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Voice Therapy: Racial Disparities in Adherence and Clinically Significant Outcomes

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VOICE THERAPY: RACIAL DISPARITIES IN ADHERENCE AND CLINICALLY SIGNIFICANT OUTCOMES

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Arts

in

The Department of Communication Disorders

by

Amber Danielle Burks
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ABSTRACT

Voice therapy is evidence-based, behavioral intervention that can reduce functional and organic voice disorders. Despite its proven effectiveness, non-adherence to voice therapy is still an issue. Research shows that an estimated 65% of patients who initiate voice therapy drop out before reaching therapeutic goals. Voice therapy outcomes are largely dependent on patients' adherence to treatment regimens, but there is limited information concerning factors that may be associated with voice therapy adherence and therapeutic outcomes for patients who successfully complete voice therapy.

The purpose of this study was to investigate which demographic factors could be associated with higher adherence rates to voice therapy and whether adherent patients reported greater positive change in vocal quality than non-adherent patients. The study consisted of a retrospective chart review of 287 patients diagnosed with various voice disorders who attended voice therapy at the outpatient Our Lady of The Lake Voice Center in Baton Rouge, Louisiana. Using a Microsoft Excel spreadsheet, the following demographic information was collected for this study: race/ethnicity, age, gender, and vocal pathology. Vocal pathologies and disorders observed were vocal fold atrophy, benign lesions, chronic laryngitis, vocal fold edema, vocal fold leukoplakia, muscle tension dysphonia (MTD), vocal cord dysfunction (VCD), sulcus vocalis/vocal fold scarring, and vocal fold paralysis.

The following information was also collected: discharge status (whether the subject was discharged from therapy by the SLP or discontinued therapy without a recommendation for discharge) and pre- and post-therapy Voice Handicap Index (VHI, Jacobson et al.1997)

responses to determine the clinical significance of subject-perceived improvement in voice quality upon successfully completing voice therapy.

Results indicated an overall adherence rate of 33.8% and a non-adherence rate of 66.2%. These results are consistent with literature published in other behavior change fields that examine adherence rates to behavioral therapies. Demographic factors associated with higher adherence rates occurred among subjects who were white, female, and older (65+ years in age). Non-white subjects, however, reported higher rates of clinically significant improvement in voice quality after completing voice therapy.

CHAPTER 1. LITERATURE REVIEW

Introduction

Voice disorders are defined by the American Speech-Language-Hearing Association (ASHA) as disorders that occur when the quality, pitch, and loudness of a person's voice are inappropriate for their age, gender, cultural background, or geographic location. Voice disorders are among some of the most common communicative disorders that occur across the lifespan. They prevent a person's ability to produce their voice in a way that meets their daily needs and can impact their quality of life.

Voice disorders can be classified as organic, meaning they are physiologic in nature and result from changes in respiratory, laryngeal, or vocal tract mechanisms. They can also be classified as functional, when the structure of the voice-production mechanism itself is intact, but the disorder is a result of improper use of the vocal mechanism, such as speaking loudly for prolonged periods of time.

Voice therapy is a behavioral intervention that can reduce or resolve organic or functional voice disorders. Voice therapy can consist of daily exercises, gaining voice production techniques that reduce the chances of a recurring pathology, and eliminating behaviors that contribute to damage to the vocal mechanism, which consists of the air pressure system (the lungs, diaphragm, ribs), the vibratory system (the larynx and vocal folds), and the resonating system (the oral and nasal cavities and the pharynx). Behavioral changes to reduce damage to the vocal mechanism can include behaviors such as reducing voice use and reducing the volume at which one speaks. Because voice therapy requires consistent practice outside of the therapy room away from the clinician and change in habits possibly developed over years, patients with voice disorders play a large role in their own vocal improvement. Adherence to behavioral therapies

such as voice therapy is contingent not only upon the sessions in which the therapy is conducted between the patient and the speech-language pathologist (SLP), but also the patient's understanding and involvement of the treatment regimen (Marques Torbes et al., 2019).

Prevalence of Voice Disorders

Approximately 1 out of 13 adults in the United States will develop a voice problem each year, though a minority of this population seeks intervention for their problems even if they report the issue has a significant impact on their lives (Bhattacharyya, 2014).

Several careers across the United States require individuals to use their voice in order to be successful at their job. These careers can include members of the clergy, singers, lawyers, tour guides, stage actors, and telemarketers to name a few, however elementary and secondary school teachers “represent the largest group of professionals who use their voice as a primary tool of trade” (Roy et al., 2004). According to the National Center for Education Statistics (NCES), there was an expected 3.7 million teachers to compose the number of teachers for the Fall 2020 semester, with 3.2 million of those teachers in public schools and the other .5 million in private schools. Because teachers make up such a large percentage of occupational voice users, it is unsurprising that teachers also constitute a significant number of individuals who experience voice disorders. Almost 58% of teachers reported experiencing “a period of time when their voice did not work, perform, or sound as it normally should, so that it interfered with communication” (Roy et al., 2004).

Further research also provides evidence of the prevalence of voice disorders among other occupational voice users. A 2002 study by Jones et al. found that, when adjusted for age, sex, and smoking status, telemarketers, also members of occupational voice users, were twice as likely to report one or more symptoms of vocal attrition (which can be defined as a reduction in

the quality and overall capability to produce adequate voice) than a control group of community college students of similar demographics.

In the general population, Roy et al. (2005) found that nearly 30% reported experiencing a voice disorder at some point in their lifetime, while 7% reported a current voice problem. There were increased odds of voice disorders occurring among participants who were women between the ages of 40-59 years, had esophageal reflux, had been exposed to chemicals, and had frequent cold/sinus infections. These findings are consistent with several other studies conducted on the demographic characteristics of voice disorders across the U.S. and found that older female patients are more likely to report experiencing a voice disorder (Bhattacharyaa, 2014; Bertelsen et al., 2018; Hur et al., 2018). While the majority of the reported voice disorders in the Roy et al. study was short lived (lasting fewer than four weeks), 7.2% of employed participants reported they had missed at least one day of work due to the voice disorder, indicating a “significant occupational impact” (Roy et al., 2005).

Voice Therapy Techniques

As mentioned previously, voice therapy is a behavioral intervention implemented to reduce negative vocal qualities that accompany a disordered voice: hoarseness, breathiness, reduced loudness, reduced pitch variation, etc. Voice therapy techniques can include direct interventions (such as auditory, somatosensory, musculoskeletal, respiratory, vocal function exercises) or indirect interventions (such as pedagogy, counseling) which involves input both from the clinician and therapy seeking individual (Van Stan et al. (2015). Voice therapy regimens typically involve a combination of direct and indirect interventions.

As a behavioral intervention, voice therapy requires a change in behavior in order to get desired results. The individual undergoing the intervention will need to change a behavior they are accustomed to, in this case improper voice use, and adopt new, healthy behaviors to resolve their vocal pathology. One of the key factors to resolving a vocal pathology is behavior management strategies, correcting negative voice behaviors that may have created or contributed to the individual's voice problem to begin with. These negative voice behaviors can be described as vocal overuse and misuse, and include behaviors such as excessive talking, throat clearing, coughing, smoking, yelling, or use of inhaled irritants. Vocal misuse can also involve improper voice usage, such as speaking too loudly for prolonged periods or at abnormally high or low pitches. Similar to other behavioral therapies, such as exercise, voice therapy relies heavily on the patient's cooperation and motivation in order to see desired results. Patients receiving voice therapy must self-monitor their behavior and self-correct when they notice their behavior is not conducive to resolving the vocal pathology; they must resist the urge to revert to the negative behaviors that contributed to their voice disorder initially.

