The Relation between Eating Disorders and Voice Disorders

Taylor Lawrence

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THE RELATION BETWEEN EATING DISORDERS AND VOICE DISORDERS

by

Taylor Lawrence

A Thesis

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Arts

Major: Speech-Language Pathology

The University of Memphis

May 2019
DEDICATION

This thesis is dedicated to PawPaw, for always reminding me how incredibly exciting life is.
ACKNOWLEDGMENTS

Thank you to Dr. Miriam van Mersbergen for her mentorship and the many hours she sacrificed to further my educational experience, to Dr. Naomi Eichorn and Dr. Idia Thurston for their kind and thoughtful feedback on this thesis, and to my parents for supporting me from the beginning.
ABSTRACT

Objective. The purpose of this study is to determine the relation between specific eating disorder diagnoses/purging behaviors and voice disorders.

Method. One hundred-nine participants with eating disorders completed a survey inquiring about eating disorder symptoms, purging behaviors, and voice disorder symptoms. Participants also completed the Eating Disorders Examination Questionnaire (EDE-Q), Voice Handicap Index (VHI), and the Reflux Symptom Index (RSI).

Results. The prevalence of voice disorders among the group with eating disorders was 21.88%. Of those with both eating disorders and voice disorders, anorexia nervosa appeared to be more prevalent in this group than bulimia nervosa. In addition, purging behaviors of exercise presented with a higher prevalence of voice problems than vomiting.

Conclusion. Individuals with eating disorders seem to be at a higher risk for voice disorders than the general population. Anorexia nervosa and exercise as a purging method were identified as the highest risk factors for voice disorders.
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INTRODUCTION

There is a common agreement among clinical professionals that voice disorders and bulimia nervosa are related in some way; that bulimia nervosa is a risk factor for voice disorders (Balata, Colares, Petribu, & de Carvalho, 2008). In the past, the traditional view on the relationship between voice and bulimia nervosa has been focused on physiological pathologies, specifically on the trauma inflicted on the vocal folds during the process of purging. Hypotheses among researchers and clinicians include the notion that gastric contents might enter the larynx during the purging process and cause damage to the vocal folds, resulting in a voice disorder (Balata et al., 2008; Ferreira, Gama, Santos, & Maia, 2010).

Ferreira and colleagues (2010) also note another possibility, which is that the gastric contents enter the larynx and damage the vocal folds due to gastroesophageal reflux disease (GERD) and laryngopharyngeal reflux (LPR), which can be caused or exacerbated by bulimia nervosa through a weakening of the lower esophageal sphincter. Excessive vomiting often causes the lower esophageal sphincter to relax, causing the gastrointestinal fluids to flow up the esophagus. This reflux could explain the secretions in the larynx as well as symptoms of hoarseness frequently demonstrated by many individuals with bulimia (Ferreira et al., 2010). Even so, it is important not to assume that all cases of voice disorders in individuals with bulimia nervosa are solely caused by the regurgitation of gastric contents into the larynx. After all, many individuals reflux constantly without ever developing a voice disorder (Lechien, Saussez, Harmegnies, Finck, & Burns, 2017). Furthermore, not all individual with bulimia nervosa develop voice problems. If gastric contents entering the laryngeal vestibule is not the sole reason for hoarseness in this population there might be other factors connecting bulimia nervosa and voice disorders.
Since the common thought is that vomiting behaviors are the cause of voice disorders in individuals with bulimia nervosa, other eating disorders, such as anorexia nervosa, binge-eating disorder, eating disorder not otherwise specified (EDNOS) have been largely neglected in the study of voice disorders among individuals with eating disorders. Even so, eating disorders including, but not limited to, bulimia nervosa often cause malnutrition (Marcos, 2000), which theoretically would cause atrophy and wasting to the muscles and tissues of the vocal folds (McLoughlin, Spargo, Wassif, Newham, Peters, Lantos, & Russell, 1998). These other organic changes could potentially develop into a voice disorder as well.

This study seeks to explore three questions:

1. Is there a relation between eating disorders and voice disorders?
2. Is there a relation between specific eating disorder diagnoses and voice disorders?
3. Is there a relation between specific purging behaviors and voice disorders?

We hypothesize that:

1. There is a higher prevalence of voice disorders among those with eating disorders and the general population.
2. Those with bulimia nervosa will demonstrate a higher prevalence of voice disorders than those with other eating disorder diagnoses due to the following characteristics: the purging behavior of vomiting and the higher incidence of acid reflux due to lower esophageal sphincter relaxation commonly seen in this population.
3. There will be a minor relation between the purging behavior of vomiting and voice disorders among those with eating disorders.
Another perspective on the relation between BN and VD lies in the fact that eating disorder fall into the larger class of anxiety-related problems. There appears to be increased evidence that anxiety-related conditions might predispose one to developing a voice problem (Gerritsma, 1991; Roy & Bless, 2000; Roy, Bless, & Heisey, 2000; Roy et al., 1997). This could indicate two different possibilities: that individuals with voice disorders have additional anxiety that relates to eating disorders or that voice disorders may just be a manifestation of a severe case of any number of anxiety disorders.

**Literature Review**

**Eating Disorders**

The most common eating disorders are anorexia nervosa, bulimia nervosa, and binge-eating disorder. While bulimia nervosa is known for its characteristic binging and purging behaviors, other eating disorders exhibit these symptoms as well (Culbert et al., 2016).

Anorexia nervosa, a disorder in which individuals restrict their caloric intake, presents with excessive weight loss, abnormally low body mass index (BMI), and malnutrition. This condition becomes damaging to overall health. Body image distortions are associated with anorexia nervosa, in which individuals either perceive themselves as significantly larger than is realistic or fail to recognize their weight as significantly below average (American Psychiatric Association, 2013). Anorexia nervosa can be divided into two different subtypes, a restricting subtype and a purging subtype. The restricting type indicates that weight loss is due to dieting restrictions, while the purging subtype indicates a continuous engagement in purging behaviors such as vomiting, exercise, laxatives, or any combination of these within the past three months.
While studies in voice tend to link voice disorders with bulimia nervosa because of the colloquial understanding that bulimia nervosa presents with behaviors of vomiting, it is conceivable that individuals with anorexia nervosa who engage in the purging behaviors of vomiting would also experience voice problems. Few studies link anorexia nervosa with voice disorders as a result of vomiting, rather they link vocal quality with anorexia (García-Santana, Capilla, & Blanco, 2016).

Bulimia nervosa refers to an eating disorder in which an individual participates in binge-purge behaviors. A binging episode is characterized by the DSM-V (American Psychiatric Association, 2013) as consuming substantially more food than a typical person would consume in the same amount of time. During these binging periods, individuals with bulimia often feel as if they have no control over the amount of food they are eating. After binging episodes, these individuals enter into a purging phase in which they attempt to prevent caloric intake and weight gain via vomiting, laxatives, or over-exercise (American Psychiatric Association, 2013).

Research on bulimia and voice exclusively focus on the purging behaviors of vomiting. It is unknown if this is the case. To establish if a link exists between all types of bulimia nervosa and voice disorders rather than simply the purging behavior of vomiting, more research needs to be conducted. If there is a relation between bulimia nervosa and voice disorders, but not a relation with vomiting and voice disorders, this would indicate that another characteristic connected with bulimia is contributing to voice disorders.

Binge eating disorder also presents with uncontrolled consumption of food but differs from bulimia nervosa in that purging behaviors are absent. So, individuals with binge eating disorders experience the same feeling of being unable to cease eating once they have begun, but they do not purge after meals (American Psychiatric Association, 2013). The voice literature
does not address binge eating behaviors with voice problems given the theoretical link that connects voice problems and eating disorders pertains to vomiting. Despite the type of eating disorder, individuals with these problems experience disruptions in activities of daily living as a result (Mason et al., 2018).

Voice Disorders

Voice disorders are defined as “any time the voice does not work, perform, or sound as it normally should, or interferes with communication” (Roy, Merrill, Gray, & Smith, 2005, p. 1989). Voice disorders can arise for a variety of reasons, including vocal overuse (sometimes called phonotrauma), illness, tobacco and alcohol use, esophageal reflux, exposure to harmful chemicals, and voice-heavy occupations (Roy et al., 2005). Voice disorders can be classified into organic and non-organic subtypes. Organic voice disorders can be attributed to a clear structural or physiological abnormality, such as vocal fold nodules or vocal fold paralysis, while non-organic voice disorders are characterized by impaired vocal quality or efficiency for which there is no apparent organic cause and are often referred to as functional dysphonia (Seifert & Kollbrunner, 2005).

Living with a voice disorder can have a detrimental impact on quality of life. Individuals with voice disorders self-report adverse effects of their voice disorders on job functions and social interactions, as well as accompanying physical discomfort (Smith et al., 1996).

Bulimia Nervosa and Voice Disorders

It is logical to think that the physiology of bulimia nervosa would lend itself to voice disorders given its obvious symptom of purging through vomiting. An abnormal buildup of
mucosal secretions in the larynx and pyriform sinuses have been reported among women who have been diagnosed with bulimia nervosa (Ferreira et al, 2010). Ferreira and colleagues (2010) compared vocal and laryngeal qualities of women with bulimia nervosa to an asymptomatic control group. Researchers assessed the participants’ voices using the GRBASI scale (De Bodt, Wuyts, Van de Heyning, & Croux, 1997), which assesses voice quality based on Grade, Roughness, Breathiness, Asthenia, Stress, and Instability. They also viewed the participants’ larynxes using videostroboscopy and found that 45.4% of the group with bulimia presented with thick, laryngeal secretions. They attributed findings to dehydration due to frequent purging and laryngopharyngeal reflux (a subcategory of gastroesophageal reflux; Martinucci et al., 2013). The authors also found that 36.3% of the individuals with bulimia nervosa presented with a medial posterior triangular cleft indicating an abnormal increase in laryngeal muscle contraction. This cleft was absent in the control group. In addition, the authors also found that 65.6% of the patients with bulimia nervosa demonstrated mild dysphonia and 27.3% demonstrated moderate dysphonia which was significantly greater than the control group where only 27.3% demonstrated mild dysphonia and no one reported moderate dysphonia.

While it seems logical to conclude that this damage is caused by exposure to gastric acid during vomiting episodes, the timing of when the damage ensues remains unknown making this relationship unclear. Some have proposed that the larynx has a self-protective mechanism during the process of vomiting by closing the vestibular folds, thereby protecting the vocal folds from any damage (Ferreira, 2010). If it is likely that vomiting does not cause laryngeal damage, then laryngopharyngeal reflux (LPR) may be the cause of laryngeal damage. Although LPR has been associated with voice disorders (Sataloff, Hawkshaw, & Gupta, 2010), Schneider, Vaezi, and Francis (2016) warn of assuming that LPR is the primary cause of voice disorders when evidence
from clinical trials still remains somewhat ambiguous (Schneider et al., 2016). In addition, many people who suffer from GERD and LPR never develop a clinical voice disorder (Lechien et al., 2017). Because LPR is not the sole cause of voice disorders, then it is unlikely the sole cause of voice disorders in individuals with bulimia.

**Anorexia nervosa and Voice Disorders**

There have been very few studies conducted regarding anorexia nervosa and voice disorders despite the clinical presentation of purging via vomiting in this population. García-Santana and colleagues (2016) compared vocal quality between adolescent females with anorexia nervosa and a control group without eating disorders. They found that the adolescents with anorexia nervosa demonstrated a “shriller” vocal quality than the control group based on fundamental frequency and voice analysis using Praat software (García-Santana et al., 2016). Despite this investigation, little is known about the relation between voice disorders and anorexia nervosa and what is known overlooks issues of vomiting.

**Anxiety and its Relation to Voice Disorders**

Despite the existence of plausible reports of the physiological cause of voice disorders in the population of individuals with bulimia nervosa, they remain incomplete. Another possibility is that voice disorders in those with bulimia nervosa may be multifactorial and involve other processes. One such contribution to voice disorders in this population is temperament and anxiety. Because eating disorders also are in a class of anxiety disorders, a psychological connection might be the link rather than a physiological connection and therefore this link should be acknowledged.

In 2000, Roy and Bless conducted a study in which they compared personality traits of patients with behaviorally acquired voice problems including functional dysphonia (FD) and
vocal nodules (VN) and medically acquired voice problems (Roy & Bless, 2000). Functional dysphonia (FD) is dysphonia in the absence of organic pathology and thought to be associated with psychological processes (Roy, 2003; Behlau, Madazio, & Oliveira, 2015). Vocal nodules (VN) on the other hand, refer to benign growths that appear on the vocal folds and are related to the behaviors of vocal overuse. The authors predicted that the FD and VN groups would demonstrate distinct personality profiles on the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975) due to the behavioral nature of those voice disorders. Other diagnoses groups would not. They found that patients with FD presented with what they called a Neurotic Introvert personality, while patients with VN presented with what they called a Neurotic Extrovert personality. Both these groups demonstrated a tendency for stress reactivity and anxiety. Roy and Bless (2000) indicated that not only can a particular personality profile cause an individual to be more susceptible to a voice disorder, they also indicated that different personality profiles can cause one to be susceptible to specific types of voice disorders.

