ABSTRACT

THE EFFECT OF VOICE DISORDERS ON PHYSICAL/SOCIAL CONCERNS AND CAREER DECISIONS IN ADULTS

By Miranda Pack

This was a pilot study to describe the long-term effects of voice disorders following laryngotracheal reconstruction. The purpose of this study was to determine the effects of childhood laryngotracheal reconstruction surgery on adult physical/educational concerns, social concerns, career decisions, and overall voice rating. Ten adults with a history of laryngotracheal reconstruction surgery were recruited from the Cincinnati Children’s Hospital Medical Center’s database to undergo a survey via telephone. Ten additional adults without a history of laryngeal reconstruction surgery were age-, gender- and education-matched to the experimental participants for administration of the same survey. Results indicated significantly lower self-reported quality of life for adults, post-laryngotracheal reconstruction, in the areas of physical/educational concerns and social concerns in comparison with control participants. There was no significant difference in self-reported quality of life in the areas of career decisions and overall voice rating for experimental participants in comparison with control participants.
THE EFFECT OF VOICE DISORDERS ON PHYSICAL/SOCIAL CONCERNS AND CAREER DECISIONS IN ADULTS

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CHAPTER I
Introduction and Review of the Literature

Children often undergo laryngotracheal reconstruction to treat more severe subglottic stenosis for airway improvement. Several different surgical procedures can be done to successfully improve the airway; however, these procedures often result in changed laryngotracheal anatomy and physiology, affecting the child’s voice quality into adulthood.

Voice Disorders

“Voice disorders occur when quality, pitch or loudness differs from voice characteristics of speakers with a similar gender, age, cultural background and geographic location.” (Stemple, Glaze, & Klaben, 2000, p. 85) Voice disorders develop secondary to a variety of voice pathologies, including neurogenic, medical, idiopathic, and voice use, as well as structural changes of the laryngeal anatomy. Changes in the vocal folds will alter flexibility of the folds, thereby affecting vibratory patterns and altering vocal quality, pitch, and loudness (Stemple et al., 2000). Changes in the surrounding anatomy will also change the modulation of airflow through the tracheal and laryngeal areas during phonation, which affects vocal characteristics. Idiopathic pathologies include congenital airway anomalies, subglottic stenosis, and laryngomalacia, all of which may require laryngotracheal reconstruction to secure a competent airway.

Congenital airway anomalies may have a more prominent effect on an individual’s breathing than voice quality; however, the surgical procedures for correction of anomalies can lead to changes in laryngeal anatomy and physiology. Laryngomalacia, a more common congenital airway anomaly, is caused by underdevelopment of the epiglottis, leading to a pliability that resists airflow during respiration. Congenital abnormalities that affect respiration are typically treated surgically in early infancy to eliminate obstruction (Sarkar et al., 2002).

Subglottic Stenosis

Congenital subglottic stenosis (SGS) results from underdevelopment of the cricoid cartilage or arrested development of the conus elasticus, causing narrowing of the laryngeal lumen below the glottis (Stemple et al., 2000). According to a study by Lesperance and Zalzal
(1998), fewer than 50% of infants with subglottic stenosis require surgical management of the airway.

Subglottic stenosis can also occur as a result of prolonged intubation, often seen in premature infants who require mechanical ventilation (Suzumura, Nitta, Tanaka, Kuwashima, & Hirabayashi, 2000). Suzumura and colleagues (2000) found that in a population of intubated preterm infants, only a portion of children who were intubated for 14 days or more developed subglottic stenosis, suggesting that the presence of an endotracheal tube was not the only contributing factor to the development of subglottic stenosis. The authors found that the main factor, coinciding with intubation in the children who developed subglottic stenosis, was the presence of infection in the first 14 days of intubation.

The severity of subglottic stenosis can be quantified using a four-level grading scale proposed by Myer, O’Connor, and Cotton (1994). The scale begins at grade I, representing 0 to 50% obstruction of the airway, and progresses to grade IV, representing complete obstruction of the airway. Using this grading system, pre-surgical subglottic stenosis can be measured and compared to the post-surgical airway.

**Laryngotracheal Reconstruction Procedures**

Surgical reconstruction of the larynx is completed with the primary purpose of maintaining the airway and achieving decannulation; however, additional surgical goals include the preservation of laryngeal function for swallowing, voicing, and airway protection (Smith, Marsh, Cotton, & Myer, 1993). Surgical procedures for airway management include cricotracheal resection, laryngotracheal reconstruction with posterior costal cartilage graft, laryngotracheal reconstruction with anterior costal cartilage graft, laryngotracheal reconstruction with anterior and posterior costal cartilage grafts.

*Cricotracheal resection (CTR).* For high-grade stenosis below the vocal folds, cricotracheal resection can be performed. The procedure involves the resection of the anterior and lateral cricoid plates with removal of the stenotic area and reapproximation of the healthy tracheal area to the thyroid lamina (Rutter, Yellon, & Cotton, 2003).

*Laryngotracheal reconstruction with posterior costal cartilage graft (LTR PCCG).* This procedure involves the splitting of the posterior cricoid plate for the placement of a cartilage
graft from the rib or other cartilaginous structures. During this procedure, the interarytenoids are incised carefully to prevent post-operative arytenoid prolapse (Rutter et al., 2003).

**Laryngotracheal reconstruction with anterior costal cartilage graft (LTR ACCG).** The procedure for LTR ACCG is similar to that of LTR PCCG, with the cricoid being split anteriorly instead of posteriorly. With an anterior incision, the procedure often affects the movement of the thyroid cartilage, therefore inhibiting frequency range (Baker et al., 2005).

**Laryngotracheal reconstruction with anterior and posterior costal cartilage grafts (LTR APCCG).** When necessary a combination of both LTR ACCG and LTR PCCG is completed to maximize augmentation of the larynx. This procedure requires precision in both the areas of the interarytenoids and the cricothyroid to avoid surgical damage to the natural physiology of the laryngeal structures (Rutter et al., 2003).

**Anterior cricoid split (ACS).** The anterior cricoid split, as described by Cotton and Seid in 1980, involves the division of the cricoid cartilage and the use of an endotracheal tube to stent the airway following surgery. The procedure is designed to eliminate the need for a tracheotomy tube in infants with subglottic stenosis.

**Single stage and double stage procedures.** Agrawal, Black, and Morrison (2007) retrospectively described post-operative outcomes for 53 children undergoing both single-stage and double-stage laryngotracheal reconstruction. Single-stage reconstruction involves the entirety of the procedure being performed at one time, while the double-stage procedure involves the division of the surgery into two stages. The authors noted worse post-operative complications following double-stage laryngotracheal reconstruction in comparison with single-stage reconstruction. Patients who required grafts both anteriorly and posteriorly were more likely to require reintubation and tracheostomy following surgery than those receiving a single graft.