Indirect voice interventions, which provide patients with knowledge and strategies to improve vocal health (Van Stan et al., 2015), provided in voice therapy, often include reducing excessive voice use, avoiding raising one's voice, eliminating smoking and habitual coughing and throat clearing, avoiding non-essential voice use, and taking "voice naps," particularly after prolonged use of the voice.

Voice therapy also typically consists of direct interventions, or exercises, given to the patient by their speech-language pathologist. Depending on the pathology, certain exercises are provided to the patient that target parts of the voice production mechanism, such as breath

coordination, tension reduction, and easy phonation. One such exercise is called Vocal Function Exercises (VFEs, Stemple et al., 1994) and are a type of physiologic treatment technique that targets the anatomy and physiology of healthy voice production (Angadi et al., 2019). Whereas previously mentioned indirect behavioral voice intervention involves adjusting behaviors that reduce the likelihood of developing or worsening phonotrauma, physiologic intervention targets the underlying physical components of voice production. A systematic literature review (2019) found that there was “moderate-to-strong evidence based on patient self-report and mild-to-moderate evidence based on objective measures to support the use of VFEs to enhance normal voice” (Angadi et al., 2019).

Another study, (Teixeira and Behlau, 2015) compared the effectiveness of VFEs to the alternative therapeutic intervention of using a personal voice amplification (VA) system for teachers in Brazil diagnosed with behavioral dysphonia. Participants either used a VA device for 6 weeks or completed six sessions utilizing VFEs with volunteer speech-language pathology undergraduates trained to administer the therapy. Three experienced speech-language pathologists completed auditory-perceptual evaluations and compared the voices of the two groups to determine if one was better, worse, or if the two were similar. They found that the teachers benefited more from the use of VFEs, and that the efficacy of the therapeutic intervention was greater than that for the group who used the VA device (Teixeira & Behlau, 2015).

Taxonomy of Voice Therapy

Van Stan et al. (2015) proposed a taxonomy that categorizes voice therapy techniques using language that can be used across disciplines and “help structure systematic investigation, improve education, and provide clinicians further insight into the voice therapy process” (Van

Stan et al., 2015). This classification system was created in response to the “black box” (DeJong et al., 2004) phenomenon, wherein variation among stroke rehabilitation across different centers leads to a lack of standardization of rehabilitative practices. This lack of standardization in rehabilitative care leaves little notion of how best to describe therapeutic interventions and limits the ability to understand the specifics of which aspects of therapy best shape patient outcomes (DeJong et al., 2004). Put simply, the taxonomy describes and classifies “what happens during a voice therapy session” (Van Stan et al., 2015).

The taxonomy can be described using two levels: the first contains three categories: direct and indirect interventions, and the delivery method of the intervention. Therapy tasks, or tools, were categorized by whether they were provided as direct or indirect interventions. The second level of the taxonomy further categorizes direct interventions and demonstrates the ways in which different therapy tools have “multiple characteristics” (Van Stan et al., 2015). Using this framework while introducing a task, clinicians can provide their patients with models and theories that allow for problem solving during a session; the taxonomy “can minimize the probability of frustration and maximize the probability of success” (Van Stan et al., 2015).

The creation of the taxonomy of voice therapy is then relevant to this study, as it can be used as a tool that contributes not only to patient adherence to voice therapy regimens, but the positive therapeutic outcomes associated with adherence.

Factors Influencing Attendance and Adherence to Voice Therapy

Given the proven effectiveness of voice therapy techniques, there is still the question regarding why patients fail to adhere to voice therapy involving the completion of exercises to resolve their vocal pathology. The American Pharmacists Association (APhA) defines adherence as the “extent to which a patient acts in accordance with the prescribed interval and dose of a

dosing regimen” (APhA, 2015). In relation to this study, adherence would be defined as the extent to which a patient participates in prescribed voice therapy by continuing to enact the behavior management strategies and exercises mentioned previously, as provided by their speech-language pathologist until discharged from therapy due to gains in vocal quality and overall satisfaction with their voice.

Patient adherence to voice therapy is such an important factor in the rehabilitation process that evidence suggests that the adherence to voice therapy plays a greater role in the resolution of a voice disorder than the chosen therapy approach itself (Hapner et al., 2009). Consequently, the efficacy of the voice therapy can be limited by the degree to which the patients adhere to their prescribed treatments, often complicating patients’ recovery processes.

An estimated 65% of patients drop out of voice therapy before reaching their treatment goals (Hapner et al., 2009). Review of the literature suggests that certain factors contribute to whether a patient will adhere to their therapy, including, but not limited to, patient understanding of therapy, attitudes towards their disorder, beliefs, patient-physician relationship, and group norms (Martin et al., 2005). Portone et al. (2008) found that 38% of patients did not adhere to their physician’s recommendations to attend voice therapy. Primary reasons for nonattendance included insurance denials, resolution of the problem without therapy, and distance to the clinic; however, the reason for the lack of follow-through on the physician’s recommendation for voice therapy was unclear. While these adherence rates are low, they are consistent with findings published across the fields of otolaryngology, gastroenterology, and psychology, which are also behavior change fields that face the obstacle of patient nonadherence and nonattendance (Portone et al., 2008).

Misono et al. (2017) identified factors associated with the likelihood of attending voice therapy among patients referred for it in the CHEER (Creating Healthcare Excellence through Education and Research) network. They found that the factors most likely to influence a person's decision to attend therapy were copay/insurance, reassurance that their vocal pathology was not cancer, and travel; barriers to voice therapy attendance included the patient's unclear outlook on their potential improvement, not understanding the purpose of speech therapy, and the mindset that voice therapy seemed "too hard" (Misono et al., 2017). When adjusting for sociodemographic characteristics, the factors greatest associated with the likelihood that a person would attend voice therapy included a shorter traveling distance to the clinic, age (40-59 years), and academic (vs. non-academic) practice type (Misono et al., 2017).

van Leer and Connor (2010) conducted a study to document patient perceptions of the voice therapy process to identify factors that act as barriers to voice therapy adherence. Race or ethnicity was not taken into consideration in this study, but the information from it contributes to a general sense of what barriers may exist to hinder voice therapy adherence. They interviewed 15 patients with a variety of voice disorders/complaints who had undergone at least two sessions of direct voice therapy about the way they perceived their voice therapy, with particular focus on the adherence to the therapy. The results of the study fit into three themes: Voice Therapy is Hard, and Make it Happen, and The Match Matters.