In a follow-up study, Roy and colleagues (2000) compared results on the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982) for these same groups of voice patients because the MPQ has subscales that might prove useful in elucidating underlying temperamental influences in voice disorders. These subcategories include Well-being, Social Potency, Achievement, Social Closeness, Stress Reaction, Alienation, Aggression, Control, Harm Avoidance, and Traditionalism. They found that compared to the control group, participants with FD demonstrated significantly lower Social Closeness, and significantly higher Stress Reaction and Alienation. The authors concluded that those with FD have a tendency to have heightened negative emotions, such as anxiety, stress, and resentfulness. The FD group’s high Negative Emotionality scores set them apart from other groups.
Specific Studies Relating Bulimia Nervosa to Anxiety

In addition, individuals with bulimia have been shown to display increased levels of depression and anxiety compared to control groups (Stein et al., 2001). This is consistent with studies that have been performed in the area of bulimia research and have correlated temperament with bulimia nervosa (Miller, Schmidt, Vaillancourt, McDougall, & Laliberte, 2006; Pryor and Wiederman, 1996; Ringham, Levine, Kalarchian, & Marcus, 2007; Stein et al., 2001). Miller and colleagues (2006) found using the EPQ that the presence of heightened Neuroticism was the driving factor between whether an individual with low Extraversion would demonstrate symptoms of bulimia. In addition, Pryor and Wiederman (1996) found that participants with bulimia nervosa who completed the MPQ demonstrated increased scores in Negative Emotionality, Alienation, and Stress Reaction as well as decreased scores for Positive Emotionality and Social Closeness.

Comparing Voice Disorders and Bulimia Nervosa in Regard to Anxiety

While the purpose of this study is not to determine whether anxiety and negative emotion is linked to voice disorders in those with eating disorders, the existence of heightened anxiety among those with bulimia nervosa and functional dysphonia are important to note, as they indicate that the assumption that vomiting behaviors and LPR are the cause of voice disorders in those with bulimia nervosa might be an incomplete way of viewing these patients. This alternate possibility for the cause of voice disorders among this population provides additional rationale for researching whether vomiting as a purging method is indeed a risk factor for voice disorders.
Purpose

While there seems to be an assumed relationship between voice disorders and bulimia nervosa amongst clinical professionals based on anecdotal evidence, few studies have been conducted to investigate the prevalence of voice disorders in the population of those with bulimia nervosa. Even fewer studies have addressed the prevalence of voice disorders among those with other eating disorders, such as anorexia nervosa, binge-eating disorder, and EDNOS. Before researchers can justify further study into what causes the relationship between voice disorders and bulimia nervosa, it is necessary to establish that there is, in fact, a correlation connecting the two disorders.

The primary purpose of this study is to determine the prevalence of voice disorders in individuals with bulimia nervosa, anorexia nervosa, binge-eating disorder, and eating disorder not otherwise specified (EDNOS). Furthermore, we hypothesize that individuals with bulimia nervosa display higher rates of voice disorders than the general population, as well as populations with other eating disorders, due to the following factors: trauma caused to the vocal folds by gastrointestinal regurgitation and a common personality profile that predisposes an individual to both voice disorders and bulimia. To determine if voice disorders are primarily a result of physiological causes, we assessed those with eating disorders who engage in purging behaviors to see if they have a higher rate of voice disorders than those who do not engage in purging.

Methods

This is a cross-sectional design employing a survey of a clinical population with the purpose of determining the correlation between voice disorders and eating disorders.
Participants

Participants for this study included individuals who either self-identified as having an eating disorder or had a clinical diagnosis of one or more of the following eating disorders: anorexia nervosa, bulimia nervosa, binge-eating disorder, and eating disorder not otherwise specified (EDNOS). Participants with a diagnosis of anorexia nervosa diagnosis were included in the group of interest due to the binge-eating/purging subtype outlined in the DSM-V. Participants with binge-eating disorder and anorexia nervosa (restricting type) were included as a disordered control group for purging behaviors. Participants were between the ages of 18 and 65. Participants were recruited from eating disorder clinics in Memphis, TN and Birmingham, AL, Reddit, and social media groups for models and dancers. Flyers with a link to the survey were posted in coffee shops and libraries in the Memphis area. The survey was accessed via Qualtrics, and a link to the survey was available to willing participants.

MEASURES

Questionnaire Outline

General Information

Demographics. Initial questions of the survey relate to general background information, age, sex, race, ethnicity, marital status, living situation, and current employment status. Marital status, living situation, and current employment status were included in order to determine situational stressors that might impact the individual’s responses.

General Health. These questions relate to frequency of illness, allergies, autoimmune disorders, and chronic pain. This section serves as a background to help interpret and further define data of interest.
Symptoms and Behaviors

Eating-Disordered Symptoms. These questions relate to the individual’s eating disorder diagnoses. This section includes questions about the individual’s type, severity, and duration of his or her eating disorder. This section also addresses specific purging behaviors as well as whether or not the participant is currently symptomatic. The cutoff for having and eating disorder on this scale was 2.6.

Vocal Behavior. These questions address the participant’s vocal behaviors, such as sleep habits, exposure to harsh chemicals, profession, water consumption, alcohol consumption, caffeine consumption, and tobacco use. The intention of this section is to help uncover additional factors that might lead to voice disorders.

Voice Symptoms. These questions relate to voice disorder symptoms and complaints. This section includes questions related to the individual’s perception of his or her voice, diagnoses of voice disorders, symptoms related to voice disorder, family history, and treatment of voice disorders. This is a main area of interest to us in that it helps to determine whether or not the participant has a voice disorder.

Reflux Symptoms. These questions address symptoms of gastroesophageal reflux disease (GERD), which is important in determining whether voice disorders in patients with eating disorders are due to the physiological consequences of purging, such as GERD.

Questionnaires

Voice Handicap Index. The Voice Handicap Index (VHI; Jacobson et al., 1997) is a thirty-item questionnaire included in order to assess the participant’s quality of life in relation to
his or her voice symptoms on an emotional, physical, and functional level. The items are based on a Likert-type scale in which the participant rates on a scale of zero to five how relevant the statement is to his or her voice with “0” meaning “never” and “5” meaning “always.” The cutoff for having a voice disorder on this scale is 33.

Reflux Symptom Index (RSI). The Reflux Symptom Index (RSI; Belafsky, Postma, & Koufman, 2002) is a nine-item questionnaire included in order to assess the severity of reflux symptoms in the participants. The items are written on a Likert-type scale, with a score of “0” meaning “no problem” and a score of “5” meaning “severe.” The cutoff for having voice symptoms due to reflux is 13.

Eating Disorder Examination Questionnaire (EDE-Q). The Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) is a norm-referenced, self-report questionnaire to detect eating disorders and eating disorder severity among adults.

Analysis

Variables for Analysis

Eating Disorder Symptoms

Eating Disorder Diagnosis. Participants responded to questions regarding the nature and type of their eating disorder. Possible responses included the following: anorexia nervosa, bulimia nervosa, and other. If the participant selected “anorexia nervosa,” a question was generated which asked with which subtype of anorexia nervosa the individual was diagnosed in order to identify the binge/purge subtype. Obtaining the participants’ diagnoses was important because the current voice literature does not address anorexia nervosa in relation to voice disorders, even though there is a purging subtype of anorexia nervosa. If results of the questionnaire showed that individuals with the purging subtype of anorexia nervosa do not
experience voice problems to the same degree as individuals with bulimia nervosa, a factor outside purging behaviors, such as an underlying personality profile, might be indicated.

**Purging Symptoms.** Participants responded to questions regarding whether purging was a symptom of their eating disorder. The purpose of obtaining this information was to analyze whether various purging behaviors such as vomiting, use of laxatives, and over-exercising have differing correlations with voice problems. For example, if results showed that individuals who purge without vomiting experience voice problems at a similar rate as those who do purge by vomiting, this would indicate that voice problems in people who purge are caused by something other than damage to the vocal folds by self-induced vomiting.

**Timeline of Eating Disorder.** Participants responded to questions regarding whether they are currently experiencing symptoms of the eating disorder. Whether the participants are currently symptomatic is important in that it indicates whether trauma to the vocal folds (in the case of those currently symptomatic) or personality constructs (in the case of those currently asymptomatic) might be causing voice problems.

**Duration of Eating Disorder.** If self-induced vomiting is a critical risk factor in developing a voice disorder, it would stand to reason that the longer an individual participated in self-induced vomiting, the more damage would be sustained to the vocal folds, which would increase the risk of developing a voice disorder.

**Severity of Eating Disorder.** Similar to the duration of the eating disorder, if self-induced vomiting is a critical risk factor for developing a voice disorder, it would stand to reason that an increased severity of purging behaviors would cause an increased amount of trauma to the vocal folds, thereby increasing the risk of developing a voice disorder.
Voice

Timeline of Voice Disorder. It is important to analyze when a voice disorder occurred in relation to purging behaviors. If voice disorders often occur concurrently with purging behaviors, it is more reasonable to suggest that purging behaviors might be causing voice problems in individuals with bulimia. If voice disorders occur before or after the cessation of purging behaviors, then there could be an underlying factor such as personality in developing voice disorders.

Voice Complaints and Symptoms. Participants answered questions regarding voice complaints and symptoms. Questions included the voice disorder diagnoses in order to analyze which types of voice disorders occur in individuals with purging disorders, specifically whether voice disorders and complaints are physiological or functional in nature.

Reflux Symptoms. Participants answered questions regarding reflux symptomology and diagnoses. These questions were included in order to determine the correlation between current reflux symptoms and voice disorders among individuals with bulimia. Questions from the RHI were analyzed in order to determine the presence of gastroesophageal reflux (GERD) or laryngopharyngeal reflux (LPR) among participants and their correlation with voice disorders among individuals with eating disorders.

In order to ensure efficiency in completing this survey, skip logic was embedded to bypass irrelevant questions based on the participant’s previous responses.

Power

A power analysis based on the prevalence of eating disorders and voice disorders in the general population revealed that a sample size of 350 individuals would yield power at .80.
RESULTS

The survey link was sent to eating disorder clinics, counseling centers, and social media groups (See Table 1 for a list of the places the survey was disseminated). It was also posted on bulletin boards in local Memphis businesses. There were 197 responses to the survey. The following is a break-down of how participants were exposed to the survey: social media (75.23%), friend/family member (8.26%), other (14.68%), response left blank (1.83%). One response was eliminated due to disagreeing to the consent form. Forty-three completed <15% of the survey, and their responses were eliminated. Forty-four did not qualify as having eating disorders (ED) according to the qualifications of this study and their responses were excluded from analysis. After these responses were eliminated, responses from one hundred-nine participants were analyzed. Due to the low number of responses in this survey, results did not reach adequate power to employ any inferential statistics. Because of this, results should be viewed as pilot data.

Table 1
Survey Dissemination

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<tr>
<td>Business</td>
<td>Trinity Panera (Cordova)</td>
<td>Memphis, TN</td>
</tr>
<tr>
<td>Business</td>
<td>Panera (Highway 64)</td>
<td>Memphis, TN</td>
</tr>
<tr>
<td>Business</td>
<td>Panera (Germantown + Poplar)</td>
<td>Memphis, TN</td>
</tr>
<tr>
<td>Business</td>
<td>Starbucks (Lakeland + Highway 64)</td>
<td>Memphis, TN</td>
</tr>
</tbody>
</table>
Table 1 (Continued)

<table>
<thead>
<tr>
<th>Business</th>
<th>Starbucks (Cordova + Germantown Parkway)</th>
<th>Memphis, TN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>Starbucks (Germantown Parkway + Wolf River)</td>
<td>Memphis, TN</td>
</tr>
<tr>
<td>Business</td>
<td>Starbucks (Exeter Village)</td>
<td>Memphis, TN</td>
</tr>
<tr>
<td>Business</td>
<td>Starbucks (Poplar and Prescott)</td>
<td>Memphis, TN</td>
</tr>
<tr>
<td>Business</td>
<td>BLH Library</td>
<td>Memphis, TN</td>
</tr>
<tr>
<td>Business</td>
<td>Panera (Laurelwood)</td>
<td>Memphis, TN</td>
</tr>
<tr>
<td>Business</td>
<td>Panera (Union)</td>
<td>Memphis, TN</td>
</tr>
<tr>
<td>Business</td>
<td>Whole Foods (Poplar)</td>
<td>Memphis, TN</td>
</tr>
<tr>
<td>Facebook Page</td>
<td>Ballet Memphis</td>
<td>Online</td>
</tr>
<tr>
<td>Facebook Page</td>
<td>Nashville Ballet</td>
<td>Online</td>
</tr>
<tr>
<td>Facebook Page</td>
<td>Memphis-Model, Photographers, and Designers</td>
<td>Online</td>
</tr>
<tr>
<td>Social Media</td>
<td>Reddit</td>
<td>Online</td>
</tr>
</tbody>
</table>

Descriptive Statistics

Demographics

Age. The average year of birth was 1993 making the average age of participants 26 years. The range of ages of participants was 18-51.

