group was statistically more likely than another to be diagnosed with a vocal problem.

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CHAPTER 1

Introduction

Many professionals throughout the world worked in jobs categorized as heavy vocal use occupations. Among these are teachers who frequently reported hoarseness, pain, or fatigue when speaking. Teachers in all academic areas reported vocal problems (Smith, Lemke, Taylor, Kirchner, & Hoffman,, 1998). Schoolteachers were 32 times more likely to be plagued with voice problems compared to non-teachers (Smith et al., 1998). Most vocal problems could be attributed to abusive habits and overuse of the voice, and it is estimated that over one million teachers suffer from voice problems. The yearly economic impact on the United States alone is thought to be more than $2.5 billion dollars (Verdolini and Ramig, 2001).

The problem was prevalent in the general teaching population and perhaps even more so in the music teaching profession. Music teachers were typically required to use their voices to teach as much, or more than the average classroom teacher. However, music teachers faced specific challenges. They may have raised their voices above students who are singing, playing instruments, or moving to musical activities. Music teachers were likely to teach after-school ensembles, and they were also likely to be involved in weekend musical activities which may hinder vocal recovery after a long week of teaching.

Statement of Problem

Though numerous studies of vocal damage have been conducted with teachers worldwide, few studies have been conducted with music teachers, who may be more susceptible

to such problems. In addition, there was a gap in the literature in regards to vocal problems among band and orchestra directors. Finally, the geographical area of the southeastern United States has not been thoroughly surveyed in order to determine the prevalence of vocal problems among music teachers.

Purpose

The purpose of the study was to determine the prevalence of voice disorders in general music teachers, choral directors, band directors, and orchestra directors in Alabama, Florida, Georgia, Mississippi, and Tennessee; to research the psychosocial impact of vocal problems on these teachers; and to identify factors possibly contributing to vocal problems.

Research Questions

1. How many public school music teachers report seeking professional help and receiving a positive diagnosis of a vocal problem?
2. How many public school music teachers report experiencing vocal problems, but have not sought medical help?
3. Is there a possible relationship between any of the common habits or environmental factors identified by experts as potential causes of vocal problems and a reported positive diagnosis of a vocal problem among the participants?
4. Is there a possible relationship between participants' VHI scores and a positive diagnosis of a vocal problem?
5. Of the following groups: general music teachers, choral teachers, band teachers, or orchestra teachers, are any teaching specialty groups more likely to report a positive diagnosis of a vocal problem than others?

Significance of the Study

For teachers, the voice is their livelihood, and it was important to survey music teachers in order to determine if they report more, less, or the same frequency of vocal problems as other teachers. Studies have been conducted with music teachers in small geographical areas, mostly in large United States cities of the Northeast, Midwest and West (DeLoach, 2000; Hackworth, 2003; Hendry, 2001; Kramer, 1994; Morrissey, 2004; Schwartz, 2006; Smith and Sataloff, 2003). Because very few studies have considered teachers in Southern U.S. cities (Schwartz, 2006; Mendes, Brown, Rothman and Sapienza, 2004), it was important to survey music teachers in the southeastern United States in order to determine if the sample population experiences more, less, or the same amount of vocal problems as indicated in previous studies in other geographical locations. Since instructional content varies slightly from region to region, such research could have implications for teacher training institutions. Most research with music teachers has been conducted with general music teachers (Hackworth, 2003; Morrissey 2004) and some choral teachers (Hackworth, 2003; Hendry, 2001; Schwartz, 2006; Smith & Sataloff, 2003). Since general music and choral music teachers tend to sing more while teaching, they are usually singled out for studies of vocal problems more often than band and orchestra teachers. Very little research has been conducted with band directors (Hendry, 2001; Sinclair, 2010) and none with orchestra directors, who potentially raise their voices over louder music than do the other types of music teachers and who probably have less vocal training than do choir directors and some general music teachers. It was important to survey band directors and orchestra directors to see if they experience more, less, or the same prevalence of vocal problems as do other music teachers.

Delimitations

In 2009, the researcher mailed survey invitations to a random sample of 2,000 out of a population of 7,625 full-time music teachers who were members of the Music Educators' National Conference (MENC) state divisions of Alabama, Florida, Georgia, Mississippi, or Tennessee.

Assumptions

It was assumed that a random sample was selected for the survey and that the participants possessed the knowledge to answer the survey accurately and truthfully. It was also assumed that each participant is counted only once.

Definitions

1. Heavy Vocal Users: Those individuals working in a job requiring them to use their voices in speaking or singing for long periods of time with few or no breaks.
2. Etiology: The cause of a disease or abnormal condition.
3. Voice Handicap Index: A 30-item instrument designed to measure the psychosocial impact of voice disorders on an individual.
4. Psychosocial: A term combining the words psychological and social.
5. Voice disorder: One of a group of problems involving abnormal pitch, loudness, or quality of the sounds produced by the larynx
6. Acute Laryngitis: A temporary inflammation of the larynx often resulting in hoarseness of the voice, normally caused by an infection or injury of the larynx.
7. Chronic Laryngitis: Inflammation of the larynx lasting longer than two to four weeks.

8. Reflux Laryngitis: Inflammation of the larynx caused by stomach acids refluxing into the vocal passage.
9. Pharyngitis: Inflammation of the pharynx, commonly known as a "sore throat."
10. Reinke's Edema: The swelling of soft tissues called the Reinke's space, or the non-muscular layer beneath the membrane of the vocal folds.
11. Vocal Fold Nodule: A small solid collection of benign tissue located near the center of both the vocal folds.
12. Vocal Fold Polyp: A projecting, non-cancerous mass of overgrown tissue resembling a balloon which is usually found on only one side of the vocal folds.
13. Intracordal Cyst: A small mass contained within a fluid sac which develops on the surface membrane but sometimes occurs deeper inside the vocal fold tissues.
14. Sulcus Vocalis or Vocal Fold Scarring: A cleft or a scar which develops on the vocal folds and alters normal vibration patterns.
15. Nervous System Vocal Disorder: A vocal disorder not caused by abusive behavior or irritating agents, but by damage to the vocalis nerves. Temporary paralysis may occur on one or both vocal folds due to numerous conditions including viral infections.
16. Vocal Loading: The amount of stress imposed upon the vocal mechanism, particularly the vocal cords, over a period of time.

All terms and definitions were compiled and then compared across sources to insure consistent and accurate meaning (Colton &Casper, 1996; Hedge, 2001; Stemple, Glaze, & Klaben, 2000).

Organization of the Study

Chapter 1 introduced the study; discussed the problem and the purpose; listed the research questions; discussed the limitations, delimitations and the assumptions; and defined the

major terms used in the study. In Chapter 2, the researcher reported the review of related literature containing information on the identity of heavy voice users, the common etiologies of vocal problems in heavy voice users, and previous research conducted with teachers and with music teachers. The researcher reported the procedures used, including the population and sample descriptions, the instrumentation, the method of data collection, and how the data were analyzed in Chapter 3. Chapter 4 included the findings of the study. Finally, Chapter 5 contained a summary of the study, the conclusions drawn from the study, the implications of the study, and recommendations for further research.

CHAPTER 2

Review of Literature

The purpose of the study was to determine the prevalence of voice disorders in general music teachers, choral teachers, band teachers and orchestra teachers in Alabama, Florida, Georgia, Mississippi, and Tennessee; to research the psychosocial impact of vocal problems on these teachers; and to identify factors possibly contributing to vocal problems in this population.

In order to gain a deeper understanding of previous research, a search for literature was conducted using the following databases: Academic Search Premier, Elsevier, ERIC, Journal of Singing Index, and Pro-Quest Dissertations and Theses. Online journals consulted include: *European Archives of Oto-Rhino-Laryngology: Official Journal of the European Federation of Oto-Rhino-Laryngological Societies*, *Folia Phoniatrica et Logopaedica*, and *Journal of Voice*. Search terms used included: vocal damage, vocal problems, teachers, music teachers, epidemiology, prevalence, voice complaints, vocal pedagogy, and speech therapy. The researcher located and read 26 books, seven theses, 76 journal articles, and two conference papers.

For the purpose of this study, the literature was organized into categories of Definition and Categories of Heavy Voice Users; Etiology of Vocal Problems in Heavy Voice Users; Studies Conducted with Teachers; and Studies Conducted with Music Teachers. Professional literature and research conducted by speech therapists and vocal pedagogues were read in order to define who are heavy voice users and to categorize heavy vocal use occupations, as well as

describe the etiology of the problems caused by heavy vocal use. Literature was consulted which reported the research conducted with teachers as heavy voice users and the vocal damage reported by these teachers. The literature revealed that classroom teachers have been studied across the world; whereas music teachers have not been studied as extensively. However, literature was located and read which dealt specifically with music teachers and the vocal problems that may exist because of added vocal use in music learning environments.

Definition and Categories of Heavy Voice Users

"Heavy" voice users were individuals who relied on the voice as the primary tool of their vocation (Benninger & Murry, 2006). Wingate, Brown, Shrivastav, Davenport, and Sapienza (2007) stated that 25% to 35% of workers in the United States can be identified as professional voice users. Because heavy vocal use often results in vocal problems, research has been conducted to investigate the impact of such problems on the professions and economies of various countries.

Some of the earliest and possibly most-cited research was compiled by Titze, Lemke, and Montequin (1997) who compared information from the 1994 United States Bureau of Labor Statistics identifying percentages of Americans in various professions to the percentage of individuals from various professions seeking treatment at voice clinics in the U.S. The largest population of professionals seeking help was salespeople (14.5% of the U.S. population). However, the total salespeople group made up only 10.3% of the clinic load. Teachers, on the other hand, made up 4.2% of the U.S. population, but made up 19.6% of the voice clinic load. Teacher subgroups included special education teachers, prekindergarten/kindergarten teachers, elementary teachers, secondary teachers, higher education teachers, and others. Music teachers were not specifically mentioned in the study and it is not known if they were included in the

subgroup, “others.” Professional singers made up 11.5% of the voice clinic load. Therefore, the top two professions seeking help from voice clinics were teachers and singers. It makes sense, therefore, to think that teachers who sing may be likely to report even more vocal problems than other categories of teachers or singers.

In 2003, Williams published a review of current literature investigating vocal problems in professional voice users. The researcher first compared a Swedish study by Fritzell (as cited in Williams, 2003) to the Titze et al. (1997) study. Both studies sought to identify occupations of individuals who visited voice clinics and compared them to the general population of the countries. When the results of both studies were combined, professional singers were at the greatest risk for vocal damage. Teachers were identified as the most common occupation at risk for vocal damage. When looking at literature specifically targeting teaching populations, Williams pointed out that most research has been based on subjective questionnaires instead of objective diagnosed pathologies. There is a difference in the results of both types of studies. The objective studies, such as the research by Lejska (as cited in Williams, 2003) have revealed as low as a 4.4% prevalence rate among teachers and the subjective self-report-type questionnaires, such as the thesis by Marks (as cited in Williams, 2003) have yielded results as high as 90% of the population. Williams concluded that most studies completed with teachers and singers do not differentiate subcategories within the two groups. There has been a tendency to use general terms and titles instead of specifics within the populations.

Etiology of Vocal Problems in Heavy Voice Users

Many books and articles have been written which identify potential causes of vocal problems. Previous researchers have identified harmful and beneficial habits, environmental factors, and physical and emotional characteristics to consider. Some habits can be beneficial for

the voice, such as vocalizing before heavy vocal use, drinking water, getting plenty of rest, and using proper vocal technique (Anticaglia, Hawkshaw, & Sataloff, 2004; Ayers, 2004; Benninger & Murray, 2006; Hackworth, 2003; Harvey & Saxon, 2003; Phillips, 1996; Saxon, Harvey, & Sataloff, 2003; Schick, Klatte, & Meis, 2000). Researchers have identified several habits that are harmful for the voice, including overuse of the voice, smoking, drinking caffeinated and alcoholic beverages, taking medications and clearing the throat (Anticaglia et al., 2004; de Jong, Kooijman, Thomas, Huinck, Graamans, & Schutte, 2006; Gotaas & Starr, 1993; Hackworth, 2007; Ihre, Zetterstrom, Ihre, & Hammarberg, 2004; McKinney, 1994; Murry, McRoy, & Parhizkar, 2007; Preciado-López, Pérez-Fernández, Calzada-Uriondo, & Preciado-Ruiz, 2006; Sataloff, 2007; Śliwińska-Kowalska, Niebudek-Bogusz, Fiszer, Los-Spychalska, Kotylo, Sznurowska-Przygocka, & Modrzewska, 2006; Södersten, Granqvist, Hammarberg, & Szabo, 2004; Södersten, Ternström & Bohman, 2005; Solomon, Glaze, Arnold, & van Mersbergen, 2003; Stemple, Glaze & Klaben, 2000; Thibeault, Merrill, Roy, Gray, & Smith, 2004; Titze, 2007). Habits, environmental factors, and physical and emotional characteristics indentified as contributing to vocal problems are described in the following section.

Harmful and beneficial habits.

Sleep patterns. Rest is crucial for the body's recovery from the activities of the previous day. Harvey and Saxon (2003a, 2003b) surveyed 56 singers and found those individuals who did not get the suggested amount of sleep may find their bodies, including their voices, are not ready for the demands of the new day. In a follow-up article, Saxon, Harvey, and Sataloff (2003) purported the need for more research into the effects of sleep deprivation on the voice.

Smoking. Smoking has been extensively researched. Citing statistics compiled by the American Cancer Society, Centers for Disease Control and Prevention, National Cancer Institute,

United States Department of Health and Human Services, and the World Health Organization, Anticaglia, Hawkshaw, and Sataloff (2004) reported that smoking is suspected to thicken the vocal folds and requires increased effort to produce sound. Smoking also affects the respiratory system, which impacts the ability to produce vocal sound. A Polish study conducted by Śliwińska-Kowalska et al. (2006) compared 425 teachers to a control group of 85 individuals in other occupations. Results indicated that teachers made up only a small percentage of smokers (13.5% as compared to 25.3% of non-teachers). Possible reasons included teachers being educated as to the bad effects of smoking and having little time during the day to smoke. However, in a study in Beirut, over 38% of the teachers reported they were smokers (Hamdan, Sibai, Srour, Sabra, & Deeb, 2007).

Drinking caffeinated and alcoholic beverages. Speech pathologists and speech therapists have extensively studied the effects of caffeine and alcohol on the vocal fold membranes. Typically, the consumption of caffeinated and alcoholic beverages is discussed simultaneously in literature, because the effects on the vocal fold membranes are similar. Boone, McFarlane, and Von Berg (2005); Colton and Casper (1996); and Stemple, Glaze, and Klaben (2000) all agree that the consumption of caffeinated and alcoholic beverages tends to thicken and dry out the vocal membranes. Dr. Robert Sataloff (2005a), in his clinical research, investigated the effects of caffeinated beverages on the vocal folds of singers. He wrote that caffeinated and alcoholic beverages dehydrate the tissues of the body, including the vocal folds. Sataloff also mentioned that caffeinated beverages contain high amounts of sodium, which adds to the threat of dehydration. In Spain, Preciado-López et al. (2006) studied 579 teachers and 326 individuals from other occupations, and found a correlation between vocal damage and drinking several cups

of coffee or tea daily. Vocal pedagogue and anatomy instructor Dayme (2005) warned singers to limit the amount of alcoholic beverages immediately before times of heavy vocal use.

Drinking water. One habit voice researchers and voice professionals concurred were beneficial to the voice is hydrating the body. Benninger and Murray (2006); Boone et al. (2005); Lawrence (1998); and Sataloff (2006a) all agree that hydration is crucial for healthy vocal folds and that six to eight 8-ounce glasses of water are generally needed for proper hydration of the body. The demands of some occupations, such as teaching, make it difficult to drink large amounts of water because of time restraints that limit bathroom breaks. Therefore, many teachers drink less than the amount of water necessary for optimum hydration.

The benefits of hydration can be overly exaggerated, however. Solomon et al. (2003) studied four women and four men who were asked to read passages of a book loudly with and without hydration and with partial hydration. Three of the four women showed only a slight reduction in phonation threshold levels when fully hydrated as compared to reading loudly without hydration. Only two of the four men showed a small benefit from drinking water. The other two men's phonation threshold level actually worsened when hydrated. Solomon could not reach a conclusion, therefore, as to whether or not hydration was beneficial to the voices of men. However, they were able to verify that all of their subjects showed a worsening in their phonation threshold level after prolonged loud reading.

Use of inhaled corticosteroids for asthma. Asthmatics typically need inhalants in order to breathe freely. Because inhalants pass through the vocal folds in order to reach the bronchioles in the lungs, recent information indicated the inhalation of corticosteroids affected the vocal folds (Ihre et al., 2004). In particular, the type of steroid that contained a capsule that must be crushed and inhaled in aerated powder form has been suspected to cause severe vocal damage to

the vocal folds. When the asthmatic inhales the powder, it rests on the vocal folds and creates a sandpaper-type scraping of the tissues (Murry et al., 2007). For an asthmatic who is a professional voice user, this would likely cause vocal problems in a short period of time (Sataloff, 2006a).

Gastro Esophageal Reflux Disorder (GERD). Recently GERD has become an area of research as a cause of vocal problems. Several voice clinicians have written books and articles on the subject, including Rouév, Chakarski, Doskov, Dimov, and Staykova (2005). Benninger and Murray (2006), Dayme (2005), and Spencer (2006) have written articles warning the professional singer about the dangers of untreated GERD. Both Spencer and Dayme warned singers of the impact of a small drop of acid reaching the vocal folds, which caused swelling, and even cysts. Less healthy diets and a more stressful lifestyle have contributed to the increase of problems related to stomach acids refluxing into the throat, especially during sleep. GERD can be a life-threatening condition and requires changes in lifestyle and usually medications. Heavy voice users need to be particularly aware of signs and symptoms of GERD because permanent damage to the voice can result when left untreated (Sataloff, Castell, Katz, & Sataloff, 2006).

Tongue piercings. A recent phenomenon involves the effects of intraoral piercings on the voice. Such piercings affected the muscle movement of the tongue causing tension in areas that typically may not experience such tension. Tongue and lip piercings decreased the articulators' abilities to clearly pronounce consonants, making it more difficult for some to understand. The pierced individual may be required to repeat, increasing the time spent in instruction and increasing the tension of the vocal mechanism (Olson, 2005).

Environmental factors.

The voice has been impacted by environmental factors that are potentially harmful. Prolonged exposure to chemicals, allergens, noise levels, humidity levels, and pollutants caused sickness and vocal loading (Sataloff, 2006b).

Noisy classrooms. One area of interest among audiologists, speech therapists, and educators was the impact of background noise and classroom acoustics, and their effects on vocal loading of teachers' voices. German researchers, Schick, Klatte, and Meis (2000) composed a review of literature of studies dealing with classroom noise and the stress it causes students and teachers. Schick noted that not enough research has been completed on the subject. Audiologist Karen Anderson (2001) studied classroom acoustics in her work with children diagnosed with hearing loss. Although her research was designed to help eliminate noise interfering with student learning, she noticed that teachers' voices were also being affected by the noise levels. She noted teachers were often required to raise their voices to speak above noise, such as ventilation systems, sounds from other classrooms, sound reflecting off hard surfaces, and even outside traffic and airplane noise. Sala, Airo, Lain, Olkinuora, Pentti, and Suonpää (1998) examined the voice disorders of 200 Finnish teachers from 25 daycare centers. They found that vocal problems were mainly caused by inadequate acoustics in classrooms. The acoustic problems caused the teachers to speak more loudly over long periods of time. Classroom noise came from student activities, student misbehavior, hallways, noise in other classrooms, and even outside noises coming through the windows. In Poland, Koszarny, and Jankowska (1995 & 1996) studied acoustics in schools for several years. They recorded noise levels in the halls of primary schools at 86 dB, and in secondary schools of 75 dB. Lazarus, Lazarus-Mainka, and Schubeius (1985) purported that speech is still easily intelligible at an

interference noise level of 45 dB and was still moderately intelligible at levels up to 55 dB. If teachers raised their speech intonation, their voices could still be understood with a noise level of up to 65 dB. However, raising the voice intonation to high levels was exhausting if continued over long periods of time.

