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Speech-Language Pathologists' Knowledge of Treatments Used to Remediate the Vocal Symptoms of Parkinson's Disease

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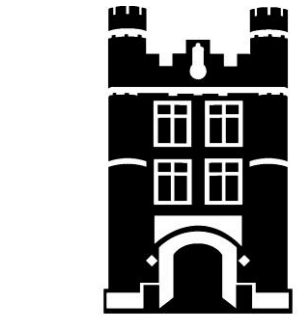

THE COLLEGE OF
WOOSTER

SPEECH-LANGUAGE PATHOLOGISTS' KNOWLEDGE OF TREATMENTS USED TO REMEDIATE THE VOCAL SYMPTOMS OF PARKINSON'S DISEASE

by
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ABSTRACT

The purpose of this study was to examine speech-language pathologists' general knowledge of four voice treatments (traditional speech therapy, the Lombard effect, SPEAK OUT!®, and the Lee Silverman Voice Treatment) used to remediate the vocal symptoms of Parkinson's disease. Parkinson's disease is the second most common neurodegenerative disorder therefore, it is important for clinicians to be educated about the voice treatments that can used to decrease the vocal symptoms of Parkinson's disease. This study was conducted by having members of the American Speech-Language-Hearing Association fill out an online survey. The results indicated that speech-language pathologists who considered themselves to be voice disorder specialists were more familiar with voice treatments for the vocal symptoms of Parkinson's disease than general speech-language pathologists.

Keywords: Parkinson's disease, vocal symptoms, voice treatments, clinician knowledge

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CHAPTER I

INTRODUCTION

Generally, when considering Parkinson's disease and its symptoms, the voice is not usually included in being particularly impacted. However, two-thirds of individuals diagnosed with Parkinson's disease suffer from voice related symptoms (Ramig, Fox, & Sapir, 2004, p. 169). I will study clinician knowledge of the different voice treatments used to help decrease the vocal symptoms, as well as what motivated patients to seek treatment for their vocal symptoms. Chapter I will describe the purpose of this study, offer two scholarly and two practical rationales about why the study is important, and indicate how its results may benefit clinicians and individuals with Parkinson's disease, define key terms, and provide a brief overview of the methods to describe how the data will be collected.

Purpose Statement

The purpose of this study is to determine clinicians' level of knowledge about the voice treatments used to reduce the vocal symptoms of Parkinson's disease. The main treatment used is The Lee Silverman Voice Treatment, which is completed over one month, with the patient having treatment four times a week for one-hour per session (Ramig et al., 2004, p. 169). Clinicians will also be asked about three other treatment techniques: Traditional speech-language pathology, the Lombard effect, and the SPEAK OUT! ® program. Clinicians' thoughts about the effectiveness of the varying treatments and whether or not clinicians believe the treatments should be researched further and improved will additionally be evaluated. This research will furthermore examine the factors that led patients to seek initial treatment for their vocal symptoms. Once the factors that influenced certain individuals to seek treatment are understood,

those factors can be used to try and recruit more individuals into getting treatment for their vocal symptoms.

Rationales

There are three rationales to research clinicians' knowledge of voice treatments for the vocal symptoms of Parkinson's disease and one rationale to research why individuals seek treatment. The first reason is that to the knowledge of the investigator, no research has been conducted about clinicians' knowledge of various voice therapies to reduce the vocal symptoms of Parkinson's disease. There has been considerable research examining the effectiveness of various treatments (Baumgartner, Sapir, & Ramig, 2001, p. 108; Fox, Morrison, Ramig, & Sapir, 2002, p. 117; Ramig et al., 2004, p. 170), but no studies that evaluate clinician knowledge of different Parkinson's disease voice treatments. Researching what treatments are the most commonly used can help determine which treatment techniques need to be better promoted so that clinicians can be made aware of them and use the treatments in their therapy sessions.

Secondly, there is little research examining why patients seek treatment for Parkinson's disease. The research that has been conducted took place over 40 years ago. Results from one study suggested that if an individual has a live-in partner, that individual is more likely to seek treatment because that intimate relationship can be impacted by the symptoms of the illness (Singer, 1973, p. 245). Research has also implied that if an individual has a comfortable living situation, for example, a good salary and owning a home, that individual is more likely to seek treatment for the symptoms (Singer, 1973, p. 246). Additionally, if an individual has a supportive friend group and strong social support, he/she is more likely to seek treatment for Parkinson's disease (Singer, 1973, p. 252). Unfortunately, there have been few studies evaluating why individuals do not seek treatment (Fox et al., 2002, p. 113), but more research

needs to be done to look at the factors that led the small percentage of individuals (3%-4%) who did seek treatment to make that decision (Singer, 1973, p. 246), so that those factors can be used to influence more individuals to seek treatment, as well as determine if the patients' motivations for seeking treatment have changed in the last 40 years.

Thirdly, this study is valuable because it has the ability to help the field of speech-language pathology find what knowledge, or lack of knowledge, clinicians have about Parkinson's disease voice treatments. This knowledge can assist in showing where the education gaps are and possibly indicate ways that those gaps can be addressed in the graduate curriculum.

Finally, the information gained from this study will be beneficial because it will help us to understand whether or not clinicians believe that Parkinson's voice treatments are successful. The study will show which treatments clinicians view as being helpful to clients and which treatments need to be researched further for improvement or possibly more widely publicized.

Definitions

There are several key terms that need to be explained in order for the reader to have a complete understanding of this research. The first term that needs to be defined is Parkinson's disease. *Parkinson's disease* is a neurodegenerative brain disorder that results in movement impairments (PD 101, 2014). This happens after 60%-80% of the brain's dopamine producing cells are damaged and are no longer producing sufficient levels of dopamine (PD 101, 2014). There is a more in-depth description of Parkinson's disease in Chapter II. The second term that requires definition is voice symptoms. *Voice symptoms* refer to the impairment in producing vocal sounds using the organs required for speech. Many of the voice symptoms in Parkinson's disease result from hypokinetic dysarthria (Ramig et al., 2004, p. 171). *Hypokinetic dysarthria* is a disorder linked to the basal ganglia in the brain, which control muscle movement and muscle

tone. Hypokinetic dysarthria includes: hypophonia (reduced loudness in voice), hypoprosodia (monotone speech), hoarseness and breathiness of the voice, and less precise articulation (Baumgartner et al., 2001, p. 108; Fox et al., 2002, p. 115; Ramig et al., 2004, p. 171).