**Voice Quality Following Surgery**

Following airway reconstruction surgery, anatomical and physiological changes may result in changed vocal quality. Because the maintenance of a functional airway is so imperative to sustaining life, the affects of surgery on an individual’s vocal quality are not a medical
 priority; however, surgical procedures and post-surgical treatment are constantly evolving for the best post-operative outcome.

Bailey, Clary, Pengilly, and Albert (1995) studied the voice outcomes of 50 completed laryngotracheal reconstruction procedures. The authors found that 17 participants had normal or near normal voice following surgery, while the remaining participants had post-surgical voice abnormalities including harshness, whisper, continuity, and ventricular band phonation. Voice outcomes were measured by parental questionnaire and rated by three speech pathologists. A single procedure as opposed to revision procedures indicated better voice outcomes, and individuals who underwent castellated laryngotracheal reconstruction had better voice outcomes than those who underwent laryngotracheal reconstruction with a costal cartilage graft. A castellated laryngotracheal reconstruction involves the notching of the thyroid cartilage without cartilage grafting, as described by Evans and Todd (1974).

Vocal quality following surgical reconstruction of the airway may be viewed as minor in comparison to precipitating airway problems; however, the effect of abnormal voice quality may become more apparent as a child ages. Zalzal, Loomis, Derkay, Murray, and Thomsen (1991) found that despite parent report of improved voice quality following their child’s laryngotracheal reconstruction, trained voice pathologists rated 15 of 16 post-operative voices as being abnormal in quality. The most common vocal quality was hoarse with breathiness, low pitch, and a decreased pitch range.

Several investigators (Baker et al., 2006; Bailey et al., 1995; Smith et al., 1993) have outlined common voice outcomes following reconstruction surgery. After surgery, children may require or resort to a supraglottic phonation pattern. Supraglottic phonation leads to significantly increased strain during voicing, indicating laryngeal hyperfunction (Weinrich et al., 2007). The presence of hyperfunction can be detected using perceptual, aerodynamic, and laryngeal imaging procedures.

Smith and colleagues (1993) described vocal quality following laryngotracheal reconstruction in 8 pediatric patients. A single rater was used to describe the perceptual quality of the participants’ voice, all of which had a history of laryngotracheal reconstruction. The results of perceptual analysis indicated a common decrease in frequency range, low habitual
frequency, and decreased intensity. The authors noted the importance of using stroboscopic examination to determine mucosal wave abnormalities as the source of dysphonia in participants. They suggested that post-surgical individuals’ voice quality may remain abnormal into adulthood, potentially affecting career choices and socialization.

**Normal Voice Quality**

Within the adult population, changes associated with aging, as well as incidental dysphonias (unrelated to surgery), can affect vocal quality. In a longitudinal study, Verdonck-de Leeuw and Mahieu (2003) studied normal male voices in a population of men over 50 years of age for a period of 5 years, and found statistically significant changes in self-reported voice changes from day-to-day and avoidance of a large social situation, such as a party. There were also changes in perceptual roughness, acoustical frequency perturbation, and soft phonation index. The researchers concluded that normal age-related voice deterioration over a period of 5 years in males older than 50 years of age had negative (but within normal limits) consequences on social functioning. Therefore, in comparing adults post-laryngotracheal surgery to adults in a non-surgical population, there is a possibility that the effects of aging on the voice can produce some of the same social responses as those created by a long-term voice disorder.

Within a typical adult population of 112 adults, Brindle and Morris (1979) found that in live samples, over 80% of individuals were judged to have normal voices while only 2% were judged as having distinctly abnormal voices. This indicates the potential for voice deviations within the typical population, exclusive of the influence of surgery.

**Effects of Dysphonia**

According to Altenberg and Ferrand (2006), perceptions of individuals with voice disorders are related to the severity of the voice disorder. The authors tested individuals from three native languages and determined there was no significant effect of native language group on the perception of individuals with voice disorders. When listening to individuals with more severe voice disorders, the participants rated the individuals more negatively on a perception of attributes questionnaire. Questions included rankings of the individual’s perceived beauty and perceived kindness, indicating that voice disorder severity can be correlated with negative perceptions of personality and attractiveness.
Voice plays an integral part in the perception of an individual’s personality traits. Montepare and Zebrowitz-McArthur (1987) found that individuals with childlike voices (soft, high-pitched and unclear) were perceived as being weaker, less competent, and warmer than individuals with louder, deeper, and clearer voices.

Scott, Robinson, Wilson, and Mackenzie (1997) reported a wide variety of problems associated with dysphonia. The most prevalent problem related to the participant’s singing ability, but other problems included social and employment difficulties, as well as decreased volume and power.

Psychological studies have shown that severity of dysphonia can be linked to psychological distress. According to Deary, Wilson, Carding, and Mackenzie (2003), individuals who reported more severely dysphonic voices also had (a) higher neuroticism (emotional disturbance) and alexithymia (the inability to express oneself), (b) more emotional coping strategies, (c) increased psychological distress, (d) poorer quality of life, and (e) a history of more unexplained medical symptoms.

Dysphonia affects not only personal perceptions, but can negatively affect social interaction as well. Negative perceptions of individuals with voice or resonance disorders are generalized by listeners, causing listeners to have negative impressions of the individuals’ intelligence, appearance, and kindness (Lallh & Rochet, 2000). In Lallh and Rochet’s study, listeners’ attitudes toward speakers with voice or resonance disorders were consistently more negative than attitudes toward speakers with normal voices; moreover, negative attitudes did not change after receiving information about voice and resonance disorders.

Quality of Life and Voice Quality

According to Benninger, Ahuja, Gardner, and Grywalski (1998), voice disorders are more handicapping physically and socially than angina pectoris, sciatica, and chronic sinusitis. Several quality of life measures exist to determine the effect of voice disorders on various life functions. In a study by Jones, Carding, and Drinnan (2006), the Voice Symptom Scale (VoiSS), a self-report quality of life measure, was administered to adults with voice disorders. Completion of the VoiSS revealed a correlation between decreased quality of life and increased voice disorder severity, meaning quality of life was poorer with more severe dysphonia.
A dysphonic voice has an effect on quality of life, reported health function, and perceived voice-related quality of life scores. Adults with voice disorders report poorer health scores on the Medical Outcome Study Short Form 36-Item Health Survey (SF-36) in comparison to a control group of adults without voice disorders (Krischke et al., 2004). Although individuals with voice disorders have consistently reported poorer scores on other similar studies (Wilson, Deary, Millar, & Mackenzie, 2002), research suggests that there may be other individualized factors that influence reported scores on quality of life questionnaires. On the shorter, more specific Voice-Related Quality of Life measure (VRQOL), Rasch, Gunter, Hoppe, Eysholdt, and Rosanowski (2005) found that regardless of etiology, women reported poorer voice status than men, with more negative scores on social-emotional components. Individuals with dysphonia often report the avoidance of social situations that are challenging, indicating a change in behavior that may be uncharacteristic of the individual and may decrease social-emotional contentedness.