Other noises could include air conditioning and heating units, fans, halogen or fluorescent lighting, construction equipment and other mechanical equipment in the vicinity of the classroom. Bovo, Galceran, Petruccelli, and Hatzopoulos (2006) studied 265 kindergarten and primary school teachers. Bovo et al. (2006) pointed out that teachers, particularly untrained speakers, are at risk for vocal problems because they are typically required to increase the loudness of their voices, causing vocal strain. Music teachers speak over music, musical instruments, and singing which may cause even more strain on the voice. However, in the 2006 self-report study by Kooijman, teachers indicated allergies, hearing problems, and tension of the neck and shoulders to be more important risk factors for vocal damage than classroom noise and vocal loading.

Simberg, Sala, Vehmas, and Laine (2005) conducted a study in Finland. A questionnaire was given to 478 participants, originally in 1988. The questionnaire was designed to gather information on six vocal symptoms that had appeared in the past two years. The study revealed 12% had reported their symptoms occurred weekly or more often. In 2001, the same questionnaire was repeated and 241 participants reported that their vocal symptoms had increased considerably over the 12-year span. Twenty-nine percent reported they experienced symptoms at least once a week. Twenty percent reported experiencing symptoms more than once a week. The occurrences were significantly greater than reported in 1988. In the 2001 survey, teachers complained most often about the sizes of their classes. One other factor that seemed to

have increased was a greater number of misbehaving pupils than in the past. The researchers believed this fact led to an increase in background noise and stress therefore increased vocal problems for the teachers. Thus, teachers felt they needed to raise their voices over more noise while they were also more stressed.

Södersten, Ternström, and Bohman (2005) examined the effect of background noise on vocal production. The study took place in Stockholm, Sweden. Participants included 12 women and 11 men. The researchers set up five different environmental noise conditions which were played over loudspeakers while the participants read text. The five conditions were quiet, soft continuous noise (70 to 75 dB), day-care babble (74 dB), disco (87 dB), and loud, continuous noise (78 to 85 dB). Recordings were analyzed with an automatic phonetograph for acoustic measures. A questionnaire was used after each condition was recorded. The questions were did you make yourself heard, was your speech effortful, what did you feel in your throat or voice during the reading? The participants rested for 10 minutes between each condition. At the end of ten minutes, they were again asked what they felt in their throat or voice during the reading. Perceptive measures were gathered from four experts in speech pathology. The expert listeners identified press, instability, and roughness of the voice on each recording. The researchers used a two-way repeated-measures ANOVA with the collected data. Gender was the group factor and recording conditions were the repeated factors. A post hoc Bonferroni test was used to study the differences between the recording conditions. Chronbach's alpha was used to determine the interjudge reliability of the perceptual data. The perceptive parameters of press, stability, and roughness of voice increased as an effect of speaking loudly over noise. This resulted in higher sound pressure levels (SPL) and fundamental frequency (F_0). Another result was higher phonation time. The total time that the participant read the text increased when continuous noise

was present than when intermittent noise was present. When comparing males to females, women presented with 4 dB lower voice sound pressure levels overall. Women also increased their phonation time more in noisy conditions than did the men. Women reported that they felt unsuccessful in making themselves heard during continuous noise. It was found that women used greater effort to overcome the noisy conditions than did the men. The researchers state that their study supported the idea that female voices are more susceptible to vocal loading when background noise is present.

Amount of talking. The amount of time required for talking is considered an environmental issue for professional voice users because it is part of the job regardless of personality type. Use of the voice is required for extended periods of time (Gotaas et al., 1993; Kooijman et al., 2006; Sataloff, 2005a; Södersten, Granqvist, Hammarberg, & Szabo, 2002). Titze (2007) stated that the heaviest vocal demands are experienced by teachers who lecture or discipline children for five to seven hours a day. These teachers often used their voices loudly and emphatically as the day progresses. Titze studied teachers in Denver over a 10-year period. As part of the study, a new device was invented to measure the dose of vibration in the teacher's neck. The device measured the amount of time vibrations and silences occurred during the working day. Titze reported that silences are important in order to allow the voice to recover from the periods of vibration. Measures were also taken on weekends to compare to the teaching week. On the weekend and in the evenings, the average voicing time in any given hour was 11%. This rose to 23% of the time during the teaching day. So, vocal fold collision or engagement of the vocal folds occurred about a quarter of the time when teachers are at work. Over one million vocal fold collisions were estimated to occur each day while teaching. Titze recommended that every singing teacher keep a log of vocal dosing and recovery times during rehearsals and

performances. Titze also mentioned that teachers need to learn their own vocal limits, just like knowing when to come in from sun exposure.

Elaine Bernstorf and Kenneth Burk of Wichita State University conducted a study in 1996 which investigated music teacher's schedules and the maximum noise levels in their classrooms. Their regression analysis found a significant relationship between maximum classroom noise levels and their scores on the VCI (Voice Conservation Index) vocal pathology test. The elementary music classrooms measured an average noise level of 106.1 dBA, but ran as high as 117 dBA. The Occupational Safety and Health Administration (OSHA) placed regulatory limits of a maximum of 90 dBA for an 8-hour day. OSHA suggested that unprotected workers should not be exposed to anything more than a one second burst of dBA above 115 without hearing protection. Out of the 45 elementary teachers surveyed and studied, 43 were determined to have some sort of vocal pathology. One teacher was categorized as "normal" and the remaining reported scores high enough to be placed in the vocal abuse category.

Sataloff, Cline, Lyons, and Rubin (2005) reported that the primary reason teachers experience vocal problems was due to the professional use of the voice from the beginning to the end of the work day without extended breaks for vocal rest. In this study, the researchers mention that having several weeks off during the summer months may contribute to the vocal problems of teachers, because the vocal fold muscle tone built up by the end of the school year would be lost during weeks of less vocal use. When the new school year began, teachers often experienced vocal tension and even hoarseness until their vocal folds could, once again, build up resilience to the demands of the teaching day. Additionally, the length of the teacher work week did not allow enough time for the voice to recover before the process started all over again (Bovo et al., 2006).

Gotaas and Starr (1993) sent questionnaires to 520 elementary and secondary teachers asking them to identify the frequency and severity of vocal problems and vocal fatigue experienced while teaching. Nine males and 13 females (n = 22) who had reported vocal fatigue while teaching participated in the study. Six males and 11 females, (n = 17) who reported no vocal problems participated in the control group. Data were collected using speech recordings at the beginning of the teaching day and at the end of the teaching day for two days when the teachers felt fatigued and for two days when the teachers felt no fatigue. It was up to the participant to identify days that fit both criteria and to record their voices until four tapes were collected. Recordings were self-rated and were evaluated by a panel of speech experts. Participants rated the level of stress and anxiety experienced on the vocal fatigue days. Two-tailed t tests indicated no significant difference between the self-ratings of the tapes by the control group versus the experimental group. The researchers found that vocal fatigue was indeed a problem for teachers, especially on days that were stressful. However most episodes of vocal fatigue appeared once a month or less and were usually only mild. Once fatigue was experienced by the experimental group, however, their voice quality was judged to deteriorate quickly by the end of the day. Questionnaire responses also revealed that teachers who experienced fatigue typically spent time outside of work in vocally-demanding activities which seemed to increase vocal fatigue.

Dusty, moldy, or dry workspaces. Research indicates that individuals who suffer frequently from sinusitis often later display vocal problems (Dayme, 2006; Sataloff, 2007). Heavy coughing caused by allergy or sickness was vocally abusive and could cause swelling and even damage to the vocal folds over time (Miller, 1996; Sataloff, 2005a). In his 2007 article, Robert Sataloff discussed sinusitis and the affects of the condition on the voice. Classrooms,

regardless of age, were likely full of dust. Sataloff mentioned that chalk dust was still common in many classrooms. Sataloff continued by stating that any allergen concentrated in a work environment was likely to increase the frequency of sinusitis, potentially leading to more vocal problems. He mentioned several conditions that may exist in classrooms and other workplace environments. Dry erase markers released chemicals as they are used. Leaks in the ceiling or plumbing could create mold which could cause many different medical problems, especially within the respiratory system. Classrooms that have air conditioning or heating units could be very dry environments, increasing the potential for drying out the vocal folds as air was taken in through the nose and the mouth. Cleaning chemicals used on floors and bathrooms were often corrosive and harmful when breathed (Sataloff, 2007). However, the Polish study conducted by Śliwińska-Kowalska et al. found no direct correlation between environmental conditions in the classroom and vocal problems in teachers of Poland. Allergies due to environmental pollutants have been often treated with medications which caused side effects. Many common allergy and cold medications, both over the counter and prescription, were found to have a drying effect on the vocal folds. Specific medications used to treat allergies and colds included antihistamines, decongestants, vitamins, and many herbal remedies (Dayme, 2005; Murry et al., 2007; Sataloff, 2005a; Schmidt et al., 2008).

Special effects used in productions. Benninger included information detailing some occupational hazards for professional voice users which can be applied to some classroom environments. Teachers and singers involved in musicals or dramas are sometimes exposed to smoke or fog machines as well as fumes from paint and glue used to create scenery and backdrops. For most individuals, exposure to these things only lasts a short time. However, this

may be a bigger problem for professional singers who are exposed to such environmental issues night after night (Benninger & Murry, 2006).

Physical and emotional characteristics.

Research has been conducted with teachers to determine if any correlation exists among such factors as gender, age, or personality type and a positive diagnosis of vocal problems.

Gender. Several gender-specific studies have been conducted indicating that females tend to report more vocal problems than do their male counterparts. It is not known whether most males have more resilient vocal folds, or if they simply do not report vocal problems as often as do females (Solomon et al., 2003). In a Dutch study, researchers found that compared to male teachers, female teachers experienced more absences from work due to vocal problems and were more likely to report vocal problems (de Jong et al., 2006). Researchers have also investigated the vocal damage experienced by females who need hormone-replacement therapy (Benninger & Murry, 2006; Heman-Ackah, 2004). Heman-Ackah (2004) reported that lack of estrogen affects the larynx, leading to a "masculinization" of the female voice. Smith, Kirchner, Taylor, Hoffman, and Lemke (1998) conducted a study using 274 male teachers and 280 female teachers ($N = 554$) comparing the prevalence of vocal problems by teacher gender. More than 38% of teachers reported their teaching careers had a negative impact on their voices. A similar number (39%) had cut back on teaching activities as a result of their vocal problems. There were no differences found by gender among those who reported that vocal problems adversely affected their careers. However, a greater number of female teachers reported a voice problem (38% vs. 26%, $p < .05$). Females in the study also reported more chronic vocal problems.

Age. Age appeared to be a factor in both male and female professional voice users. Again, changes in hormone levels in later life may have affected the vocal folds. However, a

more likely culprit was the buildup of small problems over a long period of time. An individual working in a heavy vocal-use profession had an increased likelihood of developing vocal problems in later life. Kooijman et al. (2007) surveyed 1,775 Dutch teachers in order to determine if pre-service teachers reported more or less vocal problems than did teachers who had been teaching for several years. It was found that teachers seem to complain more about the voice at the beginning of their careers. The researchers stated that their research did not reveal a reason why. It was suspected that teachers became accustomed to vocal problems, which began to feel normal, or that other later-life physical conditions were deemed to be more important than voice problems.

Personality type. One area of interest for some researchers has been the amount of vocal damage experienced by individuals with certain personality types. Heavy voice users prone to anxiety, for example, may have experienced vocal tension due to an increase in muscular tension (Deeter, 2006; Sataloff, 2005a).

Kooijman et al. (2006) conducted research with 1,878 teachers in Belgium and The Netherlands. The questionnaires gathered information on demographics, voice complaints, amount of time missed at work due to vocal problems, and conditions that may contribute to vocal problems. A DS16 Personality List was included with the questionnaire. The researchers did not find any correlation between personality type and vocal problems causing the teacher to miss work. However participants indicated that emotions did impact their vocal production negatively, especially in those who tested as sensitive personalities.

Thomas, de Jong, Kooijman, and Cremers (2006) conducted research to find if those who test as Type D personalities were more handicapped than others due to vocal problems and if this personality group behaved differently when seeking help with vocal problems. Participants in the

research were 457 student teachers and 475 primary school teachers who completed a self-report questionnaire, the Type D Scale 16 personality test, and the Voice Handicap Index (VHI). The researchers stated that a Type D personality exhibits signs of negativity and social inhibition. The Type D individual spends long periods of time in depression and tends to internalize or suppress emotion in social situations. The Type D scale, developed by a French team led by Denollet (1996) found that Type D personalities made up about 25% of the French population. But in Thomas, de Jong, Kooijman, and Cremers' (2006) study, 28.4% of the participants were indentified as having Type D personalities. The Type D group did not experience more vocal complaints than the other personality types. However, the Type D group did score higher on the VHI. Therefore, the psychosocial impact of voice complaints was higher than the seventy-fifth percentile. Thus, even though the Type D group did not experience more vocal complaints than any other group, the impact of the voice complaints on Type D individuals was much greater than those with voice complaints in other personality groups.

In a related study, Thomas, Kooijman, Cremers, and de Jong (2006) found that compared to beginning teachers, experienced teachers reported more stress, more work pressure, and more need to communicate with people who were causing or having problems. The researchers concluded that regardless of personality type, most teachers will experience a rise in work-related stress the longer they teach. The researchers reported that it was not known why stress levels increase. The increase in stress could be due to changes in students over time, new restrictions on punishment, increased lack of support from parents and administrators, the normal stresses of growing older and dealing with life changes, or some other unknown variable.

French researchers Kovess-Masféty, Sevilla-Dedieu, Rios-Seidel, Nerrière, and Chan Chee (2006) stated that some French believe teachers have more mental health problems than

other professionals. Therefore, they believe that anxiety would be higher in teachers than in the general population. Kovess-Masféty et al. (2006) sought to compare the mental and physical health of 3,679 teachers to 1,817 non-teachers. Results indicated that there is not a higher level of mental illness, including anxiety, in the teacher group. However, after adjusting for the variables, multiple analyses revealed that teachers indicated a much higher prevalence of laryngitis and rhinopharyngitis, both in the male and female subgroups. The researchers found that male teachers are at higher risk for anxiety disorders than their non-teacher counterparts or females in either group.

Studies Conducted with Teachers

Researchers have studied the vocal problems of teachers in the United States, Finland, Sweden, Belgium, The Netherlands, Italy, France, Spain, Iceland, Croatia, Poland, Hong Kong, and Jordan. However most of these studies did not address the music teaching profession. One study conducted by Thibeault et al. (2004) did discover that teachers of vocal music, drama, performing arts, and chemistry were at greater risk than other types of teachers for developing vocal problems. Previous research completed with teachers can be broken down into four categories: evaluation of preventative programs; efficacy of treatments; determining prevalence, frequency, impact and severity of vocal problems; and etiology of vocal problems.

Evaluation of preventative programs.

Because of the high frequency of teacher vocal strain, some researchers have attempted to develop preventative programs. These programs have used different approaches, therapies, workshops, and even electronic equipment in an attempt to prevent vocal strain during the teaching day. Researchers often find that teachers who experienced vocal problems before their teaching careers began are more likely to develop vocal problems later in their careers.

Therefore, additional studies have sought to identify pre-teachers who already demonstrate potential vocal problems and try to educate them about correct vocal techniques and vocal hygiene. Simberg, Laine, Sala, and Rönnemaa (2000) found that 20% of pre-teachers in Finland reported vocal problems during the school year prior to the study and 19% were diagnosed with an organic vocal problem. Such vital information may help educators develop proper vocal training classes for all teacher education programs. Much of this information was gathered and used in a pilot study conducted in the development of the survey used for the current research.

Bovo et al (2006) conducted a three-year study with kindergarten and primary school teachers in Italy and the United States. The primary purpose was to research the effectiveness of preventative vocal education programs. The researchers used a self-report survey, the Voice Handicap Index (VHI), and a video stroboscopic exam with each of the 41 randomly-chosen participants. The VHI was a self-report survey designed to measure the psychological and social effects of a voice problem on an individual. In the Bovo study, teachers were divided into two groups, one receiving instruction on vocal health and hygiene, and a control group receiving no instruction. The researchers surveyed the participants before treatment began, at 3 months into the treatment, and at one year. There was no significant difference in the number of people diagnosed with vocal problems between the control and experimental groups. There was improvement in the experimental group's mean maximum phonation time (MPT) and jitter and shimmer. The questionnaire revealed that 8% of the teachers reported a history of vocal problems before their employment as teachers. VHI scores in the experimental group improved between the first (M = 24.02, SD = 12.79, Range 9-59) and second measurement (M = 19.09, SD = 9.73, Range 8-42). However, it decreased between the second and third measurements (M =

21.88, *SD* = 12.71, Range 7-47). The difference in scores for the control group was not statistically significant.

Duffy and Hazlett (2004) conducted a preventative study in Northern Ireland with 55 pre-service teachers. The participants were divided into three groups. The control group received no treatment. The indirect training group received education and instruction in proper vocal technique but it was up to each individual to change their own vocal habits. The third group was a direct training group. The participants in this group received direct training in an attempt to modify and correct bad vocal habits. Hazlett's Vocology Screening Profile (VSP) and the VHI, as well as acoustic measures of the voice were administered before and after treatment. No significant differences were found between groups. The acoustic measure deteriorated over time for the control group, but improved for the direct training group. Changes in VHI scores were directly related to acoustic measures.

In Finland Ilomäki, Mäki, and Laukkanen (2005) examined the amount of voice training received by teachers in an effort to determine if vocal training had any impact on the prevention of vocal problems. The researchers compared the vocal symptoms of teachers in three groups: those having short-term vocal training, those having long-term vocal training, and those having no vocal training. A total of 124 primary, secondary, and upper secondary teachers participated in the study; 63% reported no vocal training, 15% reported short-term training, and 22% long-term training. The prevalence of symptoms was lowest in the group having long-term training and was highest in the group with short-term training. The differences between the three groups were not significant among all the teachers or between females. However, males showed significance between all three groups. Speech therapy and training helped protect the male voice better than the female voice. The possible reason for the highest score in the short-term training

could be that these teachers had an increased awareness of vocal symptoms. This may have led them to report more problems than the group reporting no vocal training at all.

Kovacic (2005) conducted a study at the University of Zagreb, Croatia. The researcher wished to investigate whether or not teachers-in-training possess knowledge about the voice and vocal care. Descriptive statistics indicated that the 184 teacher-training students possessed greater knowledge of the voice and voice care than did students who were training for other professions. However, scores from both groups were low, indicating that neither group knew enough about correct vocal care. The study, again, supported the need for preventative voice programs in the curriculum studies of students preparing to be teachers.

In 2002, Yiu conducted survey research in Hong Kong with 55 practicing teachers and 67 student teachers. Results showed that practicing teachers perceived their voices to be worse than did the student teachers. The practicing teachers reported difficulty communicating. Both groups reported that they would like to be trained in breathing exercises and taught how to care for the voice in order to prevent vocal problems.

Researchers have shown interest in the effects of different treatments used to correct vocal problems. The treatments included use of voice amplification equipment (Jónsdottir, Laukkanen, & Siikki, 2003; Roy et al., 2002), instruction in vocal hygiene or vocal care (Gillivan-Murphy, Drinnan, O'Dwyer, Ridha, & Carding, 2006; Roy et al., 2001), and resonant voice therapy (Chen, Hsiao, Hsiao, Chung, & Chiang, 2007).

