THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

DEPARTMENT OF COMMUNICATIONS SCIENCES AND DISORDERS

VOCAL HYGIENE AWARENESS AMONG SINGERS

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SPRING 2013

A thesis
submitted in partial fulfillment
of the requirements
for a baccalaureate degree
in Communications Sciences and Disorders
with honors in Communications Sciences and Disorders

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ABSTRACT

The purpose of this study was to identify vocal hygiene practices among singers. Vocal hygiene techniques have been found to be useful in improving the voice quality of individuals who have a voice disorder. These techniques are particularly effective when combined with a direct treatment approach to the particular voice problem. For example, the amount of vocal use and style of phonation (shouting, whispering, normal conversation, etc.), proper hydration, diet, and eliminating vocal behaviors thought to be phonotraumatic are all strategies that encompass vocal hygiene. These lifestyle and behavioral changes to support a healthy voice are all techniques that are considered hygienic for preserving normal vocal function. Singers, both professional and amateur, place their vocal folds under more severe air pressures and tension than normal. The demands of vocal performances have been known to result in vocal damage and a change in voice quality. This study was conducted to determine if singers use vocal hygiene techniques to preserve their voice quality.

Both quantitative and qualitative information was collected in this study through a questionnaire consisting of 56 questions. The questionnaire was sent to singers at The Pennsylvania State University. Twenty-three respondents successfully completed the survey.

The results of the survey revealed a high level of vocal hygiene awareness with some discrepancies. Most participants engaged in protective voice activities by preserving the voice before performances, limiting damaging practices such as yelling, and maintaining overall health. Alcohol and caffeine consumption, which dries the vocal membranes, was also limited. Water intake was minimal compared to the recommended daily intake. Especially for singers, this was one major aspect that could improve vocal functioning. Another aspect of improvement was the use of the voice when feeling ill. Many singers continued to sing even when fatigued, tired, or ill, which could cause damage to the vocal folds. Use of hearing protection was also limited. These

are some of the areas in which singers demonstrated a lack of vocal hygiene practices. When asked to provide an open-ended response with a definition of vocal hygiene, many included insightful definitions. Some listed tactics listed within the survey such as proper hydration, vocal rest, proper nutrition, not yelling/singing improperly, and maintaining good habits**.**

Education on vocal hygiene may benefit singers to improve their vocal functioning, quality, and performance. Vocal hygiene may also serve as an initiative for preventing vocal abuse and injury. Once damaged, vocal folds may not produce sound sufficiently, ultimately distorting voice quality. Preventative strategies are essential for the delicate and unique nature of the vocal folds. Further research is necessary to determine the most effective strategies specific to singers and easy implementation of these strategies within their daily lives.

TABLE OF CONTENTS

LIST OF FIGURES

ACKNOWLEDGEMENTS

I would like to express gratitude to my supervisor, Dr. Robert Prosek, whose expertise, guidance, understanding, and support allowed me to broaden my knowledge and deepen my understanding within the field. Sharing with me his expertise, I have learned more about proper vocal functioning. He has served as guidance in demonstrating how to conduct proper research. His skill in writing and assistance throughout this whole process has influenced me tremendously. The time spent in the lab was fulfilling and memorable. He has served not only as my thesis supervisor, but also as my mentor, providing me with encouragement as I continue my studies into graduate school. I am extremely thankful for this learning experience in writing my first dissertation, which would not have been possible without his support.

I would like to thank my honors advisor, Dr. Carol Miller. I greatly appreciate her guidance and encouragement throughout this whole process. Krista Wilkinson has also been a wonderful role model and a huge influence as my professor. I would like to recognize Jessica Sofranko for her suggestions and ideas. Thank you to my friends for keeping me grounded and always being there when I need them. Lastly, I am thankful for my family who foster my growth and give me the ability to thrive. I cannot fail to acknowledge my parents and Laura for their love and sacrifices that they make for me to succeed.

Chapter 1

Introduction

Singers use their voices in different ways for lengthy periods of time such as practicing with a choir, preparing a solo, or making various sounds in an a cappella group refining their skills and preparing for performance. Singers, both professional and amateur, place their vocal folds under more severe air pressures and tension than the average vocal user. The demands of vocal performances have been known to result in vocal damage and a change in voice quality. Before practicing, many singers participate in vocal warm-ups or breathing techniques to engage the proper muscles preparing them for vocal use. These vocal exercises contrast other methods of preserving the voice, such as vocal hygiene. While most singers engage in these vocal warm-ups to prevent injury, there is no specific information available to indicate if incorporating vocal hygiene techniques will improve or preserve vocal quality.

Vocal hygiene techniques are not the same as vocal exercises that are used to extend vocal range and intensity, but encompass a wide variety of daily habits used to protect and preserve the voice. According to Wicklund (2010), many vocal hygiene strategies are useful for improving the voice quality of individuals who have a voice disorder. These techniques are particularly effective when combined with a direct treatment approach to a particular voice problem. For example, the amount of vocal use and style of phonation (shouting, whispering, normal conversation, etc.), proper hydration, diet, eliminating vocal behaviors thought to be phonotraumatic, practicing lifestyle and behavioral changes to support a healthy voice are all techniques that are considered hygienic for preserving normal vocal function. One such study by Fisher et al. (2001) demonstrated the importance of hydration of the vocal folds during phonation.

The findings of this study demonstrated that a reduction in body fluid resulted in increased phonatory effort. Phonatory effort is measured with a physiological measure and with a psychological measure. The physiological measure looks at phonation threshold pressure, and the psychological measure gathers a direct magnitude estimation of perceived phonatory effort (Verdolini 1994). When hydration was restored, phonation and vocal symptoms improved. Additional studies by Verdolini et al. (2002), Sivasankar et al. (2008), and Sataloff (1991) also found that hydration greatly improves vocal functioning while dehydration significantly results in vocal fatigue.

Hydration is one important aspect of vocal hygiene. Other strategies of vocal hygiene such as avoiding excessive shouting or whispering, smoking or smoky areas, air pollutants, alcoholic beverages, and caffeine while obtaining enough rest, eating nutritious foods, and maintaining overall health have shown positive effects on vocal condition (Wicklund 2010).

The efficacy of vocal hygiene has been demonstrated in a study by Chan (1994) who compared the phonatory function of a group of teachers with that of a control group. Teachers are considered professional voice users who put more strain on their voices than other individuals. Results revealed that the vocal hygiene program improved phonatory function based on acoustic analysis of pre- and post treatment recordings. A later study by Roy et al. (2001) compared treatment results of teachers experiencing past or current vocal difficulties. The teachers were placed in separate groups consisting of two different types of treatment, one a Vocal Function Exercise group, and the other a Vocal Hygiene group. The Vocal Function Exercise group conducted four specific exercises including a warm-up, stretching exercise, contracting exercise, and low impact adductory power exercise. Some of these exercises are similar to those used by singers when warming up or strengthening the vocal folds; however, singers tend to engage in many more exercises and focus on additional aspects of vocal production such as using various vowels and singing up and down scales. Results signified greater improvements in the Vocal

Functions Exercise group compared to the Vocal Hygiene group; however, other interpretations of the data were explained. There was a possibility that researchers spent more time with clinicians teaching them the Vocal Function program, accidentally biasing that program over the Vocal Hygiene program. Other possibilities may be connected to patience adherence to the treatment protocol according to a study done by Behrman et al. (2008). This study conducted a similar experiment in which they separated women with voice disorders and placed them in either a voice therapy group or vocal hygiene group. This study took a closer look at patient adherence, or willingness of the patient to comply with treatment procedures, and follow through. In this study, the participants in the vocal hygiene group were given informative information with no direct work on their voices. In contrast, participants in the voice therapy group worked on direct treatment or exercises that they practiced within each session. Based on patient perception, more participants were satisfied with direct treatment, feeling that they had made greater improvements with the voice therapy. These studies by Roy et al. and Behrman et al. indicate the positive effects of vocal technique, yet there is still speculation when analyzing the effectiveness of vocal hygiene and patient's views of this form of therapy especially in view of the hydration findings.

Further research is required to examine the relationship and cause between patient adherence and improvements within therapy. Effectiveness of a combined program that incorporates both voice therapy and vocal hygiene is necessary for future research since other studies have demonstrated the importance of vocal hygiene in maintaining a healthy voice.

For this study, the focus will be on vocal hygiene, specifically among singers. If vocal hygiene strategies can improve vocal performance, then knowing if singers utilize these strategies would help to understand how singers preserve their vocal range and intensity. If findings demonstrate that singers do not use vocal hygiene strategies, it will be beneficial to look at additional tactics that singers use and ways to incorporate hygiene practices for improved voice quality. One of the questions within the department of Communication Sciences and Disorders, is

whether or not singers practice, or are even aware of vocal hygiene. I proposed that participants would possess less information about vocal hygiene than vocal technique and engage less in vocal hygiene practices. Research will examine participants perception of vocal hygiene, whether or not singers practice vocal hygiene, and how often. The results from this study will help gain more information on singers to better ascertain how to help when voice disorders occur. A survey was conducted in which participants answered a series of questions providing their definition of vocal hygiene and information on daily vocal regimens.