Race and Ethnicity. The races of the participants with ED were as follows: White (81.08%), White-Hispanic (3.67%), White and Black or African American (3.67%), White and Native American or Alaskan Native (0.92%), White-Other (0.92%), Asian (5.50%), Asian-Native Hawaiian or Pacific Islander (0.92%), Other (2.75%). Please see Table 2 for a breakdown of race and ethnicity.

Table 2
Race and Ethnicity

<table>
<thead>
<tr>
<th>Race</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>89</td>
<td>109</td>
<td>81.08%</td>
</tr>
<tr>
<td>White-Hispanic</td>
<td>4</td>
<td>109</td>
<td>3.67%</td>
</tr>
<tr>
<td>White, Black or African American</td>
<td>4</td>
<td>109</td>
<td>3.67%</td>
</tr>
<tr>
<td>White, American Indian</td>
<td>1</td>
<td>109</td>
<td>0.92%</td>
</tr>
<tr>
<td>White, Other</td>
<td>1</td>
<td>109</td>
<td>0.92%</td>
</tr>
<tr>
<td>Asian</td>
<td>6</td>
<td>109</td>
<td>5.50%</td>
</tr>
<tr>
<td>Asian, Native Hawaiian or Pacific Islander</td>
<td>1</td>
<td>109</td>
<td>0.92%</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>109</td>
<td>2.75%</td>
</tr>
</tbody>
</table>
**Sex and Gender.** Of the participants with eating disorders (ED), 81.65% identified as females, 13.76% males, and 4.59% did not provide their sex or gender. Please see Table 3 for a breakdown of sex/gender.

<table>
<thead>
<tr>
<th>Sex/Gender</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>89</td>
<td>109</td>
<td>81.65%</td>
</tr>
<tr>
<td>Male</td>
<td>15</td>
<td>109</td>
<td>13.76%</td>
</tr>
<tr>
<td>Did not answer</td>
<td>5</td>
<td>109</td>
<td>4.59%</td>
</tr>
</tbody>
</table>

**Marital Status.** Of the participants with ED, 82.57% had never been married, 13.76% were married, and 1.83% were divorced (See Table 4).

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>15</td>
<td>109</td>
<td>13.76%</td>
</tr>
<tr>
<td>Never Married</td>
<td>90</td>
<td>109</td>
<td>82.57%</td>
</tr>
<tr>
<td>Divorced</td>
<td>2</td>
<td>109</td>
<td>1.83%</td>
</tr>
</tbody>
</table>

**Employment.** Of the participants with ED, 52.29% were working as paid employees, 3.67% were self-employed, 11.01% were not working and looking for work, 5.50% were not working and disabled, 3.67% preferred not to answer, 1.83% left the question blank, and 22.02% were not working-other. Under the classification of “working-other,” 15.60% of the participants with ED classified themselves as full-time students, and 3.67% classified themselves as homemakers (See Table 5).

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working (paid employee)</td>
<td>57</td>
<td>109</td>
<td>52.29%</td>
</tr>
<tr>
<td>Working (self-employed)</td>
<td>4</td>
<td>109</td>
<td>3.67%</td>
</tr>
</tbody>
</table>
Table 5 (Continued)

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not working (looking for work)</td>
<td>12</td>
<td>109</td>
<td>11.01%</td>
</tr>
<tr>
<td>Not working (disabled)</td>
<td>6</td>
<td>109</td>
<td>5.50%</td>
</tr>
<tr>
<td>Not working (other)</td>
<td>24</td>
<td>109</td>
<td>22.02%</td>
</tr>
<tr>
<td>Homemaker</td>
<td>4</td>
<td>109</td>
<td>3.67%</td>
</tr>
<tr>
<td>Student</td>
<td>17</td>
<td>109</td>
<td>15.60%</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>4</td>
<td>109</td>
<td>3.67%</td>
</tr>
<tr>
<td>Left Blank</td>
<td>2</td>
<td>109</td>
<td>1.83%</td>
</tr>
</tbody>
</table>

Eating Disorder Symptoms and Diagnosis. Participants were considered as having an eating disorder (ED) if they met any of the following qualifications: Self-identifying as having an ED, having been diagnosed with an ED, or scoring above a 2.76 on the EDE-Q. Eighty-six participants qualified as having an ED. Of those with ED diagnoses, the following ED diagnoses were reported: anorexia nervosa (AN) alone (16.87%), bulimia nervosa (BN) alone (13.25%), AN+BN (9.64%), binge-eating disorder (BED; 10.84%), AN+BN+BED (6.02%), AN+ eating disorder not otherwise specific (EDNOS; 9.64%), Eating Disorder Not Otherwise Specified (EDNOS) alone (18.07%), BN+EDNOS (6.02%), BN+BED (2.41%), BN+BED+EDNOS (1.20%), AN+BED+EDNOS (2.41%), BED+EDNOS (1.20%), BED+EDNOS+Other (1.2%), and AN+BN+BED+EDNOS (1.2%; see Table 6). Of those with ED diagnoses, 46.99% included AN, 40.96% included BN, 27.71% included BED, and 42.17% included EDNOS (See Figure 1).

Table 6
Eating Disorder Diagnoses

<table>
<thead>
<tr>
<th>ED Diagnosis</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN alone</td>
<td>14</td>
<td>109</td>
<td>12.84%</td>
</tr>
<tr>
<td>BN alone</td>
<td>11</td>
<td>109</td>
<td>10.09%</td>
</tr>
<tr>
<td>AN and BN</td>
<td>8</td>
<td>109</td>
<td>7.34%</td>
</tr>
<tr>
<td>BED alone</td>
<td>9</td>
<td>109</td>
<td>8.26%</td>
</tr>
<tr>
<td>AN, BN, and BED</td>
<td>5</td>
<td>109</td>
<td>4.59%</td>
</tr>
<tr>
<td>AN and EDNOS</td>
<td>8</td>
<td>109</td>
<td>7.34%</td>
</tr>
</tbody>
</table>
Table 6 (Continued)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDNOS</td>
<td>15</td>
<td>109</td>
<td>13.76%</td>
</tr>
<tr>
<td>BN, EDNOS</td>
<td>5</td>
<td>109</td>
<td>4.59%</td>
</tr>
<tr>
<td>BN, BED</td>
<td>2</td>
<td>109</td>
<td>1.83%</td>
</tr>
<tr>
<td>BN, BED, EDNOS</td>
<td>1</td>
<td>109</td>
<td>0.92%</td>
</tr>
<tr>
<td>AN, BED, EDNOS</td>
<td>2</td>
<td>109</td>
<td>1.83%</td>
</tr>
<tr>
<td>BED, EDNOS</td>
<td>1</td>
<td>109</td>
<td>0.92%</td>
</tr>
<tr>
<td>BED, EDNOS, Other</td>
<td>1</td>
<td>109</td>
<td>0.92%</td>
</tr>
<tr>
<td>AN, BN, BED, EDNOS</td>
<td>1</td>
<td>109</td>
<td>0.92%</td>
</tr>
<tr>
<td>No Diagnosis</td>
<td>22</td>
<td>109</td>
<td>10.18%</td>
</tr>
</tbody>
</table>

Voice Disorders. Participants were considered to have a voice disorder if they met one of three separate measures: whether the participant identified themselves as having a voice disorder, scoring over >33 on the Voice Handicap Index (VHI), or reporting >10 voice symptoms per Roy et al. (2005). Six participants self-identified as having a voice disorder. The VHI identified 8 participants as having voice disorders who did not self-identify (See Table 7). Reporting >10 voice symptoms was a redundant inclusion criterion, as all of the participants who reported more than 10 voice symptoms also either identified as having a voice disorder or scored >33 on the VHI. All but one of the participants who self-identified as having a voice disorder scored >33 on the VHI. The other participant scored a 31 on the VHI. Of those who qualified as having a voice disorder for the purposes of this study, none had been officially diagnosed with a voice disorder by a physician.

Table 7
Voice Disorder Inclusion Criterion

<table>
<thead>
<tr>
<th>Inclusion Criteria</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score&gt;33 on VHI</td>
<td>13</td>
<td>14</td>
<td>92.86%</td>
</tr>
<tr>
<td>Self-Identification</td>
<td>6</td>
<td>14</td>
<td>42.86%</td>
</tr>
</tbody>
</table>
Voice Disorders among Those with Eating Disorders.

Voice Disorder Symptoms and Diagnosis. To answer the first hypothesis, that those with ED would have a higher rate of VD than the general population, we employed the above-named definitions for having an eating disorder and a voice disorder and calculated the number of individuals who had both and eating disorder and a voice disorder, compared this number to the sample of those who only reported an eating disorder. Of the 64 participants with eating disorders who completed the Voice Disorders section and the VHI, 14 (21.88%) were categorized as having a voice disorder (See Table 8). Given that the prevalence of VD in the general population is between 3-9% Ramig & Verdolini, 1998; Roy, Merrill, Gray, & Smith, 2005), this hypothesis is worth pursuing further.

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice Disorders</td>
<td>14</td>
<td>64</td>
<td>21.88%</td>
</tr>
<tr>
<td>Without Voice Disorders</td>
<td>51</td>
<td>64</td>
<td>79.69%</td>
</tr>
</tbody>
</table>

ED Diagnoses among Those with VD.

To answer the second hypothesis that those with a diagnosis of BN would have a higher rate of VD and using the above definitions of an eating disorder and voice disorder, we categorized specific eating disorders as anorexia nervosa, bulimia nervosa, binge-eating disorder, and eating disorder not otherwise specified (EDNOS) by self-identification. Obtaining the participants’ diagnoses was important in order to determine whether specific ED diagnoses were related to voice disorders. Because many participants reported multiple ED diagnoses, the specific diagnoses were aggregated and prevalence rates of VD were calculated for each ED group (See Table 9).
Table 9
Prevalence of Voice Disorders Among Specific ED

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN</td>
<td>9</td>
<td>39</td>
<td>23.08%</td>
</tr>
<tr>
<td>BN</td>
<td>6</td>
<td>34</td>
<td>17.65%</td>
</tr>
<tr>
<td>BED</td>
<td>3</td>
<td>23</td>
<td>13.04%</td>
</tr>
<tr>
<td>EDNOS</td>
<td>4</td>
<td>35</td>
<td>11.43%</td>
</tr>
</tbody>
</table>

Another way to answer this question was to look at specific ED diagnoses in only those who reported having a VD. Among those with ED and VD, the following ED were reported: AN alone (14.29%), AN+EDNOS (14.29%), AN+BED (7.14%), AN+BN (21.43%), BN alone (7.14%), BN+BED (7.14%), AN+BD+BED+EDNOS (7.14%), EDNOS (7.14%), ED diagnosis not provided (14.29%; see Table 10).

Table 10
Eating Disorder Diagnoses in those with Voice Disorders

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anorexia alone</td>
<td>2</td>
<td>14</td>
<td>14.29%</td>
</tr>
<tr>
<td>Anorexia+EDNOS</td>
<td>2</td>
<td>14</td>
<td>14.29%</td>
</tr>
<tr>
<td>Anorexia+Binge-eating</td>
<td>1</td>
<td>14</td>
<td>7.14%</td>
</tr>
<tr>
<td>Anorexia +Bulimia</td>
<td>3</td>
<td>14</td>
<td>21.43%</td>
</tr>
<tr>
<td>Bulimia alone</td>
<td>1</td>
<td>14</td>
<td>7.14%</td>
</tr>
<tr>
<td>BN+BED</td>
<td>1</td>
<td>14</td>
<td>7.14%</td>
</tr>
<tr>
<td>Anorexia+BN+BED+EDNOS</td>
<td>1</td>
<td>14</td>
<td>7.14%</td>
</tr>
<tr>
<td>EDNOS</td>
<td>1</td>
<td>14</td>
<td>7.14%</td>
</tr>
<tr>
<td>Not provided</td>
<td>2</td>
<td>14</td>
<td>14.29%</td>
</tr>
</tbody>
</table>

The one participant who reported BN alone as her diagnosis also reported that she did not participate in purging behaviors. Because many of the participants reported multiple ED diagnoses, the diagnoses were aggregated in order to obtain the prevalence of VD among each ED diagnosis. Among those with ED and VD, (64.29%) reported AN as one of their diagnoses, (42.86%) reported BN as one of their diagnoses, (21.43%) reported BED as one of their
diagnoses, and (28.57%) reported EDNOS as one of their diagnoses. Of those with ED and VD, (57.14%) reported having multiple ED diagnoses (See Figure 1).

Figure 1
Eating Disorder Diagnoses in those with Voice Disorders

It appears that those with BN did not necessarily show the highest rates of VD in this study at 42.86%. Rather, those with AN at a rate of 64.29% showed the highest prevalence of a VD. However, it should be noted that the highest rates of having a VD occurred in the population of individuals who had both AN and BN at 21.43%

Purging Behaviors

To answer the third hypothesis, that those with purging behaviors of vomiting would have the highest prevalence of a VD and defining purging behaviors by participant report of purging methods: vomiting, laxatives, exercise, or any combination of the three. Purging
behaviors in all of the participants with ED were compared with purging behaviors in those with ED and VD in order to determine whether specific purging behaviors are risk factors for developing a voice disorder.