Voice amplification systems. In a Finnish study, Jónsdottir et al. (2003) compared the changes in teachers' voice quality during a working day both in ordinary conditions and when using electrical sound amplification. Five teachers in Iceland and Finland completed a questionnaire and their speech was recorded using a portable digital audio tape (DAT) recorder

and a head-mounted microphone during the first and the last lesson of a heavy teaching day. The following week, the recording was done while the teacher was using amplification via a chest-mounted microphone, amplifier, and loudspeaker. The DATs were analyzed using long-term average spectrum and sound pressure level (SPL) measures. Acoustic voice quality was studied using long-term average spectrum (LTAS) analysis. The quality of the voices was also analyzed by two speech therapists listening to the DAT played through speakers in a dampened room. When amplification was used, speech therapists noted that the voice quality was better and the acoustic measures improved. When the questionnaires were analyzed, less fatigue was reported by the teachers when amplification was used. However, spectral tilt decreased and SPL did increase during the working day. The perceptions of the teachers were that vocal fatigue was decreasing. No changes were observed on the days amplification was not used. Changes in acoustics seemed to reflect teachers adapting to vocal loading—when one hears their own voice amplified, they tend to lower SPL in response. The absence of acoustic changes may be a sign of vocal fatigue.

Roy et al. (2002) compared three groups of teachers diagnosed with vocal disorders. Group I was composed of 15 teachers who used the ChatterVox portable amplifier. Group II (n = 15) was given instruction in vocal hygiene. Group III (n = 14) was a control group that received no treatment at all. The participants completed the VHI pre- and post-treatment and rated their vocal problems on a severity self-rating scale. Participants' voices were measured for jitter and shimmer. The control group reported a significant increase in vocal handicap as assessed by the VHI. No significant improvements were made in the vocal hygiene group on any measure. However, when compared to the control group, the other groups experienced improvement. No significant differences existed between Group I and Group II, however, the vocal amplification

group did report more clarity of their speaking and singing voices, a greater ease in producing voice, and were better able to comply with the treatment program.

Vocal hygiene and voice care education. Another voice treatment approach was evaluated in Ireland and the United Kingdom by Gillivan-Murphy et al. (2006). The treatment approach included vocal function exercises (VFE) and vocal hygiene education (VH) for teachers who had reported vocal problems. A non-treatment control group (n = 11) was compared to those who received the treatment (n = 9). Two self-report surveys were used to evaluate any perceived change after treatment. The researchers chose to use Voice-Related Quality of Life (VRQOL) and the Voice Symptom Severity Scale (VoiSS). The VoiSS was developed by the researchers specifically for the study. The researchers ran a t test on the VoiSS scores, which showed a statistically significant improvement for those in the treatment group ($p < .05$). No significant improvement was found, however, on the VRQOL.

Roy et al. (2001) evaluated the effectiveness of treatment programs in place for teachers who suffer from vocal disorders. Teachers were randomly assigned to one of three groups. The vocal hygiene group (n = 20) was instructed in the importance of vocal care. The group was asked to eliminate lifestyle choices, environmental hazards, and amount of voice use that would negatively impact the voice. The vocal function exercise group (n = 19) was asked to use vocal exercises at home, two times each, twice daily, for the entire six weeks. The third group was a control group made up of 19 participants who received no instruction or treatment. Participants completed the VHI pre- and post-treatment. The treatment was applied for six weeks. Only the vocal function exercise group reported a lower VHI score following treatment. When compared to the vocal hygiene group, the vocal function exercise group also showed an improvement in vocal production and in ease of production after treatment.

Resonant voice therapy. Chen et al. (2007) conducted a study of the effects of resonant voice therapy (RVT) on the voices of 24 female teachers in Taiwan who reported experiencing frequent reappearance of at least one voice problem. The teachers worked with three speech pathologists who trained the teachers to use resonant voice techniques. Measures included auditory perceptual judging, video stroboscopic exams, acoustic measures, aerodynamic measurements, functional measurements, and a Chinese version of the VHI. VHI scores decreased after treatment, though no change was found on the functional part of the scale. The physical and social scales decreased to a mildly severe level from a moderately severe level. All other measures significantly decreased post therapy, indicating that RVT is an effective treatment for individuals experiencing vocal problems.

Prevalence, frequency, and impact of vocal problems. Studies have been conducted by other researchers in an effort to determine prevalence, frequency, impact and severity of vocal problems. Researchers from Lebanon, Spain, Poland, and the United States have all conducted separate studies.

Hamdan et al. (2007) surveyed 217 teachers at the American University of Beirut, Lebanon to examine the prevalence among and impact of vocal problems on teachers. The researchers also wanted to assess teachers' knowledge of vocal hygiene and habits. Additionally, they sought what would trigger the teacher to seek medical attention for vocal problems and how family practitioners could intervene in the problem. The survey contained 16 questions which were designed to reveal the prevalence and impact of vocal problems in teachers. Two different multiple logistic regressions were conducted with the dependent variable of seeking a specialist's help and covariates of age, gender, years of teaching, number of hours teaching, and subjects taught. The main independent variables the first time the statistics were run were

symptoms, bad vocal habits, and knowledge of vocal hygiene. The second time the stats were run, certain items of symptoms and symptom duration were examined. Over 46% of the participants perceived their voices to be either fair or worse than fair, 79% of the teachers had never been to a throat specialist for the problem, and 38.7% were smokers. Several of the teachers exhibited an average of 2.4 bad vocal habits. When questioned about their knowledge of vocal hygiene and habits, two-thirds of the teachers were unaware of more than half of the factors that would negatively impact their voices. The most significant trigger of seeking medical attention was any problem that lasted longer than six months. A vocal problem lasting for over six months was over two and a half times more likely to trigger seeking medical help.

Preciado-López et al. (2006) studied prevalence and incidence of vocal disorders among teachers in Spain. The participating teachers included 579 cases and 326 controls; 413 volunteered and 492 were randomly selected. All participants filled out a questionnaire and received a complete laryngeal examination including ear, nose, and throat evaluation and videolaryngostroboscopy. Voice disorders were found in 57% of the teachers. The most common problems were lesions from vocal strain (18%), nodules (14%), and hyperfunctional dysphonia (8%). There were 3.87 new cases of teachers for every 1000 teachers each year. Women had more organic lesions, which was three times the rate of organic lesions in men. But, men reported chronic laryngitis three times more than did the women. Men also reported functional dysphonia at nearly twice the rate of the women. The researchers also found teachers who smoked daily, and who drank several cups of coffee or tea daily were at significant risk of developing problems. The researchers advised ordering evaluations of the voices to avoid continued problems in the teaching population.

Roy, Merrill, Thibeault, Gray, and Smith (2004) conducted a telephone study in Iowa and Utah to examine the frequency and negative impact of voice disorders on job performance of both teachers and the general population. The participants were 1,243 teachers and 1,279 workers and non-workers in fields other than teaching, all between 20-60 years of age. The teachers were significantly more likely to have experienced hoarseness, voice discomfort, increased effort while using the voice, tiring or feeling a change in vocal quality after short use, difficulty projecting the voice, trouble speaking or singing softly, and a loss of vocal range. Teachers consistently reported the symptoms they experienced were due to their occupation, and they admitted that the condition of their voices often limited their ability to carry out certain tasks at work. The teachers were more likely to have missed work due to vocal problems and to consider changing occupations because of vocal complaints. The results indicated teachers suffer more vocal problems than do the general population and that vocal problems have a negative effect on job performance, attendance and possibly future job choices.

Roy et al. (2004) used the same data to study prevalence in the same population. The prevalence of reporting a current vocal problem was 57.7% for teachers and 28.8% for non-teachers. Teachers were more likely to have consulted a voice professional (14.3% vs. 5.5% of non-teachers). Women had more lifetime prevalence of voice disorders than did men (46.3% vs. 36.9%). Women also reported more chronic voice disorders than acute voice disorders when compared to men (20.9% vs. 13.3%). They found that odds were in favor of developing a voice disorder if a participant was a teacher, a female between age 40 and 59 years, having 16 or more years of education, and having a family history of vocal problems. The study supported previous research indicating that teachers are at high risk for developing vocal problems.

In Australia, Russell, Oates, and Greenwood (1998) investigated the prevalence of self-reported vocal problems among a random sample of 1,168 teachers. Results indicated that 16% of the teachers reported current vocal problems at the time they completed survey, 20% of the teachers reported having vocal problems during the current school year, and 19% of the teachers reported having problems at some point during their career. Females were more than twice as likely as men to report vocal problems. The researchers indicated the need for further study and for the development of preventative programs.

Śliwińska-Kowalska, Niebudek-Bogusz, Fiszer, Los-Spychalska, Kotylo, Sznurowska-Przygocka, and Modrzewska (2006) stated that in Poland, occupational voice disorders make up over 25% of all occupational diseases. The researchers wished to determine the prevalence of and risk factors for vocal problems in the general population of Polish teachers. Polish law requires that all teachers be examined by an otolaryngologist every five years. Participants included 425 full-time teachers; Seventy percent were female secondary and primary school teachers ranging from 23 to 61 years of age. The remainder consisted of college or university professors. The control group consisted of 83 females whose age closely matched the teacher group, but who worked in office jobs that were not vocally demanding. All participants completed a survey and were examined using laryngological, phoniatric, and video stroboscopic tools. The survey included questions about each participant's age, current job, the duration of employment, environmental work conditions, ambient temperature, humidity, dust pollution, exposure to chemical substances, draughts, and whether or not air conditioning was used. Teachers were also asked type of class taught, number of students in each class, and number of class hours taught per week. Additional questions were asked about habits of speaking with loud voices and smoking. Teachers were also asked about previous diagnoses of vocal tract disorders

or general diseases such as thyroid, sex hormone therapy, nose and sinus problems, pharyngitis, or allergies. Work conditions proved to be similar among all the teachers. The class sizes varied from 25 to 35 students. Music teachers were found to overload their voices 2.58% of the time and sports teachers overloaded their voices 5.41% of the time. Teachers reported much less smoking than did the control group (13.45 to 25.3%). Allergies were much less frequent in the teachers (17.6% to 28.9%). Teachers did report more vocal problems and sick leave taken because of vocal problems (24.8% to 1.2%). Groups did not differ in other environmental factors, general health, or sex hormone therapy. Results indicated that the participants reporting lifetime vocal symptoms were more frequent in the teacher group than in the non-teaching group (69% vs. 36%). Permanent and recurrent hoarseness and dry throat were the main complaints reported. The average number of vocal complaints was 3.21 in teachers and 1.98 in the non-teachers ($p < .001$). Teachers also reported significantly more abnormal voices, more neck-muscle hypertension during speech, and incorrect resonator function. The maximum phonation time was shorter for teachers than the control (14.3 seconds vs. 15.9 seconds, $p < .01$). Occupational voice disorders and hyperfunctional dysphonia were diagnosed in 32.7% of the teachers and only 9.6% of the non-teachers. Probabilities were figured in the development of incomplete glottal closure and hyperfunctional dysphonia. Teachers had a much higher probability of developing both of those conditions. A significant positive relationship was found in the teaching group between the prevalence of hyperfunctional dysphonia and strained phonation, neck muscle hypertension, instability of the voice, self-assessed hyper arousal, and lifetime vocal effort. Also, the prevalence of vocal nodules and incomplete glottal closure were correlated with incorrect phonation technique parameters, but not with the psychological factors. There were no correlations with the environmental factors, including classroom temperature,

humidity, or dust. The researchers concluded that the prevalence of self-reported symptoms and clinical signs of vocal problems is two to three times more frequent in Polish female teachers than in non-teachers. Major risk factors for teachers included lifetime vocal effort, incorrect technique of phonation, and psychological predisposition.

Smith, Gray, Dove, Kirchner, and Heras (1997) wanted to compare the number of vocal problems of teachers to a group of participants in other occupations. Questionnaires were completed by 242 primary and secondary teachers and 178 employed non-teacher adults in northeastern Nevada and northern Utah. Among non-teachers, no occupation was "frequently reported" but some of the occupations included salespersons, clerks, health care providers, technicians, craftsmen, and general laborers. The questionnaire contained items rated on a Likert-type scale. Results indicated that the teachers (15%) reported more vocal problems than did those in other occupations (6%). Teachers reported having ten different voice symptoms, five of them presenting with physical discomfort. The average teacher reported experiencing two symptoms while the average non-teacher reported no symptoms. Teachers were also much more likely to report that their vocal problems would adversely affect their careers. Teachers also reported that vocal problems would limit their future career options or had limited their current job performance. Twenty percent of teachers reported that they missed a day of work due to vocal problems; none of the non-teachers missed work due to vocal problems. The study supports the idea that teaching is a career at high risk for vocal problems. The problem may indeed have effects on work and the economy.

Smith, Lemke, Taylor, Kirchner, and Hoffman (1998) reexamined the same data to write another article. Some specific items in this report indicate that teachers were more likely to

report a vocal problem (32% vs. 1%, $p < .05$) than were non-teachers. Teachers were also more likely to report tired voices, weak voices, and that their voices required more effort to use.

Södersten, Granqvist, Hammarberg, and Szabo (2002) sought to study preschool teachers' workday voices. The participants included 10 healthy female preschool teachers who worked at daycare centers in Sweden. In order to study their vocal patterns, a binaural recording technique was used. The teachers wore headsets with two microphones placed on each side of the face an equal distance from the head. A portable DAT recorder was worn on their waist. Recordings were made by having them read a passage before work. A spontaneous recording was also sampled of their speech during the day. This allowed the researchers to analyze two different samples of background noise, voice sound pressure levels, mean fundamental frequency, and total phonation time. The average background noise was 76.1 dBA with a range of 73.0 to 78.2 which is more than 20 dB higher than recommended levels. (Recommended level of noise for optimal vocal production is 50-55 dBA.) When compared to a baseline (202 Hz), participants spoke about 9.1 dB louder and with a fundamental frequency of 247 Hz during work. Average phonation time was 17%, which is considered high. Preschool teachers have vocally-demanding jobs. Decreasing background noise may be the most helpful intervention for voice damage prevention and allowing vocal breaks during the day may also help teacher voices.

Studies Conducted with Music Teachers

DeLoach (2000) studied public universities and whether or not they taught vocal health, recovery, and rehabilitation in their vocal pedagogy courses. The researcher examined vocal pedagogy courses on the post-graduate level at National Association of Schools of Music (NASM) accredited private liberal arts institutions in six states: Kentucky, Tennessee, Mississippi, Louisiana, Arkansas, and Alabama. Vocal pedagogy courses were examined for

content and inclusion of a unit on vocal health and vocal recovery. Eight pedagogy instructors completed the questionnaire; Seven instructors agreed to be interviewed. Vocal pedagogy courses were included in Bachelor of Music and Bachelor of Arts degrees; Master of Music and Master of Music Education degrees; and Doctor of Arts and Doctor of Musical Arts degrees. Anatomy, physiology, articulation, breathing, registration, phonation, posture, resonance, vocal health, and hygiene were concepts taught in all of the post-graduate courses except for one. Vocal health was discussed by more than 50% of the instructors. The vocal health discussions included the effect of drugs on the voice, vocal abuse, vocal misuse, and the effects of diet on the voice. There were no institutions that taught concepts such as recovery or vocal rehabilitation.

Hackworth (2003) studied vocal health habits of public school music teachers. The researcher examined the effect of vocal hygiene and behavior modification on the self-reported behaviors of 76 music teachers in the Kansas City area. The participants included elementary, middle or junior high, and high school music teachers. Using a checklist, they reported their daily vocal behaviors for eight weeks. Behaviors included the volume of water consumed, the minutes spent in vocal warm-up, the amount of time spent talking over noise, the number of breaks taken from speaking, the use of non-verbal commands for communication, and the number of vocal problems experienced. Demographic information was also collected. The participants were divided into three groups. One group (n = 19) received only vocal hygiene instruction (VHI) from a speech pathologist. The second group (n = 11) received both vocal hygiene instruction from a speech pathologist and additional information in behavior modification and teaching techniques (BMT) from a music education professor. The last group (n = 46) was a control group and received no instruction whatsoever. A follow-up questionnaire was used after the eight weeks to allow the participants to indicate on 10 point Likert-type scales

whether or not they identified a behavior change and how successful they felt they were at changing. No significant differences were found between the control group and group one in any of the reported categories. Group two showed a significant increase in the number of vocal breaks taken and also experienced a decrease in vocal problems. However, these results were only seen in the weeks immediately following the initial treatment. After the eight weeks had passed, no differences were found among any of the groups in any category. The researcher states that the differences in Group 2 seem to indicate that it is important to include behavior modification in programs of vocal hygiene. Variances among participants indicate that vocal hygiene routines may be easy for some and difficult for others. The only statistics reported in the study were means and standard deviations from the mean.

Hendry (2001) studied burnout and the self-reported vocal health of both music teachers and other educators. Hendry researched burnout among music teachers and sought to determine if vocal health might impact burnout. Hendry's research indicated that role-related stress and work overload contributed to burnout. She asserts that the vocal requirements of music teachers, both choral and instrumental, add to the potential for burnout. The voice is the primary tool of communication, so Hendry wondered if vocal impairment might add to the "burnout syndrome." She used the *Maslach Burnout Inventory Form Ed* in order to assess burnout on three subscales. The three scales were emotional exhaustion, depersonalization, and personal accomplishment. She also collected data on voice usage patterns, professional status and training, voice maintenance behaviors, past and present voice problems, general health, and lifestyle characteristics that might affect vocal health. A small sample of 37 teachers was recruited to participate in the study. The participants included both vocal and instrumental teachers, as well as teachers of other subjects. Among participants 43% indicated emotional exhaustion. Vocalists

demonstrated more burnout on the emotional exhaustion scale than did instrumentalists teaching vocal or instrumental music. Age was a factor, as well; Younger teachers were more emotionally exhausted. Music educators indicated they felt less depersonalized than did teachers of other subjects. Vocal problems, both current and past, were present in all groups. Only one participant reported no vocal problems. None of the instrumental teachers sought treatment for vocal problems. However 29% of the vocal music educators and 25% of the other teachers had sought medical treatment for problems.

Kramer (1994) conducted a survey on the vocal health of music educators. The researcher felt that many music educators are unaware of possible vocal problems. Specifically, they may not understand the correlation between vocal problems, their careers, and their personal lives. Music educators, according to the researcher, experience an abnormal amount of stress in either their personal lives or their careers. They may not be aware that their voice may be both affected by this stress, or may add to the stress. When some realize that their voice is a problem, they immediately feel the pressure to correct it. They understand that the voice is crucial for their careers. However, some may not think their problem is serious enough to consult a specialist. Some will attribute their vocal problems to sinus, allergies, effects of aging, or even slight strain. The researcher quotes Boone as saying, "more poor voices are simply the result of people misusing their natural voice mechanisms." The researcher states that the majority of vocal problems are "the result of chronic dysfunction and misuse/abuse of the vocal mechanism itself." She then states that minor causes would include physical disabilities, disease, or acute vocal dysfunction. She continues by saying that many music educators choose to ignore the problem.

Kramer's (1994) study took place in the Saint Louis, Missouri area. Sixty music teachers in the Midwestern area surrounding St. Louis returned completed surveys. Thirty percent of the

respondents were male and 70% were female. The majority (65%) of participants indicated that they had experienced vocal problems at some point in their careers and 38% reported a total voice loss at some point. A family history of vocal problems was reported by 22% of the participants. Of the 39 participants who reported vocal problems in their career, only 12 (31%) indicated that their problem had been resolved. Ten of them (26%) reported that the vocal problem was recurring or that it had not been completely resolved. More than half (55%) of the participants reported that they had seen a physician for a vocal problem. The majority of participants indicated that their vocal symptoms were either none or mild. Diagnoses reported by the participants indicated that of the 33 subjects reporting vocal problems, 85% had been diagnosed with vocal nodules. Other common diagnoses included allergies and fatigue.