Chapter 2

Methodology

Participants who volunteered to partake in the experiment consisted of 23 college students involved in a Penn State singing group. Their ages ranged from 18-22 years old with 14 females and nine males. The survey was conducted online and sent via e-mail through Qualtrics, a research program for data collection and analysis. To maintain survey validity, each participant completed the survey anonymously. The survey consisted of 56 questions containing open-ended, multiple choice, categorical, and numerical question types. Every participant answered all questions except for two participants who chose not to respond to open ended question types. The first question was open-ended and asked participants to provide their definition of vocal hygiene. The next question then asked them to state whether or not they felt like they utilized vocal hygiene within their life. These questions were meant to gather participant's knowledgebase of vocal hygiene as well as gather a self-assessment on their use of vocal hygiene. The next set of questions regarded general health and fitness, which ultimately affect vocal health. Other questions assessed their vocal use under specific circumstances such as fatigue or illness, whether or not they warm-up their voice, and how they take care of their voice during practice and performance. Questions that assessed the frequency and length of each participant's warm-up before singing fall under vocal technique. Vocal hygiene and vocal technique overlap, but for the purposes of this survey we will keep them separate. Additional questions highlighted hearing protection and care of the auditory system. While many may not relate hearing to the voice, the proper care of the auditory system remains an important function during singing. Use of the voice before practices and performances was assessed. The amount of water consumed on average was

calculated as well as the amount of caffeine consumed. Proper hydration of the vocal folds is necessary for effective use of the voice while singing. A healthy eating plate was provided to help with answering questions on food consumption and diet. Other questions addressed crash diets and food supplements, all factors that affect vocal health. The literature and voice connoisseurs have mentioned the use of specialized tea, specifically Throat Comfort Yogi Tea, which helps vocal function. Do singers use this as a way to soothe the voice and are other remedies used? An opened ended question was used to gather this information. Certain behaviors that affect vocal function such as laughing, whispering, and shouting were documented. Smoke, tobacco use, alcohol consumption, and use of other drugs were ascertained since these functions tend to dry out the membranes of the vocal folds. Other variables that may affect vocal function such as allergies, antihistamines, illness, or surgeries were examined. Information concerning level of stress was also gathered by each participant since stress and tension can change vocal use. Women were asked about birth control since certain birth control medications have been found to dry out the vocal folds. Lastly, an additional self-assessment was taken of each participant asking them to rate their level of singing quality compared to the best singers in the world from one to 1000 with one being average and 1000 being the best. An additional question asked them if they thought their singing voice would improve with use of better vocal hygiene strategies. The self-assessment of vocal quality gives insight to how successful each participant feels about their own singing. Comparing each singer's self-rating of their voice to their vocal hygiene habits will provide insight on perception of vocal hygiene in relation to better singing. The latter question also provides information on what participants think of vocal hygiene and effectiveness of this strategy in relation to improving singing.

Chapter 3

Results

It was hypothesized that participants would not partake in effective vocal hygiene practices. After conducting a survey and collecting responses from singers at Penn State, this proposal was both accurate and inaccurate. When asked to provide an open ended response of the definition of vocal hygiene, most participants stated ways to protect and maintain a healthy voice to prevent misuse or injury. Some listed tactics such as proper hydration, vocal rest, proper nutrition, not yelling/singing improperly, and maintaining good habits. Many listed vocal hygiene as not overusing, straining, or causing tension in the voice tissue and muscles. One participant listed warming up sufficiently as part of vocal hygiene along with avoiding dairy products before performances. Another listed drinking tea as a way to soothe the voice prior and during singing for a long period of time. A minimal number listed vocal techniques such as utilizing proper singing skills, breath support, and vocal control. All responses referred to strategies used to protect the voice from harm. When asked if they performed vocal hygiene according to their definition, one participant said “no,” five said “somewhat,” and 15 said “yes.”

Examining responses to multiple-choice questions that focused on specific aspects within vocal hygiene demonstrated varied results. With such varied responses, supporting the hypothesis of whether or not singers use vocal hygiene as a whole is difficult to measure. In order to properly determine the use of vocal hygiene, each question will be individually examined to assess the use of all aspects within the category of vocal hygiene.

The first multiple-choice question regards exercise to stay fit and exercise to achieve adequate muscle tone. According to the Center for Disease and Control Intervention (2011),

adults need two hours and 30 minutes of moderate-intensity aerobic activity or one hour and 15 minutes of vigorous-intensity aerobic activity every week and muscle-strengthening activities on two or more days a week that work all major muscle groups. This is necessary not only for general health, but for continued health of the structures used during singing. Most singers who partook in the survey met the standards set by the Center for Disease and Control, with 20 of the 23 respondents or 87% who exercised for the purposes of staying fit daily, every other day, twice a week, or at least once a week. Many, however, did not meet the requirement set for muscle strengthening with only ten of 23 participants lifting weights at least twice a week. This represents good vocal hygiene with potential for improvement for most individuals.

Figure 1: Frequency of Exercise to Stay Fit

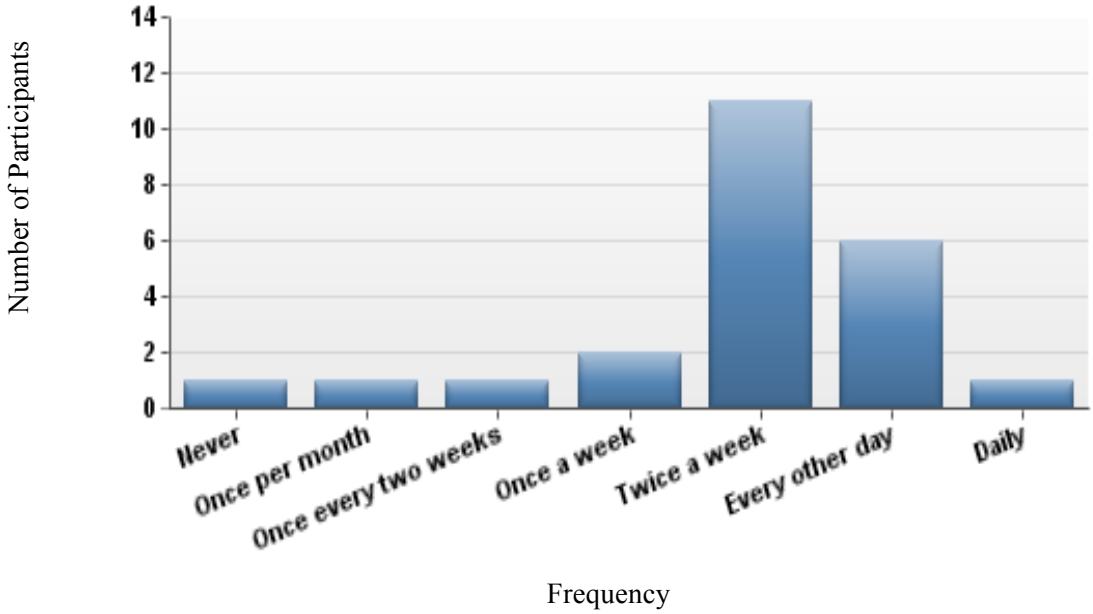
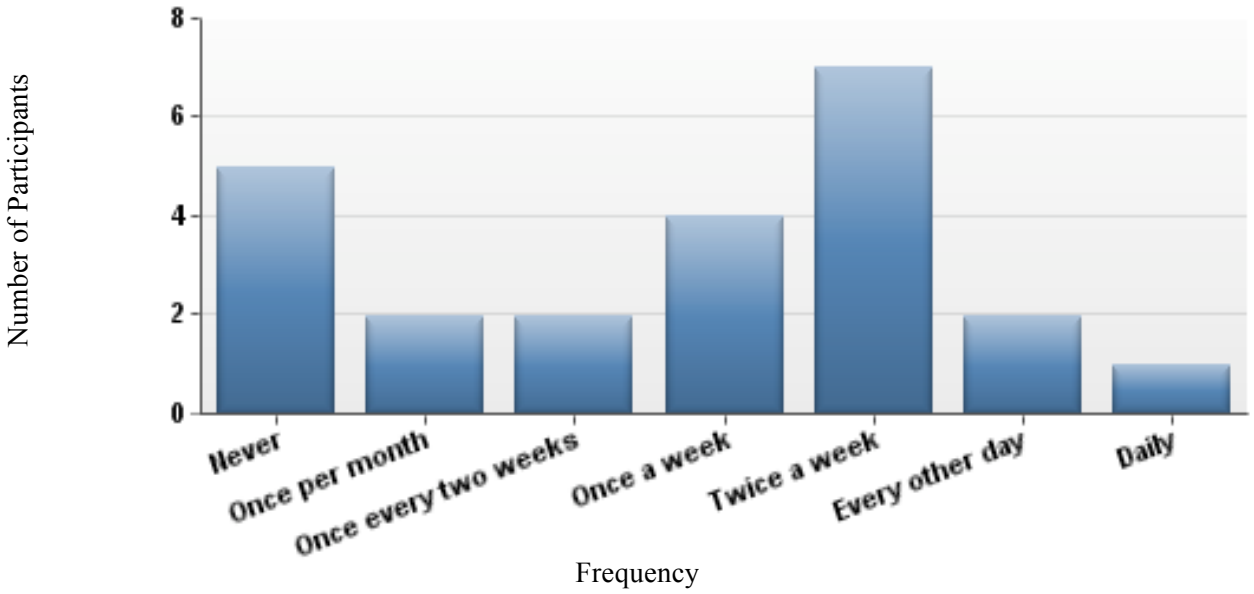