**Purging Behaviors in those with ED.** Among the 109 participants who qualified as having an ED, the following purging behaviors were reported: vomiting alone (18.35%), vomiting+exercise (14.68%), vomiting+laxatives (4.59%), vomiting+laxatives+exercise (9.17%), laxatives+exercise (1.83%), laxatives alone (1.83%), exercise alone (11.01%), and no purging (33.03%; see Table 11).

<table>
<thead>
<tr>
<th>Purging Behaviors</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting Alone</td>
<td>20</td>
<td>109</td>
<td>18.35%</td>
</tr>
<tr>
<td>Vomiting +exercise</td>
<td>16</td>
<td>109</td>
<td>14.68%</td>
</tr>
<tr>
<td>Vomiting+laxatives</td>
<td>5</td>
<td>109</td>
<td>4.59%</td>
</tr>
<tr>
<td>Vomiting+laxatives+exercise</td>
<td>10</td>
<td>109</td>
<td>9.17%</td>
</tr>
<tr>
<td>Laxatives+exercise</td>
<td>2</td>
<td>109</td>
<td>1.83%</td>
</tr>
<tr>
<td>Laxatives alone</td>
<td>2</td>
<td>109</td>
<td>1.83%</td>
</tr>
<tr>
<td>Exercise alone</td>
<td>12</td>
<td>109</td>
<td>11.01%</td>
</tr>
<tr>
<td>No purging</td>
<td>36</td>
<td>109</td>
<td>33.03%</td>
</tr>
</tbody>
</table>

Of the 109 participants who qualified as having an ED, 46.79% had purging methods that included vomiting, 17.43% had purging methods that included laxatives, and 36.70% had purging methods that included exercise (See Figure 2).
Purging Behaviors among Those with VD. Of the 14 participants who qualified as having a VD, the following purging behaviors were reported: vomiting alone (0%), vomiting+exercise (21.43%), vomiting+laxatives (7.14%), vomiting+laxatives+exercise (21.43%), laxatives+exercise (7.14%), exercise alone (14.29%), no purging behaviors (28.57%; see Table 12).

Table 12

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting Alone</td>
<td>0</td>
<td>14</td>
<td>0.00%</td>
</tr>
<tr>
<td>Vomiting +exercise</td>
<td>3</td>
<td>14</td>
<td>21.43%</td>
</tr>
<tr>
<td>Vomiting+laxatives</td>
<td>1</td>
<td>14</td>
<td>7.14%</td>
</tr>
<tr>
<td>Vomiting+laxatives+exercise</td>
<td>3</td>
<td>14</td>
<td>21.43%</td>
</tr>
<tr>
<td>Laxatives+exercise</td>
<td>1</td>
<td>14</td>
<td>7.14%</td>
</tr>
<tr>
<td>Exercise alone</td>
<td>2</td>
<td>14</td>
<td>14.29%</td>
</tr>
<tr>
<td>No purging</td>
<td>4</td>
<td>14</td>
<td>28.57%</td>
</tr>
</tbody>
</table>
Of the 14 participants who qualified as having a VD, 50.00% had purging methods that included vomiting, 35.71% had purging methods that included laxatives, and 64.29% had purging methods that included exercise (See Figure 2). Although purging behaviors of vomiting appear to be high in those with VD (50%), it appears that the highest rate of VD in those who purge appears in those who purge through exercise (64.29%)

Other Notable Findings

LPR among Those with ED and VD. The Reflux Symptom Index (RSI) was administered in order to determine the presence of LPR in the participants. Reflux is a risk factor for developing a voice disorder (Sataloff, Hawkshaw, & Gupta, 2010). This information was included to ensure that differences in voice symptoms among ED diagnoses and purging behaviors are not entirely due to LPR. A score greater than or equal to 13 on the RSI qualifies one as having LPR. The following groups scored as having LPR: ED (41.33%), ED+VD (78.57%), ED+vomiting (46.34%), ED without vomiting (37.14%), ED with vomiting+VD (87.50%), and ED without vomiting+VD (60.00%, see Table 13).

<table>
<thead>
<tr>
<th>Diagnoses and Purging Behaviors</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED</td>
<td>31</td>
<td>75</td>
<td>41.33%</td>
</tr>
<tr>
<td>ED+VD</td>
<td>11</td>
<td>14</td>
<td>78.57%</td>
</tr>
<tr>
<td>ED with vomiting+VD</td>
<td>7</td>
<td>8</td>
<td>87.50%</td>
</tr>
<tr>
<td>ED w/o vomiting+VD</td>
<td>3</td>
<td>5</td>
<td>60.00%</td>
</tr>
<tr>
<td>ED with vomiting</td>
<td>19</td>
<td>41</td>
<td>46.34%</td>
</tr>
<tr>
<td>ED w/o vomiting</td>
<td>13</td>
<td>35</td>
<td>37.14%</td>
</tr>
</tbody>
</table>

Voice Complaints among those with ED. Specific voice symptoms were analyzed in order to determine whether specific ED diagnoses or purging behaviors demonstrated specific voice complaints. Tables 14, 15, and 16 represent specific voice complaints, such as feeling a
tightness in the throat while speaking, feeling as though speaking is an effortful task, and voice symptoms becoming worse under stress. One of the participants with ED+VD did not answer this question.

Table 14
Feeling of Tightness in Throat When Speaking

<table>
<thead>
<tr>
<th>Groups</th>
<th>Number (Yes or other)</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED</td>
<td>20</td>
<td>69</td>
<td>28.99%</td>
</tr>
<tr>
<td>ED w/o VD</td>
<td>7</td>
<td>55</td>
<td>12.73%</td>
</tr>
<tr>
<td>ED+VD</td>
<td>9</td>
<td>14</td>
<td>64.29%</td>
</tr>
<tr>
<td>Includes AN+VD</td>
<td>6</td>
<td>9</td>
<td>66.67%</td>
</tr>
<tr>
<td>Includes BN+VD</td>
<td>5</td>
<td>6</td>
<td>83.33%</td>
</tr>
</tbody>
</table>

Table 15
Feel as though Speaking is an Effortful Task

<table>
<thead>
<tr>
<th>Effortful Task</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED</td>
<td>18</td>
<td>69</td>
<td>26.09%</td>
</tr>
<tr>
<td>ED w/o VD</td>
<td>4</td>
<td>56</td>
<td>7.14%</td>
</tr>
<tr>
<td>ED+VD</td>
<td>11</td>
<td>14</td>
<td>78.57%</td>
</tr>
<tr>
<td>Includes AN+VD</td>
<td>6</td>
<td>9</td>
<td>66.67%</td>
</tr>
<tr>
<td>Includes BN+VD</td>
<td>5</td>
<td>6</td>
<td>83.33%</td>
</tr>
<tr>
<td>Vomiting and VD</td>
<td>6</td>
<td>8</td>
<td>75.00%</td>
</tr>
<tr>
<td>W/o Vomiting and VD</td>
<td>4</td>
<td>5</td>
<td>80.00%</td>
</tr>
</tbody>
</table>

Table 16
Voice is Worse under Stress

<table>
<thead>
<tr>
<th>Groups</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED</td>
<td>33</td>
<td>69</td>
<td>47.83%</td>
</tr>
<tr>
<td>ED w/o VD</td>
<td>20</td>
<td>56</td>
<td>35.71%</td>
</tr>
<tr>
<td>ED+VD</td>
<td>12</td>
<td>13</td>
<td>92.31%</td>
</tr>
<tr>
<td>Includes AN+VD</td>
<td>7</td>
<td>8</td>
<td>87.50%</td>
</tr>
<tr>
<td>Includes BN+VD</td>
<td>6</td>
<td>8</td>
<td>75.00%</td>
</tr>
<tr>
<td>Vomiting and VD</td>
<td>8</td>
<td>8</td>
<td>100.00%</td>
</tr>
<tr>
<td>W/o vomiting+VD</td>
<td>4</td>
<td>5</td>
<td>80.00%</td>
</tr>
</tbody>
</table>

Concurrency of VD and ED. In regard to whether having an ED is a contributing factor in developing a voice disorder, questions regarding the concurrency of VD onset to ED onset/purging behaviors were asked. VD onset after ED onset/purging behaviors could be
indicative of the ED contributing to the voice disorder, though it could also be indicative of age contributing to the VD. VD onset *during* ED symptoms/purging behaviors would be a greater indication of the ED contributing to the VD. VD onset *before* ED onset/purging behaviors would indicate that the VD was not caused by the ED.

Among the 6 participants with ED and VD who answered the question regarding the concurrency of their VD and ED, 16.67% reported that their VD occurred *before* their ED, 16.67% reported that their VD occurred at the same time and after their ED, and 66.67% reported that their VD occurred *after* their ED (See Table 17). The diagnoses of the participant who reported that their VD occurred before their ED included AN, BN, BED, and EDNOS. The participant who reported that their VD occurred during and after their ED reported no ED diagnoses but reported purging behaviors of vomiting, laxatives, and exercise. Of those who reported that their VD occurred only after their ED, 3/4 (75%) reported that vomiting was not one of their purging behaviors. For information on ED Diagnosis, Purging, Vomiting, Purging Type, Current Purging, Most Recent Voice Problem, and Duration of VD in those with VD and ED (See Table 11).

<table>
<thead>
<tr>
<th>Concurrency</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>1</td>
<td>6</td>
<td>16.67%</td>
</tr>
<tr>
<td>At the same time, after</td>
<td>1</td>
<td>6</td>
<td>16.67%</td>
</tr>
<tr>
<td>After</td>
<td>4</td>
<td>6</td>
<td>66.67%</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Purging</td>
<td>Vomiting</td>
<td>Method of Purging</td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
<td>----------</td>
<td>-------------------</td>
</tr>
<tr>
<td>AN, EDNOS</td>
<td>Yes</td>
<td>Yes</td>
<td>Vomiting,Laxatives, Exercise</td>
</tr>
<tr>
<td>AN, BN</td>
<td>Yes</td>
<td>Yes</td>
<td>Vomiting,Laxatives</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>Vomiting,Laxatives, Exercise</td>
</tr>
<tr>
<td>AN, EDNOS</td>
<td>Yes</td>
<td>No</td>
<td>Exercise</td>
</tr>
<tr>
<td>BN</td>
<td>No</td>
<td>No</td>
<td>Exercise</td>
</tr>
<tr>
<td>AN, BED</td>
<td>No</td>
<td>Exercise</td>
<td>Yes</td>
</tr>
<tr>
<td>AN, BN</td>
<td>Yes</td>
<td>Yes</td>
<td>Vomiting,Exercise</td>
</tr>
<tr>
<td>AN, BN, BED, EDNOS</td>
<td>Yes</td>
<td>Vomiting,Exercise</td>
<td>No</td>
</tr>
<tr>
<td>EDNOS</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>AN</td>
<td>No</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>AN, BN</td>
<td>Yes</td>
<td>Yes</td>
<td>Vomiting,Laxatives, Exercise</td>
</tr>
<tr>
<td>AN</td>
<td>Yes</td>
<td>No</td>
<td>Laxatives,Exercise</td>
</tr>
<tr>
<td>BN, BED</td>
<td>Yes</td>
<td>Yes</td>
<td>Vomiting,Exercise</td>
</tr>
</tbody>
</table>
EDE-Q Subscales among those with ED and VD. ED severity among the group with VD was compared to the group with ED using the Eating Disorder Examination-Questionnaire (EDE-Q). Those with ED and VD scored as more severe on all subtests of the EDE-Q as well as the Total Score. Ninety-three of the participants with ED completed the EDE-Q. Of those 93 participants, the averages on each subscale were as follows: Restraint (3.13), Eating Concern (2.6), Shape Concern (4.06), Weight Concern, (3.63), Total Score (3.37). Of the 14 participants with ED and VD, the averages on each subscale were as follows: Restraint (4.00), Eating Concern (3.03), Shape Concern (4.29), Weight Concern (3.90), Total Score (3.80).

![Figure 3](image-url)

Figure 3
EDE-Q Subscales among those with ED and VD
DISCUSSION

While the literature has generally assumed that individuals with bulimia nervosa are at a higher risk for voice disorders than the general population due to the purging behavior of vomiting, this study suggests that this idea may not be the most accurate representation of the relationship between eating disorders and voice disorders. The majority of the participants who responded to this survey were Caucasian females. This is consistent with the population that is typically treated for eating disorders, though Sonneville and Lipson (2018) argue that ethnic minorities and males are less likely to identify themselves as having an eating disorder or be recommended for treatment. It is possible this survey is not representative of the entire population with eating disorders, as underdiagnosed populations would be less likely to complete the survey.

The first purpose of this study was to determine whether or not individuals with eating disorders demonstrate a higher incidence/prevalence of voice disorders than the general population. Overall, those with eating disorders demonstrated a 21.88% prevalence rate for voice disorders, which is over double the 3-9% prevalence rate of voice disorders in the general population (Ramig & Verdolini, 1998; Roy, et al. 2005). However, this prevalence is calculated based on only those who completed the voice disorders section and the VHI, which was a far less number than necessary to make any definite conclusions.