The ages of the men in Kramer's study ranged from 29 to 60, with a mean of 42. The females ranged from 27 to 63 with a mean of 40. The majority of the participants rated their overall health as being average to excellent. The majority of the participants viewed themselves as being average to very extroverted and viewed themselves as average talkers. They also rated the volume level of their voices to be normal. Over one third (35%) of the participants reported that they lived with a moderate level of stress. Very few of the participants felt no stress at all. Work experience ranged from 4 to 21 years with a mean of 8 years for the males. The females' work experience ranged from 4 to 9 years with a mean of 7 years. Many (50 of the 60) of the subjects reported that they had studied voice with (34%) reporting that they studied from 4 to 8 years, 28% reporting study from 2 to 4 years, and 12% indicating that they were currently studying voice. The largest percentage of the participants taught from 21 to 60 hours per week. Many of the participants reported that they volunteer or work in other jobs during the week. The largest percentage indicated that they taught from 101 to more than 300 students each week. The

majority (52%) of the subjects reported that they taught 5 or more hours without a break. The largest percentage of the participants indicated that they were required to perform additional duties including hall duty, covering coworker's classes, lunch duty, playground duty, bus duty, and office duty. Over half (59%) of the participants reported that their daily activities required them to speak or yell loudly.

In Kramer's (1994) study the highest ranked cause of participants' vocal problems were work-related demands. Poor speaking technique was ranked second, and yelling or speaking above noise was rated third. Less highly ranked factors included improper singing, too much speaking, medications, alcohol consumption, smoking drugs, and smoking tobacco. The data supported reports that teachers do experience vocal problems and that music teachers may, indeed, experience more problems than other teachers. Kramer recommended preventative vocal health education and arts-medicine as a future need.

Morrissey (2004) completed a qualitative study on intensification and the vocal health of an elementary music teacher. The qualitative study case study followed one female elementary general music teacher because the literature indicated that teachers have the potential to suffer from voice problems due to heavy vocal use. Music teachers, however, have unique demands on the voice and may be particularly susceptible to vocal problems. The study of the music teacher was conducted in order to focus on her vocal health and the working conditions that may have an impact on her voice. The potential impact of the working conditions that were studied included: teaching load, schedule, resources, class size, administrative support, and collegial relationships. The researcher used Larson's theory of intensification in the study. The different aspects were analyzed in relation to the teacher's ability to maintain her vocal health. A female teacher was chosen because the overwhelming majority of elementary general music teachers are female. The

participant was chosen because she was a full-time teacher, she had a history of vocal problems throughout her teaching career, and she was in close geographical proximity to the researcher.

In the "ergonomic" study Morrissey (2004) observed the participant 20 times over a four-month period for a few hours on some days, and the full day on others. The researcher looked at how the elementary general music teacher used her voice in the classroom and how her instruction was modified in order to maintain vocal health. Analysis of interviews, observation, and analysis of artifacts showed that the teacher's teaching load, schedule, student groupings, class sizes, and numbers of students had increased steadily over her career. The student population began to change and this affected the teacher's curriculum plans and classroom management. The teacher also found herself trying to advocate for her program (which is common among music education professionals) thereby adding stress to her working conditions. The participant was forced to limit her voice use because of the intensifying working conditions. At times, the teacher used listening exercises with her students instead of active participation. Student singing opportunities began to decrease. As time passed, the teacher became a bad vocal model for her students. This fact was frustrating to the teacher, both personally and professionally. The researcher found that more study needed to be conducted on the vocal demands of elementary general music teachers and their working conditions. In particular, the research recommended an investigation of the relationship between intensification, marginalization, and vocal health. The researcher also identified criteria for assessing healthy voice use: amplification in large spaces with large groups, minimizing voice use in classroom instruction-speaking and singing, utilizing nonverbal teaching strategies when appropriate, planning alternate activities that do not require voice use on days of vocal fatigue, spacing programs and performances to different times of the year, not using all planning period times for

extra rehearsals, properly hydrate the voice, actively avoiding stress (with exercise and fun down time,) maintaining good general physical health (by not smoking, limiting caffeine, and sleeping adequately), using classroom management techniques that do not abuse the voice, and seeking more information relating to the use of the voice in the classroom.

Schwartz (2006) studied the vocal health of middle and high school choral directors. The researcher wished to explore relationships between voice range profile, age, gender, years of teaching, and level of teaching. The researcher selected geographical centers and identified target cities in those areas: Baltimore, MD; Charlotte, NC; Rock Hill, SC; Spartanburg, SC; Columbia, SC; Ft. Lauderdale, FL; Miami, FL; and Las Vegas, NV. Participants were 26 full-time middle school and 25 full-time high school choral directors; Thirty-five participants were female and 22 were male. The average age was 40. The researcher used a modified VHI and self-reported vocal health ratings. She also gathered demographic information including age, gender, years of teaching, level of teaching, vocal health education, and fundamental frequency and intensity ranges. Independent sample *t* tests were conducted to compare fundamental frequency and intensity of choral directors to other populations represented in data of trained voices and untrained voices from a study by Sulter, Schutte and Miller. Canonical correlation was used to determine if there was a relationship between age, gender, years of teaching, level of teaching, vocal health education, the VHI scores, and VRP ranges.

Schwartz (2006) found that the minimum vocal intensity of choral directors was much higher than the trained and untrained population. When asked to produce the softest sound possible, male choral directors were still louder than the untrained, but they were also able to phonate softer than the untrained group at 100% frequency levels. Choral directors' vocal intensity range was significantly smaller than both trained and untrained populations. The

decreased intensity capabilities indicate that choral directors are not as able to differentiate between loud and soft phonation as others. This may be because they sing at the same intensity level consistently instead of varying intensity levels. Choral directors are able to produce significantly fewer semitones, a fact which indicates they have a smaller vocal frequency range than both trained and untrained populations. The average choral director was only able to produce about 26 semitones which is slightly over 2 octaves. Healthy non-singers were able to produce wider ranges, which averaged about 30 semitones. Vocally healthy singers were able to produce much wider ranges, with an average of 34 semitones. The researchers also found that choral directors were not aware of their diminished vocal capabilities. Age, gender, years of teaching, level of teaching, and vocal health education were rejected as potential contributors to choral directors' reduced frequency and intensity ranges. All choral directors were experiencing the same vocal phenomenon, regardless of age, gender, or other variables.

Smith and Sataloff (2003) observed choral directors as they conducted their choirs in order to determine if vocal care was addressed in rehearsals. Researchers examined choral warm-ups and cool down procedures, posture, whether the repertoire's music or text should be considered, discipline, breath gestures, range and tessitura, seating, performance schedule, rehearsal traditions, benefits of choral singing, and the roles of the voice teacher, the laryngologist and speech-language pathologists in the choral context. Since so much research has been conducted with classroom teachers, it would seem that music teachers would certainly be a specific population of interest. Music teachers tend to raise their voices above more classroom noise. They may use their voices not only to speak, but to sing.

Ayers (2004) studied the vocal hygiene behaviors of elementary music teachers (n = 412) in North Carolina and Virginia. Ayers' questionnaire included questions about warm-ups,

illnesses, teaching schedules, and amount of vocal training. She found that only 15.3% (n = 63) of participants took time to warm up their voices daily. Ayers also reported finding 43% (n = 177) participants who reported hoarseness or laryngitis one to two times per year. Many respondents (n = 243, 59%) reported feeling fatigue and exhaustion because of their teaching schedules. Finally, the majority of elementary teachers (n = 292, 70.8%) did not receive instruction in vocal care in any undergraduate music methods class.

Mendes et al. (2004) studied the effects of singing training on the speaking voice of singers. The researchers wished to answer the question, "Does singing training have an effect on the speaking voice?" Participants were voice majors at the University of Florida's School of Music. Twelve females and two males, ages 17 to 20, were evaluated by certified and licensed speech-language pathologists and were judged to have normal articulation, voice, resonance, language, and hearing abilities. The participants also had no history of respiratory or vocal disorders and showed no symptoms of allergies on the days of the recordings. The voice majors were recorded once a semester for four consecutive semesters reading a passage called "Rainbow Passage," and also were recorded while sustaining vowels. Acoustic measures were run using CSL and Multi-Dimensional voice Profile software. In order to determine speaking fundamental frequency (SFF) and sound pressure level (SPL). Jitter, shimmer, and harmonic-to-noise ratios were measured. Temporal measures were taken on durations of the sentences, consonants, and diphthongs. Analysis of the data revealed that as time passed, SFF increased, but jitter and shimmer decreased. However, a repeated measure analysis showed that none of the acoustic, temporal, or perturbation levels were significant. This confirmed earlier cross-sectional studies comparing singers with non-singers. Those studies also found that singing training mostly affects the singing voice and rarely does it affect the speaking voice. Though the Mendes study does not

specifically apply to all music teachers, many music teachers have had vocal training. Gilbreath's survey questioned participants about previous vocal training. Gilbreath was interested to see if vocal training had any impact on the vocal problems of teachers. So, Mendes' article provided needed insight.

Most recently, Sinclair (2010) completed a study using acoustic measures of 10 instrumental, 10 choral, and 10 elementary music teachers under two vocal conditions (natural speaking voice and professional teaching voice). Sinclair measured differences in fundamental frequency (F_0), % jitter, % shimmer, signal-to-noise ratio (SNR), and sound pressure level (SPL). Sinclair used repeated measures ANOVA procedures to reveal significant differences in these measures. She found the F_0 of the instrumental teachers to be significantly different than either the elementary or choral teacher. Sinclair also found that nearly 63% of participants had taken a class in care of the voice. But, only 16% were drinking at least 64 ounces of water daily and caffeinated beverages were consumed by 70% of participants.

Summary

In order to gain a deeper understanding of vocal damage and who was at risk for vocal damage, literature was located which defined and categorized heavy voice users (Benninger & Murry, 2006; Boone, et al. 2005; Titze, et al. 1997; Williams, 2003; Wingate et al., 2007). A great deal of research has been conducted into vocal abuse and possible etiology of vocal problems. This included harmful habits such as belting, sleep patterns, smoking, poor posture, throat clearing, drinking caffeinated beverages, drinking alcoholic beverages; and included the beneficial habit of drinking water (Anticaglia et al., 2004; Benninger et al., 2006; Brown, 2004; Chapman, 2006; Dayme, 2005, 2006; Hamdan et al., 2007; Harvey et al., 2003; Heman-Ackah, 2004; Kaplan et al., 2001; Miller, 1996; Nair, 2007; Rubin et al., 2004; Sataloff, 2000, 2005,

2006; Saxon et al., 2003; Solomon et al., 2003; Titze et al., 1997); environmental factors such as noisy classrooms; amount of talking; dusty, moldy or dry work spaces, sinusitis, allergies, medications, secondhand smoke, and the use of special effects in productions (Anderson, 2001; Anticaglia et al., 2004; Benninger et al., 2006; Bovo et al., 2006; Colton et al., 1996; Dayme, 2001, 2007; Gotaas et al., 1993; Heman-Ackah, 2005; Jónsdottir et al., 2003; Kooijman et al., 2006; Kovacic et al., 2005; Laukkanen et al., 2006; Miller, 1996; Morrissey, 2004; Rantala et al., 2002, 2003; Sataloff, 2005; Schick et al., 2000; Schmidt et al., 2008; Simberg et al., 2005; Södersten et al., 2002; Spandorfer et al., 2004; Titze, 2007); and physical or emotional characteristics: gender, age, personality type, and physical conditions requiring medications (Benninger et al., 2006; Dayme, 2007; Deeter, 2006; de Jong et al., 2006; Gotaas et al., 1993; Ihre et al., 2004; Kooijman et al., 2006, 2007; Kovess-Masféty et al., 2006; Murry et al., 2007; Olson, 2005; Sataloff, 2006, 2007; Schmidt et al., 2008; Smith et al., 1998; Solomon et al., 2003; Spencer, 2006; Thomas et al., 2006).

A great deal of research has been conducted with teachers across the world. Previous research has included evaluation of preventative programs (Bovo et al., 2006; Duffy et al., 2004; Ilomäki et al., 2005; Kovacic et al., 2005; Simberg et al., 2000; Thibeault et al., 2004; Yiu, 2002); efficacy of treatments such as voice amplification systems, vocal hygiene instruction, and resonant voice therapy (Chen et al., 2007; Gillivan-Murphy et al., 2006; Jónsdottir et al., 2003; Kramer, 1994; Roy et al., 2001, 2002); and studies determining the prevalence, frequency, impact, and severity of vocal problems (Hamdan et al., 2007; Preciado-Lopez et al., 2006; Roy et al., 2004; Russell et al., 1998; Śliwińska-Kowalska et al., 2006; Smith et al., 1997, 1998; Södersten et al., 2002). Only a few studies have been conducted with music teachers (DeLoach, 2000; Hackworth, 2003; Hendry, 2001; Kramer, 1994; Morrissey, 2004; Schwartz, 2006; Smith

et al., 2003; Ayers, 2004; Sinclair 2010). Some studies have been conducted with professional singers (e.g. Mendes et al., 2004).

Though research has been conducted on the prevalence and epidemiology of vocal problems, and research has been conducted with teachers, not enough research has been conducted on the specific population and unique problems of music teachers. In addition, the geographical area of the Southeastern United States has not been thoroughly investigated. Finally, a gap in the literature was noted in studies of vocal problems among band directors and orchestra directors.

CHAPTER 3

Method

The purpose of the study was to determine the prevalence of voice disorders in general music teachers, choral teachers, band teachers and orchestra teachers in Alabama, Florida, Georgia, Mississippi, and Tennessee, and to identify factors possibly contributing to vocal problems. Six questions were posed.

1. How many school music teachers report seeking professional help and receiving a positive diagnosis of a vocal problem?
2. How many school music teachers report experiencing vocal problems, but have not sought medical help?
3. Is there a possible relationship between any of the common habits or environmental factors identified by experts as causes of vocal problems and a positive diagnosis of a vocal problem among the participants?
4. Is there a possible relationship between participants' VHI scores and a positive diagnosis of a vocal problem?
5. Of the following groups: general music teachers, choral teachers, band teachers, or orchestra teachers, is one group more likely to be given a positive diagnosis of a vocal problem than the others?

Participants

A list of names was obtained from the 2008-2009 membership database of the Music Educators' National Conference (MENC) through the American List Council. The original database contained 8,030 potential participants who were identified as general music teachers, choral teachers, band teachers, or orchestra teachers. However, it was discovered that some of the names and addresses included individuals who taught in colleges and universities. Four hundred and five names were, therefore, outside the scope of this study and were eliminated from the list leaving 7,625 potential participants. It was calculated that to achieve a 95% confidence level with a confidence interval of ±10 %, 94.81 respondents would be required (n = 95) (Dillman, 2000; Rhea & Parker, 2005).

Microsoft® Excel was used to select a random sample of 2,000 participants. The selected participants included 215 music teachers in Alabama, 797 music teachers in Florida, 742 music teachers in Georgia, 100 music teachers in Mississippi, and 146 music teachers in Tennessee.

Permission to administer the survey was granted through the Office of Human Subjects Research (OHSR) and the Institutional Review Board for the Protection of Human Subjects in Research (IRB) at Auburn University. Participants were informed that the survey would be completely anonymous. (See Appendix A for IRB materials.)

Development of Instrument

Survey Monkey was used to develop an Internet survey. It was thought that busy music teachers would be more likely to complete the survey if it was available on the Internet instead of requiring them to mail back a written survey.

The first section of the questionnaire was designed to gather non-identifying demographic and descriptive information. Information included age, gender, number of years

teaching, number of hours teaching per week, type of classes taught, grade levels taught, weekend singing or speaking, whether previously diagnosed with a voice disorder, nature of the diagnosis, whether or not the voice changes during the day, whether or not the participant experiences vocal problems without consulting a physician, whether or not the participant smokes, drinks alcohol, drinks caffeinated beverages, drinks water, and whether or not the voice is raised above normal volume levels and why. (See Appendix B for questionnaire.)

The descriptive portion of the instrument was developed through a pilot study, through consulting with experts, and through information gathered in the literature review. A pilot study with 16 participants was conducted using an earlier version of the survey instrument. The earlier version was designed to gather information in order to determine if a correlation existed between knowledge of vocal pedagogy, vocal hygiene, and a positive diagnosis of vocal damage in choral teachers in Alabama. Statistical analysis of the instrument determined that most of the items did not reach the level of .40. Therefore, many of the questions were not reused, some items were divided into multiple choice questions, and some items were divided into more than one question. The second version of the questionnaire was further developed after the researcher consulted with speech professionals at Auburn University, read additional suggested and related literature, and adapted the current instrument for use with music teachers. Items were adapted and developed from similar questionnaire examples in speech pathology textbooks (Colton & Casper, 1996; Shipley & McAfee, 2004; Stemple, Glaze, & Klaben, 2000). The first part of the survey contained 68 descriptive questions. Six questions gathered information that could be converted into Likert-type scales. Those questions included how much daily intake of water, daily intake of soda, daily intake of coffee, daily intake of smoked tobacco, daily intake of alcoholic beverages, and how many reasons the voice is typically raised while teaching.

The second portion of the survey consisted of the Voice Handicap Index (VHI). The VHI is not meant to be a diagnostic tool of vocal damage. It was designed to measure the impact that a vocal problem has on each individual. The VHI has been extensively tested across the world in several languages (Bogaardt, Hakkesteegt, Grolman, & Lindeboom, 2007; Thomas, Kooijman, Donders, Cremers, & de Jong, 2007; Rosen, Murry, Zinn, Zullo, & Sonbolian, 2000; Wheeler, Collins, & Sapienza, 2006; Woisard, 2007). The Agency for Health Care Research and Quality reported in 2002 that the VHI "met their criteria for validity, reliability, and availability of normative data" (Rosen, 2004). Written permission was granted by Barbara Jacobson for use of the instrument in the present study. Further permission was granted by the American Speech-Language-Hearing Association for publication in this document (see Appendix B). The VHI consists of 30 Likert-type items, divided into 3 categories of 10 items each. The VHI item categories are labeled Functional, Physical, and Emotional. Participants rate each survey statement from 0 to 4. A ranking of 0 = never, 1 = almost never, 2 = sometimes, 3 = almost always, and 4 = always (Jacobson, Johnson, Grywalski et al., 1997).

Development and Validation of the VHI

Jacobson et al. (1997) conducted reliability testing to develop the current version of the VHI. The original VHI contained 85 items. Internal consistency and reliability measures were calculated using Chronbach's alpha coefficient. Item correlations ranged from $r = .17$ to $r = .86$. Nunnally (1978) suggested in order for a single item to demonstrate acceptable internal consistency, a level should be at least $r = .50$. Twenty-eight items were eliminated because they failed to meet the acceptable levels. Fifteen questions were eliminated because they appeared to demonstrate a dependency on the sex of the patient. The scores for the men on these questions differed greatly and consistently from the women. An additional 16 items were eliminated

because more than half of the participants consistently chose the option "never" in their responses. The 85-item version was, therefore, reduced to a final version containing only 30 items consisting of a 10-item Functional subscale, a 10-item Emotional subscale, and a 10-item Physical subscale.

The abbreviated version of the VHI was administered on two separate occasions to 63 patients to calculate test-retest reliability of the final version (Jacobsen et al., 1997). The Pearson product-moment correlation coefficient was used to determine the stability of the test-retest total score as well as the subscales. The Functional subscore revealed a score of $r = .84$, the Emotional subscale $r = .92$, the Physical $r = .86$, and the total score $r = .92$. The critical difference scores were strong enough to meet a 95% confidence interval (+ or – 8 points). All of the subcategories yielded an average of an 8 point increase, and the final total score averaged 18 points. The final analysis revealed a change between the test and retest greater than 18 points, representing a significant shift in the psychosocial measure. So, the shift was not due unexplained variability inherent in the VHI, but from a change in the psychosocial score. Cronbach's alpha coefficient was used to determine the correlation of the item-total correlation of the final version of the VHI. The final score of $r = .95$ represented little change from the original 85-version ($r = .97$). Finally, the Pearson product-moment correlations were moderately strong, ranging from $r = .70$ to $r = .79$ when comparing the relationship between the three subcategories from the first VHI and the second version of the VHI (Jacobson et al., 1997).