The third term that needs to be defined is voice treatment. A *voice treatment* is an intervention approach that uses vocal and physical exercises, as well as behavioral changes, to try to alleviate the vocal symptoms (Ramig et al., 2004, p. 170). The final term that needs to be defined is speech-language pathologist. A *speech-language pathologist* (SLP) is a person who, "works to prevent, assess, diagnose, and treat speech, language, social communication, cognitive-communication, and swallowing disorders in children and adults" (Speech-Language Pathologists, 2014, About Speech-Language Pathology, para. 1).

Description of Method

This will be a mixed-methods investigation, incorporating both quantitative and qualitative aspects; surveys and interviews will be used to collect data. The survey will be posted to a list server on the American Speech-Language-Hearing Association website for speech-language pathologists to complete. Speech-language pathologists who specialize in voice disorders as well as SLPs who do not have much experience with voice disorders will be invited to complete the survey. The questions on the survey will evaluate clinician knowledge of various voice treatments for Parkinson's disease, inquire about years of clinical experience, ask how many patients with Parkinson's disease the clinicians have worked with, and question what therapy techniques are already perceived as being effective and whether the clinicians think there are ways to improve the therapy techniques. The interviews will be conducted in person with individuals who have been diagnosed with Parkinson's disease and have received speech therapy to reduce their vocal symptoms. In particular, patients who have undergone the Lee Silverman

Voice Treatment will be invited to participate, as LSVT is the most common treatment. The questions will address how satisfied the patient is after receiving the Lee Silverman Voice Treatment and why the patient chose to seek treatment.

Conclusion

This study focused on the voice treatments used to remediate the vocal symptoms of Parkinson's disease. Primarily, the study examined clinicians' knowledge of various voice treatments for Parkinson's disease and what led individuals to seek treatment. This study was important for various reasons. There has not been any research regarding clinician knowledge of PD voice treatments. Also, there was a paucity of research in terms of the factors that led patients to seek treatment. The results of this study may be able to provide insight into the education gap that exists in speech-language pathology regarding the treatment of Parkinson's disease and illustrate factors of why individuals decided to get treatment for their vocal symptoms. The following chapter will provide a literature review outlining the anatomy and physiology of the speech mechanism, a more detailed description of Parkinson's disease, the various ways in which Parkinson's disease can impact individuals' lives, the different types of treatments used to manage the symptoms of Parkinson's disease, the reasons for why people may or may not seek treatment for their symptoms, and the normal declines that voice goes through during the aging process.

CHAPTER II

LITERATURE REVIEW

Parkinson's disease is recognized as the second most prevalent neurodegenerative disorder after Alzheimer's disease (Tanner & Goldman, 1996, p. 317). As mentioned in Chapter I, Parkinson's disease is a movement based disorder that affects all aspects of the body's ability to move functionally, including the ability to move the speech mechanism optimally during vocal productions (PD 101, 2014, para. 1). Effective oral communication for those who have been able to speak their entire lives and then lose the ability to speak clearly is, arguably, an important requisite for a successful and satisfying life experience. Any impairment in the ability to communicate orally, when one has previously been able to do so without issue, can be detrimental to an individual's ability and willingness to interact with others. These reasons provide the rationale for why voice treatments for the vocal symptoms of Parkinson's disease are so important, as well as why research in this area is essential to provide better treatments that are well accepted by the patient population. This literature review examines the previous research on four different treatment approaches: traditional speech-language therapy, using the Lombard effect, the Lee Silverman Voice Treatment, and the SPEAK OUT!® program. Most of the focus of this literature review is on the original Lee Silverman Voice Treatment and alternative service delivery methods for the Lee Silverman Voice Treatment. This literature review also summarizes general information on Parkinson's disease and the anatomy and physiology of the speech mechanism.

In order to understand how Parkinson's disease impacts the voice, it is first necessary to understand how the voice functions without impairment. It is also critical to understand the anatomy and physiology of the voice mechanism in order to recognize the changes that are

taking place. Knowing general information about the structures involved in speech, the functions that these structures serve, and the different theories that contribute to the production of speech can help the patient understand what problems the treatments and therapies are targeting for improvement.

Anatomy and Physiology of the Speech Mechanism

As previously noted, Parkinson's disease symptoms can be detrimental to the voice and speech mechanism (Parkinson disease, 2014, Symptoms, para. 1). It is important to understand normal speech production and the anatomy and physiology of the speech mechanism, as well as theories to explain the production of speech, to help us understand how all of these factors change and may be influenced by Parkinson's disease.

Normal Speech Production

The production of speech involves many different structures (Harrison, 1995, p. 232). These structures can be divided into three main systems: the respiratory system, the laryngeal system, and the articulatory system (Harrison, 1995, p. 232). The respiratory system is housed in the thoracic cavity, which includes the lungs (Harrison, 1995, p. 30; Seikel, King & Drumright, 2010, p. 39). The lungs provide the air for speech (Harrison, 1995, p. 30; Seikel et al., 2010, p. 38). The diaphragm separates the thoracic cavity from the abdominal cavity (Harrison, 1995, p. 30; Seikel et al., 2010, p. 80). The diaphragm is the primary muscle of inspiration (Seikel et al., 2010, p. 80). In addition, the external and internal intercostal muscles are involved in breathing (Seikel et al., 2010, p. 88). The external intercostal muscles are inspiratory muscles that elevate the ribs, and the internal intercostal muscles are expiratory muscles that lower the ribs (Seikel et al., 2010, p. 88). During speech, the muscles of inspiration serve an extremely important function called checking action (Seikel at al., 2010, p. 159). Checking action occurs when the

muscles of inspiration moderate how much air is released from the lungs during speech (Seikel et al., 2010, p. 159). This action is important because it allows people to have a constant flow of air through their vocal tract. The continuous flow of air lets people control subglottal pressure beneath the vocal folds, which are closed at the onset of phonation (Seikel at al., 2010, p. 159). Checking action plays a key role in maintaining vocal intensity and the frequency at which the vocal folds vibrate. If a person has a deficit in checking action, he/she will be limited to short bursts of speech, due to not being able to control a steady air flow through the vocal tract (Seikel at al., 2010, p. 159). The sternum provides support for the whole respiratory system (Harrison, 1995, p. 30; Seikel et al., 2010, p. 58).