The second purpose of this study was to determine whether specific eating disorder diagnoses place individuals at a higher risk for voice disorders than the general population. The assumption up to this point in the literature has been that individuals with bulimia nervosa are at a higher risk for voice disorders than the general population due to trauma to the larynx and laryngopharyngeal reflux (LPR). The results did indeed reveal a higher prevalence of voice
disorders in individuals with bulimia nervosa (17.65%) than the general population (3-9%). While 31.19% of the participants in the study reported a diagnosis of bulimia nervosa, 42.86% reported a diagnosis of bulimia nervosa among those who qualified as having a voice disorder.

Interestingly enough, the group with bulimia nervosa was not the group with the highest prevalence of voice disorders among the group with eating disorders. In fact, in this group individuals with a diagnosis of anorexia nervosa actually showed a higher prevalence of voice disorders than individuals with bulimia. Of the 39 participants who included anorexia nervosa in their diagnoses, 23.08% qualified as having voice disorders. In addition, while 35.78% of the participants reported a diagnosis of anorexia nervosa, 64.29% of the participants of the group with voice disorders reported a diagnosis of anorexia nervosa. Finally, of the participants who reported binge-eating disorder as one of their diagnoses, only 13.04% qualified as having a voice disorder. Those with EDNOS as one of their diagnoses, 11.43% qualified as having a voice disorder. Because many ED diagnosis have increased prevalence of having a voice disorder, it suggests that specific eating disorders diagnoses are less important than behaviors related to the diagnoses (purging vs. restricting).

Only 28.57% of those with eating disorders who qualified as having a voice disorder reported only one eating disorder diagnosis. Fifty-seven percent who were classified as having a voice disorder exhibited multiple eating disorder diagnoses, and 14.28% did not provide a diagnosis. It is difficult to determine whether those with multiple eating disorders are at a higher risk for voice disorders than those with only one eating disorder diagnosis. Again, given this situation of multiple diagnoses in this population, it suggests that the specific diagnoses are less important than behaviors related to that diagnosis. Because multiple diagnoses were more often reported than single diagnoses, the power needed for future studies would require additional
participants beyond 350. This increased number may not render surveys like this to be feasible. Additionally, it could also mean that having multiple diagnoses may suggest that having a voice disorder and an eating disorder reflects the severity of the eating disorder, because those with concomitant voice problems had a higher prevalence of multiple diagnoses.

The third purpose of this study was to determine whether there is a relation between specific purging behaviors and voice disorders. The general consensus to date has been that those who purge via vomiting are at a higher risk of voice disorders than the general population due to damage to the larynx during vomiting and LPR due to the relaxation of the UES (Balata et al., 2008; Ferreira et al., 2010). While this study did reveal that individuals with a bulimia nervosa diagnosis did indeed demonstrate a higher incidence/prevalence of voice disorders than the general population, the results did not clearly correlate the purging behavior of vomiting with voice disorders in individuals with eating disorders.

In this population there was not much of a difference between the prevalence of vomiting as a purging behavior among the participants who qualified as having an eating disorder (46.79%) and the prevalence of vomiting behaviors among those with eating disorders and voice disorders (50.00%). This may indicate that using vomiting as a purging behavior does not increase the risk of voice disorders among those with eating disorders. Among the group with eating disorders and voice disorders, there was a higher prevalence of using exercise as a purging behavior (64.29%) than using vomiting as a purging behavior (50.00%). This is especially interesting considering only 36.70% of the participants with eating disorders reported exercise as a purging behavior. There was also a high prevalence (57.14%) of using multiple purging methods among the group with eating disorders and voice disorders compared to the same prevalence among the entire group of those with eating disorders (30.28%). This indicates that
using exercise as a purging method or using multiple purging methods increases the risk of voice disorders in individuals with eating disorders.

While the assumption that those with bulimia nervosa are at a higher risk for voice disorders than the general population is supported by this study, the theoretical construct that this higher risk is caused by vomiting behaviors is not supported by this study. A possible explanation for this can be found in the finding that in this cohort individuals with anorexia nervosa demonstrated an even higher rate of voice disorders than those with bulimia nervosa.

A higher rate of voice disorders in this population could be the fact that individuals with eating disorders suffer from extreme malnutrition due to the restricting nature of the disorder. Over a long period of time, extreme malnutrition causes muscle wasting and the atrophy of tissues (McLoughlin, et al., 1998). It is possible that the malnutrition in those with anorexia nervosa causes damage to the extracellular matrix of the vocal folds and hinder wound repair processes (Brankski, Verdolini, Sandulache, Rosen, & Hebda, 2006). This tissue damage could be an organic cause of voice disorders among this population. As the tissue of the vocal folds wastes and the muscles of the larynx atrophy, the resulting condition could be a functional or muscle tension dysphonia that arises from maladaptive compensatory strategies, such as muscle straining (Kaye & Blitzer, 2017).

This idea that malnutrition is a contributing factor to voice disorders could also be used to explain the increased prevalence of voice disorders among those with bulimia nervosa. Individuals with bulimia nervosa also suffer from malnutrition as a result of purging behaviors (Marcos, 2000). This might explain why individuals with bulimia nervosa have a higher prevalence of voice disorders than the general population, though not as high as those with anorexia nervosa.
In addition to malnutrition, individuals who exercise, often breathe through their mouth, which can cause tissue degradation due to dehydration (Hall, 2005; Sivasankar, Erickson, Schneider, & Hawes, 2008). As the evidence indicates that exercise is a risk factor for voice disorders, it could be a combined effect of malnutrition and dehydration contributing to voice disorders among this population.

Not surprisingly, the incidence of LPR was much higher in the population with ED and VD (78.57%) than the group with simply ED (41.33%). These results are fairly consistent with the prevalence of LPR in individuals with voice disorders (50-78%; Lechein et al., 2017). Of those who scored as having LPR according to the RSI, 45.16% qualified as having a voice disorder, which is a considerably higher prevalence than the general population. This supports the notion that LPR is a risk factor for voice disorders among those with eating disorders, but it is not the only risk factor.

Other Interesting Findings. Administration of the EDE-Q revealed that the group with both eating disorders and voice disorders scored as more severely on the Total Score and the following subtests: Restraint, Eating Concern, Shape Concern, and Weight Concern. This finding may indicate that an increased severity of the eating disorder may be a risk factor for voice disorders or that voice disorders are an additional marker for a more severe eating disorder. The largest difference between the group with ED alone and those who also have VD was in the Restraint sub score, which finding could indicate that there is a certain temperamental style underlying certain voice disorders among the population with eating disorders. At this time, it is difficult to tell if the temperamental style may be creating both an ED and VD problem, if having a VD makes an ED worse, or if a VD is a marker of a more severe form of an ED.
Clinical Relevance. The clinical relevance to this study lies in how voice clinicians view the underlying pathologies causing voice disorders among individuals with eating disorders. Understanding that malnutrition might be a large factor contributing to voice disorders among this population indicates a greater importance on collaboration between voice clinicians and dieticians/nutritionists when treating this population. In addition, these results indicate that clinicians should be looking at behaviors associated with the diagnosis rather than the diagnosis itself. In the past, it has been assumed that bulimia nervosa was a cause of voice disorders, but anorexia nervosa was neglected as a possible cause, even though there is a binge-purge subclass of anorexia nervosa. Speech-language pathologists and otolaryngologists are not typically educated in the details of eating disorders, which is why it is important for clinicians to research the behaviors associated with these disorders, as well as the behaviors of their specific patients, before making assumptions.

Limitations. The most significant limitation of this study was the number of participants. As the prevalence of AN, BN, and BED in the U.S. are 0.80%, 0.28%, and 0.85%, respectively, (Udo & Grilo, 2018) and the prevalence of voice disorders in the U.S. is 3%-9% (Ramig & Verdolini, 1998; Roy, Merrill, Gray, & Smith, 2005), this study was focusing on a very small percentage of the population. Because of this, the study was only able to analyze 109 individuals with eating disorders and 14 individuals with both eating disorders and voice disorders. In addition, individuals with eating disorders are also considered a sensitive population. This made dissemination of the survey challenging, as many groups were unwilling to disseminate the survey to members with the intent of protecting members from anything that could trigger eating
disorder symptoms. This lack of participants could explain why no significant correlations were found between voice disorders and eating disorders.

Another limitation of this study was that many of the participants had multiple eating disorder diagnoses. This made it difficult to isolate any one diagnosis that might lead to having a voice disorder, which is why results were reported as “Diagnoses include AN/BN/BED/EDNOS.” In addition, many of the participants reported no eating disorder diagnosis, despite qualifying as having an eating disorder according to the EDE-Q.

Additionally, a limitation of this study involves the usage of the VHI as a measure of determining whether an individual has a voice disorder. There were individuals who had voice complaints that did not quality for having a VD using the VHI. Specifically, 35.71% additional individuals with ED complained of their voices becoming worse under stress and 12.73% complained of and experiencing a tightness in their throats. This would suggest that the VHI is a more specific test of VD and findings in this study can be interpreted accordingly. To further explicate the specificity of this test, a third definition of a voice disorder reported by Roy and colleagues (2005) stated that 10 or more voice symptoms qualify one as having a voice disorder. All of the participants who reported 10 or more voice symptoms qualified as having a voice disorder via the VHI or self-report.

On the other hand, van Mersbergen, Patrick, and Glaze (2008) report that those with social anxiety disorders are likely to score in the disordered range on the VHI, even when perceptual measures which are the gold standard for diagnosing voice disorders are not indicative of a voice disorder. This begs the question of whether or not individuals with certain anxiety-associated disorders such as EDs are more likely to perceive themselves as having voice disorder symptoms than other groups. Further research into the specificity and sensitivity of the
VHI is necessary if research into the co-occurrence of VD and other psychopathologies is to be conducted.

An additional limitation of this study was that many participants did not complete the voice disorders section or the VHI. This is probably due to these sections being located at the end of the survey. As the EDE-Q was a redundant measure for including a participant as having an eating disorder, it would have been better placed at the end of the survey. This way, the voice disorders section and VHI could have been placed further toward the beginning of the survey, which likely would have increased the response rate.

**Future Research.** A similar study with more participants would be beneficial in determining whether a significant correlation exists between eating disorder diagnoses/symptoms and voice disorders. A study exploring the relations between eating disorder diagnoses and organic versus functional voice disorders would be insightful. In addition, research in the area of differences in the extracellular matrix of the vocal folds in those with eating disorders compared to the general population would be helpful in determining how malnutrition and dehydration in those with eating disorder behaviors affect the structure of the vocal folds. One means of exploring this question is by using videostroboscopy to view the larynges of individuals with both eating disorders and voice disorder, comparing them with both individuals without an eating disorder who exhibit the same type of voice disorder and with healthy matched controls. Another way of accomplishing this research would be to use videostroboscopy to compare the larynges of those with eating disorders who do not have a voice disorder to those with eating disorders who do have voice disorders. Although this measure was used in one study (Ferreira, Gama, Santos & Maia, 2010) they did not employ multiple diagnoses.
Since this study found that those with anorexia nervosa were the most likely of all the groups with eating disorders to develop a voice disorder, studies focusing on dehydration and malnutrition in relation to voice disorders among individuals with eating disorders are needed. Comparing hydration levels and voice complaints between groups with anorexia nervosa, bulimia nervosa, binge-eating disorder, and EDNOS by using salivary studies would be helpful in determining whether dehydration is a strong factor in voice disorders among those with eating disorders. In addition, comparing blood samples between those with voice disorders and eating disorder and those with eating disorders but no voice complaints could be used to examine the effects of malnutrition on voice disorders in individuals with eating disorders.

Another question arises from the increased EDE-Q Restraint scores in those with voice disorders and eating disorders compared to those with eating disorders. Is there a temperamental style among those with anorexia nervosa and bulimia nervosa that increases their risk of developing a voice disorder compared to both the general population and those with binge-eating disorder and EDNOS? This could be investigated by administering the Multidimensional Personality Questionnaire (MPQ; assessment of temperament) and an assessment of vocal quality to the following groups: anorexia nervosa, bulimia nervosa, binge-eating disorder, EDNOS, and healthy controls.

**Conclusion.** Previous assumptions that individuals with bulimia nervosa demonstrate a higher prevalence of voice disorders than the general population are supported by this study, though the theoretical construct that this difference is caused by vomiting may not be supported. All groups of eating disorders in this study showed higher prevalence rates of voice disorders than the general population, with anorexia nervosa demonstrating the highest prevalence.
(23.08%), followed by bulimia nervosa (17.65%), binge-eating disorder (13.04%), and EDNOS (11.43%). In addition, results of this study revealed the purging behavior of exercising, as opposed to vomiting, was a risk factor for voice disorders. Possible reasons for the connection between eating disorders and voice disorders include malnutrition, dehydration, and anxiety, though these are subjects for future research.
REFERENCES


APPENDIX

TL Thesis Survey

Start of Block: Consent and Resources

Q1.1 Consent to Participate in a Research Study
The Relationship Between Bulimia Nervosa and Voice Disorders

You are being invited to take part in a research study about the relationship between bulimia nervosa and voice disorders because you reported that have experienced symptoms indicative of
an eating disorder at some point in your life. If you volunteer to take part in this study, you will be one of about 500 people to do so.