Individuals with dysphonia have poorer reported Health-Related Quality of Life scores (HRQOL) than normal peers, indicating a perceived handicap (Zraick et al., 2007). Significant communication partners, such as spouses, close friends, and family, have reported similar perceptions of voice handicap for their dysphonic partners, indicating that the disadvantages of dysphonia are evident to individuals close to dysphonic adults. According to Zraick and colleagues, regardless of the severity or etiology of a voice disorder, adults with dysphonia reported moderate perceived disability and significant others’ perceptions were in agreement.

Using the Voice Activity Participation Profile (VAPP), a questionnaire focused on self-perceived severity of a voice disorder, social, emotional, communication and job effects of the voice disorder, researchers correlated individuals’ perceptions of their voice problem with the impact of the voice disorder on their participation in daily activities (Ma & Yiu, 2001). There was no significant correlation between the severity of voice impairment and the impact of voice disorders, suggesting that the perception of impairment was more influential in daily life than the actual degree of physical impairment.

Career Choices

Three psychological factors in career decision include competence, autonomy, and relatedness according to Self Determination Theory (Ryan & Deci, 2000). Competence refers to individuals’ feeling of proficiency in their chosen area of work. Along with feeling competent,
individuals must feel that they are doing work out of personal choice (autonomy) and that they are connected to others in the work area (relatedness). According to Guay, Senecal, Gauthier, and Fernet (2003), negative perceptions of autonomy and competence, as well as parental and peer support of these two psychological beliefs are related to career-indecision. All of these factors can be affected by the presence of a dysphonia that interferes with job performance (competence) or occupational choice (autonomy). The social difficulty caused by dysphonia may negatively impact perceived relatedness as well.

*Job Performance*

Dysphonia may negatively affect job performance in occupations with high vocal demand. Relevant to the teaching profession, previous studies have suggested that a dysphonic voice puts larger demand on the auditory system, therefore affecting children’s ability to listen and learn (Morton & Watson, 2001). For this reason, individuals with voice disorders may feel unqualified for or disinterested in certain occupational paths.

*Summary*

Laryngotracheal reconstruction is beneficial for the maintenance of a functional airway; however, it often leads to disturbances in the physiology of the vocal mechanism. After airway obstruction is resolved, voice quality becomes a focus of intervention. Post-surgical dysphonia can affect others’ perceptions and the physical ability to perform certain vocal tasks. The quality of life impact of dysphonia can negatively influence individuals’ impression of their own health, vocal, and social functioning. Because career decisions are dependent upon competence, autonomy, and relatedness, the perceived disability of dysphonia may affect lifelong occupational choices and socialization. Individuals with dysphonia in occupations of high vocal demand may experience difficulties performing as well as their peers, possibly affecting the individual’s occupational proficiency and potential.

*Purpose*

This study is intended to describe the long-term effects of voice disorder following childhood laryngotracheal reconstruction. Adult dysphonia has been linked to physical and social functioning, as well as quality of life measures, but the influence of post-surgical voice quality on career choices has not yet been documented. This study will describe post-surgical life
decisions in three areas of interest: physical/educational concerns, social concerns, and career decisions. These three target areas will represent the lasting effects of dysphonia on adult occupation, socialization, and physical ability.

**Research Questions**

1. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported being enrolled in speech therapy in comparison with control participants?
2. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported attending voice therapy in comparison with control participants?
3. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported experiencing pain while talking in comparison with control participants?
4. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported experiencing breathlessness while talking in comparison with control participants?
5. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported that their voice remained strong throughout the day in comparison with control participants?
6. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported being bothered by their voice in comparison with control participants?
7. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported drinking at least six glasses of water a day in comparison with control participants?
8. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported drinking alcohol in comparison with control participants?
9. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported smoking in comparison with control participants?
10. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported engaging in yelling or screaming frequently in comparison with control participants?
11. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported using voice amplification in comparison with control participants?
12. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported having physical limitations affecting their ability to walk in comparison with control participants?
13. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported having physical limitations affecting their hand movement in comparison with control participants?

14. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported having a visual impairment in comparison with control participants?

15. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported having any hearing impairment in comparison with control participants?

16. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported current or past enrollment in individual assistance for reading in comparison with control participants?

17. What were the reported social activities of adults, post-laryngotracheal reconstruction, in comparison with control participants?

18. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported that their voice affected the activities they participate in compared to control participants?

19. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported receiving comments about their voice in comparison with control participants?

20. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported that their voice keeps them from doing things they would like in comparison with control participants?

21. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported being happy with their voice in comparison with control participants?

22. What were the reported occupations of adult participants, post-laryngotracheal reconstruction, in comparison with control participants?

23. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported that their job required a lot of talking in comparison with control participants?

24. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported that their voice affected their career choice in comparison with control participants?

25. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported that their voice affected their job performance in comparison with control participants?
26. How did adult participants, post-laryngotrahceal reconstruction, rate their voice in comparison with control participants?

Research Hypotheses

1. There will be significantly lower self-reported quality of life in the area of physical/educational concerns for experimental compared to control adults.

2. There will be significantly lower self-reported quality of life in the area of social concerns for experimental compared to control adults.

3. There will be significantly lower self-reported quality of life in the area of career decisions for experimental compared to control adults.

4. There will be significantly poorer self-reported overall voice rating for experimental compared to control adults.

Null Hypotheses

1. There will be no significant difference in self-reported quality of life in the area of physical/educational concerns for experimental compared to control adults.

2. There will be no significant difference in self-reported quality of life in the area of social concerns for experimental compared to control adults.

3. There will be no significant difference in self-reported quality of life in the area of career decisions for experimental compared to control adults.

4. There will be no significant difference in self-reported overall voice rating for experimental compared to control adults.
CHAPTER II

Methods

Participants

Ten adults, ages 18.0 years and older, were selected from Cincinnati Children’s Hospital Medical Center’s otolaryngology database of post-laryngotracheal reconstruction patients to participate in the experimental group. Ten adults with no history of airway reconstructive surgery were selected from the general community in Southwestern Ohio to serve as the control group. Participants in the control group were age-, gender-, and education-matched to the participants in the experimental group. Experimental group participants gave verbal consent via telephone to participate in a short telephone survey (Appendix A). Control group members were recruited from the community with a written permission-to-contact form that explained the study’s procedures and requested a telephone number for contact (Appendix B). After signing and returning consent forms to the researchers, individuals were eligible for selection as a matched control group member.