Other researchers have tested the VHI for validity and reliability. Bogaardt (2007) conducted Rasch analysis of the VHI in the Netherlands. The Rasch analysis identified two scales which were named the psychosocial scale (20 items) and the physical-functional scale (9 items). One item was discarded because it did not fit the Rasch model. The internal consistency

(α =.95) was similar to the normal 30-item questionnaire. The nine-item physical-functional scale was high (α =.84) even though there were only 9 items. Thomas' 2006 study compared three instruments, a general questionnaire, the Type D Scale 16, and the VHI. The intent was to determine if participants identified as Type D personalities, those who tend to experience negative viewpoints and social inhibitions over long period of time, experienced more psychosocial impact than those with other personality types. They found that the type D group (32.4% of participants) scored the VHI > 75th percentile, suggesting the VHI is an accurate psychosocial measure when compared to the Type D Scale 16 outcomes. However, the Rasch analysis revealed two unique constructs (physical-functional and psychosocial) instead of the three scales of Functional, Emotional and Physical. Wheeler et al. (2006) compared the VHI to acoustic measures using Pearson *r* correlation statistics and a significance level of .05. Acoustic measures in the 2006 study were not predictive of the total VHI score, nor were VHI items significantly correlated with the acoustic measures in any predictable pattern. However, the inter-item correlation revealed most (17 of 30) VHI items had significant correlations at the .05 level. Woisard, Bodin, Yardeni, and Peuch (2007) compared the VHI scores to quantitative assessments of the voice and found a fair but significant correlation between minimal frequency and the physical score (.36), functional score (.31), and total score (.36), but not the emotional score. Woisard also found a significant correlations between the range and the physical score (.36). The results indicated that participant's self-assessment tools are not a suitable substitute for professional laboratory measures of vocal problems.

Reliability

In this study, 62 items on the questionnaire were used to gather demographic information and descriptive information on vocal damage and daily habits. There was no assumption of

correlation between the independent items. There was no need for reliability testing because of the lack of homogeneity among the items (Streiner & Norman, 2003). Reliability had been tested, however, on the VHI. According to Jacobson et al. (1997), the VHI has good internal consistency, with a Chronbach alpha coefficient of .95. In the current study, the Chronbach alpha coefficient was also .95.

Collection of Data

Two thousand potential participants were mailed an invitation to participate in the study, a description of the risks of the study, and a card containing the survey link. The return rate was .05%. The minimum confidence level of 95% had been reached so the survey was closed.

Data Analysis

Statistical analyses were calculated with *Statistical Package for the Social Sciences 17.0* (SPSS). Descriptive statistics, independent samples *t* tests, and Chi-square analyses were used to answer the six research questions.

CHAPTER 4

Results

The target population for this study included general music teachers, choral teachers, band teachers and orchestra teachers from Alabama (*N = 1,128)*, Florida (*N = 2,449*), Georgia (*N = 2,976*), Mississippi (*N = 353*), and Tennessee (*N = 1,118*) who were members of the Music Educator's National Conference (MENC). Invitations to complete a computerized survey were sent to 2,000 randomly-selected teachers identified by their membership on the 2008 MENC membership list.

Of the 2,000 invitations mailed, 111 participants began the survey. One of the responses was deleted because it was obvious that one participant had taken the survey twice. The participant reported the same age (70 years), that they taught hand bell choirs, and that the grade levels they taught were first, sixth, seventh, and eighth. It was decided it was highly unlikely that two people could have met the exact same demographics, so the first of the two responses was eliminated. It was assumed the participant was not satisfied with their first response, so they took the survey again to make corrections. Two participants were not able to complete the survey because they only taught part-time and the survey required full-time teachers. One participant was eliminated because of indicating their primary teaching responsibility to be teaching voice at a university level. Finally, five of the participants did not complete the survey and were eliminated because not enough useful information was provided. One-hundred-two participants remained (return rate of .05%) providing a sufficient number to achieve a 95% confidence level

with ± 10% confidence interval (Dillman, 2000; Rhea & Parker, 2005). Analyses of the data included demographic statistics, independent samples *t* tests, and Chi-square analysis.

Description of Participants

The participants included 27 males (26.47%) and 75 females (73.53%). Ages ranged from 24 to 60 years with an average age of 40.64 years. The majority reported their primary job to be general music teacher (*n = 49*, 48.04%). The next largest group was choral teacher (*n = 27*, 26.47%), followed by band teacher (*n = 19*, 18.63%) and orchestra teacher (*n=4*, 3.92%). Three teachers indicated their primary job as "other." When asked to specify their job title, the answers were music therapy, class piano, and hand bell director (*n= 3*, 2.94%). Number of years teaching ranged from 1 to 37 with an average of 14.16 years.

Length of class periods ranged from 26 - 96 minutes with a mean of 53.56 minutes. When asked to estimate the number of hours their voices are used during the work day, the participants answers ranged from 3 - 20 hours with a mean of 5.73 hours. Grade levels taught ranged from pre-kindergarten to twelfth grade. The most common grade level taught was first grade (*n = 50*, 49.02%) and the least common grade level taught was pre-kindergarten (*n = 17*, 16.67%) (see Table 1). The number of grade levels taught ranged from 2 to 10 with an average of 5.30 grade levels. When divided into the categories of early childhood (pre-kindergarten to second grade), primary (third to fifth grade), middle (sixth to eighth grades) and secondary (ninth to twelfth grades), the most common grade levels were early childhood, followed by primary, middle school, and secondary (see Table 1).

Table 1

*Frequency and Percentage of Grade Levels Taught by Participants (N = 102)**

	f	*p*
Early Childhood		
Pre-kindergarten	17	16.67
Kindergarten	47	46.08
First	50	49.02
Second	49	48.04
Primary		
Third	45	44.12
Fourth	45	44.12
Fifth	47	46.08
Middle		
Sixth	40	39.22
Seventh	41	40.20
Eighth	41	40.20
Secondary		
Ninth	34	33.33
Tenth	34	33.33
Eleventh	34	33.33
Twelfth	34	33.33

**All participants reported teaching more than one grade level.*

Prevalence and Frequencies of Vocal Damage

Research Questions 1 and 2 were addressed through descriptive statistics of frequencies and percentages. Question 1 was "How many school music teachers report seeking professional help and receiving a positive diagnosis of a vocal problem?" Thirty-three (32.35%) of the 102 participants indicated a positive diagnosis of a vocal problem (Dx) by a medical professional. Twenty-nine, or 38.67%, of the female participants and four male participants (14.82% of males) reported receiving a positive diagnosis of vocal problems. Seventeen (35.42%) general music teachers, ten (37.04%) choral teachers, three (15.79%) band teachers, and 3 (75%) orchestra teacher reported positive diagnosis of vocal problems.

Question 2 asked, "How many school music teachers report experiencing vocal problems, but have not sought medical help?" Forty-two (41.18%) participants (27 females and 14 males) indicated they experienced vocal problems a minimum of a few times per year or more but had not received a positive diagnosis (NDxP). The NDxP group consisted of 20 general music teachers (41.67% of general music teachers in the sample), 10 choral teachers (37.04% of choral teachers), eight band teachers (42.11% of band teachers), 1 orchestra teacher (25% of orchestra teachers) and three "other" teachers (100% of "others) indicated experiencing vocal problems without a medical diagnosis. Seventy five (73.5%) of participants reported experiencing vocal problems, either with or without receiving a diagnosis (see Table 2).

Table 2

Frequencies and Percentages of Diagnosed Vocal Problems and Self-Reports of Problems (N = 102)

	DxVP		NDxP			
	f	*p*	*f*	*p*	*Cum. f*	*Cum. p*
Females	29	28.43	27	26.47	56	54.90
Males	4	3.92	15	14.71	19	18.63
Total	33	32.35	42	41.17	75	73.52
Gen. Music	17	16.67	20	19.61	37	36.28
Choral	10	9.80	10	9.80	20	19.60
Band	3	2.94	8	7.84	11	10.78
Orchestra	3	2.94	1	0.98	4	3.92
Other	0	0.00	3	2.94	3	2.94
Total	33	32.35	42	41.17	75	73.52

DxVP = Diagnosed Vocal Problem

NDxP = No Diagnosis, but Problems

Etiology of Vocal Problems

Question 3 was stated: "Is there a possible relationship between any of the common habits or environmental factors identified by experts as causes of vocal problems and a positive diagnosis of a vocal problem among the participants?" Literature had identified several environmental factors possibly contributing to vocal damage in teachers. Independent-sample *t* tests were used to determine differences between the reported presence or absence of diagnosed vocal problems and in each of ten continuous environmental variables. Participants were grouped according to their reported diagnosis; participants reporting no diagnosed vocal problems were assigned to Group 1 ($n = 25$), those reporting diagnoses were assigned to Group 2 ($n = 33$). The 10 environmental variables included age of participant, number of years teaching, self-estimated daily hours of speaking, weekend added hours, daily reasons for raising the voice, amount of daily water intake, amount of daily soda intake, amount of daily coffee intake, amount of daily alcohol intake, amount of daily smoking intake. Levene's test for equality of values ($p > .05$) revealed that equal variances could be assumed on all variables between groups (see Table 3). Since SPSS 17.0 does not compute effect size when running an independent sample *t* test, eta squared effect sizes were computed by hand using the following formula:

$$\eta^2 = \frac{t^2}{t^2 + (N1 + N2 - 2)}$$

Results showed a significant difference in mean daily water intake scores for those not diagnosed with a vocal problem (Group 1 $M = 6.61$, $SD = 2.20$) and those receiving a positive diagnosis of a vocal problem (Group 2 $M = 5.24$, $SD = 2.71$); $t\ (100) = 2.71$, $p = .01$ (two-tailed). The magnitude of the difference in the means ($MD = 1.37$, 95% CI: .37 - 2.36) was moderate ($\eta^2 = .07$). Therefore, 7% of variance in lack of daily water intake scores (how much water the participant drank daily) can be explained by whether or not a person has received a positive

diagnosis of a vocal problem. No other significant differences in environmental factor scores between the two groups were noted.

Cohen's (1988) guidelines for interpreting eta squared suggest that η^2 should be interpreted .01 = small effect, .06 = moderate effect, and .14 = large effect. Small effect sizes were found for the two groups in the years teaching score (η^2 = .01), daily reasons for raising the voice score (η^2 = .02), daily coffee intake (η^2 = .01) and daily alcohol intake (η^2= .01). Daily reasons to raise the voice, could account for 2% of the variance between the groups. However, the scores were lower for Group 2 (*M* = 3.70, *SD* = 1.26), indicating that on the average, participants reporting diagnoses did not raise their voices as often as participants without diagnoses.

Number of years teaching (Group 1 *M* = 13.59, *SD* = 9.67; Group 2 *M* = 15.33, *SD* = 8.49) accounted for 1% of the variance between the groups (η^2 = .01). Daily amount of coffee scores (Group 1 *M* = .74, *SD* = .98; Group 2 M = .94, SD = 1.35) also accounted for 1% of variance (η^2 = .01). Finally, daily alcohol intake scores (Group 1 *M* = .48, *SD* = .85; Group 2 *M* = .33, *SD* = .82) accounted for 1% of the variance between the groups (η^2 = .01).

Table 3

Results of Independent-Samples t tests (Equal Variances Assumed) and Eta Squared Comparing Environmental Factors for Those Diagnosed and Those Not Diagnosed with Vocal Problems

	Group 1		Group 2					
Environmental Factors	*M*	*SD*	*M*	*SD*	*t*	*df*	*p*	η^2
Age	40.19	10.44	41.58	12.08	-.60	100	.55	.00
Years Teaching	13.59	9.67	15.33	8.49	-.88	100	.38	.01
Daily Speaking	5.68	2.00	5.82	1.33	-.36	100	.72	.00
Weekend Hours	2.00	1.54	2.21	1.69	-.63	100	.53	.00
Daily Reasons to Raise Voice	4.32	2.43	3.70	2.10	1.26	100	.21	.02
Daily Water Intake (Neg.)	6.61	2.20	5.24	2.71	2.72	100	.01*	.07
Daily Soda Intake	1.41	1.65	1.27	1.68	.38	100	.71	.00
Daily Coffee Intake	.74	.98	.94	1.35	-.85	100	.40	.01
Daily Alcohol Intake	.48	.48	.33	.82	.82	100	.42	.01
Daily Smoking	.74	3.58	.30	1.74	.66	100	.51	.00

* $p < .05$ (two-tailed)

η^2 =.01-.06 = small effect, η^2 =>.06 = moderate effect

A third group (Group 3; $n = 75$) consisted of participants in both the DxP and NDxP groups. Levene's test for equality of values revealed that equal variances could be assumed on all variables between groups ($p > .05$). Independent-sample *t* tests were calculated to compare

environmental factor scores between Group 3 and Group 1. Results indicated no significant difference between any of the scores for Group 3 when compared to the scores of Group 1. Eta squared indicated small effects on six environmental variables. The variables of age, self-estimated daily hours speaking, weekend added hours of vocal use, daily water intake, daily coffee intake, and daily smoking intake each account for 1% of the variance of scores between the groups (η^2 for all six groups = .01).

Table 4

Results of Independent-Samples t tests Comparing Environmental Factors between Participants Reporting Vocal Problems to Participants Not Reporting Vocal Problems and Eta Squared Results

t = *t*-values (equal variances assumed); *df* = degrees of freedom; *p* = significance (2 tailed); η^2 = eta squared

	Group 1		Group 2					
Environmental Factors	*M*	*SD*	*M*	*SD*	*t*	*df*	*p*	η^2
Age	39.41	10.50	41.08	11.15	-.68	100	.50	.01
Years Teaching	13.30	9.03	14.47	9.44	-.56	100	.58	.00
Daily Speaking	6.00	3.01	5.63	1.11	.92	100	.36	.01
Weekend Hours	1.78	1.45	2.17	1.63	-1.11	100	.27	.01
Daily Reasons to Raise Voice	4.26	2.31	4.07	2.36	.37	100	.72	.00
Daily Water Intake (Neg.)	6.52	1.85	6.04	2.63	.87	100	.38	.01
Daily Soda Intake	1.52	1.99	1.31	1.52	.57	100	.57	.00
Daily Coffee Intake	.93	1.00	.76	1.35	.67	100	.51	.01
Daily Alcohol Intake	.52	.80	.40	.85	.63	100	.53	.00
Daily Smoking Intake	.22	1.16	.73	3.55	-.73	100	.47	.01

* $p < .05$

η^2 =.01-.06 = small effect, η^2 =>.06 = moderate effect

VHI Scores

Question four was "Is there a possible relationship between participants' VHI scores and a positive diagnosis of a vocal problem?" The total VHI score of two groups, the total vocal problems group (Group 3) and the no vocal problems group (Group 1) was compared using independent-sample *t* tests. A high VHI score indicates vocal problems have a significant psychosocial impact on participants. Results indicate a statistically significant difference ($t(75.62) = -2.78$, $p = .007$) in the total VHI scores for Group 3 ($M = 49.47$, $SD = 16.60$) and Group 1 ($M = 41.85$, $SD = 10.14$). The magnitude of the differences in the means (-7.62, 95% CI: -13.06 to -2.17) was moderate ($\eta^2 = .07$). Therefore, 7% of the variance in the total VHI scores can be explained by whether or not the participants experienced vocal problems.

Teaching Type and Likelihood of Developing Vocal Problems

Question five asked: "Of the following groups: general music teachers, choral teachers, band teachers, or orchestra teachers, is one group more likely to be given a positive diagnosis of a vocal problem than the others?" Question five was answered using a chi-square test for independence and cross tabulation. Four categories of music teachers were identified as general music teachers, choral teachers, band teachers, and orchestra teachers. The participants also added three other categories: class piano teacher, hand bell teacher, and music therapist. However, because they numbered less than five, the category of orchestra teachers and the participants identified as "other" were eliminated before statistical analysis. Responses from 95 participants remained for consideration. The categories of general music teachers, choral teachers, and band teachers were compared to the indicator of total vocal problems in a 3 x 2 table to see if the level of significance was lower than .05. A Pearson Chi-Square indicated no significant association between a participant experiencing vocal problems and the participant's

teaching type (X^2 (2, n = 95) = 2.20, p = .33). For tables larger than 2 x 2, it is suggested by Pallant (2007) to use Cramer's *V*. For 3 x 2 tables, the values of Cramer's *V* are: small = .07, medium = .21, large = .35 (Pallant, 2007). Cramer's *V* was determined to be .15, indicating a small effect.

The majority (54.4%) of Group 3 members were general music teachers (n = 37). The majority (56.7%) of Group 1 members were general music teachers (n = 17). It should also be noted that 20 of the general music teachers reported they do experience vocal problems but have not sought professional help to deal with these problems. So, 37 out of 49 general music teachers (75.5%) did report either a positive diagnosis or reported experiencing vocal problems during their careers.

Ten choral teachers (29.41% of all positively diagnosed cases) reported a positive diagnosis of a vocal problem. An additional 10 choral teachers reported that they experienced vocal problems but did not seek professional help. So, 74% of the choral teachers either reported a positive diagnosis of a vocal problem, or experiencing vocal problems without seeking help. This finding was only slightly lower than the general music teachers.

Three band teachers, accounting for 9.1% of the subgroup, reported receiving a positive diagnosis of vocal problems. Additionally, eight band teachers reported experiencing vocal problems without seeking professional intervention. Eleven out of nineteen band teachers (58%) indicated either a positive diagnosis or experiencing vocal problems.

Though the groups orchestra and "other" teachers were eliminated from statistical analysis because their numbers were not statistically significant, the participants did provide information that is valuable to the study. The crosstabs indicated that three orchestra teachers received a positive diagnosis of vocal problems. The remaining orchestra teacher did report

experiencing vocal problems without seeking professional help. Therefore, all four (100%) of the orchestra teachers either received a positive diagnosis of or experienced vocal problems in their careers.

None of the "other" categories of teachers reported any positive diagnoses of vocal problems. However, all three indicated that they did experience vocal problems but had not sought professional help for these problems.

CHAPTER 5

Discussion

The purpose of the study was to determine the prevalence of voice disorders in general music teachers, choral directors, band, and orchestra directors in Alabama, Florida, Georgia, Mississippi, and Tennessee; to research the psychosocial impact of vocal problems on these teachers; and to identify factors possibly contributing to vocal problems. The findings of the study may provide insight to voice and speech specialists as well as music educators regarding the unique vocal problems facing general music, choral, band, and orchestra teachers.

Five research questions were formulated to guide the study:

1. How many public school music teachers report seeking professional help and receiving a positive diagnosis of a vocal problem?
2. How many public school music teachers report experiencing vocal problems, but have not sought medical help?
3. Is there a possible relationship between any of the common habits or environmental factors identified by experts as potential causes of vocal problems and a positive diagnosis of a vocal problem among the participants?
4. Is there a possible relationship between participants' VHI scores and a positive diagnosis of a vocal problem?

5. Of the following groups: general music teachers, choral teachers, band teachers, or orchestra teachers, is one group more likely to be given a positive diagnosis of a vocal problem than others?

In order to gain a deeper understanding of vocal damage and who was at risk for vocal damage, literature was located which defined and categorized heavy voice users. The researcher located and read previous studies in the areas of vocal abuse and possible etiology of vocal problems. The research into various etiologies included both beneficial and harmful habits: belting, sleep patterns, smoking, poor posture, throat clearing, drinking caffeinated beverages, drinking alcoholic beverages, and drinking water. Environmental factors affecting the voice included in research were: noisy classrooms; amount of talking; dusty, moldy, or dry work spaces; sinusitis, allergies and medications; secondhand smoke; and the use of special effects in productions. Physical or emotional characteristics included: gender, age, personality type, and physical conditions requiring medications.