The laryngeal system is situated superior to the respiratory system (Harrison, 1995, p. 30). The laryngeal system connects to the respiratory system by means of the trachea, which attaches the larynx to the bronchi in the lungs (Harrison, 1995, p. 30; Seikel et al., 2010, p. 60). The trachea has rings that are solid in the front and open in the back (Harrison, 1995, p. 30; Seikel et al., 2010, p. 61). On top of the trachea is the cricoid cartilage (Harrison, 1995, p. 30; Seikel et al., 2010, p. 168). The cricoid cartilage is shaped like a signet ring; it is narrow in front and wider in the back (Seikel et al., 2010, p. 168). The arytenoid cartilages are shaped like pyramids and sit on the back of the cricoid cartilage (Harrison, 1995, p. 30; Seikel et al., 2010, p. 169). The arytenoid cartilages articulate with the posterior superior surface of the cricoid cartilage. The vocal processes of the arytenoid cartilages are the posterior (back) point of attachment for the vocal folds (Seikel et al., 2010, p. 169). The inferior horns of the thyroid cartilage articulate with the lateral surface of the cricoid cartilage (Harrison, 1995, p. 30; Seikel et al., 2010, p. 168). The thyroid cartilage is the anterior (front) point of attachment for the vocal folds (Seikel et al., 2010, p. 168). The vocal folds are possibly the most important part of the

speech mechanism (Seikel et al., 2010, p. 165). When they phonate (i.e., vibrate) speech can be created (Seikel et al., 2010, p. 165). When the vocal folds are phonating (opening and closing) the variable space between them is called the glottis (Seikel et al., 2010, p. 165).

Although the larynx seems to be perfectly formed for speech, speech is actually an overlaid function (Seikel et al., 2010, p. 227). There are three biological functions of the larynx (Seikel et al., 2010, p. 223). The first function is to act like a valve and keep air from escaping the lungs. This is a result of abdominal fixation (tensing the abdominal muscles) (Seikel at al., 2010, p. 224). The second function is to keep unwanted substances from entering the trachea, glottis, and lungs. This is achieved when the epiglottis closes over the opening of the larynx during swallowing (Seikel et al., 2010, p. 225). The third function is to forcefully expel (cough) any foreign substances that do manage to enter the trachea (Seikel et al., p. 223). The larynx is suspended from the hyoid bone (Harrison, 1995, p. 30; Seikel et al., 2010, p. 169). The last part of the laryngeal system is the epiglottis (Harrison, 1995, p. 30). It closes the larynx during swallowing so food does not enter into the trachea and lungs (Harrison, 1995, p. 30; Seikel et al., 2010, p. 169). Please see the image on the following page of a posterior (back) view of the laryngeal system (*Ligaments of the larynx. Posterior view*, 2007).

The articulatory system is situated superior to the laryngeal system (Seikel et al., 2010, p. 267). The articulatory system is made up of mobile (tongue, lips, etc.) and immobile (teeth, etc.) articulators. The tongue is the primary articulator. After air is set into vibration by the vocal folds and larynx, the articulators shape the air into recognizable speech sounds. During speech, a person is able to manipulate the air into different sounds by using different articulators (Seikel et al., 2010, p. 267). However, a person can also change the resonance of a sound by either opening or closing his/her nasal cavity, which affects the nasality of a sound. The process of

using the respiratory, laryngeal, and articulatory systems and all of their parts to produce speech is called the source-filter theory. See Figure 1 for an image of the laryngeal structures.

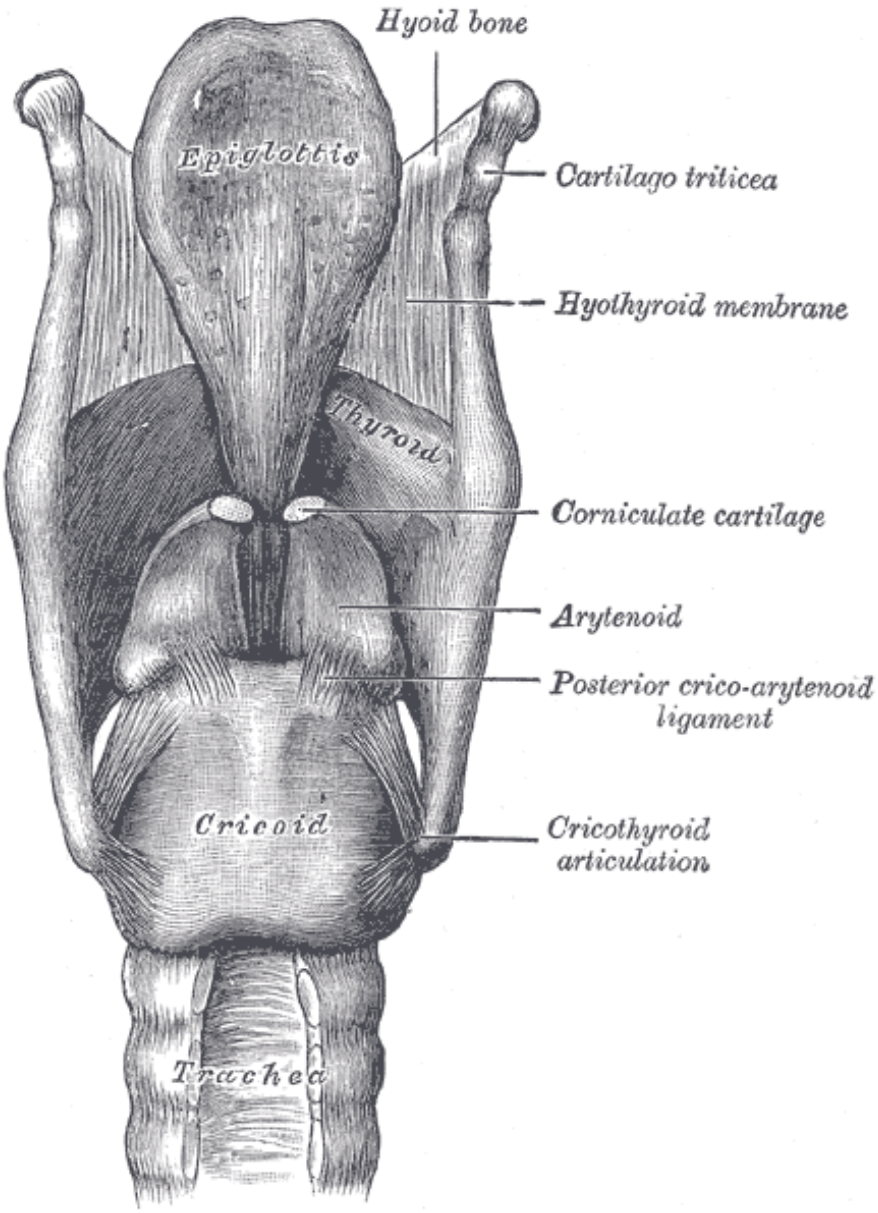

Figure 1. Image of laryngeal structures.