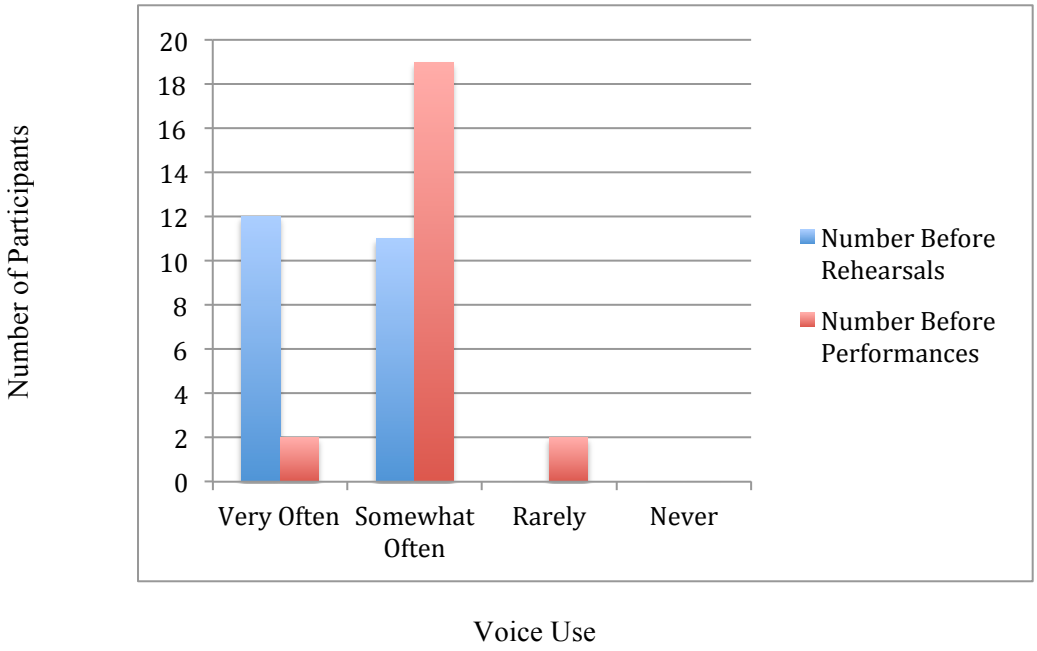
Figure 2: Frequency of Exercise to Achieve Adequate Muscle Tone



A different question asked about activity levels (i.e. working out at the gym, running, swimming, etc.) specifically before rehearsals. The majority (87%) said they were somewhat active while the remaining four people said they were inactive. No one reported being extremely active. Moderate activity before rehearsals is ideal so structures of the vocal apparatus are not compromised as a result of previous overexertion of activity or lack thereof. An individual will want to feel well rested before beginning to sing. While the majority did not overexert themselves before rehearsals, all but two singers reported that they sang even when feeling tired. Singing when feeling tired can cause strain on the vocal folds. A different question asked if participants continued to sing even when feeling fatigue in their vocal folds. Fourteen reported that they did not sing, while nine (39%) continued to sing even when feeling fatigue in their vocal folds. So while most engaged in vocal hygiene, there were still many who continued to sing even when

feeling strain in their vocal folds. All of the participants reported using their voice either very often or somewhat often before rehearsals. Twelve or 52% said they used their voice very often, talking or singing for extended periods of time while 11 or 48% said they talked and sang but not for extended periods of time. This finding indicates potential damage if singers are talking or singing for extended periods of time and come to rehearsals with overworked vocal folds. Other factors could influence this finding if participants are talking in noisy environments or lacking proper breath support throughout the day. When asked about their vocal use before performances, results differed slightly. The majority (83%) said they used their voices somewhat before rehearsals, talking and singing but not for extended periods of time. Only two participants (9%) said they used their voice very often, talking and singing for extended periods of time. The remaining two participants said they rarely talk or sing before performances. These findings indicate that singers may be more conscious of their vocal use before concerts or recitals, realizing that they must preserve their voice to give the utmost performance without signs of fatigue.

Figure 3: Voice Use Before Rehearsals Compared to Voice Use Before Performances



The next set of questions examined specific behaviors throughout the day and during rehearsals that impact vocal health. One question asked, “How often do you clear your throat?” Fourteen or 61% said they rarely clear their throat (1-3 times a day), five sometimes clear their throat (1 time an hour), 2 frequently clear their throat (2-4 times an hour), and the remaining 2 never clear their throat. Frequent throat clearing can be traumatic to the vocal folds and can cause vocal injury. Throat clearing presents a problem since it can easily become habitual. So even though the majority of singers do not clear their throat often, awareness of the effects of throat clearing is essential since any throat clearing, especially excessively, could cause damage.

Another question asked was, “How often do you shout?” This question revealed that 5 people never shouted, 10 people rarely would shout (1-3 times a day), seven people sometimes would shout (1 time per hour), and 1 person frequently shouted (2-4 times an hour). Excessive shouting is damaging to the vocal folds and can cause them to become irritated or inflamed. While gentle whispering is okay, whispering tends to be damaging to the vocal folds because whispering requires substantial air pressure and air flow without voicing. This puts excessive pressure and muscle tension on the vocal folds. In addition, excessive whispering dries out the mucous membranes of the vocal folds, which must remain moist. According to the survey, 1 person never whispers, 57% or 13 singers rarely whisper (1-3 times a day), 9 people sometimes whisper (1 time per hour), and no singers frequently whisper. With this question, results indicate better practice of vocal hygiene since most singers avoid whispering often. According to Benninger and Murry (2006), laughing is beneficial to singers since it is a natural way to rid tension and relax muscles. Eight people frequently laugh during rehearsals (4-5 times), 13 people sometimes laugh during rehearsals (2-3 times), and 2 people rarely laugh during rehearsals (1-2 times). No participants reported never laughing during rehearsals.

Figure 4: Frequency of Laughing During Rehearsals

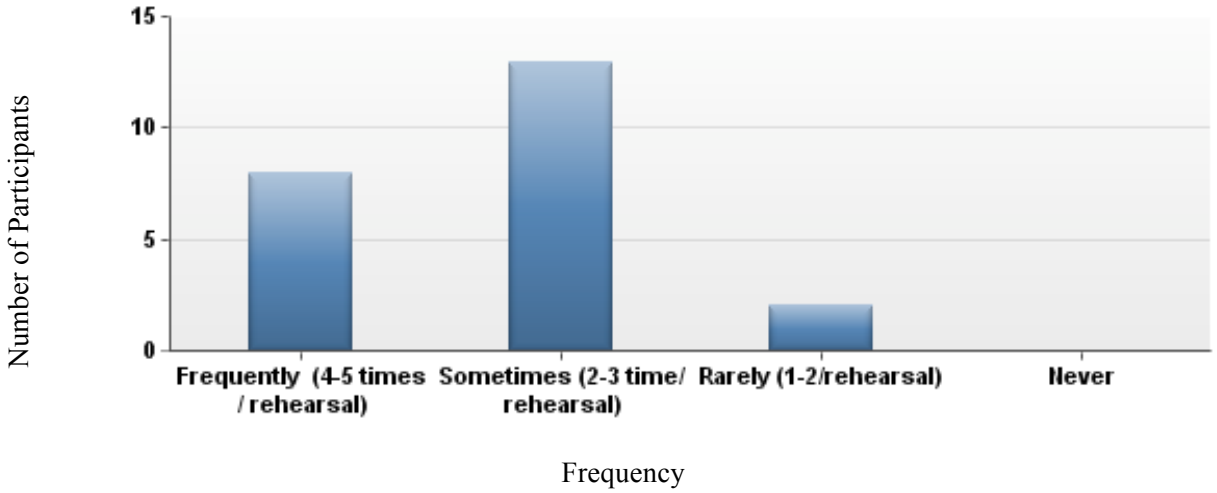
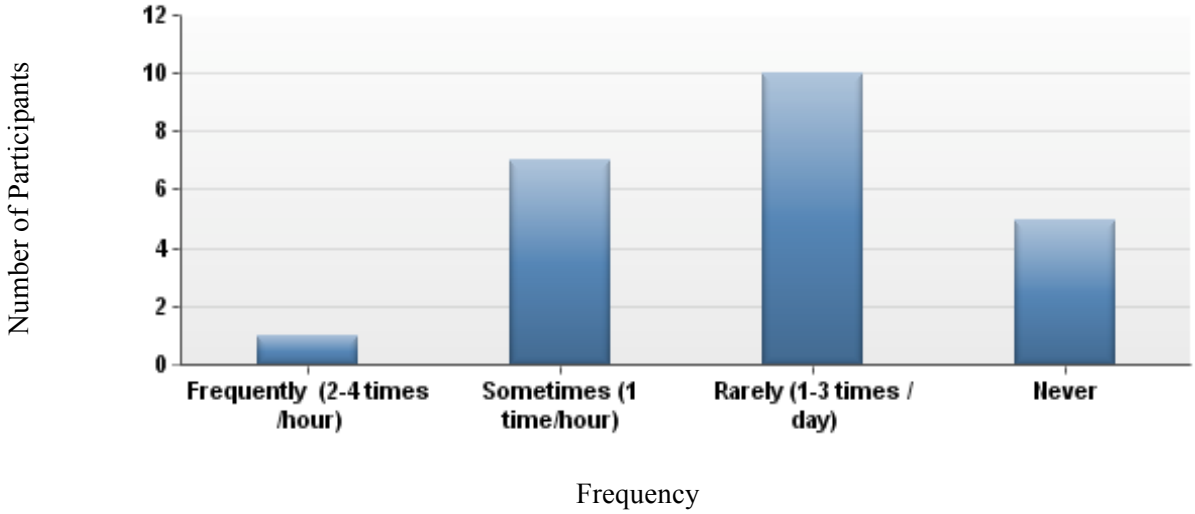