Theme 1: Voice Therapy is Hard, refers to patients' perceptions that they don't have enough time or motivation to adhere to their voice therapy. Patients reported finding it difficult to adhere to their therapy because of the awareness and dedication it requires in order to see desired results. External barriers, such as time constraints weren't the only reasons patients found

voice therapy to be difficult. Internal cognitive and even emotional barriers, such as being embarrassed about having to do certain exercises also contributed to the perception that voice therapy is hard to adhere to. Several patients in the study reported that they only practiced when others could not hear them, or that they felt teased or ridiculed by their families when they did practice their exercises. The notion of teasing from family members acting as a barrier to adherence to voice therapy is “underscored by the finding that only three participants reported receiving active support from others” (van Leer & Connor, 2010). In a study consisting of 15 patients overall, this translates to only 20% of participants having active support from others to adhere to their prescribed voice therapy.

Theme 2: Make it Happen refers to the way “participants’ use of self-regulation emphasizes the importance of patient agency in voice therapy” (van Leer & Connor, 2010). The patients with these agentic perceptions reported making conscious decisions to adhere, and they reported a sense of control over their voice production. Several patients stress the need for motivation when adhering to voice therapy, and that unless they are actually motivated to complete their exercises, they won’t see the desired change.

Theme 3: The Clinician-Patient Match Matters refers to the way patients viewed their voice clinicians as facilitators to adherence. Essentially, the way a patient views their clinicians and their relationship to their clinician may influence the patient’s motivation to adhere to their therapy. A particularly interesting quote from one of the participants says, “Find a voice therapist that you can really work with that is working with you to become who you want to be and to improve upon yourself and not just go to a voice therapist to go through their ‘ay ee ii’ and go back the next week and ‘ay ee ii’” (van Leer & Connor, 2010). Another patient recommended to

other patients to “think of their therapist as their friend because you feel silly and who wants to feel silly in front of someone they're not comfortable with. You're gonna do silly things. It's OK, the therapist will do silly things with you” (van Leer & Connor, 2010). These quotes are interesting because they beg a question that relates the van Leer and Connor study to this research: could a relationship between Black patients and Black speech-language pathologists could facilitate higher rates of voice therapy adherence? However, because race and ethnicity were not taken into consideration, such a question cannot be attempted to be answered with this particular study.

Racial Disparities in Laryngology & Speech-Language Pathology

Hou et al. (2012) examined racial disparities in the use of larynx preservation, a procedure that utilizes radiation and chemotherapy for locally advanced laryngeal cancer. They hypothesized that Black and Hispanic patients with locally advanced laryngeal cancers would be less likely to undergo laryngeal preservation treatment than their white counterparts. The National Cancer Institute’s SEER database was used to identify Black, white, Hispanic, and Asian patients with stage III and stage IV laryngeal cancer between the years 1991 and 2008. The research found that despite the fact that the use of nonsurgical larynx preservation increased among the general population, racial disparities still existed within this treatment. Black patients were less likely to undergo the larynx preservation therapy than white patients, which was a significant finding in this research as “chemoradiation therapy confers a high probability of retaining a functional larynx without a negative impact on survival” (Hou et al., 2012). The findings of the study also show that racial disparities exist with respect to therapeutic treatment options for laryngeal cancer, consistent with previously conducted studies that examine such issues in radiation therapy.

Possible explanations as to why the gap observed exist: a physician may deem a patient unreliable to complete the intensive and prolonged course of therapy, a lack of health literacy could prevent patients from understanding their management options in full, and lack of social or familial support could contribute to the disparity. Other social factors, health insurance, finances, and lack of reliable and adequate transportation can all contribute to observed disparities in cancer treatment, underlining the finding in the study that “Pronounced racial disparities exist in the use of larynx preservation therapy for locally advanced laryngeal cancer” (Hou et al., 2012). The authors propose that with the knowledge of the existence of racial disparities, further research is needed, focusing on identifying and eliminating barriers that contribute to the gap in medically suitable patients who receive this treatment, “with a particular focus on Black patients with stage IV disease” (Hou et al., 2012).

Speech-language pathologists are not directly involved in the treatment of laryngeal cancers with radiation and chemotherapy, but they are directly involved in the recovery process after surgery. Ideally, patients will initiate therapeutic services with a speech-language pathologist prior to surgery for a prophylactic treatment regimen shortly after being diagnosed with a cancer of the head and/or neck. It is then possible to assume that if there is a disparity among Black patients receiving a larynx preserving treatment to begin with, that there is also a disparity among Black patients initiating services with a speech-language pathologist to aid in the recovery process of their radiation and chemotherapy. This demonstrates a need for more research into how racial disparities within treatment of voice disorders impact Black and other minority patients’ abilities to successfully complete treatment regimens.

Radowsky et al. (2013) examined the potential disparity in voice outcomes between Black and white patients following a thyroid and parathyroid operations. “The available literature reports consistently worse symptoms and advanced disease at presentation, greater treatment-related morbidity, and increased mortality in the minority population when compared with whites for a variety of head-neck cancers, including cancers of the oral cavity, pharynx, larynx, and thyroid gland” (Radowsky et al., 2013). Patients were evaluated before operation, 2 weeks post-operation, 3 months post-operation, and finally at 6 month post-operation using functional voice assessments of voice characteristics. Assessments utilized in the study include the Voice Handicap Index (VHI, Jacobson et al.1997), a voice-related, quality of life questionnaire; the Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V), and the Dysphonia Severity Index (DSI). Finally, patients were examined with the use of a flexible nasal videolaryngostroboscopy. A potential side effect of thyroid and parathyroid surgery is damage to the recurrent laryngeal nerve, which can result in a weakened voice or the complete loss of voice, aphonia, and can be distressing for patients. Over the course of the study, there was a trend of greater adverse vocal symptoms for Black patients than white patients.

The same study also explored contributing factors to the disparity in voice outcomes following the surgery. The study found that Black patients had a greater incidence of negative voice outcomes than white patients, meaning there was a failure to resolve the patients’ dysphonia from the 3-month assessment to 6-month follow-up assessment among Black patients. Postoperative VHI scores were greater, meaning less favorable overall, for Black patients than white patients, as a higher VHI score indicates the patient’s perception of their voice disorder is more severe. Conversely, 3 out of 5 white patients showed improvement from the 3 to 6-month

postoperative assessment. Overall, it seemed that Black patients were more likely to have voice problems in the postoperative period than white patients.

The VHI ratings gathered at the 6-month follow-up assessment, which were self-reported by the patients themselves, were the main basis in the difference between the participant groups of this study. The authors stated that “It is unknown whether or not a cultural or racial bias has bearing on self-ratings via the VHI, although this is certainly plausible” (Radowsky et al., 2013). It is important to note that the quality of life tools, such as the VHI, are often insensitive to racial and cultural influences, and that it is possible that the VHI is not universally applicable when applied to varying cultures, demonstrating a need for more culturally inclusive assessment materials.

While these studies show the disparity in voice outcomes between Black and white patients following thyroid and parathyroid surgery, the specific reasoning behind the disparity has yet to be pinpointed, and merits further investigation. A review conducted by Feit et al. (2020) highlighted the limited extent of research regarding disparities in laryngology and found that inequities most studied within adult laryngology (specifically laryngeal cancer, voice disorders, deglutitive [swallowing] disorders, and airway disorders) were race/ethnicity, sex gender, insurance status, geography, income, and education level; race/ethnicity and sex/gender were the most common sources of disparity examined (Feit et al., 2020). With regard to research of race/ethnicity disparities among voice disorders, another review demonstrated that minorities had lower odds of reporting a voice disorder and were less likely to seek out and attend voice therapy (Hur et al., 2018). Vamosi et al. (2020) reported, using percentage of appointments attended, that the non-white race was associated with higher no-show rates specific to voice therapy.