This study is a part of a master’s thesis project for Taylor Lawrence of University of Memphis, in the department of Speech-Language Pathology under the supervision of Dr. Miriam van Mersbergen, Ph.D. and with the help of her research team.

By doing this study, we hope to learn how different types of eating disorder symptoms are related to developing specific types of voice problems and disorders.

Participation in this study will take place via an online survey that should take about 20 minutes to complete.

You should not participate in this study if you are under 18 years of age or if you are pregnant.

There are no major risks to this study. However, you may find some questions we ask you to be upsetting or stressful. If so, we have a list of people who may be able to help you listed below. Other risks remain unknown and unanticipated.

There are no direct benefits from taking part in this study. However, your willingness to take part may help others better understand the relationship between eating disorders and voice problems.

Participation in this study is voluntary. You are free to stop at any time during the study and keep the benefits and rights you had before volunteering. Unfortunately, there are no costs or rewards for taking part in the study.

This study is anonymous. That means that no one, not even members of the research team, will know that the information you give came from you. We have made every effort to keep all research records private and, from our end, your responses will remain confidential. The PI will set Qualtrics to anonymize ISP addresses.

If you have questions, suggestions, concerns, or complaints about the study, you can contact the investigators, Taylor Lawrence at tlawnce@memphis.edu or Miriam van Mersbergen at mrvmrnsb@memphis.edu. If you have any questions about your rights as a volunteer in this
research, contact the Institutional Review Board staff at the University of Memphis at 901-678-2705.

By clicking the I Agree button, you agree to participate in this study. By clicking the No Thank You button, you do not agree to participate in this study.

Below is a list of resources for your information.

INFORMATION ABOUT NATIONAL & REGIONAL RESOURCES

National Mental Health Resources
National Institutes of Mental Health (NIMH): http://www.nimh.nih.gov
National Alliance on Mental Illness (NAMI): http://www.nami.org
American Psychological Association: http://www.apa.org

Memphis Mental Health Resources
U of M Psychological Services Center: (901) 678-2147; http://www.memphis.edu/psychology/psc/index.php
Memphis Crisis Center: (901) 274-7477; http://memphiscrisiscenter.org/

National Eating Disorders Resources
National Eating Disorders Association: (800) 931-2237 https://www.nationaleatingdisorders.org/help-support/contact-helpline
Eating Disorder Hope: (800) 273-8255 https://www.eatingdisorderhope.com/treatment-for-eating-disorders/get-help-now
Memphis Eating Disorders Resources
The Transformation Center: (901)755-1396; 1-866-777-8092 http://transformationmemphis.com
Fairhaven Treatment Center: (844) 757-7979 https://www.fairhaventc.com
The Oaks at La Paloma: 1 (866) 821-3107 https://theoakstreatment.com/about/
National Voice Disorders Resources
Medline Plus: https://medlineplus.gov/voicedisorders.html
The Voice Foundation: https://voicefoundation.org/health-science/voice-disorders/voice-disorders/
Memphis Voice Disorders Resources
University of Tennessee Health Science Center: https://www.uthsc.edu/asp/clinical/sls/voice.php

Other Voice Resources
The National Center for Voice and Speech (NCVS): http://www.ncvs.org
I Agree (1)

No Thank You (2)

Skip To: End of Survey If Consent to Participate in a Research Study The Relationship Between Bulimia Nervosa and Voice Dis... = No Thank You

End of Block: Consent and Resources

Start of Block: Demographics

Q2.1 What is your year of birth?

________________________________________________________________

________________________________________________________________

Q2.2 Are you Spanish, Hispanic, or Latino or none of these?

☐ Yes (1)

☐ None of these (2)

Q2.3 Choose one or more races that you consider yourself to be:

☐ White (1)

☐ Black or African American (2)

☐ American Indian or Alaska Native (3)

☐ Asian (4)

☐ Native Hawaiian or Pacific Islander (5)

☐ Other (6) ________________________________________________
Q2.4 What is your sex?

○ Male (1)

○ Female (2)

Q2.5 Are you now married, widowed, divorced, separated or never married?

○ Married (1)

○ Widowed (2)

○ Divorced (3)

○ Separated (4)

○ Never Married (5)

Q2.6 How many people are living or staying at this address? INCLUDE everyone who is living or staying here for more than 2 months. INCLUDE yourself if you are living here for more than 2 months. INCLUDE anyone else staying here who does not have another place to stay, even if they are here for 2 months or less. DO NOT INCLUDE anyone who is living somewhere else for
more than 2 months, such as a college student living away or someone in the Armed Forces on deployment.

- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- More than 6 (7)

Q2.7 Which statement best describes your current employment status?

- Working (paid employee) (1)
- Working (self-employed) (2)
- Not working (temporary layoff from a job) (3)
- Not working (looking for work) (4)
- Not working (retired) (5)
- Not working (disabled) (6)
- Not working (other) (7) ________________________________________________
- Prefer not to answer (8)
Q2.8 Where did you hear about this survey?

- Eating disorder clinic (1)
- Flyer (2)
- Social Media (3)
- Friend/Family Member (4)
- Other (5) ________________________________________________

End of Block: Demographics

Start of Block: Eating-Disordered Symptoms

Q3.1 Do you think you have an eating disorder, or ever been diagnosed with an eating disorder?

- Yes (4)
- No (5)
- Other (6) ________________________________________________

Skip To: Q3.3 If Do you think you have an eating disorder, or ever been diagnosed with an eating disorder? = Yes
Skip To: End of Block If Do you think you have an eating disorder, or ever been diagnosed with an eating disorder? = No
Skip To: Q3.2 If Do you think you have an eating disorder, or ever been diagnosed with an eating disorder? = Other

Q3.2 If other, please explain.  

_________________________________________________________________
Q3.3 Which year were you diagnosed with an eating disorder or did you think symptoms began?

___________________________________________________________________________

Q3.4 At what age did your symptoms first occur?

___________________________________________________________________________

Q3.5 If you were diagnosed, at what age were you first diagnosed with an eating disorder?

___________________________________________________________________________

Q3.6 Click any of the following that were part of that diagnosis.

☐ Anorexia nervosa (1)

☐ Bulimia nervosa (2)

☐ Binge-eating disorder (3)

☐ Eating disorder not otherwise specified (EDNOS) (5)

☐ Other (4) ________________________________

Page Break
Q3.7 One of the terms people use for a symptom of an eating disorder is "purging." Purging can be described as vomiting (making yourself sick), using laxatives when you aren't constipated, or over-exercising to get rid of extra calories. We will use the term "purge" to mean these symptoms unless we would like you to specify something different.

Display This Question:
If Click any of the following that were part of that diagnosis. = Anorexia nervosa

Q3.8 With which type of anorexia nervosa were you diagnosed? (click all that apply)

☐ Restricting type (I reduce the amount of calories I take in) (1)
☐ Binge-eating/purging type (I make myself sick or exercise to . . . ) (2)
☐ Other (3) ________________________________________________

Display This Question:
If Click any of the following that were part of that diagnosis. != Binge-eating disorder

Q3.9 Was purging (vomiting, laxatives, over-exercise) a symptom of you experienced?

☐ Yes (1)
☐ No (2)
☐ Other (please specify) (3) ________________________________________________

Display This Question:
If Was purging (vomiting, laxatives, over-exercise) a symptom of you experienced? != No
Q3.10 What was your method of purging?

☐ Vomiting (1)

☐ Laxatives (2)

☐ Exercise (3)

☐ Other (please specify) (4) ________________________________________________

Display This Question:
If What was your method of purging? = Vomiting
And What was your method of purging? = Laxatives
And What was your method of purging? = Exercise

Q3.11 Please rank your methods of purging from "used most often" as 1 to "used least often" as 4.

_____ Vomiting (1)

_____ Laxatives (2)

_____ Exercise (3)

_____ Other (4)

Display This Question:
If Click any of the following that were part of that diagnosis. = Anorexia nervosa

Q3.12 To the best of your recollection, what was the severity of your symptoms in terms of your weight?

☐ Mild (BMI less than or equal to 17) (1)

☐ Moderate (BMI of 16-16.99) (2)

☐ Severe (BMI of 15.99) (3)

☐ Extreme (BMI less than or equal to 15) (4)
Q3.13 To the best of your recollection, what was the severity of your symptoms in terms of how often you had them?

- Mild (1-3 episodes/week) (1)
- Moderate (4-7 episodes/week) (2)
- Severe (8-13 episodes/week) (3)
- Extreme (14 or more episodes/week) (4)

Q3.14 Are you still experiencing these symptoms?

- Yes (1)
- No (2)
- Other (Please specify) (3) ________________________________________________

Q3.15 Are you currently participating in purging (vomiting, laxatives, over-exercise) activities?

- Yes (1)
- No (2)
- Other (Please specify) (3) ________________________________________________
Q3.16 “Consistent” refers to experiencing symptoms that range from mild to severe on a constant basis. “Intermittent” refers to experiencing periods of time when you are not experiencing symptoms at all.

Display This Question:
If Are you currently participating in purging (vomiting, laxatives, over-exercise) activities?
!= No

Q3.17 How would you best describe your purging symptoms?

○ Consistent (1)
○ Intermittent (2)
○ Other (3) ____________________________

Q3.18 How often do you purge?

○ More than once a day (please specify) (1)
○ 2-6 times a week (2)
○ Once a week (3)
○ 2-3 times a month (4)
○ Once a month (5)
○ Less than once a month (please specify) (6)
○ Other (7) ____________________________
Q3.19 When was the last time you purged?

- Today (1)
- Within the past week (2)
- Within the past month (3)
- Within the past three months (4)
- Within the past six months (5)
- Within the past year (6)
- Other (please specify) (7) ____________________________________________

Q3.20 How many years has it been since you have purged?

__________________________________________________________________________

Display This Question:
If Are you currently participating in purging (vomiting, laxatives, over-exercise) activities?
!= No

Display This Question:
If Click any of the following that were part of that diagnosis. = Binge-eating disorder
Q3.21 How often do you feel overly full or nauseous after eating?

- More than once a day (please specify) (1)
- Between 2-6 times a week (2)
- Once a week (3)
- 2-3 times a month (4)
- Once a month (5)
- Less than once a month (Please specify) (6)
- Other (Please specify) (7) ________________________________________________

Display This Question:
If Click any of the following that were part of that diagnosis. = Binge-eating disorder

Q3.22 Do you often eat alone because you are embarrassed of how much you eat?

- Yes (1)
- No (2)
- Other (3) ________________________________________________

Display This Question:
If Click any of the following that were part of that diagnosis. = Binge-eating disorder

Q3.23 Do you often feel guilty after eating?

- Yes (1)
- No (2)
- Other (3) ________________________________________________
Q4.1 The following list of questions are from a questionnaire that is given to people who might have an eating disorder. Please complete the questionnaire to the best of your knowledge. There are about 36 questions to complete. Do not worry if some of the questions seem similar to the ones you just completed. Go ahead and fill them out anyway.

Q4.2 On how many of the past 28 days…

Q4.3 Have you been deliberately trying to restrict the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?

○ 0 (0 days) (1)
○ 1 (1-5 days) (2)
○ 2 (6-12 days) (3)
○ 3 (13-15 days) (4)
○ 4 (16-22 days) (5)
○ 5 (23-27 days) (6)
○ 6 (Everyday) (7)
Q4.4 Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?

- 0 (0 days) (1)
- 1 (1-5 days) (2)
- 2 (6-12 days) (3)
- 3 (13-15 days) (4)
- 4 (16-22 days) (5)
- 5 (23-27 days) (6)
- 6 (Everyday) (7)

Q4.5 Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?

- 0 (0 days) (1)
- 1 (1-5 days) (2)
- 2 (6-12 days) (3)
- 3 (13-15 days) (4)
- 4 (16-22 days) (5)
- 5 (23-27 days) (6)
- 6 (Everyday) (7)
Q4.6 Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your weight or shape (whether or not you have succeeded)?

- 0 (0 days) (1)
- 1 (1-5 days) (2)
- 2 (6-12 days) (3)
- 3 (13-15 days) (4)
- 4 (16-22 days) (5)
- 5 (23-27 days) (6)
- 6 (Everyday) (7)

Q4.7 Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?

- 0 (0 days) (1)
- 1 (1-5 days) (2)
- 2 (6-12 days) (3)
- 3 (13-15 days) (4)
- 4 (16-22 days) (5)
- 5 (23-27 days) (6)
- 6 (Everyday) (7)
Q4.8 Have you had a definite desire to have a totally flat stomach?

- 0 (0 days) (1)
- 1 (1-5 days) (2)
- 2 (6-12 days) (3)
- 3 (13-15 days) (4)
- 4 (16-22 days) (5)
- 5 (23-27 days) (6)
- 6 (Everyday) (7)

Q4.9 Has thinking about food, eating, or calories made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?

- 0 (0 days) (1)
- 1 (1-5 days) (2)
- 2 (6-12 days) (3)
- 3 (13-15 days) (4)
- 4 (16-22 days) (5)
- 5 (23-27 days) (6)
- 6 (Everyday) (7)
Q4.10 Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?