Figure 5: Frequency of Shouting During Rehearsals



Certain substances, such as water, promote healthy vocal functioning while others may act as soothing agents for the vocal folds. Other substances, such as alcohol and caffeine dry out the vocal folds and increase risk for damage if vocal folds are not lubricated properly. Eating a properly balanced diet is necessary for keeping the whole body healthy which ultimately effects vocal health. Crash diets should be avoided because they may contain substances that change the way a person feels and produces voice. Food supplements may be helpful for a person who does not receive enough nutrients or vitamins throughout the day, but must be taken carefully. Excessive amounts of vitamin E can cause blood vessels to rupture in the vocal folds and other parts of the body (Benninger and Murry, 2006). Light meals with plenty of water are ideal before practicing and performing. Heavy meals that cause a person to feel past the point of fullness negatively affects a person's ability to sing.

Results were somewhat surprising when looking at the amount of water singers reported drinking per day. Fifty-two percent or 12 singers said they drank on average only 2-3 glasses of water per day. This would not include water intake from other sources such as fruit, vegetables, and other drinks; however, there is nothing better than plain water when hydrating the vocal folds. Benninger and Murry (2006) recommend 6-8 glasses of plain water per day for singers to ensure adequate hydration. Thirty percent or 7 participants may not have achieved this recommended amount of water intake, only drinking 4-6 glasses of water per day. Three participants achieved adequate water intake, drinking 7-8 glasses and one person drank 9-10 glasses of water per day. When examining water intake before rehearsals, about half of the singers said they always drank water before rehearsals. The other half said they sometimes drink water before rehearsals. Only one person said they rarely drink water immediately before rehearsals.

An additional consideration for singers involves the moisture of their environment. When the air is extremely dry, there is an increased likelihood for the vocal folds to become dried out. Keeping a humidifier in one's room helps to prevent vocal dryness and a sore throat, especially at night when there is a lack of water intake for the eight hours that the average person sleeps. Reports show that no one keeps a humidifier in their room all the time. Four people sometimes keep a humidifier in their room and 19 never do. These statistics demonstrate a lack of vocal hygiene awareness in terms of keeping the vocal folds moist. Not all participants may need a humidifier if they drink enough water, keeping their voices hydrated that way. Also, most participants filled out this survey at the end of spring and beginning of summer months. There may have been a higher humidity at that time with more moisture in the air. At Penn State where the air can be extremely dry particularly in the winter, a humidifier is an option for singers to help improve their vocal health.

When looking at caffeine consumption, most people reported drinking a minimal number of caffeinated drinks. Sixteen out of 23 or 70% drank only 1-2 caffeinated drinks in one day. Five of the participants drank 3-4 and two drank 5-6 cups of caffeinated drinks in one day. Caffeine dries out the vocal folds, so singers must drink enough water to counteract the effects of dehydration. If the majority of singers are drinking 1-2 glasses of caffeinated drinks per day and only drinking 2-3 glasses of water per day, they may not be achieving adequate hydration for their vocal folds.

Figure 6: Glasses of Water Consumed Per Day

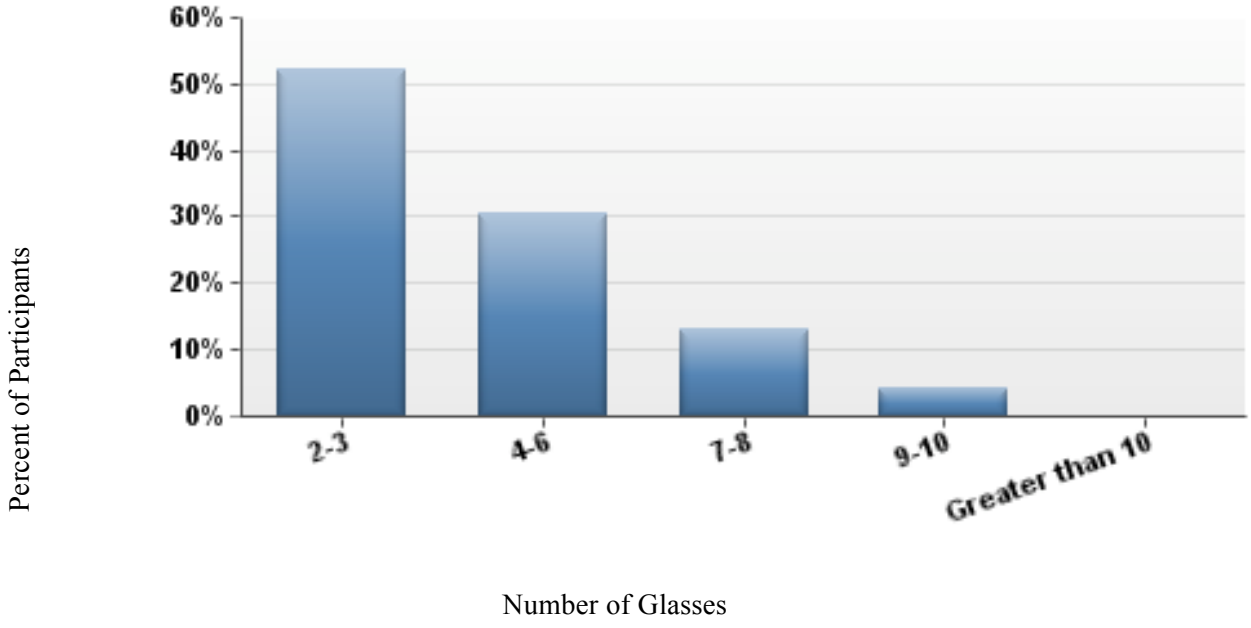
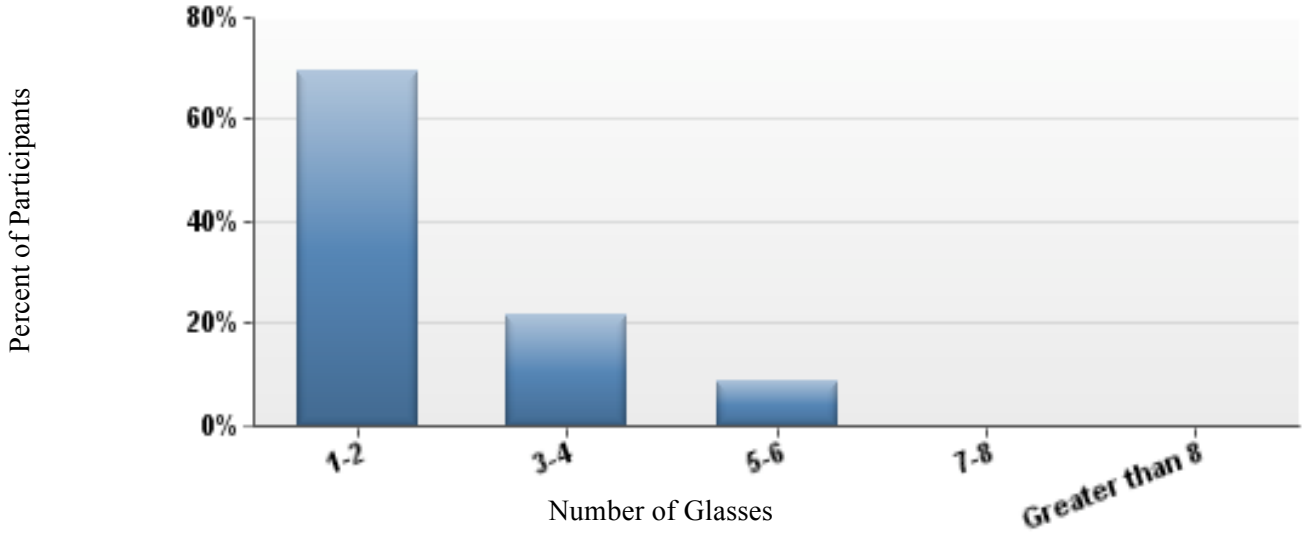