Source-Filter Theory

The source-filter theory states that the larynx is the source of speech and that the supralaryngeal vocal tract (articulators) is the filter (Seikel et al., 2010, p. 267; Titze, 2008, p. 2733). The larynx and vocal folds are set into phonation (vibration) after enough pressure

beneath the vocal folds develops and they are blown apart, which vibrates the air around them (Seikel et al., 2010, p. 267; Titze, 2008, p. 2733). That air is then moved through the supralaryngeal vocal tract (everything above the larynx) and shaped by all the articulators, such as the tongue, mandible, velum (soft palate), and lips, into recognizable speech (Seikel et al., 2010, p. 267; Titze, 2008, p. 2733). Patients with Parkinson's disease have trouble setting their vocal folds into phonation (Fox et al., 2002, p. 114). They also have trouble moving their articulators to produce clear speech (Baumgartner et al., 2001, p. 105).

Another necessary component of speech is the Bernoulli effect (Finnegan, Luschei, & Hoffman, 2000, p. 943). Without the Bernoulli effect, the vocal folds would not be able to adduct (close) properly (Seikel et al., 2010, p. 229). The inadequate adduction of the vocal folds leads to a diminished vocal quality (Finnegan et al., 2000, p. 943).

The Bernoulli Effect

The Bernoulli effect states that at a constriction, an increase in velocity causes a corresponding decrease in pressure, which causes the vocal folds to come back together (adduct) (Seikel et al., 2010, p. 229). The vocal folds are also brought back together (adducted) due to the elastic tissue of the vocal folds. During speech, it is very important to be able to build up pressure beneath the vocal folds (subglottal pressure) (Finnegan et al., 2000, p. 943). If subglottal pressure cannot be built up, speech can sound extremely breathy (Finnegan et al., 2000, p. 943). In patients with Parkinson's disease who suffer from voice related symptoms, their vocal folds do not adduct (close) adequately (Fox et al., 2002, p. 114). This means that the individuals cannot develop subglottal pressure and that their resulting voices are breathy (Fox et al., 2002, p. 114). Fortunately, there are voice treatments that can help increase vocal fold adduction.

Now that the normal production of speech has been discussed the factors that are impacted by Parkinson's disease can be more easily comprehended. These factors cover a wide range of topics. Some of these topics include, impact on quality of life and impact on job satisfaction.

Parkinson's Disease

Parkinson's disease is a multifaceted illness. When discussing Parkinson's disease, it is important to consider many of the different factors, including: causes, symptoms, diagnosis, treatments, demographic trends, and impacts on family, jobs, and quality of life.

Causes

Parkinson's disease is an incurable neurodegenerative movement disorder. It is caused by the death of dopaminergic neurons (cells that produce dopamine) in the brain. These cells are located in the pars compacta, the medial portion of the substantia nigra. The substantia nigra is part of the basal ganglia and is the largest nucleus (grouping of densely connected neurons) of the midbrain. The substantia nigra has two parts, one on each side of the midline (Parkinson disease, 2014, Causes, para. 1; What is Parkinson's disease? 2014, para. 1 & 2). The dopamine producing cells from the pars compacta project into the dorsal striatum, which plays a key role in controlling motor functions. Dopamine is a chemical that helps send signals to control muscle movement, and when 60%-80% of these cells start to die, the movement-related symptoms of Parkinson's disease start to manifest. Parkinson's disease is generally a very slow-progressing disease, but eventually the majority of the dopamine producing cells die and all intentional and coordinated movement is impaired, leading to the progression of the symptoms. This progression usually takes many years (Parkinson disease, 2014, Causes, para. 1; What is Parkinson's disease?, 2014, para. 1 & 2).

Symptoms

There are many different symptoms associated with Parkinson's disease. The four main symptoms are shaking or tremor, bradykinesia (slowed movement), stiffness or rigidity of the limbs and torso, and postural instability leading to problems with balance or falls (What are the Symptoms, 2014, Four Main Motor Symptoms of PD, para. 1). James Parkinson, in 1817 in *An Essay on Shaking Palsy*, described the symptoms for Parkinson's disease as, "Involuntary tremulous motion, with lessened muscular power, in parts not in action and even when supported; with a propensity to bend the trunk forward, and to pass from a walking to a running pace: the senses and intellects being uninjured" (Parkinson, 1817, p. 1). While Parkinson was correct about the numerous movement-based symptoms of Parkinson's disease, he was incorrect about "the senses and intellects being uninjured." Dementia, depression, and anxiety can develop as secondary symptoms of the diagnosis later in the progression of Parkinson's disease (Parkinson disease, 2014, Symptoms, para. 4). Another less discussed symptom of Parkinson's disease is the decrease in ability to communicate fully with speech, because of the decreased motor control of the relevant muscles.

Parkinson's disease impacts many aspects of voice such as, hypophonia (decreased vocal loudness), breathiness, hoarseness, and a general decrease in voice quality (Parkinson disease, 2014, Symptoms, para. 1). Parkinson's disease can also impact secondary aspects of communication, such as ability to change vocal intonation and facial expression (Parkinson disease, 2014, Symptoms, para. 1). The loss of the ability to change vocal intonation and facial expression can make communicating very difficult. This can be observed when more nuanced emotions are trying to be communicated. When looking for a diagnosis of Parkinson's disease, all of these symptoms would be on the physician's radar.

Diagnosis

Parkinson's disease can be very difficult to diagnose, especially in its early stages, because of its slow progression (Parkinson disease, 2014, Exams and Tests, para. 1). It can take years before an individual receives an accurate diagnosis (Diagnosis, 2014, para. 1). Generally, a family doctor makes the first diagnosis of Parkinson's disease (Diagnosis, 2014, How is Parkinson's Diagnosed?, para. 1). Then, the family doctor refers the patient to a neurologist with special training in diagnosing and working with Parkinson's disease and movement disorders. It is the neurologist who will confirm the diagnosis (Diagnosis, 2014, How is Parkinson's Diagnosed?, para. 1). There is no medical test that can be used to specifically diagnose Parkinson's disease (Diagnosis, 2014, How is Parkinson's Diagnosed?, para. 2). Instead, the neurologist gets an extensive neurological history and performs a physical examination (Diagnosis, 2014, How is Parkinson's Diagnosed?, para. 2).

During this examination, the neurologist looks at a number of different aspects of the patient including: facial expression/animation, muscle tremors, muscle rigidity, ability to stand up from a chair, ability to walk with normal steps with arms swinging symmetrically by the sides, and ability to regain balance (Diagnosis, 2014, How is Parkinson's Diagnosed?, para. 2). Additionally, other medical tests may be conducted to rule out other disorders. Even though there is not yet a cure for Parkinson's disease, there are still a number of effective treatment options to help manage the various symptoms (Parkinson's disease, 2014, Exams and Tests, para. 1).