The researcher also located several studies conducted with teachers across the world. The international research included evaluation of preventative programs; efficacy of treatments such as voice amplification systems, vocal hygiene instruction, and resonant voice therapy; and studies determining the prevalence, frequency, impact and severity of vocal problems. The researcher was only able to locate a few studies conducted specifically with music teachers. Some research has been completed with professional singers, which offered insight into how singing might affect a teacher's voice with weekend use or singing in the classroom.

It was concluded a great deal of research had been conducted in the areas of prevalence and epidemiology of vocal problems, and, much research had been conducted with teachers. However, not enough research has been conducted on the specific population and unique

problems of music teachers. In addition, the geographical area of the Southeastern United States has not been thoroughly investigated. Some possible differences might exist in the vocal training of teachers in this region. Very little research was located on the vocal problems of band teachers.

Conclusions

Demographic information and data were collected and analyzed. The first two research questions were addressed by calculating frequencies and percentages. The statistics revealed that 32.4% of the participants (n = 33) had sought professional help for a vocal problem. Similar findings were reported by Śliwińska-Kowalska et al. (2006) who found that 32.7% of Polish teachers had been diagnosed with a vocal disorder. Hendry (2001) found that 29% of vocal music educators and 25% of other teachers sought medical treatment for voice problems. The rate was higher than Roy et al. (2004) in which only 14.3% of the teachers had sought medical attention for a vocal problem. Kramer (1994) found a higher rate (55%) in music teachers seeking medical help. Preciado-Lopez (2006) found the rates among teachers in Spain to be 57%. The results show similar findings to studies conducted in Poland and the United States. Although Kramer's study showed significantly higher rates, the research was conducted in a small geographical radius around Saint Louis. Preciado-Lopez also reported a higher rate. However, the participants in Spain reported high levels of smoking and drinking several cups of caffeinated beverages daily.

Question 2 was stated "How many public school music teachers report experiencing vocal problems, but have not sought medical help?" In the present study, 41% (n = 42) reported experiencing vocal problems at least twice per year without seeking professional help for the problems (NDxP). Hamdan (2007) found that 79% of Lebanese teachers diagnosed with vocal

problems had never previously sought help for their conditions. In Hendry's study (2001) of 37 music teachers, even though 29% had received a positive diagnosis of a vocal problem, only one person (2.6%) in the study reported no vocal problems at all. This left 68.4% of the participants who experienced vocal problems but did not seek professional help. In the Kramer study, 65% of the 60 music teachers in the Saint Louis, Missouri area reported vocal problems, but only 55% had seen a physician for the problem. Results of the present study (41% NDxP) were lower than Hamdan (79%) and Hendry (68.4%), but were similar to Kramer's study (45%).

Question 3 sought to answer, "Is there a possible relationship between any of the common habits or environmental factors identified by experts as potential causes of vocal problems and a positive diagnosis of a vocal problem among the participants?"

An independent samples *t* test comparison of those experiencing no vocal problems (NVP) and those diagnosed with a vocal problem (DxVP), eta squared indicated a medium effect due to reported daily water intake and small effect sizes for number of years of teaching, daily reasons for raising the voice, daily caffeine intake, and daily alcohol intake. When comparing the total vocal problems group (TVP) to the NVP group, small effects were found for age, self-estimated daily hours of speaking, weekend added hours of phonation, lack of daily water intake, daily caffeine intake, and daily smoking intake.

A possible relationship between participants' VHI scores and a positive diagnosis of a vocal problem was the focus of Question 4. Results of an independent-samples *t* test indicated a significant difference in total VHI scores between the total vocal problems group to the no vocal problems group. The average VHI for the TVP group was 49.5 (SD = 16.6) but the NVP group average score was 41.9 (SD = 10.1) yielding eta squared = .07, indicating that 7% of the variance in the VHI scores can be explained by whether or not the participants reported experiencing

vocal problems. The purpose of the VHI is to indicate the social and psychological impact (psychosocial impact) of a voice problem, therefore, individuals experiencing vocal problems should have a higher score on the VHI than those experiencing no problems at all. The lowest possible VHI score is 30 and the highest is 150. A score of 30 – 70 represents low psychosocial impact, 70 – 110 represents moderate psychosocial impact, and 110 – 150 represents high psychosocial impact. The DxVP group scores ranged from 32 – 95, NDxP group scores ranged from 30 – 75, and NVP scores ranged 30 – 73. These results suggest that vocal problems had no impact or low psychosocial impact for some individuals in each group and moderate impact on some individuals who experienced vocal problems. It is interesting to note that some NVP member's VHI scores indicated moderate levels of psychosocial impact. In those cases a vocal problem may exist but the participant did not acknowledge the problem or perhaps the VHI measured something other than what was intended. As expected, VHI scores were highest in among the DxVP group and the lowest VHI scores were found in the NVP group.

Question 5 asked, "Of the following groups: general music teachers, choral teachers, band teachers, or orchestra teachers, is one group more likely to be given a positive diagnosis of a vocal problem than the others?" Chi square analysis revealed that none of the groups were significantly more likely to receive a positive diagnosis than any other group. However, 75.5% of general music teachers and 74% of the choral directors were in the TVP group reporting either a diagnosis or experiencing vocal problems at least twice a year. The teaching specialties more closely aligned with vocal performance made up the majority of the DxVP group (56.7% general music and 29.41% choral teachers).

Data from demographic etiological questionnaire items were inspected for commonalities between general and choral music respondents for possible reasons why general music teachers

and choral teachers might be more likely to report vocal problems. The mean age of general music teachers was 42, of choral teachers was 39, and of band directors 37. So, both groups reporting the highest diagnoses or experiencing vocal problems were also, on the average, slightly older in age. Though the age differences were not great, Kooijman et al. (2007) noted that age plays a role in who is likely to develop vocal problems. Gender of the general music teachers was most often female (42 female, 7 male) and choral directors were mainly female (22 female, 5 male) but band directors were mostly male (4 female, 15 male). Several researchers found females more likely to experience more vocal problems, possibly because of weaker vocal folds, or hormonal fluctuations in later life (Benninger & Murray, 2006; de Jong et al., 2006; Heman-Ackah, 2004; Smith et al., 1998; Solomon et al., 2003). The present study's findings support related literature indicating females experience more vocal problems.

Water intake data were examined, finding 12% (n = 6) of general music teachers reported no intake of water during an average day. Of the six general music teachers who reported no water intake at all, all of them reported either a diagnosis (n = 2) or vocal problems experienced without a diagnosis (n = 4). None of choral directors reported no daily intake of water. In fact, 41% (n = 21) of general music teachers, 33% (n = 9) of choral teachers, and 26% (n = 5) of band teachers reported drinking at least six glasses of water daily. Benninger and Murry (2006) and Solomon et al. (2003) had both noted that water intake was important to good vocal health. Other studies indicated that those previously diagnosed with vocal problems tended to drink more water than those without diagnoses, indicating a possible change in habits after diagnosis. In the present study, those who have been previously diagnosed with a vocal problem (n = 33) reported drinking an average of 4.5 glasses of water daily, while those reporting problems without a diagnosis (n = 38) reported drinking 3.5 glasses of water daily.

All three groups included many individuals who reported drinking at least one soda per day (general music teachers 21, choral 16, band 13), a trend that went against research indicating that intake of caffeinated beverages increases the likelihood of vocal problems (Sataloff, 2005a). However participants who reported quantity of soda intake included 6 general music teachers and 2 choral teachers drinking 6 or more sodas per day. On the other hand no band directors reported drinking more than three sodas per day. As to coffee intake, among general music teachers the majority (59%) reported no coffee intake and only 19 general music teachers (39%) reported drinking 2 - 3 coffees daily. On the other hand, choral teachers (67% drinking over 3 cups daily) band teachers (58% drinking over 3 cups daily) reported slightly higher coffee intake than that reported by general music teachers. In the present study, those diagnosed with a vocal problem (n = 33) 24 (72.73%) drank soda daily and 15 (45.45%) drank coffee daily. Those who reported problems without a diagnosis (n = 38) indicated that 31 (81.58%) drank soda daily and 17 (44.74%) drank coffee daily.

Alcohol intake was also considered. Overall, the majority of teachers reported no drinking at all. Only 22% of general music teachers, 33% of choral teachers, and 47% of band teachers (total of 29 teachers) reported drinking one alcoholic beverage daily. However, three choral teachers (11%) and two band teachers (11%) reported drinking more than 3 alcoholic beverages daily. Dayme (2005) indicated that drinking moderate levels of alcohol daily increased the possibility of dehydration of the vocal folds, leading to vocal damage. In the present study, of the 33 diagnosed with vocal problems, 9 (27.27%) reported drinking alcoholic beverages daily. Of those experiencing vocal problems without a diagnosis (n = 38), 13 (34.21%) reporting daily alcoholic beverage consumption.

Research has indicated negative effects of smoking on the voice. Anticaglia, Hawkshaw, and Sataloff (2004), Dayme (2005), and Kaplan et al. (2001) found smoking was negative for the respiratory system, therefore increasing effort required to produce vocal sound. The 2007 Lebanese study by Hamdan et al. indicated that many teachers in Lebanon smoked. However, in the present study few smokers were represented: no general music teachers reported smoking, one choral teacher reported smoking at least one cigarette daily, two band directors at least one cigarette daily, and one band director more than five cigarettes daily. Smoking, therefore, did not appear to be a major factor in vocal problems. It should be noted, however, that one choral teacher reporting smoking < 10 cigarettes daily also reported a diagnosis of vocal fold cysts. One band director reported smoking < 25 cigarettes daily, did not report a diagnosis, but did indicate suffering from undiagnosed problems during the average year. Three participants who have vocal problems without a diagnosis reported daily smoking.

Some of the most revealing data were found in the self-report of environmental factors affecting the voice. The impact of classroom noise on the voice has been extensively researched by Andersen (2001), Heman-Ackah (2005), Jónsdottir, Laukkanen and Siikki (2003), Kooijman et al. (2006), Morrissey (2004), Rantala, Vilkman, and Bloigu (2002), Schick et al. (2000), Sataloff (2005a), and Södersten et al. (2005). Bovo et al. (2006) pointed out that teachers are at risk for vocal problems because they are typically required to increase the loudness of their voices, causing strain on the voice. Music teachers usually speak over music, over singing, over instruments, and for a number of other reasons that typically classroom teachers do not face. In the present study, teachers were asked if they tended to raise their voice during the day and why. Only 9 teachers (8.8%) reported not raising their voice during the typical day. Sixteen teachers (15.7%) reported raising their voice at least once or twice a day, 32 teachers (31.4%) raised their

voices two to three times daily, 28 teachers (27.5%) raised their voices four to five times a day, and 17 teachers (16.7%) raised their voices more than six times every day. Therefore, 91.2% of participants reported raising their voices during the typical day.

Simberg et al. (2005) conducted a study in Finland which found that an increase in the sizes of classes or a greater number of misbehaving students led to increased background noise and stress, thus increasing vocal problems for teachers. Teachers in the Finnish study felt that they needed to raise their voices over more noise, while they were also more stressed. In the present study, participants reported the following reasons to raise their voices during professional duties: 100% to speak above music performance (vocal or instrumental), 65% to speak above noisy students, 65% to use a professional speaking voice, 39% to speak above recordings of music, and 36% to sing loudly (see Table 5). Participants also reported raising their voices to speak over environmental sound such as mechanical noise (24%), hallway activity (22%), and exterior sound (13%). Most band teachers (58%) reported they angrily yelled for discipline reasons and 53% of band directors reported yelling at ballgames.

Table 5

Teacher Categories and Frequency and Percentages of Reasons to Raise the Voice

	Gen. Music (n = 49)		Choral (n = 27)		Band (n = 19)		Orchestra (n = 4)		Totals (N = 99)	
Reasons to Raise Voice	*f*	*P*	*f*	*P*	*f*	*P*	*f*	*P*	*f*	*P*
Prof. Teaching Voice	29	59.18	19	70.37	15	78.95	1	25.00	64	64.64
Speak above Noisy Students	27	55.10	18	66.67	15	78.95	4	100.00	64	64.64
Speak above Singing	32	65.30	22	89.48	1	5.26	0	0.00	55	55.55
Speak above Instruments	26	53.06	0	0.00	17	89.47	4	100.00	47	47.47
Speak above Recordings	26	53.06	7	25.93	5	26.32	1	25.00	39	39.39
Singing Loudly	17	34.69	14	51.85	5	26.32	0	0.00	36	36.36
Angrily Yelling	9	18.37	5	18.52	10	52.63	1	25.00	25	25.25
Speak above Mech. Equip.	13	26.53	1	3.70	8	42.11	2	50.00	24	24.24
Speak above Hallway Noise	11	22.45	5	18.52	5	26.32	1	25.00	22	22.22
Yelling at Ballgames	3	6.12	1	3.70	11	57.89	0	0.00	15	15.15
Speak above Outside Noise	8	16.33	2	7.41	3	15.79	0	0.00	13	13.13
Other: Above other Adults	2	4.08	0	0.00	0	0.00	0	0.00	2	2.02

Gotaas and Starr (1993), Kooijman (2006), Sataloff (1991), Södersten et al. (2002) reported the primary reason teachers experience vocal problems is due to the professional use of the voice from the span of the beginning of the day to the end of the day without extended breaks

for vocal rest. The length of the teacher work week also does not allow enough time for the voice to recover before the process starts all over again (Bovo et al., 2006). Titze (2007) states teachers are the largest group of professional voice users and that the heaviest vocal demands are experienced by teachers who lecture or discipline children for five to seven hours a day. These teachers often use their voices much louder and more emphatically as the day progresses. Sataloff (1991) stated the fact that teachers have several weeks off during the summer months may contribute to the vocal problems. The vocal fold muscle tone built up by the end of the school year will be lost during weeks of little vocal use. When the new school year begins, teachers often experience vocal tension and even hoarseness until their vocal folds can, once again, build up resilience to the demands of the teaching day (Sataloff, 1991).

The researcher asked the participants to estimate, on the average, how many hours per day they used their voices. Participants were asked to report whether or not they were responsible for before or after school activities and how many hours of vocal use are added during such activities. Additional weekend hours of vocal use were also reported. Finally, the participants were asked how many classes they taught and how long the classes lasted. Table 6 shows the results of the teachers' self-estimated hours of vocal use during a typical day. The answers for hours of vocal use during the Fall semester ranged from 3 - 20 hours for an average of 5.75 hours (SD = 1.83). Forty percent of participants reported they used their voices at least five hours daily. General music teachers most often reported six hours of daily vocal use (39%); choral (41%), band (47%), and orchestra (75%) teachers most often indicated using their voices five hours per day. Interestingly for general music teacher and choral teachers the average daily hours increased from the fall (general music teachers M = 5.69, SD = 2.31; choral teachers M = 5.89, SD = 1.25) to spring (general music teachers M = 5.84, SD = 1.23; choral teachers M =

6.26, *SD* = 1.58) semesters. It is not known why the estimated time of phonation increased during the spring. Some possible reasons might include extra rehearsals for contests, which are common to choral directors. Some teachers, both general music and choral, also mentioned spring musicals added more vocal use to their schedules.

Table 6

Means, Ranges, and Standard Deviations for Teacher Self-Estimated Daily Hours of Vocal Use in Fall and Spring Semester (N = 99)

	Gen. Music (n = 49)	Choral (n = 27)	Band (n = 19)	Orchestra (n = 4)	Totals (N = 99)
Fall Semester					
Min.	3.00	4.00	4.00	5.00	3.00
Max.	20.00	9.00	9.00	7.00	20.00
M	5.69	5.89	5.74	5.50	5.75
SD	2.31	1.25	1.20	.56	1.83
Spring Semester					
Min.	3.00	2.00	4.00	4.00	2.00
Max.	20.00	9.00	8.00	5.00	20.00
M	5.84	6.26	5.74	4.75	5.75
SD	1.23	1.58	1.07	0.50	1.58

Teachers were asked to report additional vocal use from before-school activities such as car duty, hall duty, bus duty, zero block classes, study hall, home room, early rehearsals, or other

required duties before traditional school hours. The overwhelming majority of teachers reported no before-school activities in the fall (82%) nor in the spring (80%). Reported hours per week of added vocal use due to before-school duties in the fall semester ranged from 0 - 4 hours (*M* = .43, *SD* = .1.02); reported spring hours ranged from 0 - 8 added hours (*M* = .50, *SD* = 1.20) per week (see Table 7).

Table 7

Means, Ranges, and Standard Deviations of Self-Estimated Hours of Added Vocal Use Before School in Fall and Spring Semester (N = 99)

	Gen. Music (*n* = 49)	Choral (*n* = 27)	Band (*n* = 19)	Orchestra (*n* = 4)	Totals (*N* = 99)
Fall Semester					
Fall Semester					
Min.	0.00	0.00	0.00	0.00	0.00
Max.	3.00	4.00	4.00	0.00	4.00
M	0.49	0.33	0.53	0.00	0.43
SD	0.86	0.95	1.39	0.00	1.02
Spring Semester					
Min.	0.00	0.00	0.00	0.00	0.00
Max.	4.00	3.00	8.00	0.00	8.00
M	0.51	0.51	0.79	0.00	0.50
SD	1.01	0.82	2.07	0.00	1.20

Although few participants reported additional vocal use for before-school duties, the vast majority (73%) reported some additional vocal use in after-school duties ranging from 0 - 10 hours for an overall yearly average of 3.12 (*SD* = 2.96). Half of the orchestra teachers (*n* = 2, 50%) reported no after school duties in the fall. Most (53%) general music teachers reported after-school duties including choirs, private lessons for students, and car or bus duty. Eighty-nine percent of choral teachers reported after-school duties requiring additional voice use, including show choir rehearsal, teaching vocal or piano lessons, and dance rehearsal. All (100%) of band teachers reported additional vocal use in after-school activities, listing activities such as band rehearsals, private instrumental instruction, and athletics-related work. Teachers from every group reported similar after school activities in the spring as they did in the fall with the exceptions of adding musicals and rehearsal for competitions during the spring. (See Table 8 for descriptive statistics of self-estimated hours of added vocal use after school in fall and spring semesters.)

Table 8

Means, Ranges, and Standard Deviations for Self-Estimated Hours of Added Vocal Use After School in Fall and Spring Semester (N = 99)

Added Hours for After-School Duties	Gen. Music (n = 49)	Choral (n = 27)	Band (n = 19)	Orchestra (n = 4)	Totals (N = 99)
Fall Semester					
Min.	0.00	0.00	3.00	0.00	0.00
Max.	9.00	8.00	11.00	5.00	11.00
M	1.90	2.67	6.53	2.00	3.06
SD	2.39	2.82	2.93	2.45	3.01
Spring Semester					
Min.	0.00	0.00	3.00	0.00	0.00
Max.	10.00	0.00	10.00	5.00	10.00
M	2.02	4.33	4.84	1.25	3.21
SD	2.45	3.45	1.84	1.33	2.94

Bovo et al. (2006), Gotaas et al. (1993), Kooijman et al. (2006), Sataloff (1991), Södersten et al. (2002) all reported the problem of lack of time for the voice to recover from a long week of heavy vocal use. The researcher questioned the participants about additional vocal use on the weekend, which would not only add more vocal use, but would reduce possible recovery time. In this study, participants' weekend vocal use included such activities as singing

in choirs or bands, teaching classes, teaching private lessons, and workshops. Overall, the majority (65%) of the participants reported at least 2 additional hours of vocal use on the weekends. General music teachers most often reported an additional 2 hours (15 teachers, or 31%) or 3 hours (11, 23%). Choral teachers most-often reported an additional 2 - 4 hours (6, 22%). Although nine (47%) band teachers reported no additional weekend hours, and equal number of band teachers reported 2 - 4 additional hours of weekend vocal use. These data regarding vocal rest periods support the research cited above that many teachers did not have enough time to rest the voice on weekends in order to recover from a week of heavy vocal use. While most teachers did not use the voice as much as a typical teaching day, the lack of vocal rest can add to vocal fatigue and impact the health of the vocal folds.