Figure 7: Glasses of Caffeinated Drinks Consumed Per Day



When asked if they have ever taken Throat Comfort-Yogi Tea, a drink meant to soothe the throat, most had not. Only three out of the 23 participants answered that they had. Out of the three that drank Throat Comfort-Yogi Tea, two said it worked to soothe their voice, while one person said it did not. The benefits of this tea may be analyzed in later research. An additional question asked singers what they used to soothe their voices. The majority of responses were water, tea, and honey. Many mentioned popular remedies used for a sore throat when sick referring to using salt water, and even sucking on cough drops. Other answers were steam, singer's saving grace, slippery elm, throat lozenges, immune boost, milk, fruit juices, and rest. The benefits of Throat Comfort-Yogi Tea as well as these other named voice therapies require further study.

Similar to the effects of caffeine, alcohol consumption also dries out the vocal folds and can contribute to vocal damage. When asked about drinking alcohol, there was a large variance in responses; however, a little less than 1/3 of the participants said they never drink alcohol. The remaining responses are displayed in Figure 8 below.

Figure 8: Frequency of General Alcohol Consumption

#	Answer		Response	%
1	Daily		0	0%
2	Every other day		1	4%
3	Twice a week		5	22%
4	Once a week		4	17%
5	Once every 2 weeks		1	4%
6	Once per month		5	22%
7	Never		7	30%
	Total		23	100%

Even fewer people said they binge drank, with 14 participants who said they never binge, five that they binge once per month, and three that they binge once every two weeks. One person binge drank once per week. This was the most frequent binge drinker among participants. These responses are displayed in Figure 9 below.

Figure 9: Frequency of Binge Drinking

#	Answer		Response	%
1	Daily		0	0%
2	Every other day		0	0%
3	Twice a week		0	0%
4	Once a week		1	4%
5	Once every 2 weeks		3	13%
6	Once per month		5	22%
7	Never		14	61%
	Total		23	100%

According to the National Institute on Alcohol Abuse and Alcoholism (2012), moderate drinking constitutes up to two drinks per day for men and up to one drink per day for women

when considering the U.S. dietary guidelines. This would resemble a maximum of 14 drinks per week for men and seven drinks per week for women. All of the respondents seemed to follow these guidelines. Nine of the 22 participants that responded to this question said they hardly drink if ever. Out of the remaining participants, all of the participants fell within these limits with a male drinking a maximum of 10 beers and a female drinking a maximum of five spirits and two beers within one week.

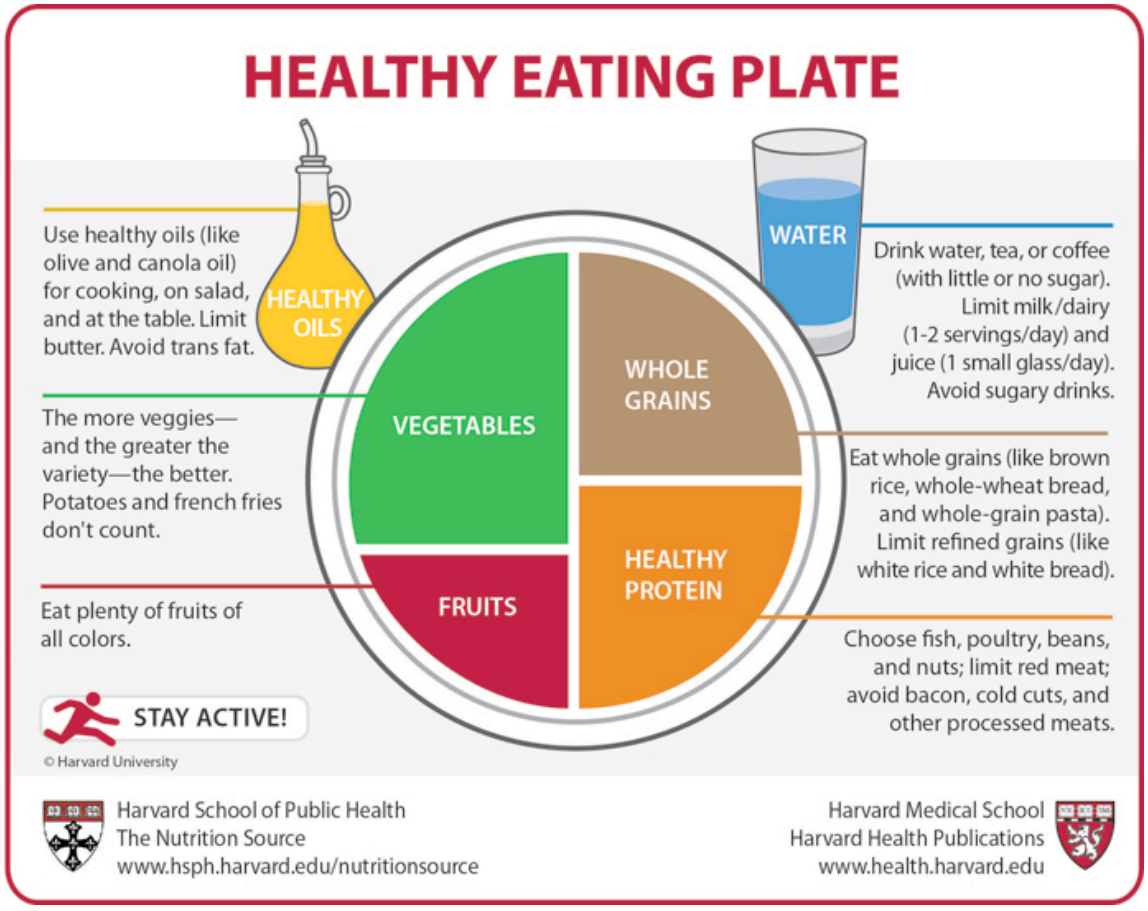
Along with alcohol consumption, tobacco use and any type of smoking are detrimental to the vocal apparatus. Smoking dries out the vocal membranes, decreases airflow from the lungs, and could lead to cancer in the mouth or larynx. When asked about smoking, four of the 23 participants reported smoking tobacco or non-tobacco products. Out of the four that smoke, one person smokes frequently (1-2 times a day), one person smokes sometimes (1-2 times a week), and two people rarely smoke (1-3 times a month). None of the singers reported smoking cigarettes. These results are mixed in terms of vocal hygiene. The participants do not smoke cigarettes, which might demonstrate some knowledge of vocal hygiene. At the same time, four of the 23 still engage in some kind of smoking. These results may seem somewhat alarming because any type of smoking can be harmful to the vocal folds. When comparing these results to a cigarette smoker who might smoke 25 cigarettes a day; however, these results are not so bad in terms of vocal hygiene. The most frequent smoker, smoking one to two cigars or other smokable product would do much less damage to their voice than the average cigarette smoker. Another question inquired about second hand smoke. The majority of the singers (19 of the 23) said they rarely or never felt like they were affected by second hand smoke. Three people said they were sometimes affected and one person said they were frequently affected by second hand smoke. Second hand smoke can have the same consequences as smoking. Aside from smoking, it is important to consider recreational drugs as well as harmful over the counter substances, which may also damage vocal folds. Twenty-one of the 23 people said they never use recreational or

harmful over the counter drugs. One person said they often do and one person frequently reported using these substances.

Breathing in noxious chemicals or fumes for prolonged periods of time may cause damage to the lungs or vocal apparatus. Those who work with noxious chemicals may be at risk for creating damage to their vocal folds. Most of the participants in the survey do not work with noxious chemicals or fumes. Nineteen said they never work in such an environment and three said they rarely do. For singers at Penn State, this aspect of vocal hygiene may not be much of a concern since most do not work with toxic fumes.

Diet is another important aspect of vocal hygiene. A balanced diet effects overall health, the way a person feels, and consequently voice production. When asked to compare their daily meals to a healthy eating plate, 14 (61%) said they had a good diet. They usually eat a well-balanced diet with a variety of healthy foods. Seven (30%) said they had a satisfactory diet where they sometimes have a well balanced diet and only sometimes eat healthy foods. One person (4%) said they have a very good diet where they always make sure to eat healthy foods, and one person (4%) said their diet was not the best (Harvard School of Public Health The Nutrition Source, 2013). These results signify that the majority participates in eating well-balanced, healthy meals. Eight of the participants display room for improvement in their diets.