Inclusion and Exclusion Criteria

Inclusion criteria for the experimental group included a history of airway reconstruction surgery with a voice disorder resulting from the airway reconstruction procedure. Only participants with at least one year post-surgery were considered. Participants were required to give consent, have adequate speech intelligibility for telephone conversation, and have the ability to comprehend and answer questions. Participants who were accessible for telephone contact were included. Exclusion criteria for this group included the inability to communicate verbally, as well as no history of a voice disorder.

Inclusion criteria for the control group were similar to the inclusion criteria for the experimental group, with the exception that individuals with a history of airway reconstruction surgery or history of a voice disorder were excluded from the control group.

Procedure

After participants were selected from a field of 573 names and determined to meet inclusion and exclusion criteria, they were assigned a patient number for confidential
participation in the study. A reserve list was also chosen to participate in the study to replace any individuals that could not be contacted or who were unwilling to participate. Information regarding the date and nature of the most recent laryngotracheal surgical procedure was obtained from the database and noted for each experimental participant.

During review of participants’ medical charts, several randomly chosen participants were noted to have severe mental retardation that would inhibit the ability to complete a telephone survey. These participants, as well as participants who were unable to be contacted by phone due to geographical location, were automatically replaced by participants on a backup list selected in a random drawing identical to the previously described protocol.

The participants meeting the inclusion criteria according to medical records were contacted via telephone and asked to contribute to the research. After obtaining verbal consent, the experimental group participants were administered a 31-item survey (Appendix A). The survey was discontinued if experimental participants indicated no history of voice disorder, were unable to verbally answer the questions required, or indicated a desire to end the survey.

Ten adult participants for the control group were found and recruited in the community by means of a written permission-to-contact form (Appendix B). Each participant was then assigned a patient number to maintain confidentiality. Control group participants were matched exactly with an experimental group member based on age, gender, and education level, and contacted via the telephone number provided on the signed permission-to-contact form. The participants in the control group were contacted and administered a 31-item survey (Appendix C) describing physical/educational concerns, social concerns, and career decisions. The survey was discontinued if control participants indicated a history of voice disorder, were unable to verbally answer the questions required, or indicated a desire to end the survey.

Survey Questions

The questions included in the survey were modeled after previously administered quality of life measures in similar studies, including: the HRQOL (Zraick et al., 2007), the VAPP (Ma & Yiu, 2001), the VRQOL (Rasch, Gunter, Hoppe, Eysholdt & Rosanowski, 2005), the SF-36 (Krischke et al., 2004; Wilson, Deary, Millar & Mackenzie, 2002), and the VoiSS (Jones, Carding & Drinnnan, 2006). The survey questions encompassed three components: (a)
physical/education concerns, (b) social concerns, and (c) career decisions. Questions addressing physical mobility were included, as well, to determine the presence of any factors that may influence career choice, such as a physical inability to write or limited movement. Questions designed to determine the affect of dysphonia on physical voicing capability were included to describe the participants’ vocal challenges. Educational questions were included to match the control group with the experimental group. Inclusion of these questions could also indicate the role of educational background in participants’ career decision-making.

Items pertaining to career decisions targeted the perceived affect of voice quality on occupational choices. The purpose was to determine whether patterns in occupational interest or disinterest existed across individuals with a history of laryngotracheal reconstruction. Survey questions designed for social function were included to gauge the participants’ interest in activities and reported social difficulties.

**Analysis of Data**

Responses to each survey question were recorded for participants and summed for each group. The totals were used to perform descriptive statistics. Percentages were determined by group for each response to compare response rates. A two-sample t-test was used to compare mean score values between experimental and control groups in the areas of physical/educational concerns, social concerns, career decisions, and overall voice rating. Responses were coded and summed so that scores represented the negativity of the responses for each group. Keys for response coding can be found in Appendices D, E, and F. The two-sample t-test was performed to determine if there was a significant difference in response scores between the groups.
CHAPTER III

Results

*Descriptive Statistics*

Descriptive statistics were performed to answer the research questions. Participants ranged in age between 20 years to 43 years (M=25.1, SD=7.65). There were 7 female participants and 3 male participants, and 8 of the 10 participants included in this study were under the age of 26. Seven participants had a high school education, and 3 participants had a college education. Control participants were matched by age, gender, and education level to experimental participants, therefore, their age range was between 20 to 43 years (M=25.1, SD=7.65) as well.

Experimental participants had a range of 2-15 years (M=5.85, SD=4.39) time lapse since their most recent laryngeal surgery. The time elapsed since participants’ most recent surgeries are displayed in Table 1. Within the experimental group, participants’ most recent surgeries included one laryngotraceoplasty with anterior costal cartilage graft with a cricotracheal resection, a single-stage laryngotraceoplasty with anterior and posterior costal cartilage grafts, five laryngotraceoplasties with anterior costal cartilage grafts, one tracheal resection, one cricotracheal resection, and one laser arytenoidectomy.

Table 1

*Time Elapsed Since Participants’ Most Recent Laryngeal Surgeries*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Time in Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>7</td>
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<tr>
<td>3</td>
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<td>6</td>
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<tr>
<td>7</td>
<td>2</td>
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Table 1 Continued

Time Elapsed Since Participants’ Most Recent Laryngeal Surgeries

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<th>Participant</th>
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</thead>
<tbody>
<tr>
<td>8</td>
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</tr>
<tr>
<td>9</td>
<td>2.5</td>
</tr>
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</tbody>
</table>

Survey Results by Research Question

Physical/ Educational Concerns

Research question 1. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported being enrolled in speech therapy in comparison with control participants? In response to enrollment in speech therapy, 10 out of 10 experimental participants (100%) indicated having received speech therapy in the past. Within the control group, only one individual (10%) had received speech therapy in the past.

Research question 2. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported attending voice therapy in comparison with control participants? Eight of the ten (80%) experimental participants indicated having voice therapy in the past, with therapy durations ranging from 1 to 24 months (M= 12.625, SD= 11.90). None of the control participants reported having voice therapy in the past.

Research question 3. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported experiencing pain while talking in comparison with control participants? When asked whether they experienced any pain while talking, 2 experimental participants (20%) indicated they do. In comparison, none (0%) of the control participants reported experiencing pain while talking.

Research question 4. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported experiencing breathlessness while talking in comparison with control participants? Six experimental participants (60%) reported
experiencing breathlessness while talking. None of the control participants (0%) indicated experiencing breathlessness while talking.

Research question 5. What was the percentage of adult participants, post laryngotracheal reconstruction, who reported that their voice remained strong throughout the day in comparison with control participants? Participants were asked whether their voice remains strong throughout the day. Eight (80%) experimental participants and 10 control participants (100%) responded positively to this question.

Research question 6. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported being bothered by their voice in comparison with control participants? When asked whether they are bothered by their voice, three experimental participants (30%) indicated being bothered by their voice. Only one control participant (10%) indicated being bothered by her voice.