Table 9

Means, Ranges, and Standard Deviations for Self-Estimated Hours of Added Vocal Use on Weekends (N = 99)

Weekend Added Hours Vocal Use		Gen. Music (n = 49)	Choral (n = 27)	Band (n = 19)	Orchestra (n = 4)	Totals (N = 99)
	Min.	0.00	0.00	0.00	0.00	0.00
	Max.	5.00	7.00	5.00	2.00	7.00
	M	2.10	2.41	1.74	0.50	2.05
	SD	1.46	1.65	1.85	1.00	1.61

Gotaas et al. (1993), Kooijman et al. (2006), Sataloff (1991), Södersten et al. (2002) not only studied the number of hours taught by teachers during an average day, but also how many classes were taught and how long the classes lasted. Sataloff (2005) and Titze (2007) reported that the amount of time spent vocalizing without a break may negatively impact the vocal folds. So, length of classes and how many classes between breaks can reveal a lot about vocal loading. In the present study, teachers were asked how many classes they taught on an average day and the length of those classes. (See Table 10 for descriptive statistics for number of classes taught per day and length of classes.) The most commonly reported number of classes taught was 6 (*n* = 29, 29%) and the most commonly reported length of class was 45 minutes (*n* = 22, 22%). General music teachers taught the largest number of classes with 86% teaching 5 or more classes per day; only 44% of choral and instrumental teachers combined taught that many daily classes. Choral teachers most often reported 3 classes per day (*n* = 9, 33%) and 50 minute class periods (*n* = 9, 33%). Band teachers most often reported teaching seven classes per day (*n* = 8, 42%) and 90 minutes (n = 6, 32%) as the most common length of class. The researcher did not ask how much phonation was estimated during each class period. It is not known if the general music teachers tended to talk more because of the method of instruction resulting from a generally shorter class period. It is not known if choral and band directors talked less because they were conducting ensembles during some class periods.

Table 10

Means, Ranges and Standard Deviations for Number of Classes Taught Per Day and Length of Classes (N = 99)

	Gen. Music (n = 49)	Choral (n = 27)	Band (n = 19)	Orchestra (n = 4)	Totals (N = 99)
Number of Classes Taught Per Day					
Min.	3.00	2.00	3.00	3.00	2.00
Max.	10.00	10.00	8.00	7.00	10.00
M	5.92	4.04	5.74	5.25	5.34
SD	1.44	1.85	2.04	1.80	1.81

Table 11

Frequencies of Length of Classes in Minutes (N = 88)

	Gen. Music (n = 43)	Choral (n = 25)	Band (n = 18)	Orchestra (n = 2)	Totals (N = 88)
Length of Daily Classes					
25 min. – 40 min.	19	2	0	0	21
45 min. – 60 min.	23	17	7	2	49
65 min. – 96 min.	1	6	11	0	18

Table 12

Frequencies of Length of Classes in Minutes when Participant Reports More Than One Time Length (N = 11)

	Gen. Music (n = 6)	Choral (n = 2)	Band (n = 1)	Orchestra (n = 2)	Totals (N = 11)
Length of Daily Multiple Class Times					
30 min. & 40 min.	2	0	0	0	2
30 min. & 45 min.	2	0	0	0	2
30 min. & 50 min.	1	0	0	0	1
35 min. & 50 min.	0	1	0	0	1
40 min. & 50 min.	1	0	0	0	1
40 min. & 90 min.	0	0	0	1	1
55 min. & 90 min.	0	1	1	0	2
80 min. & 90 min.	0	0	0	1	1

Recommendations

The present study found results similar to research conducted across the world. Music teachers appear to be at high risk of developing vocal problems. Although in this study, there were not significant differences in the frequency of vocal problems between the specialty areas, it was noted that 74% of the general music teachers and 76% of the choral teachers reported either a diagnosis of vocal damage or experiencing vocal problems without medical treatment. Although some general music teachers were trained as instrumentalists, this would suggest that

general music teachers and choral teachers tend to use their voices more than either band or orchestra teachers. More research needs to be conducted with the specific population of music teachers, since they use their voices in ways unique to the profession. More research needs to be conducted with populations generally ignored by such studies, specifically band and orchestra teachers. Professors who train teachers need to consider teaching the care of the voice to all teachers. However, professors working with music educators need to especially take care that all music educators, not just choral or general music teachers, need to be trained in the proper use and care of the voice. More time needs to be spent teaching all specialty areas how to properly use the voice (such as proper vocal placement, proper loudness of the voice, use of amplification devices and proper ways to discipline without raising the voice), how to reduce bad habits (such as drinking caffeinated beverages or smoking), how to increase good habits (such as drink more water, and taking vocal breaks during the day and especially on weekends), and how to know when it is time to seek medical help for a vocal problem.

Limitations

The study was a self-report survey. Therefore, no professional interview or diagnoses was made. The researcher relied on the truthfulness and accuracy of the participants. The estimated population of music teachers in Alabama, Georgia, Florida, Mississippi, and Tennessee was too large to survey each person. It was necessary to use a sample of the population. The survey was an anonymous computerized survey. Therefore, it was be impossible to determine whether or not the actual person addressed on the invitation will actually answer the survey. "Snowballing" is likely to have occurred. Therefore, the survey link was passed on to other teachers. It is likely that other teachers who took the survey were interested because they experienced some vocal problems. Therefore, the results of the survey may be skewed in the positive direction for

diagnosis of vocal problems or experiencing vocal problems. Additionally, only 102 of 2000 potential participants completed the survey with a return rate of .05%. This greatly limits the implications of such a survey, since it cannot be assumed that the sample population is indicative of the much larger actual population.

Implications for Teachers, Music Teacher Educators, Vocal Pedagogues, and Researchers

Considering the high instance of reported problems, teachers should be aware and practice good vocal habits. Music educators should be aware of good vocal habits and should educate future teachers of best practice in teaching methods, organization and classroom management. Teachers should not talk above classroom noise, should not talk above recorded music, and should manage classroom behavior and restrain from raising the voice in anger. Since general music and choral teachers reported more problems and more instances of singing too loudly, vocal pedagogues should address strategies for correct vocal production in singing and correct conducting techniques. Teachers and teacher educators should be able to model correct vocal technique in their own classes. Researchers should continue to conduct vocal research with band and orchestra teachers, since they have not been studied thoroughly.

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APPENDIX A

Institutional Review Board Approval Materials

AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD for RESEARCH INVOLVING HUMAN SUBJECTS

RESEARCH PROTOCOL REVIEW FORM

For information or help completing this form, contact: **THE OFFICE OF HUMAN SUBJECTS RESEARCH**, 307 Samford Hall,
Phone: 334-844-5966 **e-mail:** hsubjec@auburn.edu **Web Address:** http://www.auburn.edu/research/vpr/ohs/index.htm

Complete this form using Adobe Acrobat Writer (versions 5.0 and greater).

1. **PROPOSED DATES OF STUDY:** **FROM:** 01/25/2009 **TO:** 01/31/2010

REVIEW TYPE (Check one): ☐ FULL BOARD ☐ EXPEDITED ☑ EXEMPT

2. **PROJECT TITLE:** The Self-Reported Prevalence of Vocal Disorders of Public School Music Teachers in the Southeastern United States

3.

Jeffrey L. Gilbreath	GTA	C&T	844-6877	gilbrje@auburn.edu
PRINCIPAL INVESTIGATOR	TITLE	DEPT	PHONE	E-MAIL

5040 Haley Center, Auburn University, AL 36849 — ADDRESS FOR CORRESPONDENCE

844-4735 — FAX

4. **SOURCE OF FUNDING SUPPORT:** ☑ Not Applicable ☐ Internal ☐ External (External Agency): _____

5. **STATUS OF FUNDING SUPPORT:** ☑ Not Applicable ☐ Approved ☐ Pending ☐ Received

6. **GENERAL RESEARCH PROJECT CHARACTERISTICS**

A. Research Content Area

Please check all descriptors that best apply to this proposed research project.

- ☐ Anthropology
- ☐ Anthropometry
- ☐ Biological Sciences
- ☐ Behavioral Sciences
- ☑ Education
- ☐ English
- ☐ History
- ☐ Journalism
- ☐ Medical
- ☐ Physiology
- ☐ Other (Please list:) _____

Please list 3 or 4 keywords to identify this research project: _____

B. Research Methodology

Please check all descriptors that best apply to the research methodology.

Data collection will be: ☑ Prospective ☐ Retrospective ☐ Both

Data will be recorded so that participants can be directly or indirectly identified: ☐ Yes ☑ No

Data collection will involve the use of:

- ☐ Educational Tests (cognitive, diagnostic, aptitude, achievement)
- ☑ Surveys / Questionnaires
- ☐ Private Records / Files
- ☐ Interview / Observation
- ☐ Audiotaping and / or Videotaping
- ☐ Physical / Physiologic Measurements or Specimens

C. Participant Information

Please check all descriptors that apply to the participant population.

- ☑ Males
- ☑ Females

Vulnerable Populations

- ☐ Pregnant Women
- ☐ Children
- ☐ Prisoners
- ☐ Adolescents
- ☐ Elderly
- ☐ Physically Challenged
- ☐ Economically Challenged
- ☐ Mentally Challenged

Do you plan to recruit Auburn University Students? ☐ Yes ☑ No

Do you plan to compensate your participants? ☐ Yes ☑ No

D. Risks to Participants

Please identify all risks that may reasonably be expected as a result of participating in this research.

- ☐ Breach of Confidentiality
- ☐ Coercion
- ☐ Deception
- ☐ Physical
- ☐ Psychological
- ☐ Social
- ☑ None
- ☐ Other (please list):

For OHSR Office Use Only

DATE RECEIVED IN OHSR: _____ by _____ PROTOCOL #: _____

DATE OF OHSR CONTENT REVIEW: _____ by _____ DATE ASSIGNED IRB REVIEW: _____ by _____

DATE OF IRB REVIEW: _____ by _____ DATE IRB APPROVAL: _____ by _____

INTERVAL FOR CONTINUING REVIEW: _____

7. PROJECT ASSURANCES

PROJECT TITLE: The Self-Reported Prevalence of Vocal Disorders of Public School Music Teachers in the Southeastern United States

A. PRINCIPAL INVESTIGATOR'S ASSSURANCE

1. I certify that all information provided in this application is complete and correct.
2. I understand that, as Principal Investigator, I have ultimate responsibility for the conduct of this study, the ethical performance this project, the protection of the rights and welfare of human subjects, and strict adherence to any stipulations imposed by the Auburn University IRB.
3. I certify that all individuals involved with the conduct of this project are qualified to carry out their specified roles and responsibilities and are in compliance with Auburn University policies regarding the collection and analysis of the research data.
4. I agree to comply with all Auburn policies and procedures, as well as with all applicable federal, state, and local laws regarding the protection of human subjects, including, but not limited to the following:
   a. Conducting the project by qualified personnel according to the approved protocol
   b. Implementing no changes in the approved protocol or consent form without prior approval from the Office of Human Subjects Research (except in an emergency, if necessary to safeguard the well-being of human subjects)
   c. Obtaining the legally effective informed consent from each participant or their legally responsible representative prior to their participation in this project using only the currently approved, stamped consent form
   d. Promptly reporting significant adverse events and/or effects to the Office of Human Subjects Research in writing within 5 working days of the occurrence.
5. If I will be unavailable to direct this research personally, I will arrange for a co-investigator to assume direct responsibility in my absence. This person has been named as co-investigator in this application, or I will advise OHSR, by letter, in advance of such arrangements.
6. I agree to conduct this study only during the period approved by the Auburn University IRB.
7. I will prepare and submit a renewal request and supply all supporting documents to the Office of Human Subjects Research before the approval period has expired if it is necessary to continue the research project beyond the time period approved by the Auburn University IRB.
8. I will prepare and submit a final report upon completion of this research project.

Jeffrey L. Gilbreath		
Principal Investigator (Please Print)	**Principal Investigator's Signature**	**Date**

B. FACULTY SPONSOR'S ASSSURANCE

1. By my signature as sponsor on this research application, I certify that the student or guest investigator is knowledgeable about the regulations and policies governing research with human subjects and has sufficient training and experience to conduct this particular study in accord with the approved protocol.
2. I certify that the project will be performed by qualified personnel according to the approved protocol using conventional or experimental methodology.
3. I agree to meet with the investigator on a regular basis to monitor study progress.
4. Should problems arise during the course of the study, I agree to be available, personally, to supervise the investigator in solving them.
5. I assure that the investigator will promptly report significant adverse events and/or effects to the OHSR in writing within 5 working days of the occurrence.
6. If I will be unavailable, I will arrange for an alternate faculty sponsor to assume responsibility during my absence, and I will advise the OHSR by letter of such arrangements.
7. I have read the protocol submitted for this project for content, clarity, and methodology.

Dr. Kimberly C. Walls		
Faculty Sponsor (Please Print)	**Faculty Sponsor's Signature**	**Date**

C. DEPARTMENT HEAD'S ASSSURANCE

By my signature as department head, I certify that every member of my department involved with the conduct of this research project will abide by all Auburn University policies and procedures, as well as with all applicable federal, state, and local laws regarding the protection and ethical treatment of human participants.

Dr. Nancy H. Barry		
Department Head (Please Print)	**Department Head's Signature**	**Date**

8. **PROJECT ABSTRACT: Prepare an abstract (400-word maximum) that includes: I.) A summary of relevant research findings leading to this research proposal; II.) A concise purpose statement; III.) A brief description of the methodology; IV.) Expected and/or possible outcomes, and V.) A statement regarding the potential significance of this research project.** ***Please cite relevant sources and include a "Reference List" as Appendix A.***

I. Millions of individuals across the world work in jobs categorized as heavy vocal use occupations, (Verdolini & Ramig, 2001; Roy, Merrill, Thibeault, Gray & Smith, 2004; Benninger & Murry, 2006; Titze, 2007). Teachers frequently report hoarseness, pain, or fatigue when speaking. All teachers, not just music teachers, report vocal problems, (Russell, Oates, & Greenwood, 1998; de Jong, Kooijman, Thoman, Huinck, Graamans & Schutte, 2006). Schoolteachers are thirty-two times more likely to be plagued with voice problems compared to non-teachers, (Smith, Kirchner, Tayor, Hoffman & Lemke,1998). Most vocal problems can be attributed to abusive habits and overuse of the voice. It is estimated that over one million teachers suffer from voice problems, (Smith, Gray, Dove, Kirchner & Heras, 1997). The yearly economic impact on the United States, alone, is thought to be more than $2.5 billion dollars (Verdolini, 2001). The Voice Handicap Index, or VHI, was developed by a team of speech pathologists to be used to help determine the psycho-social impact of voice disorders on individuals, (Jacobson, Johnson, Grywalski, Silbergleit, Jacobson, Benninger, et al., 1997).The VHI has been thoroughly tested and found to be an accurate measure of the psycho-social impact of vocal problems, (Thomas, de Jong, Kooijman & Cremers, 2006; Bogaardt, Hakkesteegt, Grolman & Lindeboom, 2007).
II. The purpose of the study is to determine the prevalence of voice disorders in general music teachers, choral directors, band, and orchestra directors in Alabama, Florida, Georgia, Mississippi, and Tennessee, to research the psychosocial impact of vocal problems on these teachers, and to identify factors possibly contributing to vocal problems.
III. The study will be conducted using an anonymous survey questionnaire.
IV. It is expected that individual participants in every teaching group will indicate either a positive diagnosis or a vocal disorder or experiencing vocal problems without seeking professional intervention. It is expected that the VHI scores will correspond to the positive diagnosis of a vocal disorder. It is expected that one or more of the groups will report receiving a diagnosis of a vocal disorder than the other groups.
V. This project will add data to fields of research, particularly the fields of speech communication, vocal disorders, and music education. The Southeastern United States, as a whole, have not been surveyed and compared to other geographical regions. No previous research has been conducted with band directors, in particular, and it is expected that this is a population experiencing vocal problems, possibly without professional intervention. It is anticipated that some teachers, particularly band directors, will become more interested in the importance of the care of the voice. This project could have significant impact on the future training of music teachers in the care and maintenance of the voice.

9. **PURPOSE & SIGNIFICANCE.**

   a. **Clearly state all of the objectives, goals, or aims of this project.**

The purpose of the study is to determine the prevalence of voice disorders in general music teachers, choral directors, band, and orchestra directors in Alabama, Florida, Georgia, Mississippi, and Tennessee, to research the psychosocial impact of vocal problems on these teachers, and to identify factors possibly contributing to vocal problems.

Six questions will be posed.
1. How many public school music teachers sought professional help for a vocal problem?
2. How many public school music teachers report seeking professional help and receiving a positive diagnosis of a vocal problem?
3. How many public school music teachers report experiencing vocal problems, but have not sought medical help?
4. Is there a possible correlation between any of the common habits or environmental factors identified by experts as potential causes of vocal problems and a positive diagnosis of a vocal problem among the participants?
5. Is there a possible correlation between participants' VHI scores and a positive diagnosis of a vocal problem?
6. Of the following groups: general music teachers, choral teachers, band teachers, or orchestra teachers, is one group more likely to be given a positive diagnosis of a vocal problem than the others?

   b. **How will the results of this project be used? (e.g., Presentation? Publication? Thesis? Dissertation?)**

The results of this project will be used as a dissertation and for possible presentations and future publications in professional journals.

10. **KEY PERSONNEL INVOLVED WITH DATA COLLECTION. Identify each individual involved with the conduct of this project and describe his or her roles and responsibilities related to this project. Be as specific as possible.**

Individual: Jeffrey L. Gilbreath **Title:** GTA **Dept/ Affiliation:** C&T
Roles / Responsibilities:

Mr. Gilbreath is responsible for the design of the study, data collection and entry, statistical analysis, and reporting.

Individual: Dr. Kimberly C. Walls **Title:** Professor **Dept/ Affiliation:** C&T
Roles / Responsibilities:

Dr. Walls serves as the faculty advisor, consulting on design, statistical analysis and reporting. Dr. Walls will not be involved in data collection or data entry.

Individual: _____ **Title:** _____ **Dept/ Affiliation:** _____
Roles / Responsibilities:

Individual: _____ **Title:** _____ **Dept/ Affiliation:** _____
Roles / Responsibilities:

Individual: _____ **Title:** _____ **Dept/ Affiliation:** _____
Roles / Responsibilities:

11. **LOCATION OF RESEARCH. List all locations where data collection will take place. Be as specific as possible.**

The survey will be taken online. Invitations will be mailed to all potential participants. No on-site data collection will be necessary.

12. PARTICIPANTS.

a. Describe the participant population you have chosen for this project.

The population of interest was general music teachers, choral teachers, band teachers, and orchestra teachers in Alabama, Florida, Georgia, Mississippi, and Tennessee. A list of names will be obtained from the membership database of the Music Educators' National Conference (MENC). The music teachers will be divided into four groups: General Music Teachers, Choral Teachers, Band Teachers and Orchestra Teachers. Invitations to participate in the survey will be sent to all music teachers in Alabama, Florida, Georgia, Mississippi, and Tennessee. Descriptive statistics will be run in order to determine the number of females and males, and the ranges and averages of the variables of age and number of years teaching

What is the minimum number of participants you need to validate the study? 300

What is the maximum number of participants you will include in the study? 8413

b. Describe the criteria established for participant selection. (If the participants can be classified as a "vulnerable" population, please describe additional safeguards that you will use to assure the ethical treatment of these individuals.)