Adherence to Voice Therapy Among Ethnic Groups

Adherence to therapy is defined as a “multifactorial process which reflects how engaged the patient is to the conducts proposed by a service or health professional” (Marques Torbes et al., 2019). Treatment of voice disorders requires a behavioral change involving not only structured treatment sessions between the patient and speech-language pathologist, but also independent follow-up work completed by the patient outside structured sessions. The follow-up work must be consistent to reinforce positive change towards treating the disorder.

Studies exist that examine various factors that attribute to poor voice therapy adherence, and while they contribute to the question of why patients don’t adhere to their therapy, they, too, fail to take into account patient ethnicities, how they perceive their disorder, and the therapy prescribed to treat it. The most common reason reported for not adhering to voice therapy was lack of insurance coverage, with 48% of the 21 subjects randomly selected indicating this reason (Portone, Johns, & Hapner, 2008). Five of the respondents reported that their lack of attendance was due to their voice problems resolving spontaneously or after one only session, and three patients reported not returning to therapy because of distance from the clinic (Portone, Johns, & Hapner, 2008).

In a follow-up study, Hapner et al. (2009) found that there was no significant difference in attendance between gender or age groups; there was also no significant difference between those who completed and those who dropped out based on race or ethnicity. There was a limitation to this finding, however. While age, gender, diagnoses, severity, and perceived voice handicap were adequately represented, race and ethnicity of the study participants did not reflect the demographics of the Atlanta, GA area, where the study took place. “Only 15 patients (10.2%)

in the study were African American. The latest census of the Atlanta, GA area indicated that African Americans comprised 31.5% of the population” (Hapner et al., 2009). The study is useful for seeing that there is not only an issue with patients not adhering to their voice therapy, but it also underlines the need for more research into the ways race and ethnicity can influence how a patient adheres to their therapy.

Rosow et al. (2019) examined the difference in rates of voice therapy attendance for patients seeking treatment for benign vocal fold nodules between patients who self-identified as Hispanic versus those who self-identified as non-Hispanic. Rosow et al. (2019) also examined differences between patients whose preferred language was English and those who preferred Spanish, emphasizing that language preference was not meant to convey language exclusivity.

Further demographic information gathered in the study included age, zip code, gender, ethnicity, and VHI-10 scores (Rosen et al., 2004). This study was a retrospective medical record review, wherein voice therapy adherence was defined as “attendance to at least one therapy session, and patients who did not attend at least one therapy session were deemed nonadherent” (Rosow et al., 2019). This is the first known study to examine rates of voice therapy adherence in the Hispanic population. The study does only include patients with benign vocal fold nodules because at the institution in which the study was conducted, voice therapy is typically prescribed for this condition before another medical intervention. Because the research focuses particularly on this specific group, in which the diagnosis is considered relatively less severe, there is the possibility that the disparity in adherence rates could be smaller or even nonexistent if more severe diagnoses were taken into consideration. Counting for the severity of the diagnosis in the study, the results of the study indicated that Hispanic patients were less likely to adhere to

prescribed voice therapy than non-Hispanic patients. The overall rate of adherence for all patients of the institution was 68%, with non-Hispanic patients having higher rates of adherence to therapy than Hispanic patients. Non-Hispanic patients had a 78% adherence rate compared to the 57% adherence rate of Hispanic patients, without significant differences in the number of sessions, age, or VHI scores between the groups. When the Hispanic group was further classified into language preference between English and Spanish, the research found a more pronounced difference. Interestingly, only 48% of Hispanic patients who preferred English adhered to their therapy when compared to the 78% of non-Hispanic patients. Hispanic patients who preferred Spanish, however, had an adherence rate of 68%. Despite being less likely to adhere to voice therapy, the English-preferring Hispanic patients presented with higher VHI scores compared to non-Hispanic patients. “These findings suggest that the nature of the observed disparity in therapy adherence may be rooted more in differences of culture, rather than language” (Rosow et al., 2019). Cultural differences nor their potential to attribute to lower therapy adherence rates were investigated, but such research could help determine further barriers to voice therapy adherence, not only among the Hispanic population, but among other racial and ethnic minority groups across the United States.

Research shows that there exists an issue with patients with voice disorders completing prescribed voice therapy, but there is limited information about which patients are more likely to complete therapy compared to others; there is also little research regarding the outcome of therapy for patients who do complete their voice therapy. The purpose of this study is to provide insight into the demographic factors that may be associated with higher adherence rates and clinically significant positive change in therapeutic outcomes of prescribed treatment regimens

for voice disorders. Members of the interdisciplinary team can utilize findings to better support nonadherent patients throughout the course of their treatment so that the patients can better adhere to their recommended treatment plan. The results of this study can be used by speech-language pathologists who specialize in treating voice disorders to develop a new process for introducing voice therapy to patients and keeping them on course to complete their treatment. By recognizing that patients belonging to certain demographic groups may be more likely to not adhere to treatment, and that certain demographic groups perceive greater positive change in vocal quality after completing voice therapy, speech-language pathologists can proactively support these patients at the beginning of treatment through education and building and maintaining a therapeutic relationship.

The questions of this study therefore are:

1. Does voice therapy adherence differ by race and ethnic group (White/Caucasian, Black/African American, American Indian/Alaska Native, Asian; Hispanic/Non-Hispanic)?
2. Does adherence differ among white, and nonwhite (Black/African American, American Indian/Alaska Native, and Asian) subjects based on age, gender, and vocal pathology?
3. Do racial disparities exist in Voice Handicap Index scores after adhering to voice therapy, based on subject age, gender, and vocal pathology?

Hypothesis

It is hypothesized that, based on the literature review and historical racial disparities, subjects belonging to non-white racial and ethnic groups will have higher rates of non-adherence and to prescribed voice therapy than white subjects. It is also hypothesized that adherence rates

will differ among white and non-white subjects when examining age, gender, and vocal pathology. Finally, it is hypothesized that the data will show racial disparities among voice therapy outcomes between white and non-white subjects based on the comparison between pre- and post-therapy VHI-30 (Jacobson et al., 1997) and VHI-10 (Rosen et al., 2004) questionnaire responses, with non-white subjects reporting lower rates of clinically significant improvement in vocal quality post-therapy.

CHAPTER 2. METHODS

This study compared adherence rates among subjects of different demographics to determine if certain demographic groups had higher rates of adherence to prescribed voice therapy and more frequently reported greater clinically significant positive change in voice therapy by the end of treatment. Information that was collected from patient's medical records, included demographics (age, race, ethnicity, gender) and voice related diagnosis. Pre- and post-treatment VHI-30 and VHI-10 responses were recorded as well in regard to the outcomes of patients, with the purpose of determining clinically significant outcomes of those patients who successfully completed their voice therapy.