Parkinson's disease tends to be a slowly progressing disease, thus it can be helpful for the patient to know which stage of the illness that he/she is classified in and appears to be experiencing (Ferrand, 2012, pp. 319-320). There are two main measures that are used to

indicate a person's stage of Parkinson's disease (Ferrand, 2012, pp. 319-320). The Hoehn and Yahr Staging of Parkinson's Disease was first developed in 1957 and was modified in 2004. It contains five levels of symptoms (Hoehn & Yahr, 1967, pp. 427-442). These symptoms range from mild (unilateral symptoms only) in Stage 1 to complete debilitation (needing a wheelchair or bedridden unless assisted) in Stage 5 (Hoehn & Yahr, 1967, pp. 427-442). The more in-depth diagnostic measure of Parkinson's disease stages is the Unified Parkinson Disease Rating Scale (UPDRS) (Ferrand, 2012, pp. 319-320). This measure breaks down the various symptoms of Parkinson's disease into three scales (Goetz et al., 2004, pp. 1020-1028). The Mentation, Behavior, and Mood (MBM) scale measures personality and cognition. The Activities of Daily Living (ADL) scale assesses everyday living ability. Finally, the Motor scale rates movement (tremor and posture). The MBM scale also measures factors like intellectual impairment, thought disorder, and depression. The ADL scale measures many subcategories including speech intelligibility, swallowing, handwriting, walking, and hygiene. The Motor scale also assesses many subcategories such as speech production, facial expression, resting tremor, active tremor, rigidity, and posture. All of these factors are measured on a scale ranging from 0-4 (Goetz et al., 2004, pp. 1020-1028).

Knowing the stage in which an individual falls could be beneficial when trying to evaluate the treatments options. The stage could help determine the type of treatment necessary and how much of a specific treatment is needed (Ferrand, 2012, pp. 319-320).

Treatments

The symptoms of Parkinson's disease can be alleviated through a variety of treatments including medicine and surgery (How is PD Treated?, 2014, para. 1). The medicine used to treat the movement-based symptoms of Parkinson's disease is called levodopa (L-DOPA)

(Carbidopa/levodopa, 2014, What are the Facts?, para. 1). Levodopa is designed to replenish the dopamine in the brain and is almost always given in tandem with a levodopa enhancer called Carbidopa (Carbidopa/levodopa, 2014, What are the Facts?, para. 5). This treatment is very successful initially, but the success wears off as the disease progresses to more severe stages (Parkinson disease, 2014, Treatment, Medicine, para. 1). There are also surgical treatments for Parkinson's disease that are aimed at controlling the movement-based symptoms (Surgical Treatment Options, 2014, para. 1).

The most common surgical treatment is deep brain stimulation (Parkinson disease, 2014, Treatment, Surgery, para. 1). Deep brain stimulation (DBS) is completed by placing electrodes in the brain in the areas that produce dopamine, in order to stimulate those regions. DBS is shown to reduce symptoms initially, but the impacts eventually decrease (Parkinson disease, 2014, Treatment, Surgery, para. 1). Another, less common, surgical treatment involves removing the brain tissue that is thought to be causing the symptoms (Parkinson disease, 2014, Treatment, Surgery, para. 1). Removing impacted brain tissue is often a last resort treatment, as it can cause more harm than good. Recently, experiments have been conducted with surgically implanting stem cells into the dopamine producing cells in hopes that those cells would rejuvenate (Parkinson disease, 2014, Treatment, Surgery, para. 1). Unfortunately, this treatment has not yet been very successful (Parkinson disease, 2014, Treatment, Surgery, para. 1).

Additionally, there are some nonmedical strategies that can be used to decrease the symptoms (Parkinson disease, 2014, Treatment, Lifestyle, para. 1). These include eating healthy, avoiding smoking, and exercising regularly (Parkinson disease, 2014, Treatment, Lifestyle, para. 1). An individual with Parkinson's disease can also visit a speech-language pathologist to receive treatment to reduce the voice related symptoms of Parkinson's disease

(Parkinson disease, 2014, Treatment, Lifestyle, para. 1). Occupational therapy can help reduce movement symptoms and suggest alternative ways to perform daily tasks of living. Lastly, a mental health professional can help with the psychological symptoms that develop (Parkinson disease, 2014, Treatment, Lifestyle, para. 1).

Demographic Trends

As many as 1.5 million Americans have been diagnosed with Parkinson's disease, with 60,000 new diagnoses each year (Statistics on Parkinson's, 2014, Who Has Parkinson's?, para. 1 & 2). Worldwide, an estimated 10 million individuals have been diagnosed (Statistics on Parkinson's, 2014, Who Has Parkinson's?, para. 3). Generally, individuals are not diagnosed until after age 50, but a small subset of people, 4%, are diagnosed with early onset Parkinson's disease (Statistics on Parkinson's, 2014, Who Has Parkinson's?, para. 4). Interestingly, men are one and a half times more likely to have Parkinson's disease than women (Statistics on Parkinson's, 2014, Who Has Parkinson's?, para. 5). One possible reason for this is that men are more likely than women to work in environments where they are exposed to toxic chemicals, which are associated with developing Parkinsonian symptoms. Another reason for this disparity is that men are more likely to experience head injuries, which are also associated with developing Parkinson's disease. It could also be that being male is a risk factor in and of itself, or that estrogen plays some sort of protective role in the female nervous system (Statistics on Parkinson's, 2014, Who Has Parkinson's?, para. 5).

Impacts on Family, Jobs, and Quality of Life

Terminal illnesses are often associated with stress and conflict within family, jobs, and general quality of life (Emotional Responses, 2014, para. 1; Kübler-Ross & Kessler, 2005, p. 7). The knowledge that a person is not going to recover from the illness that he/she has been

diagnosed with can be emotionally draining, and many individuals go through stages of emotions that mirror the five stages of grief to try and cope with the diagnosis (Emotional Responses, 2014, para. 1). Obviously, people are all different and the order in which these stages occur may reflect these variances. It is also possible that some patients may not experience all of the stages.

However, in general, the first of these emotions that patients experience is denial (Emotional Responses, 2014, Denial, para. 1; Kübler-Ross & Kessler, 2005, p. 7). Denial typically occurs early after the diagnosis, before the symptoms become severe (Emotional Responses, 2014, Denial, para. 1). Denial can be a helpful emotion if it lets the individual ignore the symptoms and continue on with life (Emotional Responses, 2014, Denial, para. 1; Kübler-Ross & Kessler, 2005, p. 8). However, denial can also be counter-productive if it prevents the individual from taking any required medication or if the individual excessively seeks out other opinions about the diagnosis (Emotional Responses, 2014, Denial, para. 1).