Figure 10: Daily Diet



Another question inquired about food consumption before rehearsals. Heavy meals can make a person feel sluggish while also infringing on the diaphragm, an important muscle used for singing. Light meals should be eaten a few hours before singing. Most people (17 or 74%) reported that they did not eat heavy meals before rehearsals. Three people said they sometimes eat heavy meals before rehearsals and three people said they do eat heavy meals before rehearsals. The three people who frequently eat heavy meals before rehearsals prevent themselves from singing with their fullest potential during rehearsals. Practicing without full vocal capabilities will inhibit a person from singing to their best ability during performance. An

additional component relating to a well-balanced diet includes avoiding crash diets. Crash diets for rapid weight loss can negatively affect health and may contain substances that change the way a person produces voice. Out of the 23 responses, four (14%) said they had been on a crash diet for rapid weight loss. While four may not seem like many, this number is concerning when considering health generally and vocally. The consumption of food supplements was also assessed. If eating a well-balanced meal, a person does not need food supplements to obtain enough nutrients and vitamins; however they can be used for this purpose. Intake of food supplements must be monitored because an excess of certain vitamins can cause damage. For example, too much Vitamin E may cause uncontrolled bleeding in parts of the body including the vocal folds. Results were somewhat split among participants when asked about taking vitamins or non-prescription medication. Thirteen (59%) said they did not take food supplements or non-prescription medication and nine (41%) said they did take food supplements or non-prescription medication. Out of the nine people that took food supplements, seven took them often and two sometimes took them. Analyzing a person's overall vitamin intake is required for determining a positive or negative influence of food supplements on a person's vocal functioning. Nevertheless, singers should be aware of their daily vitamin intake.

One of the worst ways a singer can cause damage to the vocal folds is singing when ill. According to Benninger and Murry (2006), any type of cold or upper respiratory infection affects the way a person uses and hears their voice. Swelling of the vocal folds may erupt with changes in breathing muscles. Interestingly, all 23 participants reported singing while feeling ill. With desires to sing and limited rehearsal time, singers will continue to train even with illness. Unfortunately, this practice can lead to increased irritation of the vocal folds and further damage. Only three reported ever consulting an otolaryngologist or voice pathologist about their illness. These results could signify mixed results depending on the severity and duration of the illness. Any kind of illness that causes the voice to hurt over long periods of time should consult a

professional. The majority, or 19 of the 23 participants reported that they never experienced a hoarse or fatigued voice for prolonged periods of time (over two weeks). The four that have experienced a hoarse or fatigued voice for over two weeks should have received help from a voice expert to prevent more permanent or serious damage. Out of the 23 participants, nine did report that they had previously had an injury, surgery, or sickness that affected their voice. Of the nine people that previously had an injury, surgery, or sickness, four claimed to modify or change their vocal technique as a result. It is hard to say if these changes were for the better or worse. Some changes after a surgery could be positive changes for the voice, while changes due to sickness could harm the voice in other ways. This question provides valuable information that some singers indeed modify their voices to compensate under various circumstances. Further study may analyze the specific changes made by each singer and the vocal hygiene of these modifications.

Allergies are a contributor to nasal congestion, drainage, and throat irritation, thus affecting the voice. Prevalence of allergies among participants were almost evenly split with one more that half the group having allergies. Another question asked the singers if they regularly took antihistamines, decongestants, or cold remedies. The majority or 19 of the 23 said they did not. Those with allergies are at a higher risk of vocal discomfort and may have symptoms that require remedies to eliminate problems with the voice. Taking the proper steps, medicine, or care is extremely important. Every person is different and each situation is unique for individuals so awareness in choosing correct therapy that is individualized for each singer becomes necessary. Antihistamines, decongestants, and cold remedies relieve the symptoms of allergies, but may come with side effects. According to the American Academy of Otolaryngology (2013), antihistamines relieve the discomforts from allergies while eliminating upper respiratory infections; however, side effects include drowsiness. Decongestants work to clear the nasal passages by reducing the swelling of membranes. This may be helpful for singers to relieve

congestion, but side effects include jitteriness or difficulty sleeping. Cold remedies may contain antihistamines, decongestants, or both with added aspirin and possible cough suppressants. Singers with allergies may benefit from these drugs, but need to be careful of the time and frequency in which they take them. Side effects such as drowsiness of antihistamines and the hyper stimuli of the decongestants must be considered. Whether or not the singers who take these medications are aware of these side effects and their influence on vocal production is unknown. Further study may be necessary to acquire more specific information on vocal hygiene for singers with allergy like symptoms.

Another form of medication that may influence voice production is the consumption of oral contraceptives. A study conducted by Amir and M. M. Gorham-Rowan (2004), compared pitch, vocal stability, and loudness of speech tasks for women taking oral contraceptives to women not taking oral contraceptives and found that the use of oral contraceptives seem to have a positive influence on vocal fold functioning. The women taking oral contraceptives reached higher pitch levels and demonstrated greater stability during phonation than women not taking oral contraceptives. The study concluded that the use of oral contraceptives helped create a more stable hormonal environment, thus improving vocal functioning. A review of supplemental literature supports these findings of greater voice stability and control for those women who took oral contraceptives. In this study, 14 of the 23 participants were female and out of those 14, only one indicated knowledge of birth control medication affecting the voice. This finding may demonstrate a lack of awareness that female hormones influence voice production.

Feeling high incidents or prolonged amounts of stress can have a negative impact on vocal production. Taking steps to reduce stress or manage stress are important for overall health and vocal functioning. According to the survey, every person reported feeling some kind of stress and a surprising number of people rated their level of stress in the middle to high range. On a scale from zero to ten, the lowest stress level was at a two and the highest was at a nine. The

mean was a stress level of 5.85. These results indicate that stress levels among participants are about average to a little above average. Singers who are actively involved may be at a higher stress level do to their high expectations of themselves and active involvement in multiple roles on and around campus as a student. At the same time, students juggling multiple activities may know how to better manage their time and stress. Music may also serve as a way to relieve stress. These results provide significant insight to the stress levels of this particular group of singers. While there was a wide range of stress levels among survey participants, it should be noted that most were in the average to above average range. Vocal hygiene practices may include ways to better manage or relieve stress among singers since stress can lead to later vocal fatigue or impaired vocal production. Future research may look at stress levels among singers over prolonged periods of time since this research only assessed stress during the time of taking the survey. Other questions may assess how these singers cope and manage their daily stress. This would provide further insight in how to better help college students and specifically college aged singers in the future.

Figure 11: Stress Levels On Scale 1-10

#	Answer		Response	%
0	0		0	0%
1	1		0	0%
2	2		3	13%
3	3		0	0%
4	4		1	4%
5	5		5	22%
6	6		4	17%
7	7		6	26%
8	8		3	13%
9	9		1	4%
10	10		0	0%
	Total		23	100%

Hearing protection may seem like a separate topic when discussing vocal hygiene; however, the ears are just as essential to the singer as the voice. Inhibited ability to listen to oneself prevents a person from singing in tune. Singers must constantly listen to themselves as

they produce voice to adjust and modify their pitch as well as their tonal quality. Thus, questions were placed in this survey to assess hearing protection. One question asked about the use of hearing protection during a loud concert. Results were scattered with eight participants who reported never using ear protection during a concert, five rarely, three sometimes, four most times, and three who use ear protection every time they attend a concert. As illustrated, most singers do not use hearing protection and only a minimal number use protection when attending a loud concert. These results are somewhat alarming since noise induced hearing loss is a difficult problem to treat. Once damage occurs to the hair cells within the ear, there is no easy solution to gain hearing back since human hair cells do not regenerate. The ability to hear is a valuable tool that singers need to address in order to maintain good vocal hygiene and singing abilities. A different question inquired about a hearing test. Less than half the participants had their hearing checked once every few years. Six had their hearing checked once a year, six had their hearing checked a few times in their whole life, and one person reported never having their hearing checked. These results demonstrate that the majority had their hearing checked at least regularly. The remaining participants may not have felt a need to have their hearing checked; however, without a proper hearing check, problems may go unnoticed. A person may think their hearing is normal when they indeed have a hearing problem. Many singers may not view hearing as a vocal hygiene regimen and could potentially prevent future problems with greater awareness.