What bothers you most about your voice? The participants that indicated they were bothered by their voice were asked what bothers them most. Experimental participants said, “people ask questions and mention laryngitis”, “my voice sounds different, I get weird comments and funny looks”, and the “tone, how it sounds” were most bothersome. The control participant who reported being bothered by her voice expressed displeasure with her “baby-ish” voice.

Research question 7. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported drinking at least six glasses of water a day in comparison with control participants? Five experimental participants (50%) reported hydrating with at least six glasses of water daily. Only three control participants (30%) indicated similar hydration.

Research question 8. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported drinking alcohol in comparison with control participants? When asked about alcohol consumption, four experimental participants (40%) indicated regular alcohol consumption. Five control participants (50%) said they consume alcohol.
Research question 9. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported smoking in comparison with control participants? None of the experimental participants (0%) were smokers. Two of the control participants (20%) reported smoking.

Research question 10. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported engaging in frequent screaming or yelling in comparison with control participants? One experimental participant (10%) and three control participants (30%) reported engaging in frequent screaming or yelling.

Research question 11. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported using voice amplification in comparison with control participants? None of the experimental participants and none of the control participants reported using voice amplification.

Research question 12. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported having physical limitations affecting their ability to walk in comparison with control participants? All participants (in both control and experimental groups) indicated they had no limitations affecting their ability to walk.

Research question 13. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported having physical limitations affecting their hand movement in comparison with control participants? When asked about hand mobility, two experimental participants (20%) reported having limited hand movement. All of the control participants responded negatively to this question, indicating adequate hand mobility.

Research question 14. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported having a visual impairment in comparison with control participants? Three of the experimental participants (30%) indicated having a visual impairment, with one individual specifying she is legally blind. Five control participants (50%) reported having a visual impairment. Of these participants, all indicated using either glasses or contact lenses.
Research question 15. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported having a hearing impairment in comparison with control participants? All of the participants (in both experimental and control groups) indicated having no history of hearing impairment.

Research question 16. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported current or past enrollment in individual assistance for reading in comparison with control participants? Experimental participants reported no history of individualized reading assistance. In comparison, two control participants (20%) had previously received individualized reading assistance.

Physical/educational concerns overall response score. Responses to physical/educational concern questions were coded and tallied for each participant for a score representative of the participant’s negative responses. There were 16 possible negative responses, meaning the most negative score a participant could have received was a 16. Experimental participants had scores ranging from 2 to 8 (M=4.6, SD=1.89) in the area of physical/educational concerns. Control group members had scores ranging from 1 to 4 (M=2.6, SD=1.17). The survey questions used to determine each participant’s physical/educational concern response scores can be found in Appendix D.

Social Concerns

Research question 17. What were the reported social activities of adults, post-laryngotracheal reconstruction, in comparison with control participants? Experimental participants reported involvement in several different social activities, including the following: attending movies, going to bars, work, school, exercise, hanging out with friends and family, sports (horseback riding and baseball), church, and support groups. Control participants reported being involved in the following: church groups, spiritual leadership groups (Young Life), community theater, singing, being with friends, being with family, sports (hiking and softball), grief support groups, and shopping.

Research question 18. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported that their voice affected the activities they participate in compared to control participants? Three experimental participants (30%) said
their voice affects the activities they are involved in. Two individuals in the control group (20%) responded positively to this question as well, indicating lack of participation in activities that are affected by their voice.

Research question 19. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported receiving comments about their voice in comparison with control participants? When asked whether people comment on their voice, seven experimental participants (70%) indicated yes. One of the control participants reported receiving comments on her voice. The control participant who said she received comments on her voice specified that she sings frequently and receives compliments. Due to her misunderstanding of the question, her response was positive instead of negative, and was coded accordingly.

Research question 20. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported that their voice keeps them from doing things they would like in comparison with control participants? Two of the experimental participants (20%) said their voice keeps them from doing things they would like to participate in. All of the control group members responded negatively to this question.

Research question 21. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported being happy with their voice in comparison with control participants? When asked, eight experimental participants (80%) and ten control participants (100%) reported being pleased with their voice.

Social concerns overall response score. Participant questions were coded to report overall scores for social concern. The coded scores indicate the amount of negativity reported by each participant for social concern questions with a maximum score of 4. The coding of survey responses used to determine response scores can be found in Appendix E. Participants in the experimental group had social concern scores ranging from 0 to 4 (M=1.4, SD=1.26). Control group participants had social concern scores ranging from 0 to 2 (M=0.3, SD=0.48).

Career Decisions

Research question 22. What were the reported occupations of adult participants, post-laryngotracheal reconstruction in comparison with control participants? Experimental and
control group members reported a wide variety of occupations. A comparison of occupations by group can be found in Table 2.

Table 2  
*Participant Occupations by Group*

<table>
<thead>
<tr>
<th>Experimental</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse</td>
<td>Retail worker</td>
</tr>
<tr>
<td>Bartender</td>
<td>Salesperson</td>
</tr>
<tr>
<td>Deli Clerk</td>
<td>Coach</td>
</tr>
<tr>
<td>Claims Clerk</td>
<td>Lifeguard</td>
</tr>
<tr>
<td>Homemaker</td>
<td>Teacher</td>
</tr>
<tr>
<td>Salesperson</td>
<td>Teacher</td>
</tr>
<tr>
<td>Library Clerk</td>
<td>Day Care Worker</td>
</tr>
<tr>
<td>Marketing Specialist</td>
<td>Law Firm Clerk</td>
</tr>
<tr>
<td>Cemetery Worker</td>
<td>Surgery Scheduling Secretary</td>
</tr>
<tr>
<td>Stock Clerk</td>
<td>Office Coordinator</td>
</tr>
</tbody>
</table>

Research question 23. *What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported that their job required a lot of talking in comparison with control participants?* Seven of the experimental group members (70%) reported having jobs that require a lot of talking. Ten control group members (100%) indicated their jobs required a lot of talking.

Research question 24. *What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported that their voice affected their career choice in comparison with control participants?* One individual in the experimental group (10%) said her voice affected her career choice. None of the control group members (0%) reported a link between their career choice and their voice.
If so, how? The single individual in the experimental group who reported her career choice being affected by her voice also indicated that she had to make a career change because of her voice. She reported losing her job following laryngeal surgery in adulthood, requiring a career change.

Research question 25. What was the percentage of adult participants, post-laryngotracheal reconstruction, who reported that their voice affected their job performance in comparison with control participants? When asked whether voice has an affect on job performance, three experimental participants (30%) responded positively. One individual in the control group (10%) said his voice affects his job performance.

Career decisions overall response score. The participants’ responses to career decision questions were coded and tallied so that each participant had a total score representing the negativity of their responses. Within the area of career decision, there was a maximum of 2 negative responses, represented by a maximum score of 2. Experimental participants’ response scores ranged from 0 to 2 (M=0.4, SD=0.699). Scores for control participants ranged from 0 to 1 (M=0.1, SD=0.31). Coding of the career decision survey questions for the determination of response scores can be found in Appendix F.