Subjects

This study was conducted at Our Lady of the Lake Voice Center, an outpatient voice center located within Our Lady of the Lake Regional Medical Center in Baton Rouge, Louisiana. The voice center provides ENT services, voice therapy, and swallowing therapy for primarily head and neck cancer patients, but also patients with other varying medical diagnoses that impact their voice, breathing, and swallowing abilities. The sample for this research study consisted of a convenience sample of patients' charts. A retrospective chart review of patients from December 2015 to December 2020 was used for data collection. Subjects met inclusion criteria for this study if they had a diagnosed voice disorder, a recommendation from their referring MD and speech-language pathologist to begin speech therapy services, and a clinical voice examination conducted by the SLP specifying the treatment regimen for the subject along with a recommended follow-up session within a certain timeframe. A total of 287 subjects met the inclusion criteria for this study. The following demographic information was collected:

race/ethnicity, age, gender, and vocal pathology diagnosis. Patient-specific information was also collected, including pre- and post-therapy VHI-30 and VHI-10 responses.

Protection of Human Subjects

Following the IRB approval of the study by Louisiana State University, Baton Rouge and Our Lady of the Lake Regional Medical Center, the study was conducted as a retrospective chart review. The study included subjects that received voice treatment for a diagnosed voice disorder at the Voice Center from 2015 to 2020. Study-related information was collected from subjects' electronic medical records. After a subject was included in the study, they received a study-related file number which was used for the data analysis. No protected health information (name, address, SSN, etc.) was collected. The research involved minimal risk to subjects. The Microsoft Excel spreadsheet that included all study-related information was maintained by the researcher in a password protected computer in a locked office.

Data Collection

Using Microsoft Excel, a data collection spreadsheet was created for the collection of information for this study. The following demographic information was collected: race/ethnicity, age, and gender. The following information was also kept on the spreadsheet: the pre- and post-treatment VHI-30 and VHI-10 scores, the subject's diagnosed vocal pathology, and the subjects' discharge status: whether they were successfully discharged from therapy or discontinued therapy prior to reaching therapeutic goals as noted by the SLP. Participants in the study were assigned grouped numbers by each category, depending on the number of groups within each category. For example, in the Gender column, male participants were assigned a 0 and female participants were assigned a 1.

VHI-30 and VHI-10 Comparison

The VHI is used to measure the psychosocial impact of voice disorders (Jacobson et al., 1997). The original version of the VHI is a 30-item questionnaire that tasks an individual with rating how severely they believe their voice disorder has impacted them across three domains (functional, physical, and emotional) by ranking each item on a scale from 0 (never) to 4 (always). The VHI has a “moderately strong” relationship between subject self-perceived severity of their voice disorder and VHI scores (Jacobson et al., 1997). Because of its reliability, the VHI has several uses within the clinical environment: it can assess the subject’s perception about the impact of their voice disorder on daily activities, it can help determine the effectiveness of treatment techniques, and it can be used to measure the functional outcomes of behavioral, medical, and surgical treatment strategies employed for voice disorders (Jacobson et al., 1997). The Voice Handicap Index-10 (VHI-10), was developed as an abbreviated version of the VHI-30, containing only 10 items compared to the 30 on the original version. The VHI-10 shows “no statistically significant differences” from the original (Rosen et al., 2004).

In December of 2015 the voice center where the data for this study was collected moved from having subjects complete the original 30-item version of the VHI to its abbreviated version, the VHI-10. As a result, 10 subjects who met inclusion criteria for this study have scores from the VHI-30, and the remaining 277 have scores from the VHI-10.

Severity ratings of the VHI are as follows: a total score of 0 to 30 indicates a minimal or mild handicap, a score from 31 to 60 indicates a moderate handicap, and a total score of 61 to 120 indicates a severe vocal handicap (Maertens & De Jong, 2007). The voice center where this study was conducted uses the following severity ratings for the VHI-10: a score from 0 to 11 is considered within functional limits (WFL), a score from 12 to 19 is considered a mild handicap,

a score from 20 to 26 is considered a moderate handicap, a score from 27 to 34 is a moderate/severe handicap, and a score from 35 to 40 is considered a severe handicap.

This study aimed to determine outcomes of subjects' adherent to voice therapy using pre- and post-treatment VHI and VHI-10 scores, with it being hypothesized that adherent subjects would see more clinically significant improvements in vocal quality than nonadherent subjects. The change between pre- and post-treatment VHI of 15 is considered a significant clinical change. There is no clear consensus on what constitutes clinically significant improvement using VHI-10 scores. Young et. al (2018) stated that "clinical consensus previously defined clinically meaningful improvement as a decrease ≥ 5 " but found that a change of 4 points on the total score was the minimal clinically important difference (Young et al., 2018). Misono et al. (2017), however, considered the minimal important difference of VHI-10 scores as a decrease of 5 points on the total score. For this study, clinically significant improvement in vocal quality was defined as a decrease of a minimum of 4 points on the total VHI-10 score.

CHAPTER 3. RESULTS

Data Analysis

This study included 287 subjects, where 69.7% were female and 73.5% were white. Inclusion criteria for the study were (1) a diagnosed vocal pathology by a referring MD, (2) a referral for initiation of speech therapy by a referring MD, and (3) a clinical voice examination conducted by a speech-language pathologist recommending initiation of speech therapy with specifications on the subject's treatment regimen and a recommended follow-up session within a certain timeframe.

The results of the demographic information collected for the 287 subjects were put into a Microsoft Excel spreadsheet for descriptive analysis. The data collected in the chart review were demographic variables, including race/ethnicity, age, gender, the subjects' diagnosed vocal pathologies, and pre- and post-therapy VHI scores. Subjects were coded for either having completed voice therapy (adherent) or having dropped out without recommendation by the therapist (non-adherent).

Currently, there is no standard definition for what is considered completion of voice therapy. Thus, an operational definition of voice therapy adherence was developed for use in this study. A subject was coded as adherent if their last voice therapy note documented either of the following criteria: (1) the subject met therapeutic goals for discharge according to the SLP and (2) no follow-up appointments for the subject were made with the SLP. A subject was coded as non-adherent if they met either of the following criteria: (1) the SLP provided parameters for a follow-up appointment and the subject cancelled or did not show for the appointment or (2) the therapist discharged the subject due to failure to comply with the prescribed treatment program.

Table 3.1 shows the overall demographic numbers of the subjects included in the study, along with the number of vocal pathologies treated among the subjects.

Table 3.1 Subject Demographics & Pathologies Treated. Total Number of Subjects, N = 287

GENDER	Males N = 87	Females N = 200				Total N = 287
RACE	White N = 211	Black N = 65	Asian: N = 1	Other N = 3	Unknown/Patient Refused N = 7	Total N = 287
VOCAL PATHOLOGY						
ATROPHY	N = 21					
BENIGN LESIONS	N = 73					
CHRONIC LARYNGITIS	N = 8					
EDEMA	N = 10					
LEUKOPLAKIA	N = 4					
MTD	N = 87					
VCD	N = 37					
SULCUS VOCALIS/SCAR	N = 25					
TREMOR	N = 1					
VOCAL FOLD PARALYSIS	N = 21					

MTD; Muscle Tension Dysphonia, VCD; Vocal Cord Dysfunction

Question 1

The first question of this study asked whether therapy adherence rates differ by subject race. Of the 287 subjects who met initial inclusion criteria, 211 identified as White/Caucasian, 65 identified as Black/African American, 1 identified as Asian, 3 indicated Other as their race, and 7 failed to indicate a race classification on intake paperwork. There were no subjects who

identified as American Indian or Alaska Native among the information collected for this study, thus this group is not represented in the final results.