The second emotion felt is discouragement (Emotional Responses, 2014, Discouragement, para. 1). Generally in this phase, people look for a direct cause for their illness and start asking the "why me" question (Emotional Responses, 2014, Discouragement, para. 1; Kübler-Ross & Kessler, 2005, p. 10). Individuals in the discouragement stage who have been diagnosed with Parkinson's disease may also start seeking out someone or something to blame for their unfortunate situation (Emotional Responses, 2014, Discouragement, para. 1).

The third phase is role conflict (Emotional Responses, 2014, Role Conflict, para. 1). Role conflict occurs when the symptoms become more severe and the person diagnosed may not be able to keep up with the tasks that were usually expected of him/her (Emotional Responses, 2014, Role Conflict, para. 1). This can put emotional stress on everyone involved, especially when trying to determine and adjust to the new roles of each person (Emotional Responses,

2014, Role Conflict, para. 1). Meeting with a counselor or mediator can be helpful for anyone going through that situation (Emotional Responses, 2014, Role Conflict, para. 1).

The fourth phase of the grief process is identity change (Emotional Responses, 2014, Identity Change, para. 1). During this phase, individuals seek out others with the same diagnosis for the purpose of gaining knowledge about the illness and how others are coping with it (Emotional Responses, 2014, Identity Change, para. 1). Individuals also look for encouragement and for ways to become the most independent person possible in their situation (Emotional Responses, 2014, Identity Change, para. 1).

The final phase is adapting to the situation (Emotional Responses, 2014, Adaptation, para. 1). During the adaptation phase, patients become resigned to the fact that they have a terminal illness and start to take the diagnosis seriously (Emotional Responses, 2014, Adaptation, para. 1; Kübler-Ross & Kessler, 2005, p. 24). Usually, this is seen when patients start working more closely with doctors and want to learn more about what medications they are taking. The patients also become concerned about what the doses for those medications should be (Emotional Responses, 2014, Adaptation, para. 1). Further, patients in this phase pay close attention to new treatment options (Emotional Responses, 2014, Adaptation, para. 1).

Parkinson's Disease Voice Treatments

As mentioned previously, some of the nonmedical treatments for Parkinson's disease include voice treatments. These treatments are used to help decrease the vocal symptoms that many individuals diagnosed with Parkinson's disease are impacted by. Voice treatments use the voice to try and reduce the vocal symptoms of Parkinson's disease such as decreased intensity and breathiness, by doing intensive vocal and breathing exercises (Ramig et al., 2004, p. 170).

Traditional Speech-Language Therapy

Traditional speech-language therapy is voice therapy used to treat the vocal symptoms of Parkinson's disease (Sackley et al., 2014, p. 214). Traditional speech-language therapy targets the articulation of speech, rate of speech, and prosody (the changing of pitch) of speech (Ramig et al., 2004, p.170; Scott & Caird, 1983, p. 140). Usually, traditional speech-language therapy takes place one or two times a week (Baumgartner et al., 2001, p. 105).

In traditional speech-language therapy, the speech-language pathologist (SLP) assesses the individual's speech and then determines what targets will be practiced (Sackley et al., 2014, p. 214). From that point, the SLP designs the therapy sessions to focus on the specific needs of the patient (Sackley et al., 2014, p. 214). For example, if the patient is having difficulty changing the inflection of his/her voice, then the SLP will focus the therapy sessions on that problem.

Although this traditional speech-language type of treatment that is directly targeted towards the patient's needs seems like a good idea, no significant long-term improvements have been noted, however, treatment does help slow the progression of the disorder (Sapir et al., 2002, p. 300; Trail et al., 2005, p. 217). While traditional speech-language therapy was shown to decrease the vocal symptoms of Parkinson's disease in patients, such as imprecise articulation, slower rate of speaking, and difficulty changing the pitch and inflection of the voice after only two weeks of intensive daily speech therapy, these results only lasted for three months. The decrease in symptoms was shown only to last while the patient continued to regularly attend therapy (Pinto et al., 2004, p.551; Robertson & Thomson, 1984, p. 220; Scott & Caird, 1983, p. 143).

Fortunately, other voice treatments have been developed to help decrease the vocal symptoms of Parkinson's disease. These treatments have been shown to be more effective at increasing vocal loudness and decreasing breathiness. In addition, these treatments have also been shown to have more long-term benefits. A treatment has been researched which uses the Lombard effect to increase vocal loudness (Adams & Lang, 1992, p. 121). So far, this treatment has demonstrated promising results (Stathopoulos et al., 2014, p. 2).

The Lombard Effect

The Lombard effect, a largely involuntary response, is based on the observation that as background noise increases, the speaker will reflexively raise the intensity of his/her voice to make himself/herself audible to the listener (Ho, Bradshaw, Iansek, & Alfredson, 1999, p. 1454). Most individuals, when speaking, are able to change their breathing patterns without even thinking about it in order to produce the subglottal pressure (pressure below the vocal folds) needed to increase vocal loudness (Finnegan et al., 2000, p. 943). Vocal loudness is continually being raised and lowered based on the surrounding environment (Stathopoulos et al., 2014, p. 2). However, these continuous changes are very difficult for individuals with Parkinson's disease because the disorder impairs control of the relevant muscles (Stathopoulos et al., 2014, p. 2). Therefore, the Lombard effect has been used to increase vocal loudness in patients with Parkinson's disease who suffer from a range of voice symptoms resulting from hypokinetic dysarthria, the most prominent of these symptoms being hypophonia (decreased vocal loudness) (Adams & Lang, 1992, p. 122; Ho et al., 1991, p. 1454; Stathopoulos et al., 2014, p. 2).

The Lombard effect is used to treat Parkinson's disease voice symptoms by placing an electronic device that plays background noise (white noise or multi-talker babble) in the ear of the individual with Parkinson's disease (Ho et al., 1991, p. 1454). When comparing the use of

the device to trigger the Lombard effect with the use of the clinician cueing patients to increase or maintain vocal intensity (loudness), three important findings emerged (Adams, & Lang, 1992, p. 122; Ho et al., 1991, p. 1454; Stathopoulos et al., 2014, p. 2).