Overall Voice Rating

Research question 26. How did adult participants, post-laryngotracheal reconstruction, rate their voice in comparison with control participants? When asked to rate their own voice quality on a scale of 1 to 5, with 1 representing poor vocal quality and 5 representing excellent vocal quality, the experimental group had ratings with a range from 2-5 (M=3.3, SD=0.948). Control participants overall voice ratings ranged from 3-5 (M=3.9, SD=0.567).

Inferential Statistics

Inferential statistics were used to describe the difference between participant groups (experimental and control) for each area of interest (physical/educational concerns, social concerns, career decisions, and overall voice rating). In order to complete inferential statistics in four interest areas, the survey questions were coded according to their value, with negative responses being coded as a 1 and positive responses being coded as a 0. In each area of interest, participant responses were coded and tallied so that summative response scores could be used to
represent the overall negativity of responses. With the summed scores, a two-sample t-test was performed with control group and experimental group responses for survey questions in physical/educational concerns (PEC), social concerns (SC), career decisions (CD), and overall voice rating (OVR). Analysis revealed a significant difference between the experimental and control groups in the area of physical/educational concerns ($p=0.01$). There was also a significant difference between the groups in the area of social concerns ($p=0.04$). There was no significant difference in the area of career decisions ($p=0.23$). There was a marginal difference between groups on overall voice rating ($p=0.10$). The results of the two-sample T-test are displayed in Table 3.

Table 3

*Comparison of Participant Groups by Survey Question Area of Interest*

<table>
<thead>
<tr>
<th>Area of Interest</th>
<th>$t$-value</th>
<th>$p$-value</th>
<th>$df$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEC</td>
<td>-2.83</td>
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</tr>
<tr>
<td>SC</td>
<td>-2.19</td>
<td>0.042</td>
<td>18</td>
</tr>
<tr>
<td>CD</td>
<td>-1.24</td>
<td>0.232</td>
<td>18</td>
</tr>
<tr>
<td>OVR</td>
<td>1.72</td>
<td>0.103</td>
<td>18</td>
</tr>
</tbody>
</table>

Note. PEC= physical/educational concerns, SC=social concerns, CD=career decisions, OVR=overall voice rating.
CHAPTER IV

Discussion

_Interpretation of the Results by Research Hypothesis_

_Physical/Educational Concerns_

Research hypothesis 1. **There will be significantly lower self-reported quality of life in the area of physical/educational concerns for experimental compared to control adults.** The experimental group means were significantly higher than control group means for physical/educational concern questions. Due to the nature of response coding, high response scores were representative of more negativity in responses. The results indicated significantly lower self-reported quality of life in the area of physical/educational concerns for experimental participants in comparison with control participants. This supports the previous research demonstrating that individuals with dysphonia report poorer health scores than individuals without dysphonia (Krischke et al., 2004).

In the area of physical/educational concerns, a higher percentage of experimental participants reported the following: pain while talking, breathlessness while talking, a history of speech therapy, a history of voice therapy, being bothered by their voice, having a physical limitation affecting hand movement, and drinking at least six glasses of water daily. A higher percentage of control participants reported the following: a voice that remains strong throughout the day, alcohol consumption, engaging in frequent screaming or yelling, visual impairment and a history of individual reading assistance.

The reported physical/educational concerns of participants suggest that experimental participants practice more vocal hygiene than control participants, perhaps because of a history of voice and speech therapy, but have higher rates of physical concerns. The reported physical limitations and concerns of experimental participants support the findings of Zraick and colleagues (2007) that individuals with dysphonia reported poorer HRQOL (Health-Related Quality of Life), suggesting a perceived handicap in comparison with individuals without dysphonia. Due to the analyzed results in the area of physical/educational concerns, null hypothesis 1 can be rejected.
Social Concerns

Research hypothesis 2. There will be significantly lower self-reported quality of life in the area of social concerns for experimental compared to control adults. The experimental group means were significantly higher than control group means for social concern questions. With coding, high scores in this area were indicative of more negative responses. These results demonstrate significantly lower self-reported quality of life in the area of social concerns for experimental participants in comparison with control participants.

A higher percentage of experimental participants reported the following social concerns: their voice affects the activities they participate in, people comment on their voice, and their voice keeps them from doing things they would like. There was a higher percentage of control participants who reported being happy with their voice. These results indicate that individuals who have undergone laryngeal reconstruction surgery may modify their social activities to accommodate their post-surgical voices. Considering the results of the data analysis indicating a significant difference between groups in the area of social concerns, null hypothesis 2 can be rejected.

Career Decisions

Research hypothesis 3. There will be significantly lower self-reported quality of life in the area of career decisions for experimental compared to control adults. The results of the analysis indicate that there was no significant difference in self-reported quality of life in the area of career decisions. This suggests that individuals who have undergone laryngeal reconstruction surgery have similar career decisions as peers without a history of laryngeal reconstruction.

In the area of career decisions, a higher percentage of experimental participants reported their voice affecting their career choice and their voice affecting their job performance in comparison with control participants. A higher percentage of control participants reported having a job that requires a lot of talking, such as teaching and sales. This suggests that although there was no significant difference in career decision response scores inferentially, there were differences in the career decisions of individuals with a history of laryngeal reconstruction. Due to the absence of a significant difference in self-reported quality of life in the area of career
decisions between the experimental and control participants, null hypothesis 3 failed to be rejected.

**Overall Voice Rating (OVR)**

*Research hypothesis 4. There will be significantly poorer self-reported overall voice rating for experimental compared to control adults.* In response to survey question 31 (“On a scale of 1 to 5, how would you rate your voice?”), the mean for the experimental group was marginally lower than for the control group, indicating poorer perceived voice quality. This indicates a small but insignificant difference in the way individuals with a history of laryngeal reconstruction surgery perceived their voice in comparison with peers who had not undergone laryngeal reconstruction. Analysis of the data indicates that null hypothesis 4 failed to be rejected.

**Factors Influencing Collection of Data**

Due to the nature of the study and exclusion criteria, data collection was dependent upon the number of individuals who were appropriate for telephone conversation and who were available for telephone contact. Potential participants were excluded for an inability to communicate, syndromes affecting cognition or mobility, brain injuries affecting cognition, no history of laryngeal reconstruction, and unwillingness to participate. Participants whose medical information included a recent procedure (within 1 year) or whose information was incomplete were excluded. Some individuals could not participate due to inaccurate or outdated contact information, while others were contacted multiple times but could not be reached. From a field of 573 patients, 84 patients’ medical charts were reviewed for potential contact.

**Medical History**

*Ability to communicate.* Three individuals with an inability to communicate verbally were excluded. Aphonia, as well as tracheotomy dependence without use of a passy muir speaking valve, were two indicators of an inability to participate. Potential participants with no apparent means of verbal communication were not contacted.