As discussed previously, vocal hygiene is one aspect of voice care. A different aspect related to vocal hygiene is vocal technique or ways in which voice production occurs. Proper vocal technique would include warm-ups before extensive singing or exercises to improve vocal range and intensity. Like any other sport, warm-ups are essential in preventing injury and for boosting performance. According to the American Academy of Otolaryngology—Head and Neck Surgery (2013), short warm-ups should be utilized before any voice intensive activity. Thus, for the purposes of this study vocal hygiene will include vocal exercises because they serve to

strengthen, protect, and improve voice quality. The first question regarding vocal technique asks if participants warm-up their voices before singing. According to the American Academy of Otolaryngology—Head and Neck Surgery, short warm-ups should be utilized before any voice intensive activity. Almost all of the participants, or 20 of the 23, warmed up their voices. A different question asked how long participants warmed up their voices for. Most participants warmed up their voices for a ten minute period of time. Some took slightly more time warming up their voice, spending 20 minutes. Here, only one person reported never warming up their voice. According to the Voice Center of Baltimore (2010), warm-ups should be long enough to include a variety of different techniques that will stretch the muscles. These results demonstrate that most singers participate in good vocal hygiene. While most adequate warm-ups last closer to 20 minutes, it may be that singers can adequately stretch their voices in ten minutes (New York Eye and Ear Infirmary, 1996-2012). When asked about the frequency of warm ups, the majority or 52% (12 people) warmed up their vocal folds several times a week. Three people warmed up their vocal folds daily, six once a week, and two reported that they rarely warm up their vocal folds. For this question, zero people reported never warming up their voice. The next question inquired about vocal warm-ups specifically before rehearsals. For this question, 57% (13 people) warmed up their vocal folds every time before rehearsals. Two people said they sometimes warm-up their voice before rehearsals and one person said they rarely warm-up their voice before rehearsals. Results indicate that the majority of singers warm-up their voices most of the time; however, the few participants who do not warm-up their voice often before singing is significant in terms of vocal hygiene. Especially since this study only accounts for 23 participants, it is worth noting that there are two or three singers who rarely warm-up their voice. This could cause serious damage especially if the singer engages in extensive singing. Further questioning would need to determine the amount and level of singing in which participants involve themselves in;

however, this provides information that not all singers may understand the impact warm-ups or lack thereof can have on the voice.

Chapter 4

Discussion

Singers, even more than the average person must take extreme care of their vocal instrument: their voice. To prevent injury and to maximize their vocal potential, singers must practice proper vocal health. The vocal hygiene strategies evident in this survey have indicated potential benefits for singers; however, no real studies have been done to look exclusively at vocal hygiene among singers. The purpose of this study was to examine if singers engage in any of these strategies already and if singers uphold these vocal regimens in their daily lives. Professionals in the department of Communications Sciences and Disorders have utilized some of these vocal hygiene strategies as a supplementary approach with varying voice disorders; however, utilizing these strategies as preventative and treatment measures for singers is a somewhat new idea. Findings indicate that most singers practice at least some if not most of the vocal hygiene techniques covered within the survey.

Most participants live fairly healthy lifestyles by engaging in exercise and healthy eating. The majority seemed cautious of over-using their voices before rehearsals and especially before performances. Additionally, they participated in mostly beneficial behaviors with more people laughing during rehearsals than damaging behaviors such as whispering or shouting. Drinking alcohol and smoking was also minimal for most participants. Reaching adequate hydration may be somewhat of a concern since most were not reaching the recommended amount of daily water consumption. At the same time, these students may be hydrating themselves in additional ways through fruits or other beverages. Even so, water remains one of the most important components to keeping the voice functioning effectively and remaining healthy. Many drank caffeinated

drinks, although most drank a minimal amount. This finding may show awareness of vocal hygiene because caffeine dries out the vocal folds. Most were aware of remedies that they found helpful or soothing to their voice such as drinking more water, drinking tea, and using honey. Some gave alternative ways such as using salt water, which is a popular remedy when feeling ill. Others even mentioned the use of steam to add moisture to the vocal mechanism. Other answers were sucking on cough drops, drinking singers saving grace, slippery elm, throat lozenges, immune boost, milk, fruit juices, and rest. These would need to be studied further to learn the effectiveness of each relief strategy. Some of these regimens have not been considered or even studied. Nevertheless, these responses demonstrate a general awareness of personal vocal hygiene strategies even if only beneficial at an individual level. All of the participants reported that they continued to sing even when feeling ill. This may not be the best practice since singing with a fatigued voice increases the risk of damaging the voice further, creating a greater problem in the future. Other aspects of vocal hygiene that singers seemed to lack dealt with taking care of their ears. Many of the participants could utilize hearing protection more often and may consider having their hearing checked to ensure that they have full range of hearing. Overall, participants demonstrated behaviors of good vocal hygiene with some discrepancies among a small group of participants.

An open-ended question within the survey gathered an assessment of the participants' definition of vocal hygiene. Most participants provided a definition almost exact to the definition provided in the literature. This finding provides insight that participants have some awareness of vocal hygiene or could at least assess the definition of vocal hygiene by the explicit name "vocal hygiene." Most provided ways to protect and maintain a healthy voice to prevent misuse or injury. Some listed tactics such as proper hydration, vocal rest, proper nutrition, not yelling/singing improperly, and maintaining good habits. Many listed vocal hygiene as not overusing, straining, or causing tension in the voice tissue and muscles. One participant listed

warming up sufficiently as part of vocal hygiene, as well as, not drinking dairy before a performance. Another listed drinking tea as a way to soothe the voice prior and during singing for a long period of time. A few listed vocal techniques such as utilizing proper singing skills, breath support, and vocal control. All responses referred to strategies used to protect the voice from harm. A large number of responses signified outside knowledge of the vocal hygiene strategies focused on within the survey. Most of these strategies are in congruence with strategies used by speech-language pathologists when treating voice disorders. Many specific practices listed are the same practices used for patients with voice disorders with the notion that vocal hygiene consists of daily habits utilized to maintain a healthy voice. When asked if they performed vocal hygiene according to their standards, one participant said no, five said somewhat, and the remaining 15 said yes. The survey also gathered a personal assessment of the participants' voice quality. The question asked them to rate themselves using a scale of 1-1000 when comparing their singing voice to the best in the world. Four rated their singing between 1-300, ten rated themselves between 450-500, and seven rated themselves between 600-800. These responses provide interesting insight to how these singers may regard themselves and their voice. Most rated themselves within the middle range as average singers. How these singers regard themselves as compared to the best in the world may influence how they care for their voices as well. Further questioning would be necessary to determine if there is a correlation between self-assessment of voice quality and diligence in caring for the voice. Of the 23 participants that completed the survey, 20 said they thought their singing would improve with better vocal hygiene. Gaining awareness of vocal hygiene may be worth implementing because the majority of singers found this beneficial. As mentioned within the literature, motivation to practice daily strategies is an important determining factor in the effectiveness and success of certain therapy. Further understanding behind the reasons of the three participants who do not find vocal hygiene beneficial might be worth learning. This is a limitation of this study. Surveys only provide so

much information since participants are limited by the questions and options offered. Another limitation was not all participants answered every question. There was one participant who answered all multiple-choice questions, but skipped open-ended questions, which influenced results. While the study provided insightful information of daily practices of many singers at Penn State, the study was limited with a small number of participants from a single area. Another survey that gathers more participants from other areas besides Penn State may offer more reliable results. Nevertheless, this research provides substantial insights of the vocal hygiene regimen among college-aged student singers.

Chapter 5

Conclusion

In summary, findings from this survey indicate that most singers have some awareness of vocal hygiene and strategies for preserving and maintaining healthy vocal functioning. While there is definite room for improving vocal hygiene, many singers seem to follow some kind of guideline or to avoid activities that would cause harm to the voice. Most also found vocal hygiene to be beneficial in helping them improve their singing. These findings demonstrate promise in utilizing vocal hygiene techniques as an additional way to help singers. Figuring out specific aspects of vocal hygiene that are most beneficial to singers requires additional testing and research. Finding ways to implement vocal hygiene techniques into the daily lives of singers also requires further exploration. Vocal hygiene may not only improve vocal functioning, but could provide additional benefits for overall health. Many of the vocal hygiene regimens mentioned in the survey keep the voice healthy by keeping other parts of the body healthy. Educating and reminding singers of vocal hygiene practices may prove valuable through the positive influence these regimens have on singers vocally and systemically.

Appendix

Survey Assessing Vocal Hygiene Within Singers

Vocal Hygiene within Singers

Q1 Implied Informed Consent Form for Social Science Research

Q2 What is your definition of vocal hygiene?

Q3 Do you think you perform vocal hygiene?

Q4 How would you rate your general health?

- Very Healthy (1)
- Healthy (2)
- Somewhat Healthy (3)
- Poor Health (4)

Q5 How often do you exercise to stay fit?

- Never (1)
- Once per month (2)
- Once every two weeks (3)
- Once a week (4)
- Twice a week (5)
- Every other day (6)
- Daily (7)

Q6 How often do you exercise to receive adequate muscle tone?

- Never (1)
- Once per month (2)
- Once every two weeks (3)
- Once a week (4)
- Twice a week (5)
- Every other day (6)
- Daily (7)

Q7 Do you sing even when you feel your vocal folds (also called vocal cords) are fatigued or overused?

- Yes (1)
- No (2)

Q8 Have you ever experienced a hoarse voice, change in the sound of the voice, or noticeable voice fatigue for a prolonged period of time (2 or more weeks)?

- Yes (1)
- No (2)

Q9 Do you sing even when you feel tired (lack of energy, not enough sleep)?

- Yes (1)
- No (2)

Q10 Do you warm-up your vocal folds before singing?