White subjects had a greater than 2 to 1 representation in this study with 211 white subjects and at least 65 non-white subjects, not including the 7 subjects who did not provide data for their respective racial group and for whom it was not possible to confirm their racial identification. Because these 7 subjects could not definitively be classified as white or non-white, they are excluded from calculations of adherence rates by race, making the total number of subject adherence rates by race 280, as opposed to the overall 287. Females also had a greater than 2 to 1 representation in this study, with 200 female subjects and 87 males.

Results indicated an overall adherence to voice therapy regardless of race or other demographic factors to be 33.8%; 97 out of the 287 subjects who met inclusion criteria for the study were coded as adherent.

By race, white subjects had the highest completion rate, with 37.4% of subjects successfully meeting criteria for discharge. Black subjects had the second highest adherence rates, with 26.2% of Black subjects meeting criteria for discharge. Only 1 subject identified as Asian in the data collected, and that individual failed to meet the criteria for discharge, thus the completion rate for Asian subjects in this study is 0%. None of the three subjects who indicated their race as Other met discharge criteria, making the adherence rate for this group 0%. Of the remaining 7 subjects, whose race was listed as either Unknown or Patient Refused, only 1 individual met the criteria for discharge, making the adherence rate for this group 14.3%. Table 3.2 compares adherent and non-adherent subjects by race.

Table 3.2 Adherence/Non-Adherence Rates by Race

	Adherent	Non-Adherent	Total	Adherence Rate
Race				
White/Caucasian	79	132	211	37.4%
Black/African American	17	48	65	26.2%
Asian	0	1	1	0%
Other	0	3	3	0%
Unknown/Patient Refused	1	6	7	14.3%

Question 2

The second question of this study asked whether subject adherence differed among white and nonwhite subjects, based on age, gender, and vocal pathology. To answer this question, subjects were divided into groups of either white or non-white. Because of the lack of adequate representation for the genders of the Asian and Other groups, subjects from these groups were combined with subjects of the Black/African American group to comprise a non-white group, which would be compared to adherence rates of white subjects by gender. The 7 subjects whose race was classified as Unknown/Patient Refused in the EMR system were excluded from this question, due to the inability to verify the race these individuals identify as.

Among white subjects, females had an adherence rate of 35.1%, while the male adherence rate was 43.3%. Among non-white subjects, the female adherence rate was 26.7%, while the male adherence rate was 20.8%. Table 3.3 compares adherence rates between white and non-white subjects by gender.

Table 3.3 Adherence/Non-Adherence Rates by Race and Gender

	Adherent	Non-Adherent	Total	Adherence Rates
White				
Female	53	98	151	35.1%
Male	26	34	60	43.3%
Non-White				
Female	12	33	45	26.7%
Male	5	19	24	20.8%

Among white subjects, subjects in the 65+ age group had the highest adherence rate, with an adherence rate of 49.4%. The Under 35 and 51 – 65 age groups had the lowest adherence rates, with equal rates of 29.4%. Among non-white subjects, subjects in the Under 35 age group had the highest adherence rate, with a rate of 37.5%. Non-white subjects in the 36 – 50 group had the lowest adherence rates, with a rate of 11.8%. Table 3.4 compares adherence rates between white and non-white subjects by race.

Table 3.4 Adherence/Non-Adherence Rates by Race and Age

	Adherent	Non-Adherent	Total	Adherence Rates
White				
Under 35	10	24	34	29.4%
36 – 50	16	33	49	32.7%
51 – 65	15	36	51	29.4%
65 +	38	39	77	49.4%
Non-White				
Under 35	3	5	8	37.5%
36 – 50	2	15	17	11.8%
51 – 65	7	18	25	28%
65 +	5	14	19	26.3%

Across both racial groups, white and non-white, subjects diagnosed with vocal fold atrophy had the highest adherence rate to voice therapy; white subjects diagnosed with atrophy had an adherence rate of 55.6%, while non-white subjects diagnosed with atrophy had an adherence rate of 100%. Among white subjects, the diagnosis of tremor had the highest rate of nonadherence at 0%; among non-white subjects, the diagnoses of edema, VCD, and sulcus vocalis/scar had the highest rates of nonadherence, each diagnosis had an adherence rate at 0%. Table 3.5 compares adherence rates between white and non-white subjects by diagnosed vocal pathology.

Table 3.5 Adherence/Non-Adherence Rates by Race and Vocal Pathology

	Adherent	Non-Adherent	Total	Adherence Rate
White				
Atrophy	10	8	18	55.6%
Benign Lesion	19	28	47	40.4%
Chronic Laryngitis	2	3	5	40%
Edema	2	4	6	33.3%
Leukoplakia	3	1	4	75%
MTD	23	39	62	37.1%
VCD	8	22	30	26.7%
Sulcus Vocalis/Scar	8	12	20	40%
Tremor		1	1	0%
Vocal Fold Paralysis	4	14	18	22.2%
Non-White				
Atrophy	3		3	100%
Benign Lesion	5	19	24	20.8%
Chronic Laryngitis	1	2	3	33.3%
Edema		3	3	0%
MTD	7	15	22	31.8%
VCD		6	6	0%
Sulcus Vocalis/Scar		5	5	0%
Vocal Fold Paralysis	1	2	3	33.3%

MTD; Muscle Tension Dysphonia, VCD; Vocal Cord Dysfunction

Question 3

The third and final question of this study asked whether racial disparities exist in the outcomes of voice therapy treatment of adherent subjects based on age, gender, and vocal pathology per VHI scores. To answer this question, subjects who successfully met discharge criteria were divided into white and non-white groups. VHI scores were compared; scores provided on the day of the clinical voice examination were used as the pre-therapy score, and scores provided on the session in which the subject was discharged were used as the post-therapy scores. As mentioned previously, this study examined the rates of clinically significant improvement in VHI scores, which, for the VHI-30 is a decrease of 15 points, and, for the VHI-10, is a decrease of 4 points.

For reasons not investigated for this study, pre- and post-therapy VHI scores were not available from every adherent subject’s medical charts; it is assumed that the subject either did not complete a VHI questionnaire at pre- and/or post-therapy sessions, the clinician did not record VHI scores in the note for the pre- and/or post-therapy sessions, or the questionnaire was not scanned into the EMR system. Thus, only the scores from subjects for which this information was available could be used to answer this study question. Of the 97 subjects who were successfully discharged from voice therapy by their clinician, only records from 65 subjects contained pre- and post-therapy VHI scores that would be used to answer the third study question, which is approximately 23% of the total number (280) of subjects included in tables that include a racial breakdown.

Between white and non-white subjects, white subjects had a clinically significant improvement rate improvement of 66.7%, while non-white subjects had a clinically significant improvement rate of 90.1%. Table 3.6 compares the rate of improvement in voice outcomes of subjects by race.