*Cognition.* Participants whose medical information noted syndromes with associated deficits in cognitive functioning were excluded from the study due to a potential inability to
accurately answer questions. Eleven individuals with documented or reported mental retardation were considered inappropriate for participation.

*Mobility.* Because mobility can also be an important factor in career options, one potential participant with a medical condition affecting mobility was not included in the study. Individuals with decreased mobility may be limited in potential careers due to an inability to complete certain required tasks. In order to ensure that results of the survey truly represented the effects of a voice disorder on career choice, this individual’s documented severe immobility was noted, which excluded the individual from the study.

*No history of laryngeal reconstruction.* After reviewing medical charts, 5 individuals listed on the otolaryngology database had received treatment at Cincinnati Children’s Hospital Medical Center, but had not undergone laryngotraceal reconstruction surgery. These individuals were excluded. Individuals without specific surgery dates in the database were also excluded.

*Recent procedures.* Eight individuals in the database had record of recent surgeries within the last year, and in order to adhere to exclusion criteria, these individuals were not contacted.

*Inability to Contact*

*Incorrect contact information.* Thirty-nine previous patients, whose laryngotracheal reconstruction procedures were performed 2 to 26 years ago, could not be reached at the telephone number provided in their medical charts. Of the 39 individuals with incorrect contact information, 8 phone numbers were wrong, 12 phone numbers were disconnected, 11 phone numbers resulted in multiple connections with voice mail, and 8 phone numbers resulted in no answer. Phone numbers were attempted multiple times before excluding an individual from the study.

*Foreign residence.* One individual was not contacted due to residence outside of the United States. Contact information as well as documentation indicated that the individual lived outside the country. To avoid language interference, this individual was not contacted for participation.

*Deceased.* While reviewing medical charts, it was determined that 2 individuals were recently deceased and therefore excluded from the study.
Unwillingness to Participate

During the course of the study, 2 contacted individuals did not wish to participate and 1 individual was assumed unwilling to participate. In one instance, family members were not willing to provide current contact information for the sought individual. One contacted individual’s family member indicated displeasure with CCHMC, at which time the individual’s complaints were noted and they were excluded from participation in the study. One individual with documented displeasure with CCHMC in their medical chart was not contacted due to an assumed unwillingness to participate.

Life Stage

Although over the age of 18 years of age, in order to answer certain questions, participants were excluded if still in high school. One potential participant was 19 years of age, but once contacted, was determined to be enrolled in high school. Being in high school made questions regarding employment and occupation irrelevant, requiring that individuals still in high school be excluded from participation.

Limitations

Due to the small size of this study’s sample, the results are limited in their generalization and in their validity. With a larger sample size, the long-term effects of voice disorders following laryngotracheal reconstruction surgery on adult career decisions, social lives, and physical concerns can better be determined. This study was also limited due to the fact that a similar study does not exist to model a procedure or for comparison of data. The survey was limited in the number of questions targeting career decisions, making it difficult to describe the true effects of laryngotracheal reconstruction on career choices.

In response to certain survey questions, responses were not always clear-cut. The participants who reported breathlessness while talking indicated situational breathlessness, which was not delineated by the format of survey question #7. Also, although both experimental and control members reported having visual impairment (Q #18), only one participant in the experimental group indicated that her visual impairment was so severe that it could not be corrected with glasses or contact lenses. All other participants with reported visual impairment also reported using corrective lenses. Survey questions can be further clarified to obtain more
specific information regarding physical conditions and vocal challenges from participants. Because this study serves as a pilot study in this specific area of research, future investigations will benefit from the data and procedure documented and can further improve the knowledge base in the area of voice disorders following laryngotracheal reconstruction surgery.

**Future Implications**

This study served as a pilot study of the long-term effects of voice disorders following laryngotracheal reconstruction into adulthood in the areas of physical concerns, social concerns and career decisions. Due to the limitations of this study, there are many opportunities for further research. Future studies should include a larger sample to determine whether results are generalizable to a larger number of individuals with dysphonia following laryngotracheal reconstruction. More questions targeting career decisions could be formulated to investigate the effect of laryngotracheal reconstruction on occupational choices and job performance.
References


Appendix A

Telephone Survey for Experimental Adult

Consent Script Following Laryngeal Reconstructive Surgery:

Hello. This is ____________ from Cincinnati Children’s Hospital Pediatric Voice Clinic. We have record that you had laryngeal reconstructive surgery at the hospital. We are calling to ask for your consent to ask you a few questions over the phone for research. The research is about the job choices patients make after having voice problems following surgery. Have you experienced a voice problem? (If subject answers yes, continue script). We want to know if voice problems still affect what you do. This will help us to find out about some of the long-term effects of airway reconstruction. The survey should only take about 10 minutes and it is voluntary, meaning you can choose to discontinue at any time. Any information gathered from the survey will be kept confidential and will not be linked to your name in publications. Will you take part? If you have any questions about the research, you can contact Ravindhra Elluru, MD at 513-636-4356 or Barbara Weinrich, Ph.D., at 513-636-6281.

### Demographic Information

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<td></td>
<td></td>
<td></td>
<td>M</td>
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<tr>
<td></td>
<td></td>
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<table>
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<table>
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### Physical/ Educational Concerns

<table>
<thead>
<tr>
<th>2.</th>
<th>Have you ever been enrolled in speech therapy?</th>
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<tr>
<td></td>
<td>Yes</td>
</tr>
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<table>
<thead>
<tr>
<th>3.</th>
<th>Have you ever attended therapy for your voice?</th>
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</thead>
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<tr>
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</tbody>
</table>

<table>
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<th>4.</th>
<th>If so, when did you begin and end therapy?</th>
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<td>Length in months:</td>
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<table>
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<th>5.</th>
<th>Where did you attend therapy?</th>
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<td></td>
<td>Question</td>
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<td>---</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>6</td>
<td>Do you experience pain while talking?</td>
</tr>
<tr>
<td>7</td>
<td>Do you experience breathlessness while talking?</td>
</tr>
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<td>8</td>
<td>Does your voice remain strong throughout the day?</td>
</tr>
<tr>
<td>9</td>
<td>Are you bothered by your voice?</td>
</tr>
<tr>
<td>10</td>
<td>If so, what bothers you most about your voice?</td>
</tr>
<tr>
<td>11</td>
<td>Do you drink at least six glasses of water a day?</td>
</tr>
<tr>
<td>12</td>
<td>Do you drink alcohol?</td>
</tr>
<tr>
<td>13</td>
<td>Do you smoke?</td>
</tr>
<tr>
<td>14</td>
<td>Do you engage in yelling or screaming frequently?</td>
</tr>
<tr>
<td>15</td>
<td>Do you use voice amplification?</td>
</tr>
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<td>16</td>
<td>Do you have any physical limitations that affect your ability to walk?</td>
</tr>
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<td>Do you have any physical limitations that affect your hand movement?</td>
</tr>
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<td>Do you have any visual impairment?</td>
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<td></td>
<td>Question</td>
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<tr>
<td>---</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>19</td>
<td>Do you have any hearing impairment?</td>
</tr>
<tr>
<td>20</td>
<td>Are you currently enrolled, or in the past have you been enrolled, in individual assistance for reading?</td>
</tr>
</tbody>
</table>