- Yes (1)
- No (2)

Q11 On average, how long is your warm-up?

- 10 mins (1)
- 20 mins (2)
- 30 mins (3)
- 40 mins (4)
- >1 hour (5)
- I don't warm up my voice (6)

Q12 How often do you warm-up your vocal folds?

- Daily (1)
- Several Times a Week (2)
- Once a Week (3)
- Rarely (4)
- Never (5)

Q13 How often do you warm-up your vocal folds before rehearsals?

- Every time (1)
- Most times (2)
- Sometimes (3)
- Rarely (4)
- Never (5)

Q14 How often do you use ear protection when the sound level is high (such as at a rock & roll concert or when working with loud machinery)?

- Every time (1)
- Most times (2)
- Sometimes (3)
- Rarely (4)
- Never (5)

Q15 How often do you have your hearing checked?

- Once a year (1)
- Every few years (2)
- A few times in your life (3)
- Have never had them checked (4)

Q16 Have you noted any changes in your voice sound quality (pitchy, cannot hold a note long enough) over the past year.

- Yes, my voice changes all the time (1)
- Yes, I have noticed some changes (2)
- No, I have not noticed any changes (3)

Q17 How often do you use your voice before rehearsals?

- Very often. I talk or sing for extended periods of time (e.g. Giving multiple speeches, lecturing for a class, constantly talking with friends all day). (1)
- Somewhat often. I talk or sing, but not for extended periods of time. (2)
- Rarely. I will rarely talk or sing. (3)
- Never. I never talk or sing before rehearsals (4)

Q18 How often do you use your voice before performances?

- Very often. I talk or sing for extended periods of time (e.g. Giving multiple speeches, lecturing for a class, constantly talking with friends all day). (1)
- Somewhat often. I talk or sing, but not for extended periods of time. (2)
- Rarely. I will rarely talk or sing. (3)
- Never. I never talk or sing before performances. (4)

Q19 How often do you drink water immediately before rehearsals?

- I drink water every time before rehearsals (1)
- I sometimes drink water before rehearsals (2)
- I rarely drink water before rehearsals (3)
- I never drink water before rehearsals (4)

Q20 On average, how many glasses of water do you drink per day?

- 2-3 (1)
- 4-6 (2)
- 7-8 (3)
- 9-10 (4)
- Greater than 10 (5)

Q21 How many cups of caffeinated drinks (coffee, tea, colas, etc.) do you consume in a day?

- 1-2 (1)
- 3-4 (2)
- 5-6 (3)
- 7-8 (4)
- Greater than 8 (5)

Q22 How active are you before rehearsals (such as exercising in a gym, swimming, running, etc)?

- Extremely active (1)
- Somewhat active (2)
- Not active (3)

Q23 How would you describe your daily diet (according to the Healthy Eating Plate described below)?

- Very Good. I always make sure to eat a well balanced diet, and try to eat a variety of healthy foods. (1)
- Good. I usually eat a well balanced diet, with a variety of healthy foods. (2)
- Satisfactory. I sometimes eat a well balanced diet, and only sometimes eat healthy foods. (3)
- Not the best. I could greatly improve my diet. (4)

Q24 Have you ever been on a crash diet (diet for rapid weight loss)?

- Yes (1)
- No (2)

Q25 Do you take food supplements (vitamins or non-prescription products)?

- Yes (1)
- No (2)

Answer If Do you take food supplements (vitamins or non-p... Yes Is Selected

Q26 How often do you take them?

- Often (1)
- Sometimes (2)
- Rarely (3)

Q27 Have you ever used Throat Comfort® - Yogi Tea?

- Yes (1)
- No (2)

Answer If Have you ever used Throat Comfort® - Yog... Yes Is Selected

Q28 Did it soothe your voice at all?

- Yes (1) _____
- No (2) _____

Q29 What do you use to soothe your voice?

Q30 How often do you clear your throat?

- Frequently (2-4 times /hour) (1)
- Sometimes (1 time/hour) (2)
- Rarely (1-3 times / day) (3)
- Never (4)

Q31 On average, how often do you laugh during rehearsal?

- Frequently (4-5 times / rehearsal) (1)
- Sometimes (2-3 time/ rehearsal) (2)
- Rarely (1-2/rehearsal) (3)
- Never (4)

Q32 How often do you shout?

- Frequently (2-4 times /hour) (1)
- Sometimes (1 time/hour) (2)
- Rarely (1-3 times / day) (3)
- Never (4)

Q33 How often do you whisper?

- Frequently (2-4 times /hour) (1)
- Sometimes (1 time/hour) (2)
- Rarely (1-3 times / day) (3)
- Never (4)

Q34 Do you smoke any tobacco or non-tobacco products?

- Yes (1)
- No (2)

Answer If Do you smoke any tobacco or non-tobacco ... Yes Is Selected

Q35 How often do you smoke tobacco or non-tobacco products?

- Frequently (1-2 times/day) (1)
- Sometimes (1-2 times/ week) (2)
- Rarely (1-3 times / month) (3)

Q36 Do you smoke cigarettes?

- Yes (1)
- No (2)

Answer If Do you smoke cigarettes?<o:p></o:p> Yes Is Selected

Q37 How often?

- Less than half a pack/day (1)
- Half a pack/ day (2)
- 1 pack /day (3)
- More than 1 pack/ day (4)

Q38 How often do you feel you are affected by second hand smoke?

- Frequently (2-4 times /hour) (1)
- Sometimes (1 time/hour) (2)
- Rarely (1-3 times / day) (3)
- Never (4)

Q39 Besides alcohol, tobacco, or non-tobacco products, do you use any recreational drugs or harmful over the counter substances?

- Yes, often (1)
- Yes, sometimes (2)
- Yes, rarely (3)
- No, never (4)

Q40 How often do you drink alcohol?

- Daily (1)
- Every other day (2)
- Twice a week (3)
- Once a week (4)
- Once every 2 weeks (5)
- Once per month (6)
- Never (7)

Q41 How often do you binge drink?

- Daily (1)
- Every other day (2)
- Twice a week (3)
- Once a week (4)
- Once every 2 weeks (5)
- Once per month (6)
- Never (7)

Q42 According to the information below, how much do you consume on an average week, if you drink alcohol? (Example: 3 beers, and 1 spirit) Fortified Wine GLASS: 60ml ALCOHOL CONTENT: 10.ml - 17.5% Beer GLASS: 285ml ALCOHOL CONTENT: 11.4ml - 4% Wine GLASS: 100ML ALCOHOL CONTENT: 11.5ml - 11.5% Spirit GLASS: 200ML ALCOHOL CONTENT: 11.4ml - contains one 30ml nip of spirits (38%)

Q43 Do you ever work with noxious chemicals/fumes?

- Frequently (1-2 times/day) (1)
- Sometimes (1-2 times/ week) (2)
- Rarely (1-3 times / month) (3)
- Never, I never work with noxious chemicals/fumes (4)

Q44 Do you ever lift heavy weights?

- 1-2 times/day (1)
- 1-2 times/ week (2)
- 1-3 times / month (3)
- Never (4)

Q45 Do you eat heavy meals (feeling past the point of fullness) before rehearsals and performances?

- Yes (1)
- No (2)
- Sometimes (3)

Q46 On a scale from 1-10, how would you rate your level of stress?

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Q47 Do you use a humidifier in your room?

- Yes, all the time (1)
- Sometimes (2)
- No (3)

Q48 Do you have any allergies?

- Yes (1)
- No (2)

Q49 Do you regularly take antihistamines, decongestants, or cold remedies?

- Yes (1)
- No (2)

Q50 Have you ever had an injury, surgery, or sickness that affected your voice?

- Yes (1)
- No (2)

Answer If Yes Is Selected

Q51 Have you modified or changed your vocal techniques at all as a result of this injury, surgery, or sickness?

- Yes (1)
- No (2)

Q52 Have you sung while feeling ill?

- Yes (1)
- No (2)

Answer If Have you sung while feeling ill? Yes Is Selected

Q53 Have you ever consulted an otolaryngologist or voice pathologist about your illness?

- Yes (1)
- No (2)

Q54 Compared to the best singers in the world, how would you rate your level of singing quality in the range of 1-1000, where 1 is average singing quality and 1000 is the best singing quality?

Q55 With better vocal hygiene (daily preventive strategies to achieve and maintain a healthy voice), do you think your quality of singing could improve?

- Yes (1)
- No (2)

Q56 Are you a female?

- Yes (1)
- No (2)

Answer If Are you a female? Yes Is Selected

Q57 Are you aware of any birth control medications that affect the voice?

- Yes (1)
- No (2)

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Research Interests

I have broad interests in the speech and hearing sciences, particularly in relation to the voice. Specifically, I am interested in improving vocal functioning for singers. I would like to further my understanding of the perception and production of sound. Fluency disorders are another interest I have within the field. I would like to find alternative methods to help with stuttering. Specifically, the role of music, which utilizes alternative areas of the brain than those used in speech, is an area that I would like to explore further.