Table 3.6 Voice Therapy Outcomes by Race, N:65

	Clinically Significant Improvement	Not Clinically Significant Results	Total	Improvement Rates
White	36	18	54	66.7%
Non-White	10	1	11	90.1%

The adherent non-white subjects had higher rates of clinically significant improvement in voice quality post-therapy than adherent white subjects. Among white subjects, 68.6% of females reported clinically significant improvement in vocal quality upon discharge from voice therapy, per VHI score; 63.2% of white males reported clinically significant improvement in vocal quality post-therapy. Among non-white subjects, 87.5% of females reported an

improvement in vocal quality, while 100% of males reported an improvement in vocal quality.

Table 3.7 compares the outcomes of white and non-white subjects by gender.

Table 3.7 Voice Therapy Outcomes by Race and Gender, N:65

	Clinically Significant Improvement	Not Clinically Significant Improvement	Total	Improvement Rates
White				
Female	24	11	35	68.6%
Male	12	7	19	63.2%
Non-White				
Female	7	1	8	87.5%
Male	3		3	100%

Among white subjects, both the Under 35 and 65+ age groups had the highest rates of clinically significant improvement in vocal quality after voice therapy, with an overall improvement rate of 66.7% for both age groups. Among non-white subjects, the Under 35, 36 – 50, and 51 – 65 age groups had the highest rates of improvement in vocal quality after voice therapy, with an overall improvement rate of 100% for all three groups. Table 3.8 compares rates of improvement by age group between white and non-white subjects.

Table 3.8 Voice Therapy Outcomes by Race and Age, N: 65

	Clinically Significant Improvement	Not Clinically Significant Improvement	Total	Improvement Rates
White				
Under 35	4	2	6	66.7%
36 – 50	5	3	8	62.5%
51 – 65	7	3	10	70%
65+	20	10	30	66.7%
Non-White				
Under 35	1		1	100%
36 – 50	1		1	100%
51 – 65	4		4	100%
65+	4	1	5	80%

Adherent white subjects diagnosed with chronic laryngitis, edema, leukoplakia of the vocal folds, and vocal fold paralysis had the highest rate of clinically significant improvement post-therapy, with each diagnosis having a 100% of subjects reporting clinically significant improvement in voice quality.

Adherent non-white subjects were diagnosed with fewer vocal pathologies than white subjects; non-white subjects were only diagnosed with atrophy, benign lesions, chronic laryngitis, and MTD. Of the non-white group, subjects diagnosed with atrophy, chronic laryngitis, and MTD had the highest rate of clinically significant improvement in voice quality post-therapy. Table 3.9 compares rates of improvement in vocal quality by subject race and diagnosis.

Table 3.9 Voice Therapy Outcomes by Race and Diagnosis, N: 65

	Clinically Significant Improvement	Not Clinically Significant Improvement	Total	Improvement Rates
White				
Atrophy	3	3	6	50%
Benign Lesion	11	4	15	73.3%
Chronic Laryngitis	1		1	100%
Edema	1		1	100%
Leukoplakia	2		2	100%
MTD	9	7	16	56.3%
VCD	2	2	4	50%
Sulcus Vocalis/Scar	4	2	6	66.7%
Vocal Fold Paralysis	3		3	100%
Non-White				
Atrophy	2		2	100%
Benign Lesion	2	1	3	66.7%
Chronic Laryngitis	1		1	100%
MTD	5		5	100%

MTD; Muscle Tension Dysphonia, VCD; Vocal Cord Dysfunction

CHAPTER 4. DISCUSSION

This study was an attempt to quantify the issue of nonadherence to prescribed voice therapy among varying diagnoses and the demographic factors of race, gender, and age. This study also aimed to compare clinically significant therapeutic outcomes between white and non-white individuals who were adherent to voice therapy to determine if racial disparities existed among the outcomes of adherent voice patients. Adherence to voice therapy was defined in this study as being successfully discharged from voice therapy by the speech-language pathologist upon meeting therapeutic goals. This study included 287 subjects, where 69.7% were female and 73.5% were white. Results indicated an overall adherence to voice therapy regardless of race or other demographic factors to be 33.8%. The result of this study further supports the issue of non-adherence to voice therapy among non-white individuals, which was consistent with the literature review conducted. However, findings indicate that adherent non-white subjects reported higher rates of clinically significant improvement in voice quality post-therapy than white subjects.

Race/ethnicity variables did not match the demographics of the Baton Rouge, LA area in this study. Study data indicated that 73.5% of subjects were White/Caucasian, while DataUSA (2018) indicates that Non-Hispanic whites comprise 36.6% of the Baton Rouge population (DataUSA, 2018). Black/African American individuals are the largest race group in Baton Rouge, comprising 54.8% of the population; however Black/African American individuals only comprised 22.6% of the data collected for this study (Table 3.1). Asian individuals comprise 3.22% of the Baton Rouge population but were represented by less than 1% in this study. Further, studies are needed to determine if this underrepresentation of the racial and ethnic groups are due to problems of accessibility to health services or attitude towards voice therapy among these populations.

The first question of this study asked whether subject adherence to voice therapy differed by race. Without a racial breakdown, the overall adherence rate of the subjects included in this study was 33.8% (97 adherent subjects out of 287 subjects total), making the non-adherence rate 66.2%. These findings are consistent with the literature review performed for this study, as Hapner et al. (2009) found a dropout rate from voice therapy of 65% in their study.

By racial breakdown, it was found that subjects who identified as white had an overall adherence rate of 37.4% (Table 3.2). Subjects who identified as Black/African American had an overall adherence rate of 26.2%. These numbers prove the hypothesis for the first question of the study: that white subjects would have higher rates of adherence than non-white subjects. These results similar to Vamosi et al. (2020) study that found non-white race to be significantly associated with no-show status. There were no adherent subjects who identified as Asian or an Other race represented in this study, and of the subjects whose races were unknown or the subject refused to provide a race, the overall adherence rate was 14.3%.

The second question of this study asked if adherence differed among white and non-white subjects based on age, gender, and vocal pathology. By gender, white males had a higher rate of adherence (43.3%) than white females (35.1%). Non-white females, however, had a higher adherent rate (26.7%) than non-white males (20.8%) (Table 3.3). This finding is consistent with previous studies conducted and discussed in the literature review that found that gender was not associated with outcome differences with regard to attendance and dropout from voice therapy (Portone et al., 2008; Hapner et al., 2009; Misono et al., 2017). Age groups had different pattern of adherence to voice therapy depending on race (Table 3.4). Older white subjects in the 65+ age group had the highest therapy adherence rates (49.4%), while younger non-white subjects in the Under 35 age group had the highest therapy adherence rates (37.5%).

Vocal fold atrophy had the highest adherence rates among white and non-white subjects (Table 3.5). In addition, both white and non-white group appeared to adhere some voice therapy when diagnosed with benign lesions, muscle tension dysphonia (MTD), however, adherence rates were higher in white group. Among non-white subjects, edema, vocal cord dysfunction (VCD), and sulcus vocalis/scar had the highest rates of nonadherence to voice therapy. There was not a strong adherence rate for any particular diagnosis, which is consistent with the findings of the Hapner et al. (2009) study that there was not a strong association between diagnosis and non-adherence.