Participants will be public school music teachers who are members of MENC, the Music Educators' National Conference. These individuals are not considered a "vulnerable" population.

c. Describe all procedures you will use to recruit participants. *Please include a copy of all flyers, advertisements, and scripts and label as Appendix B.*

Potential participants will be mailed a card containing an invitation to participate in the study and the survey link. After two weeks, a reminder card will be mailed to all potential participants if fewer than 300 respond.

What is the maximum number of potential participants you plan to recruit? 8413

d. Describe how you will determine group assignments (e.g., random assignment, independent characteristics, etc.).

There is no experimental group assignment.

e. Describe the type and amount and method of compensation for participants.

There will be no compensation offered to the participants.

c. **List all instruments used in data collection. (e.g., surveys, questionnaires, educational tests, data collection sheets, outline of interviews, scripts, audio and/or video methods etc.)** ***Please include a copy of all data collection instruments that will be used in this project and label as Appendix C.***

Vocal Health Survey

d. **Data Analysis: Explain how the data will be analyzed.**

Demographic statistics will be gathered in Survey Monkey as the computerized surveys are completed.
SPSS 16.0 (Statistical Package for the Social Sciences) will be used to run correlation coefficients and Chi-Square Analysis.

14. **RISKS & DISCOMFORTS: List and describe all of the reasonable risks that participants might encounter if they decide to participate in this research.** ***If you are using deception in this study, please justify the use of deception and be sure to attach a copy of the debriefing form you plan to use and label as Appendix D.***

There are no risks, since the survey is anonymous.

13. **PROJECT DESIGN & METHODS. Describe the procedures you will plan to use in order to address the aims of this study. (NOTE: Use language that would be understandable to a layperson. Without a complete description of all procedures, the Auburn University IRB will not be able to review protocol. If additional space is needed for #13, part b, save the information as a .pdf file and insert after page 6 of this form.)**

a. **Project overview. (Briefly describe the scientific design.)**

The instrument to be used is an anonymous survey.

b. **Describe all procedures and methods used to address the purpose.**

The instrument was developed by the researcher based on the review of literature. Included within the anonymous survey is the Voice Handicap Index, or VHI. The researcher will send a card to all the members of MENC, the Music Educator's National Conference, in the states of Alabama, Florida, Georgia, Mississippi, and Tennessee. The card will invite them to take the survey online. The link will take the participant to Survey Monkey where they will complete the survey. If not enough people have responded, a reminder card will be sent after two weeks. Survey Monkey collects the demographics. The rest of the anonymous data will be taken from Survey Monkey and put into SPSS. Questions one, two and three will be answered using descriptive statistics. Questions four and five will be answered using correlation coefficients. Question six will be answered using Chi-Square Analysis.

15. **PRECAUTIONS. Describe all precautions you have taken to eliminate or reduce risks that were listed in #14.**

There will be no way to identify an individual taking the survey online. Data is gathered as the participant completes the survey and no contact is possible with the researcher.

16. **BENEFITS.**

a. **List all realistic benefits participants can expect by participating in this study.**

It is expected that the participants will learn more about vocal hygiene and the importance of caring for the voice in such a heavy voice profession. It is expected that participants may realize they need to seek intervention for possible vocal disorders.

b. **List all realistic benefits for the general population that may be generated from this study.**

It is hoped that universities and colleges would become more aware of the heavy vocal use careers and would make changes to their curriculum to help train their students for a heavy-vocal-use career. It is hoped that the general population will also find out more about the importance of the voice and would become more proactive in their medical care so that the voice is not damaged.

17. **PROTECTION OF DATA.**

a. **Will data be collected as anonymous?** ☑ **Yes** ☐ **No** ***If "YES", go to part "g".***

b. **Will data be collected as confidential?** ☐ **Yes** ☑ **No**

c. **If data is collected as confidential, how will the participants' data be coded or linked to identifying information?**

N/A

d. **Justify your need to code participants' data or link the data with identifying information.**

N/A

e. **Where will code lists be stored?**

N/A

f. **Will data collected as "confidential" be recorded and analyzed as "anonymous"?** ☐ **Yes** ☑ **No**

g. **Describe how the data will be stored (e.g., hard copy, audio cassette, electronic data, etc.), where the data will be stored, and how the location where data is stored will be secured in your absence.**

The electronic data will be stored on a zip drive which will be locked in a filing cabinet in the Department of Curriculum and Teaching. Survey Monkey also stores the data on their own server space, which is accessible only by the researcher.

h. **Who will have access to participants' data?**

The researcher will be the only person who can access the data.

i. **When is the latest date that the data will be retained?**

The anonymous data will be kept indefinitely so that it may be used in further publications.

j. **How will the data be destroyed? (NOTE: Data recorded and analyzed as "anonymous" may be retained indefinitely.)**

N/A

PROTOCOL REVIEW CHECKLIST

All protocols must include the following items:

☑ **1.** Research Protocol Review Form (All signatures included and all sections completed)

☑ **2.** Consent Form or Information Letter (examples are found on the OHSR website)

☑ **3.** Appendix A "Reference List"

☑ **4.** Appendix B if flyers, advertisements, generalized announcements or scripts are used to recruit participants.

☑ **5.** Appendix C if data collection sheets, surveys, tests, or other recording instruments will be used for data collection. Be sure to mark each of the data collection instruments as they are identified in section # 13, part c.

☐ **6.** Appendix D if a debriefing form will be used.

☐ **7.** If research is being conducted at sites other than Auburn University or in cooperation with other entities, a letter from the site / program director must be included indicating their cooperation or involvement in the project. NOTE: If the proposed research is a multi-site project, involving investigators or participants at other academic institutions, hospitals or private research organizations, a letter of IRB approval from each entity is required prior to initiating the project.

☐ **8.** Written evidence of acceptance by the host country if research is conducted outside the United States.

APPENDIX B

Questionnaire

Vocal Health Survey

1. Introduction

You are invited to participate in a research study to determine the prevalence of vocal disorders among general music teachers, choral directors, band directors and orchestra directors in Alabama, Florida, Georgia, Mississippi and Tennessee; to research the psychosocial impact of voice disorders on these teachers, and to identify factors possibly contributing to vocal problems. This study is being conducted by Jeff Gilbreath, graduate teaching assistant, under the direction of Dr. Kimberly C. Walls, professor of music education in the Auburn University Department of Curriculum and Teaching. You were selected as a possible participant because you are a member of MENC and are age 19 or older.

If you decide to participate in this research study, you will be asked to complete an anonymous computerized survey. Your total time of commitment will be approximately 10 minutes.

There are no risks associated with participating in this study.

If you participate in this study, you can expect to learn more about the care of the voice and possible causes of vocal problems. We cannot promise you that you will receive any of the benefits described.

If you wish to withdraw, simply close your browser without submitting the data. Once you have submitted anonymous data, it cannot be withdrawn due to it being unidentifiable.

Any information obtained in connection with this study will remain anonymous. Information obtained through your participation may be used to fulfill an educational requirement, may be published in a professional journal, and may be presented at a professional meeting.

If you have questions about this study, please contact Jeff Gilbreath at (334)-844-6877 or Dr. Kimberly C. Walls at (334)-844-6892.

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)-844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION ABOVE, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, PLEASE CLICK ON THE "NEXT" BUTTON.

Vocal Health Survey

2. In what state do you teach?

1. In which state do you teach?

- ◯ Alabama
- ◯ Florida
- ◯ Georgia
- ◯ Mississippi
- ◯ Tennessee

Other (please specify)

Vocal Health Survey

3. Years Teaching/ Full or Part Time

2. How many years have you been teaching full time in schools?

Choose one from dropdown list

Years teaching

3. Do you currently teach full time or part time?

- ◯ Full Time
- ◯ Part Time

4. What do you consider to be your primary teaching responsibility?

- ◯ Band Director
- ◯ Choral Director
- ◯ General Music Teacher
- ◯ Orchestra Director
- ◯ Other

Vocal Health Survey

4. Other job title

5. What do you consider to be your primary teaching responsibility? (Please type response in box.)

Vocal Health Survey

5. Ever before school duties?

6. Aside from teaching courses, do you have BEFORE school responsibilities, such as car line, homeroom or hall duty?

- ◯ Yes
- ◯ No

Vocal Health Survey

7. What additional duties do you perform DURING school hours?

8. Aside from teaching courses, are there duties you must perform DURING school hours?

- ◯ Yes
- ◯ No

Vocal Health Survey

6. What before school duties?

7. Aside from teaching courses, what BEFORE school duties must you regularly perform?

- [ ] Breakfast duty
- [ ] Car Line Duty
- [ ] Homeroom
- [ ] Hall Duty

Other (please specify)

Vocal Health Survey

8. What DURING school duties do you perform?

9. Aside from teaching courses, what additional duties must you peform DURING school hours?

- [ ] Lunch room duty
- [ ] Hall duty
- [ ] Study Hall duty

Other (please specify)

Vocal Health Survey

9. Ever after school duties?

10. Aside from teaching courses, do you have AFTER school responsibilities, such as car line, detention or hall duty?

- ◯ Yes
- ◯ No

Vocal Health Survey

10. What after school duties?

11. What AFTER school duties must you regularly perform?

- [ ] Car Line Duty
- [ ] Detention
- [ ] Hall Duty

Other (please specify)

Vocal Health Survey

12. Normal Fall Classes Taught

16. Excluding before or after school activities, in the FALL semester what courses do you teach during the school day? (Please choose all that apply.)

- ☐ Chamber Choir/Small Vocal Group
- ☐ Concert Band
- ☐ Concert Choir/Large Vocal Group
- ☐ General Music
- ☐ Instrumental Ensemble
- ☐ Instrumental Methods Class
- ☐ Jazz Band
- ☐ Marching Band
- ☐ Men's/Boys' Choir
- ☐ Music Appreciation
- ☐ Music Theory
- ☐ Orchestra
- ☐ Private Instrumental Lessons
- ☐ Private Vocal Lessons
- ☐ Sectional Rehearsals (additional time apart from large ensemble)
- ☐ Vocal Methods Class/Class Voice
- ☐ Show Choir
- ☐ Women's/Girls' Choir
- ☐ Other (please specify)

Vocal Health Survey

11. Number of hours/ Number of Classes/ Grade Levels Taught

12. During the FALL semester how many CLASSES per school day do you typically teach? (Please do not include BEFORE or AFTER school courses or activities.)

Indicate number of classes taught per day in the Fall semester

How many classes per day taught in the Fall semester	

13. How many minutes does each class period last during the school day?

14. During the FALL semester how many HOURS do you estimate you teach courses on a typical school day? (Please do not include BEFORE or AFTER school courses or activities.)

Please choose one response

Hours of daily teaching per workday	

15. What grade levels do you teach? (Please choose all that apply.)

- ☐ Pre-Kindergarten
- ☐ Kindergarten
- ☐ First Grade
- ☐ Second Grade
- ☐ Third Grade
- ☐ Fourth Grade
- ☐ Fifth Grade
- ☐ Six Grade
- ☐ Seventh Grade
- ☐ Eighth Grade
- ☐ Ninth Grade
- ☐ Tenth Grade
- ☐ Eleventh Grade
- ☐ Twelfth Grade

Vocal Health Survey

13. Fall Classes Before School Hours?

17. During the FALL semester, do you teach musical activities BEFORE school hours?

- ◯ Yes
- ◯ No

Vocal Health Survey

14. Fall Before-School Hours Added

18. Approximately how many HOURS PER WEEK are added to your teaching schedule during the FALL semester from teaching activities BEFORE school?

	Choose number of hours per week
Number of additional hours per week teaching BEFORE school in FALL	

Vocal Health Survey

15. Which Classes Taught Before School in Fall?

19. Please indicate all musical activities you teach BEFORE SCHOOL HOURS in the FALL.

- ☐ Chamber Choir/Small Vocal Group
- ☐ Concert Band
- ☐ Concert Choir/Large Vocal Group
- ☐ General Music
- ☐ Instrumental Ensemble
- ☐ Instrumental Methods Class
- ☐ Jazz Band
- ☐ Marching Band
- ☐ Men's/Boys' Choir
- ☐ Music Appreciation
- ☐ Music Theory
- ☐ Orchestra
- ☐ Private Instrumental Lessons
- ☐ Private Vocal Lessons
- ☐ Sectional Rehearsals (additional time apart from large ensemble)
- ☐ Vocal Methods Class/Class Voice
- ☐ Show Choir
- ☐ Women's/Girls' Choir
- ☐ Other (please specify)

Vocal Health Survey

16. Fall Classes After School Hours?

20. During the FALL semester, do you teach musical activities AFTER school hours?

- ◯ Yes
- ◯ No

Vocal Health Survey

17. Fall After-School Hours Added

21. Approximately how many HOURS PER WEEK are added to your teaching schedule during the FALL semester from teaching activities AFTER school?

	Choose number of hours per week
Number of additional hours per week teaching AFTER school in FALL	

Vocal Health Survey

18. Which Classes Taught After School in Fall?

22. Please indicate all musical activities you teach AFTER SCHOOL HOURS in the FALL.

- ☐ Chamber Choir/Small Vocal Group
- ☐ Concert Band
- ☐ Concert Choir/Large Vocal Group
- ☐ General Music
- ☐ Instrumental Ensemble
- ☐ Instrumental Methods Class
- ☐ Jazz Band
- ☐ Marching Band
- ☐ Men's/Boys' Choir
- ☐ Music Appreciation
- ☐ Music Theory
- ☐ Orchestra
- ☐ Private Instrumental Lessons
- ☐ Private Vocal Lessons
- ☐ Sectional Rehearsals (additional time apart from large ensemble)
- ☐ Vocal Methods Class/Class Voice
- ☐ Show Choir
- ☐ Women's/Girls' Choir
- ☐ Other (please specify)

Vocal Health Survey

19. Number of hours/ Number of Classes/ Grade Levels Taught

23. During the SPRING semester how many CLASSES per school day do you typically teach? (Please do not include BEFORE or AFTER school courses or activities.)

Indicate number of classes taught per day in the Fall semester

How many classes per day taught in the Fall semester	

24. How many minutes does each class period last during the school day?

25. During the SPRING semester how many HOURS do you estimate you teach courses on a typical school day? (Please do not include BEFORE or AFTER school courses or activities.)

Please choose one response

Hours of daily teaching per workday	

Vocal Health Survey

20. Normal Spring Classes Taught

26. Excluding before or after school activities, in the SPRING semester what courses do you teach during the school day? (Please choose all that apply.)

- ☐ Chamber Choir/Small Vocal Group
- ☐ Concert Band
- ☐ Concert Choir/Large Vocal Group
- ☐ General Music
- ☐ Instrumental Ensemble
- ☐ Instrumental Methods Class
- ☐ Jazz Band
- ☐ Marching Band
- ☐ Men's/Boys' Choir
- ☐ Music Appreciation
- ☐ Music Theory
- ☐ Orchestra
- ☐ Private Instrumental Lessons
- ☐ Private Vocal Lessons
- ☐ Sectional Rehearsals (additional time apart from large ensemble)
- ☐ Vocal Methods Class/Class Voice
- ☐ Show Choir
- ☐ Women's/Girls' Choir
- ☐ Other (please specify)

Vocal Health Survey

21. Spring Classes Before School Hours?

27. During the SPRING semester, do you teach musical activities BEFORE school hours?

- ◯ Yes
- ◯ No

Vocal Health Survey

22. Spring Before-School Hours Added

28. Approximately how many HOURS PER WEEK are added to your teaching schedule during the SPRING semester from teaching activities BEFORE school?

	Choose number of hours per week
Number of additional hours per week teaching BEFORE school in SPRING	

Vocal Health Survey

23. Which Spring Classes Taught Before School?

29. Please indicate all musical activities you teach BEFORE SCHOOL HOURS in the SPRING.

- ☐ Chamber Choir/Small Vocal Group
- ☐ Concert Band
- ☐ Concert Choir/Large Vocal Group
- ☐ General Music
- ☐ Instrumental Ensemble
- ☐ Instrumental Methods Class
- ☐ Jazz Band
- ☐ Marching Band
- ☐ Men's/Boys' Choir
- ☐ Music Appreciation
- ☐ Music Theory
- ☐ Orchestra
- ☐ Private Instrumental Lessons
- ☐ Private Vocal Lessons
- ☐ Sectional Rehearsals (additional time apart from large ensemble)
- ☐ Vocal Methods Class/Class Voice
- ☐ Show Choir
- ☐ Women's/Girls' Choir
- ☐ Other (please specify)

Vocal Health Survey

24. Spring Classes After School Hours?

30. During the SPRING semester, do you teach musical activities AFTER school hours?

- ◯ Yes
- ◯ No

Vocal Health Survey

25. Spring After-School Hours Added

31. Approximately how many HOURS PER WEEK are added to your teaching schedule during the SPRING semester from teaching activities AFTER school?

	Choose number of hours per week
Number of additional hours per week teaching AFTER school in SPRING	

Vocal Health Survey

26. Which Spring Classes Taught After School?

32. Please indicate all musical activities you teach AFTER SCHOOL HOURS in the SPRING.

- ☐ Chamber Choir/Small Vocal Group
- ☐ Concert Band
- ☐ Concert Choir/Large Vocal Group
- ☐ General Music
- ☐ Instrumental Ensemble
- ☐ Instrumental Methods Class
- ☐ Jazz Band
- ☐ Marching Band
- ☐ Men's/Boys' Choir
- ☐ Music Appreciation
- ☐ Music Theory
- ☐ Orchestra
- ☐ Private Instrumental Lessons
- ☐ Private Vocal Lessons
- ☐ Sectional Rehearsals (additional time apart from large ensemble)
- ☐ Vocal Methods Class/Class Voice
- ☐ Show Choir
- ☐ Women's/Girls' Choir
- ☐ Other (please specify)

Vocal Health Survey

27. Weekend Vocal Use?

33. On the weekend, do you use your voice for extra activities, such as singing, conducting an ensemble or teaching?

- ◯ Yes
- ◯ No

Vocal Health Survey

28. Number of Weekend Hours

34. How many additional hours of vocal use do you typically add on Saturday or Sunday by singing, conducting or teaching?

How many addtional hours of vocal use do you add on weekends?

Additional hours of vocal use added on weekends	

Vocal Health Survey

29. Weekend Activities to Add Vocal Use

35. Please indicate which REGULARLY OCCURING WEEKEND ACTIVITIES add vocal use to your week.(Choose all that apply.)

- [ ] Conducting an Ensemble
- [ ] Private Instrumental Instruction
- [ ] Private Vocal Instruction
- [ ] Singing in a choir
- [ ] Singing with a band
- [ ] Teaching a class
- [ ] Weekend Seminars
- [ ] Other (please specify)

Vocal Health Survey

30. Ever change in vocal quality?

36. Do you ever notice a change in the quality of your speaking or singing voice at the end of the day?

- ◯ Yes
- ◯ No

Vocal Health Survey

31. How often change in vocal quality?

37. How often do you notice a change in the quality of your speaking or singing voice?

Please choose one option

How often?	

APPENDIX C

Recruiting Materials

Dear Music Educator:

I am a graduate student in the Department of Curriculum and Teaching at Auburn University. I would like to invite you to participate in my research study to help determine the prevalence of vocal disorders in music teachers in the Southeastern United States. You may participate if you are a full-time teacher.

Participants will be asked to take an anonymous computerized survey, which will last approximately 10 minutes.

There are no risks associated with this anonymous survey. If you participate, you may learn more about vocal damage and possible causes of vocal damage, though this cannot be guaranteed.

If you would like to participate, please type the following link into your web browser: http://www.surveymonkey.com/vocalhealth

If you would prefer a written survey or have any questions, please contact me at gilbrje@auburn.edu and 334-844-6877 or my advisor, Dr. Kimberly Walls at wallski@auburn.edu or 334-844-6892.

Thank you for your consideration,

Jeff Gilbreath