First, when individuals with Parkinson's disease wore the device, their vocal loudness greatly increased (Adams, & Lang, 1992, p. 122; Ho et al., 1991, p. 1454; Stathopoulos et al., 2014, p. 2). The patients wearing the device instinctively raised their voices, which provides support for the earlier statement that the Lombard effect is largely involuntary. Most patients with Parkinson's found it very difficult to maintain that increased level of speech with a person cueing them to stay at that increased intensity (Ho et al., 1999, p. 1454). However, when the increase in loudness became reflexive, they were able to do it without a problem (Ho et al., 1999, p. 1454). As long as the masking device was in use, the Lombard effect was triggered and the patients with Parkinson's disease were able to increase their vocal loudness and generalize that loudness across conversations and paragraph readings with the clinician (Ho et al., 1999, p. 1454). Unfortunately, there is not any information on whether or not this technique will generalize to situations outside of the therapy session (Adams & Lang, 1992, p. 124; Pinto et al., 2004, p. 551).

Second, the increased levels of loudness that resulted from the Lombard effect were found to resemble natural increases in vocal loudness, more so than the increased levels due to a person cueing the patients to speak as loudly as they could (Ho et al., 1999, p. 1455). For example, when a person is told to speak as loudly as possible, it is awkward for the speaker because most people do not feel comfortable speaking very loudly when unnecessary, so the resulting loudness and voice sound forced and unnatural. However, when people have to

increase their voice to be heard in a noisy situation, the resulting voice will be much more natural sounding because it is easier to gauge how much the voice needs to be increased to be heard.

Finally, the individuals who used the Lombard effect were also shown to have more efficient respiratory patterns than when they were cued to speak twice as loudly as comfortable or when they were targeting a specific vocal intensity level (Stathopoulos et al., 2014, p. 3). If a person is being cued to speak twice as loudly as comfortable or to speak at a specific vocal loudness, that is not a natural increase in loudness (as noted above). Therefore, the resulting respiratory function is less efficient and natural than when vocal loudness is increased by using the Lombard effect. Unfortunately, the results that were observed from studying the Lombard effect in the clinical setting have not been studied in a conversational setting at this point in time (Pinto et al., 2004, p. 551). Another voice treatment called the Lee Silverman Voice Treatment is the most common treatment being used to decrease the voice symptoms in Parkinson's disease at this time (Spielman et al., 2007, p. 96).

Lee Silverman Voice Treatment

The Lee Silverman Voice Treatment (LSVT) is a technique used to diminish the voice-related symptoms of Parkinson's disease (Spielman et al., 2007, p. 96). Between 50%-90% of individuals with Parkinson's disease have voice-related symptoms (Baumgartner et al., 2001, p. 105; Fox et al., 2002, p. 111; Ramig et al., 2004, p.169). These symptoms include: hypophonia (reduced loudness in voice), hypoprosodia (monotone speech), hoarseness and breathiness of the voice, and less precise articulation (Baumgartner et al., 2001, p. 105; Fox et al., 2002, p. 111; Ramig et al., 2004, p.169). Hypokinetic dysarthria is the term used to describe many of the voice-related impairments in Parkinson's disease (Deane et al., 2002, p. 985; Ramig et al., 2004, p. 170). LSVT has also been shown to help treat hypomimia (reduced facial expression),

dysphagia (difficulty swallowing), as well as help decrease vocal symptoms in multiple sclerosis, ataxic dysarthria, and Down syndrome (Dumer et al., 2014, p. 308; El Sharkawi et al., 2001, p. 33; Fox & Boliek, 2012, p. 937; Mahler & Jones, 2012, p. 48; Sapir et al., 2001, p. 148).

LSVT is a phonatory-respiratory treatment. This means that phonation (i.e., the vibration of the vocal folds) and respiration are targeted during treatment. LSVT is considered an intensive treatment (Ramig et al., 2001, p. 494; Spielman et al., 2007, p. 96). The schedule for LSVT is four times a week for one hour, for one month (Ramig et al., 2001, p. 494). There is also homework that is given out at the end of each session, for a total of 40 homework assignments (Ramig et al., 2001, p. 494). Each session of LSVT starts with a repeated exercise such as prolonged voicing of the "ah" sound at different levels of loudness, and then moves into speech tasks such as reading a paragraph for the second half of the session (Spielman et al., 2007, p. 99). The LSVT is lead by SLPs who have been specially certified (Spielman et al., 2007, p. 97).

In order to understand how and why the Lee Silverman Voice Treatment is successful, one must first understand the hypothesis of the treatment. The hypothesis was based off of successful treatment techniques in other medical fields. A large component of the hypothesis revolves around the idea of producing effortful and intensive actions to retrain the speech mechanism.

Hypothesis of the Lee Silverman Voice Treatment. The initial hypothesis behind LSVT was that soft and monotonous speech in individuals with Parkinson's disease was being caused by decreased airflow to the respiratory and laryngeal systems (Fox et al., 2002, p. 112). In simpler terms, decreased airflow, which is the deficit, is causing a soft voice, which is the symptom. The hypothesis of LSVT was developed in response to results that showed that

patients with Parkinson's disease were able to overcome some of their symptoms when they participated in intensive high-effort tasks, vocalizing long and short "ah" at varying levels of intensity (Baumgartner et al., 2001, p. 106). The treatment protocol of LSVT was derived from the principle of physical therapy where a person does intensive practice of a skill for a fairly short period of time. Other neurological evidence showed that when patients with Parkinson's disease were asked to complete a task that required a large amount of effort (intent), the patients were able to overcome some of their deficits that were caused by the motor impairment in Parkinson's disease (Baumgartner et al., 2001, p. 106). Two of these tasks included writing and walking; the length of a letter stroke and of a stride when produced with intent both increased compared to the initial measure of each task (Baumgartner et al., 2001, p. 106). When researchers realized that patients with Parkinson's disease were able to decrease some of their symptoms when they participated in intensive high effort treatment, the researchers decided to apply the high effort intensive treatment to try and increase airflow. This led to the idea of vocalizing long and short "ah" at varying levels of intensity to improve breath support (Fox et al., 2002, p. 112). The primary aim of LSVT is to increase airflow to the respiratory and laryngeal systems, thereby raising vocal loudness (Fox et al., 2002, p. 112). When high-effort intensive voice treatment was paired with trying to increase vocal loudness and the patient self-monitored his/her vocal productions, he/she was able to modify his/her speech and increase its loudness and then generalize that loudness to conversation (Ramig, Countryman, O'Brien, Hoehn, & Thompson, 1996, p. 1498).

LSVT increases airflow by improving vocal fold adduction, which then results in a louder voice. That is, when the vocal folds were retrained to close completely via LSVT, no air was able to escape through them and the pressure was able to build up beneath the vocal folds

(subglottal pressure), which led to increased vocal loudness and phonation (Fox et al., 2002, p. 114). The increased vocal loudness benefitted coordination and increased effort in the laryngeal, respiratory, and orofacial systems (Fox et al., 2002, p. 114).