The third question of this study asked whether racial disparities existed among clinically significant therapeutic outcomes for adherent subjects based on gender (Table 3.7), age (Table 3.8), and vocal pathology (Table 3.9) Results indicated that non-white subject had higher rates of clinically significant improvement of voice quality after completing voice therapy, based on pre-post VHI scores, which contradicts the study hypothesis. Adherent white subjects had a clinically significant improvement rate of 66.7%, while adherent non-white subjects had a clinically significant improvement rate of 90.1%. While non-white subjects had higher rates of non-adherence to therapy, non-white subjects who did adhere to voice therapy reported higher rates of clinically significant improvement in their voice. This finding is significant not only because it disproves the hypothesis, but because it is indicative of patient perceptions of voice improvement, and how much the individuals completing therapy believe their voice has improved. Clinically significant improvement rates for this study were derived from Voice Handicap Index questionnaire score totals, which are completed solely by the individual diagnosed with the voice disorder, and not a clinician who is experienced in treating voice disorders. VHI scores are a reflection of how significant of an impact a voice disorder has on a

person's life. Thus, the clinically significant rates of improvement seen in this study reflect the degree of improvement subjects believed they made after therapy. Non-white subjects may not have adhered to therapy at the same rate as white subjects, but non-white subjects saw greater gains in voice quality after completing voice therapy than white subjects.

Also disproving the hypothesis was the finding that, while white females reported higher rates of clinically significant improvement in voice quality, non-white males reported higher rates of clinically significant improvement in voice quality than non-white females. However, the study had limited number of subjects within the non-white group to be able generalize these findings. Future studies are warranted to determine if the findings of this study will hold.

Among white subjects, subjects in the Under 35 and 65+ age groups had the highest rate of clinically significant improvement of voice quality based on pre- and post-therapy VHI scores; both groups had rates of improvement in voice quality of 66.7% (Table 3.8). Among non-white subjects, all age groups (Under 35, 36 – 50, and 51 – 65), with the exception of the 65+ group, had higher rates of clinically significant improvement in voice quality. However, there were limited number of subjects in each age group to determine the significance of this trend. These findings are also inconsistent with factors associated with improvement by Marmor & Misono (2018), who found that, while men were less likely to report a voice disorder, subjects of male sex, white race, and younger age, were more likely to report improvement after receiving treatment. In addition, clinically significant improvements were seen in both adherent white and non-white subjects who were diagnosed with benign lesions and muscle tension dysphonia (MTD) (Table 3.9).

Overall, while the adherence rates observed in this study are low, they are consistent with research published across fields that employ the use of behavioral intervention. They also

suggest trends within racial, age, and gender groups that could better help specify the issue of non-adherence to voice therapy.

Limitations

This study encountered various limitations regarding representation among the various demographic groups examined due to the retrospective design of the study, as data available for collection was reliant solely on the information available in the EMR system used at the clinic. This information excluded subjects who may not identify as some of the predetermined groups available in the clinic's system. Because of the retrospective nature of this study, the researcher was limited to determine adherence, non-adherence, and demographic information of study subjects based solely on information provided by the EMR system in their charts. For example, in this study population, the terms "male and female" were used to describe the subjects' "gender." A more appropriate term for the data collected would have been "biological sex," as no information reflective of gender identity was collected for this study. "Male" and "female" were the only categories in the EMR system that could be used to calculate adherence rates by gender, and this limitation highlights an issue across voice therapy research: lack of research examining unequal care of the LGBTQ community due to the absence of sexual orientation and gender identity information in datasets, despite voice therapy for the transgender and non-binary community being an active area of research (Feit et al., 2020).

Race/ethnicity variables did not match the demographics of the Baton Rouge, LA area. Study data indicated that 73.5% of subjects were White/Caucasian, while DataUSA (2018) indicates that Non-Hispanic whites comprise 36.6% of the Baton Rouge population (DataUSA, 2018). Black/African American individuals are the largest ethnic group in Baton Rouge, comprising 54.8% of the population. Black/African American individuals has only comprised

22.6% of the data collected for this study. Similar finding is also reported in the literature by Hapner et al. (2009). Further studies are needed to determine the reasons for this discrepancy.

Finally, the study reports high rates of dropout across demographic factors, which is true when operating on the definition of adherence as the subject being discharged by their speech-language pathologist. It is possible, however, that a patient can achieve therapy goals and self-discharge from therapy without the recommendation by their therapist if they are satisfied with their voice. Depending on the definition of adherence and nonadherence, it is possible that the rates of patients who successfully adhere to voice therapy can change.

Moreover, while this study contributes more research to answer the question of *who* is more likely to adhere to prescribed voice therapy based on varying factors, and *who* is more likely to see clinically significant gains in voice quality after voice therapy, it does not answer *why* certain populations are more likely to adhere to voice therapy and see greater improvement, warranting further research into the topic. Other contributing factors to adherence that were not examined in this study include insurance problems, distance from the voice center among others, severity of the vocal pathology by the speech-language pathologist and/or referring MD, and the relationship between the subjects and their clinician which are indicated as factors in previous literature. Further research on these variables could contribute to existing nonadherence research and help answer the questions of why patients drop out of voice therapy.

CHAPTER 5. CONCLUSION

Concluding Remarks

This study further highlighted the racial disparities of adherence to voice therapy between white and non-white races and examined rates of clinically significant improvement in voice outcomes among white and non-white races. As hypothesized, subjects belonging to non-white racial and ethnic groups had higher rates of nonadherence and nonattendance to prescribed voice therapy than white subjects.

Of the data available, it was found that non-white subjects reported higher rates of clinically significant improvement in voice therapy outcomes compared to white race, per the comparison between pre- and post-therapy VHI questionnaire responses. This is inconsistent with the literature review conducted, where non-white subjects reported lower rates of improvement in voice quality post-therapy. In this study, however, non-white subjects had improvement rates of 90.1%, while white subjects had improvement rates of 66.7%.

However, there was limitation regarding the amount of pre- and post-intervention VHI scores collected for adherent subjects compared to the overall number of subjects. Pre- and post-therapy VHI scores were available for 65 out of the 287 subjects, which is approximately 22% of the total number subjects who met initial inclusion criteria for this study.

While rates of improvement were compared for the current study to answer the third research question, a larger sample size would have provided more accurate outcome rates. Should future studies be conducted to further investigate racial disparities among voice therapy outcomes, the researchers should ensure that there is adequate representation of subjects in their study groups.

Future research is also needed to explore racial disparities in voice therapy outcomes by age, gender, and vocal pathology. A study that explores the reasons behind nonadherence to behavioral voice therapy for the non-adherent subjects in this study is warranted to get a full picture of the issue of nonadherence to voice therapy.

Finally, future studies evaluating the disparities among the LGBTQ+ community in regard to voice therapy are also warranted. Despite the fact that intervention for the transgender and non-binary community is an active area of research, there still remains an absence of studies specific to these individuals (Feit et al., 2020). This is likely due to problems similar to those encountered in this study, where information regarding sexual orientation and gender identity is limited by the dataset used for data collection.

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