- 0 (0 days) (1)
- 1 (1-5 days) (2)
- 2 (6-12 days) (3)
- 3 (13-15 days) (4)
- 4 (16-22 days) (5)
- 5 (23-27 days) (6)
- 6 (Everyday) (7)

Q4.11 Have you had a definite fear of losing control over eating?

- 0 (0 days) (1)
- 1 (1-5 days) (2)
- 2 (6-12 days) (3)
- 3 (13-15 days) (4)
- 4 (16-22 days) (5)
- 5 (23-27 days) (6)
- 6 (Everyday) (7)
Q4.12 Have you had a definite fear that you might gain weight?

- 0 (0 days) (1)
- 1 (1-5 days) (2)
- 2 (6-12 days) (3)
- 3 (13-15 days) (4)
- 4 (16-22 days) (5)
- 5 (23-27 days) (6)
- 6 (Everyday) (7)

Q4.13 Have you felt fat?

- 0 (0 days) (1)
- 1 (1-5 days) (2)
- 2 (6-12 days) (3)
- 3 (13-15 days) (4)
- 4 (16-22 days) (5)
- 5 (23-27 days) (6)
- 6 (Everyday) (7)
Q4.14 Have you had a strong desire to lose weight?

- 0 (0 days) (1)
- 1 (1-5 days) (2)
- 2 (6-12 days) (3)
- 3 (13-15 days) (4)
- 4 (16-22 days) (5)
- 5 (23-27 days) (6)
- 6 (Everyday) (7)
Q4.15 Please Fill in the Appropriate number in the boxes on the right. Remember that the questions only refer to the past four weeks (28 days).

Q4.16 Over the past 28 days, how many times have you eaten what other people would regard as an unusually large amount of food (given the circumstances)?

Q4.17 On how many of these times did you have a sense of having lost control over your eating (at the time that you were eating)?
Q4.18 Over the past 28 days, on how many DAYS have such episodes of overeating occurred (i.e., you have eaten an unusually large amount of food and have had a sense of loss of control at the time)?

________________________________________________________________

Q4.19 Over the past 28 days, how many times have you made yourself sick (vomit) as a means of controlling your shape or weight?

________________________________________________________________

Q4.20 Over the past 28 days, how many times have you taken laxatives as a means of controlling your shape or weight?

________________________________________________________________

Q4.21 Over the past 28 days, how many times have you exercised in a “driven” or “compulsive” way as a means of controlling your weight, shape or amount of fat, or to burn off calories?

________________________________________________________________
Q4.22 Please choose the appropriate number. Please note that for these questions, the term “binge eating” means eating what others would regard as an unusually large amount of good for the circumstances, accompanied by a sense of having lost control over eating.

Q4.23 Over the past 28 days, on how many days have you eaten in secret?...Do not count episodes of binge eating

- □ 0 (0 days) (1)
- □ 1 (1-5 days) (2)
- □ 2 (6-12 days) (3)
- □ 3 (13-15 days) (4)
- □ 4 (16-22 days) (5)
- □ 5 (23-27 days) (6)
- □ 6 (Everyday) (7)
Q4.24 On what proportion of the times that you have eaten have you felt guilt (felt that you’ve done wrong) because of its effect on your shape or weight?...Do not count episodes of binge eating

0 (None of the times) (1)
1 (A few of the times) (2)
2 (Less than half) (3)
3 (Half of the times) (4)
4 (More than half) (5)
5 (Most of the time) (6)
6 (Every time) (7)

Q4.25 Over the past 28 days, how concerns have you been about other people seeing you eat? … Do not count episodes of binge eating

0 (Not at all) (1)
1 (2)
2 (Slightly) (3)
3 (4)
4 (Moderately) (5)
5 (6)
6 (Extremely) (7)
Q4.26 Please choose the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days)

Q4.27 Has your weight influenced how you think about (judge) yourself as a person?

- 0 (Not at all) (1)
- 1 (2)
- 2 (Slightly) (3)
- 3 (4)
- 4 (Moderately) (5)
- 5 (6)
- 6 (Extremely) (7)

Q4.28 Has your shape influenced how you think about (judge) yourself as a person?

- 0 (Not at all) (1)
- 1 (2)
- 2 (Slightly) (3)
- 3 (4)
- 4 (Moderately) (5)
- 5 (6)
- 6 (Extremely) (7)
Q4.29 How much would it have upset you if you had been asked to weight yourself once a week (no more, or less, often) for the next four weeks?

○ 0 (Not at all)  (1)
○ 1   (2)
○ 2 (Slightly) (3)
○ 3   (4)
○ 4 (Moderately) (5)
○ 5   (6)
○ 6 (Extremely) (7)

Q4.30 How dissatisfied have you felt about your weight?

○ 0 (Not at all)  (1)
○ 1   (2)
○ 2 (Slightly) (3)
○ 3   (4)
○ 4 (Moderately) (5)
○ 5   (6)
○ 6 (Extremely) (7)
Q4.31 How dissatisfied have you felt about your weight?

- 0 (Not at all) (1)
- 1 (2)
- 2 (Slightly) (3)
- 3 (4)
- 4 (Moderately) (5)
- 5 (6)
- 6 (Extremely) (7)

Q4.32 How dissatisfied have you felt about your shape?

- 0 (Not at all) (1)
- 1 (2)
- 2 (Slightly) (3)
- 3 (4)
- 4 (Moderately) (5)
- 5 (6)
- 6 (Extremely) (7)
Q4.33 How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, which undressing or taking a back or shower)?

- 0 (Not at all) (1)
- 1 (2)
- 2 (Slightly) (3)
- 3 (4)
- 4 (Moderately) (5)
- 5 (6)
- 6 (Extremely) (7)

Q4.34 How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?

- 0 (Not at all) (1)
- 1 (2)
- 2 (Slightly) (3)
- 3 (4)
- 4 (Moderately) (5)
- 5 (6)
- 6 (Extremely) (7)

Display This Question:
If What is your sex? = Female
Q4.35 Over the past three-to-four months, have you missed any menstrual periods?

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

Display This Question:
If Over the past three-to-four months, have you missed any menstrual periods? = Yes

Q4.36 Over the past three to four months, how many menstrual periods have you missed?
________________________________________________________________

Display This Question:
If What is your sex? = Female

Q4.37 Have you been taking or using birth control?
________________________________________________________________

End of Block: EDQ
Start of Block: General Health

Q5.1 Do you catch colds often?

- Yes (1)
- No (2)
- Other (3) ____________________________________________________________
Q5.2 When you have an infection such as a cold or the flu, does it tend to last for longer than 5 days?

- Yes (1)
- No (2)
- Other (3) __________________________________________________________

Q5.3 Do you have seasonal allergies (grass, pollen, trees, etc . . .)?

- Yes (1)
- No (2)
- Other (3) __________________________________________________________

Q5.4 Have you ever been diagnosed with an autoimmune disease (lupus, fibromyalgia, Chrohn's, endometriosis, etc . . .)?

- Yes (1)
- No (2)
- Other (3) __________________________________________________________

Q5.5 Do you consistently have dark circles under your eyes?

- Yes (1)
- No (2)
- Other (3) __________________________________________________________
Q5.6 Do you have pain in your muscles or joints?

- Yes (1)
- No (2)
- Other (3) ____________________________________________

End of Block: General Health

Start of Block: Reflux

Q6.1 Do you experience pain in your abdomen (tummy) or chest?

- Yes (1)
- No (2)
- Other (3) ____________________________________________

Display This Question:

If Do you experience pain in your abdomen (tummy) or chest? != No

Q6.2 If yes, is this pain worse at night?

- Yes (1)
- No (2)
- Other (3) ____________________________________________
Q6.3 How often do you feel as though you can taste your stomach acid?

- More than once a day (Please specify) (1)
- Between 2-6 times a week (2)
- Once a week (3)
- 2-3 times a month (4)
- Once a month (5)
- Less than once a month (Please specify) (6)

- Other (please specify) (7) ________________________________

Q6.4 Do you often experience the sensation of a lump in your throat?

- Yes (1)
- No (2)
- Other (please specify) (3) ________________________________

Q6.5 Do you cough more often at night than during the day?

- Yes (1)
- No (2)
- Other (please specify) (3) ________________________________
Q6.6 Do you experience a burning sensation in your throat?

- Yes (1)
- No (2)
- Other (3) ______________________________

Display This Question:
If Do you experience a burning sensation in your throat? != No

Q6.7 When do you feel this burning sensation the most?

- Morning time right when I wake up (1)
- Mid-morning (2)
- Afternoon (3)
- Evening (4)
- After I eat or drink (5)
- After I exercise (6)
- Other (please specify) (7) ______________________________

Q6.8 Have you ever been diagnosed with acid reflux?

- Yes (1)
- No (2)
- Other (3) ______________________________
Q6.9 Do you take medication for acid reflux?

- Yes (1)
- No (2)
- Other (3) ________________________________________________

Q6.10 Do you have pain in your ear?

- Always (1)
- Most of the time (2)
- About half the time (3)
- Sometimes (4)
- Never (5)
Q6.11 Which ear?

- Left (1)
- Right (2)
- Both (3)
- Unsure (4)
- Other (5)

End of Block: Reflux

Start of Block: Reflux Symptom Index

Q7.1 The following set of questions is from a questionnaire given to people who might have difficulty with acid reflux. Some of the questions may be similar to others you just completed. Please fill them out anyway. There are 9 questions.
Q7.2 Within the last month, how did the following problems affect you? (0-5 rating scale with 0 = No problem and 5 = Severe)
<table>
<thead>
<tr>
<th>Hoarseness or a problem with your voice (1)</th>
<th>0 (1)</th>
<th>1 (2)</th>
<th>2 (3)</th>
<th>3 (4)</th>
<th>4 (5)</th>
<th>5 (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearing your throat (2)</td>
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<tr>
<td>Excess throat mucous or postnasal drip (3)</td>
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<tr>
<td>Difficulty swallowing food, liquids or pills (4)</td>
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<td>Coughing after you ate or after lying down (5)</td>
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<td>Breathing difficulties or choking episodes (6)</td>
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<tr>
<td>Troublesome or annoying cough (7)</td>
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<tr>
<td>Sensations or something sticking in your throat (8)</td>
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<tr>
<td>Heart burn, chest pain, indigestion, or stomach acid coming up (9)</td>
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<td></td>
</tr>
</tbody>
</table>
End of Block: Reflux Symptom Index

Start of Block: Vocal Behavior Questions

Q8.1 On average, how many hours of sleep do you get per night?

- More than 9 hours (1)
- 7-8 hours (2)
- 5-6 hours (3)
- 3-4 hours (4)
- Less than 3 hours (5)

Q8.2 I feel as though I get enough sleep at night.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)
Q8.3 I breathe through my mouth.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

Display This Question:

If I breathe through my mouth.  != Strongly disagree
And I breathe through my mouth.  != Disagree

Q8.4 When do you breathe through your mouth?

- During all activities (1)
- During sleep (2)
- During exercise (3)
- During an illness (4)
- Other (please specify) (5) _______________________________________________________
Q8.5 I often feel as though my mouth is dry.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

Q8.6 Do you participate in hobbies that expose you to dust and chemicals? Check all that apply.

- Pottery (1)
- Painting (2)
- Woodworking (3)
- Gardening (4)
- Glues (5)
- Other (please specify) (6) 

-----------------------------------------------------------------------------------------------------------------------------------------
Q8.7 I consider my job or my daily activities to be voice-heavy.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

Display This Question:

- If I consider my job or my daily activities to be voice-heavy. = Strongly agree
- Or I consider my job or my daily activities to be voice-heavy. = Agree
- Or I consider my job or my daily activities to be voice-heavy. = Somewhat agree

Q8.8 What is your profession?

- Teacher (1)
- Coach (2)
- Singer (3)
- Personal Trainer (4)
- Other (Please specify) (5) ________________________________________________

---------------------------------
Q8.9 Do you participate in any of the following activities?

- Singing/Acting (1)
- Coaching (2)
- Exercise/Sports (3)
- Weight lifting (4)
- Yelling at sporting events (5)
- Other voice-heavy activities (please specify) (6)

Q8.10 On average, how much water do you drink a day? (1 bottle=16 oz)

- 1 bottle or less (1)
- 2 bottles (2)
- 3 bottles (3)
- 4 bottles (4)
- 5 bottles or more (5)
- Other (please specify) (6)
Q8.11 How often do you drink alcohol? Each of the following are examples of one drink of alcohol: 12 oz of beer, 8 oz of malt liquor, 5 oz of wine, or 1.5 oz of 80 proof liquor (e.g. vodka, rum).

- Never (1)
- Monthly or less (2)
- 2 to 4 times per month (3)
- 2 to 3 times per week (4)
- 4 or more times per week (5)
- Other (6) ________________________________________________

Q8.12 What is your typical form of caffeine intake?

- Coffee (1)
- Sports or energy drink (2)
- Soda (3)
- Tea (4)
- Chocolate (5)
- I do not consume caffeine (6)
- Other (7) ________________________________________________
Q8.13 Do you use tobacco?