**Social Concerns**

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
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<tbody>
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<td>21</td>
<td>What social activities do you participate in?</td>
<td></td>
<td></td>
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<tr>
<td>22</td>
<td>Does your voice affect the activities you participate in?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Do people comment about your voice?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Does your voice keep you from doing things you’d like?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Are you happy with your voice?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Career Decisions**

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>What is your occupation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Does your job require a lot of talking?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Has your voice affected your career choice?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>If so, how?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Does your voice affect your job performance?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Voice Rating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31. On a scale of 1 to 5, how would you rate your voice?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1-being poor and 5-being excellent)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Appendix B

Permission to Contact-Control Adult

Researchers from Cincinnati Children’s Medical Center Pediatric Voice Clinic seek permission to contact you via telephone to complete a short survey. The survey is part of a research project studying the effects of a voice disorder following airway reconstruction surgery on adults’ social concerns and career choices. We would like to compare survey results in adults with a history of voice disorders to those without voice disorders. The adults without voice disorders or a history of airway reconstructive surgery will be asked the same questions as their voice-disordered peers. There are no risks associated with participation in this study. This research will help us understand the way airway reconstructive surgery and associated voice disorders affect life decisions and will benefit future surgical candidates. The survey will take approximately 10 minutes to complete by telephone. You are free to consent or refuse participation in this study. Any personal information obtained in this study will be kept confidential and will not be used in publications.

By signing this document and providing a telephone number, you are giving permission for the research team to contact you via telephone. If you have any questions about the research, you can contact Ravindhra Elluru, MD, at 513-636-4356, Barbara Weinrich, Ph.D., at 513-636-6281, or Miami University IRB (OARS, 513-529-3600).

____________________________________
Print Name

____________________________________
Signature

____________________________________
Home Phone Number
Appendix C

Telephone Survey for Control Adult

(For adults who’ve signed and returned a consent form)

Consent Script Following Laryngeal Reconstructive Surgery:

Hello. This is ____________ from Cincinnati Children’s Hospital Pediatric Voice Clinic. We have no record that you have undergone laryngeal reconstructive surgery. We are calling to ask your permission to ask you a few questions over the phone for research. The research is about the social concerns and career choices patients make after having voice problems following surgery. Have you experienced a voice problem? (If subject answers yes, discontinue script). This survey will help us to find out about some of the long-term effects of airway reconstruction in comparison to individuals who have not undergone this type of surgery. The survey should only take about 10 minutes and it is voluntary, meaning you can choose to discontinue at any time. Any information gathered from the survey will be kept confidential and will not be linked to your name in publications. Will you take part? If you have any questions about the research, you can contact Ravindra Elluru, MD, at 513-636-4356 or Barbara Weinrich, Ph.D., at 513-636-6281, or Miami University IRB (OARS, 513-529-3600).

<table>
<thead>
<tr>
<th>Demographic Information</th>
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</thead>
<tbody>
<tr>
<td>Participant Number:</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Type of Surgery:</td>
</tr>
<tr>
<td>1. What is your highest level of education?</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Physical/Educational Concerns

2. Have you ever been enrolled in speech therapy?  
   Yes  No

3. Have you ever attended therapy for your voice?  
   Yes  No
<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th></th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>If so, when did you begin and end therapy?</td>
<td></td>
<td>Length in months:</td>
</tr>
<tr>
<td>5</td>
<td>Where did you attend therapy?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Do you experience pain while talking?</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>Do you experience breathlessness while talking?</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>8</td>
<td>Does your voice remain strong throughout the day?</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>9</td>
<td>Are you bothered by your voice?</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>10</td>
<td>If so, what bothers you most about your voice?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Do you drink at least six glasses of water a day?</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>12</td>
<td>Do you drink alcohol?</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>13</td>
<td>Do you smoke?</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>14</td>
<td>Do you engage in yelling or screaming frequently?</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>15</td>
<td>Do you use voice amplification?</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>16</td>
<td>Do you have any physical limitations that affect your ability to walk?</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Question</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>17.</td>
<td>Do you have any physical limitations that affect your hand movement?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Do you have any visual impairment?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Do you have any hearing impairment?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Are you currently enrolled, or in the past have you been enrolled, in</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>individual assistance for reading?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Social Concerns</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>What social activities do you participate in?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>Does your voice affect the activities you participate in?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>Do people comment about your voice?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>Does your voice keep you from doing things you’d like?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>Are you happy with your voice?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Career Decisions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>What is your occupation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>Does your job require a lot of talking?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>Has your voice affected your career choice?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>29.</td>
<td>If so, how?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>Does your voice affect your job performance?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

**Overall Voice Rating**

| 31. | On a scale of 1 to 5, how would you rate your voice? (1-being poor and 5-being excellent) | 1 | 2 | 3 | 4 | 5 |
Appendix D

*Coding For Physical/Educational Concerns Overall Response Score*

<table>
<thead>
<tr>
<th>Survey Question #</th>
<th>Positive Response</th>
<th>Negative Response</th>
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<tbody>
<tr>
<td>2</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Not Coded-Qualitative Data</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Not Coded-Qualitative Data</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>8</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>10</td>
<td>Not Coded- Qualitative Data</td>
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</tr>
<tr>
<td>11</td>
<td>Yes</td>
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<tr>
<td>12</td>
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<td>16</td>
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<td>17</td>
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<td>18</td>
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<td>19</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>20</td>
<td>No</td>
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</table>

Note. Negative response=1; positive response=0.
### Appendix E

**Coding For Social Concerns Overall Response Score**

<table>
<thead>
<tr>
<th>Survey Question #</th>
<th>Positive Response</th>
<th>Negative Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
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<td>22</td>
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<td>23</td>
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<td>Yes</td>
</tr>
<tr>
<td>24</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>25</td>
<td>Yes</td>
<td>No</td>
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</tbody>
</table>

Note. Negative response=1; positive response=0.
Appendix F

*Coding For Career Decisions Overall Response Score*

<table>
<thead>
<tr>
<th>Survey Question #</th>
<th>Positive Response</th>
<th>Negative Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Not coded- Qualitative data</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Not coded- Does not indicate quality of life</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>29</td>
<td>Not coded- Qualitative data</td>
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</tr>
<tr>
<td>30</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Note. Negative response=1; positive response=0.