○ Yes (1)

○ No (2)

○ Other (3) ________________________________________________

Q8.14 What type of tobacco do you use?

☐ Cigarettes (1)

☐ Cigars (2)

☐ Pipe (3)

☐ Smokeless tobacco (chew or dip) (4)

☐ Other (please specify) (5) ________________________________________________

Display This Question:

If What type of tobacco do you use? = Cigarettes
Q8.15 About how many cigarettes do you smoke in a typical day?

- 0-5 (1)
- 5-10 (2)
- 10-20 (3)
- 1-2 packs a day (4)
- 3-4 packs a day (5)
- 5-6 packs a day (6)
- 7 or more packs a day (7)
- Other (8) __________________________________________________________________________

---

Display This Question:
If What type of tobacco do you use? = Cigars

Q8.16 About how many cigars do you smoke in a typical day?

- 0-2 (1)
- 3-4 (2)
- 5-6 (3)
- 7-8 (4)
- More than 8 (5)
- Other (6) __________________________________________________________________________

---

Display This Question:
If What type of tobacco do you use? = Smokeless tobacco (chew or dip)
Q8.17 How often do you chew tobacco?

- More than once a day (Please specify) (1)
- Once a day (2)
- 2-6 times a week (3)
- Once a week (4)
- 2-3 times a month (5)
- Once a month (6)
- Less than once a month (7)

Display This Question:
If What type of tobacco do you use? = Pipe

Q8.18 How often do you smoke a pipe?

- More than once a day (Please specify) (1)
- Once a day (2)
- 2-6 times a week (3)
- Once a week (4)
- 2-3 times a month (5)
- Once a month (6)
- Less than once a month (7)
Q8.19 Do you have any of the following disorders?

☐ Connective tissue disease (example: lupus, Rheumatoid arthritis, scleroderma) (1)

☐ Thyroid disease (2)

☐ Tremor of the neck or head (3)

☐ Neurological disorders (example: Multiple Sclerosis, peripheral neuropathy) (4)

☐ Cancer of the head and neck (5)

☐ Fibromyalgia (6)

☐ Migraine Headaches (7)

☐ Irritable Bowel Syndrome (8)

☐ Back Pain (9)

☐ Dizziness (10)

☐ Ringing in the ears (11)

☐ Other (12) ________________________________________________
Q9.1 I consider myself to have a voice problem.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

Q9.2 Have you ever been diagnosed with a voice problem?

- Yes (1)
- No (2)
- Other (3) ________________________________________________

Display This Question:
If Have you ever been diagnosed with a voice problem? != No

Q9.3 What was your diagnosis?
________________________________________________________________

Page Break
Q9.4 Below are a list of statements describing aspects of your voice. Please complete the question by choosing the answer that best describes how often that statement applies to you.
<table>
<thead>
<tr>
<th></th>
<th>Always (1)</th>
<th>Most of the time (2)</th>
<th>About half the time (3)</th>
<th>Sometimes (4)</th>
<th>Never (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel pain or discomfort in my throat when speaking. (1)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>My throat feels dry after I speak. (2)</td>
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<tr>
<td>My voice sounds hoarse. (3)</td>
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<tr>
<td>The pitch of my voice is unusually high. (4)</td>
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<tr>
<td>The pitch of my voice is unusually low. (5)</td>
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<tr>
<td>My voice is louder than normal. (6)</td>
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<tr>
<td>My voice is quieter than normal. (7)</td>
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<tr>
<td>My voice sounds monotone. (8)</td>
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<tr>
<td>My voice sounds unsteady, even when I am not upset or nervous. (9)</td>
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<tr>
<td>Statement</td>
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<td>--------------------------------------------------------------------------</td>
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<tr>
<td>There are times in which I am unable to produce my voice. (10)</td>
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<tr>
<td>I feel as though food is stuck in my throat even after taking a drink. (11)</td>
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<tr>
<td>I cough while eating or drinking. (12)</td>
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<tr>
<td>When I eat, I feel as though food had “gone down the wrong pipe.” (13)</td>
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<tr>
<td>I experience shortness of breath while speaking, even when I am not exercising. (14)</td>
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<tr>
<td>Speaking is effortful for me. (15)</td>
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<tr>
<td>I clear my throat a lot. (16)</td>
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</tbody>
</table>
Q9.5 If you checked any of these statements, how long did these symptoms last?

- Never - I did not experience any of the previous symptoms (1)
- Less than 1 day (2)
- 1-2 days (3)
- 3-4 days (4)
- 5-7 days (5)
- 1-2 weeks (6)
- 1 month (7)
- Other (please specify) (8) ________________________________________________

Skip To: Q9.7 If you checked any of these statements, how long did these symptoms last? = Never - I did not experience any of the previous symptoms

Q9.6 When did these symptoms occur?

- In the last month (1)
- In the last year (2)
- In the last 5 years (3)
- In the last 10 years (4)
- At some time in your life (5)
- Other (6) ________________________________________________
Q9.7 Have you ever been diagnosed by a physician with any of the following disorders? Check all that apply.

☐ Reflux laryngitis (1)
☐ Laryngeal Polyp (2)
☐ Vocal Fold Nodule (3)
☐ Vocal Fold Paralysis (4)
☐ Voice/Laryngeal cancer (5)
☐ None (6)
☐ Other (please specify) (7) ________________________________________________

Display This Question:
If Have you ever been diagnosed by a physician with any of the following disorders? Check all that a... != None

Q9.8 When did you have this disorder?

☐ In the last month (1)
☐ In the last year (2)
☐ In the last 5 years (3)
☐ In the last 10 years (4)
☐ In your life (5)
☐ Other (please specify) (6) ________________________________________________
Q9.9 How long did this voice disorder last?

- 1 week (1)
- 1-2 weeks (2)
- 1 month (3)
- 2-3 months (4)
- 4-6 months (5)
- 7-12 months (6)
- Longer than 1 year (please specify) (7)

Q9.10 Do you have a family history of voice disorders? (e.g. laryngitis, hoarseness, polyps, nodules, vocal fold paralysis, voice/laryngeal cancer)

- Yes (1)
- No (2)
- Other (3) ____________________________________________________
Q9.11 If yes, who in your family has a history of voice disorders? Select all that apply.

- Mother (1)
- Father (2)
- Brother (3)
- Sister (4)
- Maternal grandparents (5)
- Paternal grandparents (6)
- Other (please specify) (7) ________________________________________________

Display This Question:
If Do you have a family history of voice disorders? (e.g. laryngitis, hoarseness, polyps, nodules,... != No

Q9.12 If yes, what was the disorder? Please specify.

- Laryngitiis (1)
- Hoarsenss (2)
- Polyp (3)
- Nodules (4)
- Vocal fold paralysis (5)
- Voice/laryngeal cancer (6)
- Other (please specify) (7) ________________________________________________
Q9.13 Did you seek treatment for your voice problem?

- Surgery (1)
- Speech Therapy (2)
- Vocal Rest (3)
- Medication (4)
- Other (please specify) (5) ________________________________________________

Q9.14 Was your voice diagnosis related to a specific health problem? (Example: Did the doctor give an explanation for your voice diagnosis such as a neurological condition or a connective tissue disease?)

- Yes (please specify) (1) ________________________________________________
- No (2)
- Other (please specify) (3) ________________________________________________

If Have you ever been diagnosed by a physician with any of the following disorders? Check all that apply = Reflux laryngitis
Q9.15 When I take my reflux medication my voice

- Gets worse (1)
- Gets better (2)
- Stays the same (3)
- Other (4) ________________________________________________

Q9.16 Does your voice get worse when you are under stress?

- Yes (1)
- No (2)
- Other (3) ________________________________________________

Q9.17 Do you often experience a feeling of tightness in your throat when speaking?

- Yes (1)
- No (2)
- Other (3) ________________________________________________

Q9.18 Do you feel as though speaking is an effortful task?

- Yes (1)
- No (2)
- Other (3) ________________________________________________
Q9.19 When did your voice problems occur in relation to your eating disorder? Check all that apply.

☐ My voice problems occurred before my eating disorder occurred. (1)

☐ My voice problems occurred at the same time as my eating disorder. (2)

☐ My voice problems occurred after my eating disorder. (3)

☐ Other (4) ________________________________________________

End of Block: Voice

Start of Block: VHI

Q10.1 The following is a questionnaire given to people who may have a problem with their voice. Some of the questions may appear to be similar to ones you just completed. Please go ahead and answer them anyway. There are 35 questions.
Q10.2 These are statements that many people have used to describe their voice and the effects of their voices on their lives. Circle the response that indicates how frequently you have the same experience.
<table>
<thead>
<tr>
<th></th>
<th>Never (1)</th>
<th>Almost Never (2)</th>
<th>Sometimes (3)</th>
<th>Almost Always (4)</th>
<th>Always (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>My voice makes it difficult for people to hear me. (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I run out of air when I talk. (2)</td>
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</tr>
<tr>
<td>People have difficulty understanding me in a noisy room. (3)</td>
<td></td>
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<tr>
<td>The sound of my voice varies throughout the day. (4)</td>
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<tr>
<td>My family has a difficult time hearing me when I call throughout the house. (5)</td>
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<tr>
<td>I use the phone less often than I would like. (6)</td>
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<tr>
<td>I’m tense when talking with others because of my voice. (7)</td>
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</tr>
</tbody>
</table>
I tend to avoid groups of people because of my voice. (8)

People seem irritated with my voice. (9)

People ask, “What’s wrong with your voice?” (10)

I speak with friends, neighbors, or relatives less often because of my voice. (11)

People ask me to repeat myself when speaking face-to-face. (12)

My voice sounds creaky and dry. (13)

I feel as though I have to strain to produce voice. (14)

I find other people don’t understand my voice problem. (15)
<table>
<thead>
<tr>
<th>My voice difficulties restrict personal and social life. (16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The clarity of my voice is unpredictable. (17)</td>
</tr>
<tr>
<td>I try to change my voice to sound different. (18)</td>
</tr>
<tr>
<td>I feel left out of conversations because of my voice. (19)</td>
</tr>
<tr>
<td>I use a great deal of effort to speak. (20)</td>
</tr>
<tr>
<td>My voice is worse in the evening. (21)</td>
</tr>
<tr>
<td>My voice problem causes me to lose income. (22)</td>
</tr>
<tr>
<td>My voice problem upsets me. (23)</td>
</tr>
<tr>
<td>I am less outgoing because of my voice problem. (24)</td>
</tr>
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<tr>
<td>---</td>
</tr>
<tr>
<td>My voice makes me feel handicapped.</td>
</tr>
<tr>
<td>My voice “gives-out” on me in the middle of speaking.</td>
</tr>
<tr>
<td>I feel annoyed when people ask me to repeat.</td>
</tr>
<tr>
<td>I feel embarrassed when people ask me to repeat.</td>
</tr>
<tr>
<td>My voice makes me feel incompetent.</td>
</tr>
<tr>
<td>I’m ashamed of my voice problem.</td>
</tr>
<tr>
<td>I never really think about my voice.</td>
</tr>
<tr>
<td>People comment on my voice.</td>
</tr>
</tbody>
</table>
I feel like my voice represents who I am.
(33)
Overall, I am satisfied with the sound of my voice.
(34)
I feel like I am in control of my voice.
(35)

End of Block: VHI

Start of Block: Resources
Q11.1 INFORMATION ABOUT LOCAL & NATIONAL RESOURCES

National Mental Health Resources
National Institutes of Mental Health (NIMH): http://www.nimh.nih.gov
National Alliance on Mental Illness (NAMI): http://www.nami.org
American Psychological Association: http://www.apa.org

Memphis Mental Health Resources
U of M Psychological Services Center: (901) 678-2147; http://www.memphis.edu/psychology/psc/index.php
Memphis Crisis Center: (901) 274-7477; http://memphiscrisiscenter.org/

National Eating Disorders Resources
National Eating Disorders Association: (800) 931-2237 https://www.nationaleatingdisorders.org/help-support/contact-helpline
Eating Disorder Hope: (800) 273-8255 https://www.eatingdisorderhope.com/treatment-for-eating-disorders/get-help-now

Memphis Eating Disorders Resources
The Transformation Center: (901)755-1396; 1-866-777-8092 http://transformationmemphis.com
Fairhaven Treatment Center: (844) 757-7979 https://www.fairhaventc.com
The Oaks at La Paloma: 1 (866) 821-3107 https://theoakstreatment.com/about/

National Voice Disorders Resources
Medline Plus: https://medlineplus.gov/voicedisorders.html
The Voice Foundation: https://voicefoundation.org/health-science/voice-disorders/voice-disorders/

Memphis Voice Disorders Resources
University of Tennessee Health Science Center: https://www.uthsc.edu/asp/clinical/sls/voice.php

Other Voice Resources
The National Center for Voice Disorders (NCVS): http://www.ncvs.org
IRB #: PRO-FY2019-160
Title: The Relationship between Voice and Eating Disorders
Creation Date: 9-24-2018
End Date: 10-26-2019
Status: Approved

Principal Investigator: Taylor Lawrence
Review Board: University of Memphis Full Board

Sponsor:
Study History
Submission Type
Initial Review Type
Expedited Decision
Approved

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