LSVT has been shown to have short-term and long-term (2-years) impacts on the voice impairments in patients with Parkinson's disease (Ramig et al., 2001, p. 495; Ramig et al., 2004, p. 175). The key factors that make LSVT successful are the intensity of the treatment; the increased clinical contact; the simple instructions that are given, such as, "think loud;" and the retraining of sensory pathways (Spielman et al., 2007, p. 96). It is important to note that the findings for the LSVT of using intent to decrease vocal symptoms in patients with Parkinson's disease directly contradict the finding associated with using the Lombard effect to reflexively increase vocal loudness. Further research must be conducted to attempt to resolve this apparent discrepancy.

Importantly, LSVT was shown to not cause any phonotrauma (damage to the vocal folds) (Baumgartner et al., 2001, p. 111). In other words, the increased loudness of the voice did not cause hyperfunction of the speech mechanism. In short, this means that LSVT did not cause any harm; the increased level of loudness was within normal limits and yielded a good quality voice (Baumgartner et al., 2001, p. 111; Smith, Ramig, Dromey, Perez, & Samandari, 1995, p. 456). Recently, there have been two newer versions of LSVT that have been researched, an extended version of the LSVT and an online-home based delivery of the LSVT.

Lee Silverman Voice Treatment-Extended. The newer version of LSVT is called LSVT-X, which stands for Lee Silverman Voice Treatment-Extended. The LSVT-X follows the same principles as LSVT including "think loud," and the sessions are also organized in the same way, starting with the prolonged "ah" at differing levels of vocal loudness and then moving into

speech tasks for the second half of the session (Spielman et al., 2007, p. 99). The difference between LSVT and LSVT-X is that LSVT-X extends the overall treatment time. LSVT-X has two treatment sessions a week, both lasting an hour, instead of four sessions a week. These sessions go on for eight weeks, which is twice as long as LSVT (Spielman et al., 2007, p. 99). The LSVT-X also has homework assignments for every class. There are 96 assignments in total, compared to LSVT, which has 40 (Spielman et al., 2007, p. 99).

LSVT-X is also designed to decrease the vocal symptoms of Parkinson's disease (Spielman et al., 2007, p. 100). Specifically, LSVT-X improves intensity (vocal loudness) and has been shown to improve voice quality and articulatory clarity, as well as speech rate and intonation (Spielman et al., 2007, p. 102). A final aspect that LSVT-X was shown to recover was the natural sound quality of the voice (Spielman et al., 2007, pp. 100 &102). These improvements were short and long term; individuals were still maintaining their improvements six months later (Spielman et al., 2007, p. 100). Another alternate version of LSVT has been focused on assessing whether or not home and online-based deliveries of the LSVT have the same positive impacts of the reduction of Parkinson's disease voice symptoms.

Online-Based Lee Silverman Voice Treatment. Telecare or telepractice is when treatment or therapy is delivered from a distance (Constantinescu et al., 2010, p. 100; Howell, Tripoliti, & Pring, 2009, p. 7). Telecare is becoming more and more popular because it allows patients who are homebound, either because of age or illness or both, to seek treatment and because there are a limited number of clinicians who can provide therapy and telepractice allows the clinicians to reach a greater number of patients (Constantinescu et al., 2010, p. 100; Howell et al., 2009, p. 7). Telecare includes online therapy, which is the newest delivery method to be studied for the LSVT (Constantinescu et al., 2010, p. 100; Howell et al., 2009, p. 7). The online-

based LSVT is delivered in the same way as the standard LSVT. The online home-based LSVT is conducted by a specially certified SLP over the internet from the clinician's office to the patient's home at an agreed upon time. The treatment is delivered using the normal treatment regimen of four one-hour sessions per week, for one month, and each therapy session begins with the prolonged "ah" phonation exercises at different loudness levels and then moves into speech tasks, such as reading a paragraph out loud (Constantinescu et al., 2010, p. 101; Howell et al., 2009, p. 10). The online home-based treatment was shown to improve vocal loudness in a sample of patients 65 and older based off of sound pressure level measurements and overall voice quality, and clarity based off of a perceptual rating, just like the face-to-face LSVT (Constantinescu et al., 2010, p. 102; Howell et al., 2009, p. 14). One of the most important successes of the online home-based LSVT was that patients and clinicians both highly rated their enjoyment of the treatment and their feelings of whether or not it was successful although, the actual success of the online treatment at reducing symptoms was limited (Constantinescu et al., 2010, p. 103; Howell et al., 2009, p. 9). While these findings are valuable, it is important to understand that self-reported data comes with limits that need to be discussed. According to self-perception theory, a person is going to rate his/her treatment as being successful even if there was no improvement because otherwise the person would be admitting to his/herself that he/she wasted time receiving the treatment for no reason (Zanna & Cooper, 1974, p. 704). So, while the results that show that patients did find the online delivery of the LSVT to be successful are important, it is good to understand the possible limits of the results as well.

The online delivery of LSVT directly to the patients' homes has many benefits. The cost of travel for both the clinician and the patient, as well as the number of cancelled treatment sessions, is reduced (Howell et al., 2009, p. 7). For many, their home is a more comfortable

environment than the treatment facility; thus, allowing people to have home based therapy helps with their level of comfort (Howell et al., 2009, p. 7). Also, some individuals may be interested in the technological aspect of the therapy and become more motivated and participate more fully in the treatment (Howell et al., 2009, p. 7). Another major benefit of online home-based therapy is that the many individuals who do not live near a specialist can receive that specialized treatment directly in their homes (Constantinescu et al., 2010, p. 100; Howell et al., 2009, p. 7). However, there are also some negative aspects of online-based treatment.

While some individuals might enjoy the use of the internet and technology in their therapy sessions, others will not, which can impact the overall effectiveness of the treatment (Howell et al., 2009, p. 10). An individual who is receiving online home-based LSVT treatment needs to be comfortable with the use of technology in order for the treatment to be successful (Howell et al., 2009, p. 10). Also, sometimes tactile cues can be very helpful for the patient, and these are not possible in online-based therapies (Howell et al., 2009, p. 8). More recently, another face-to-face voice treatment for the vocal symptoms of Parkinson's disease was developed (Levitt, Chitnis, & Walker-Batson, 2015, p. 14). This treatment is based off of similar principles to those of the LSVT (Levitt et al., 2015, p. 14).

SPEAK OUT!®

SPEAK OUT!® was developed in 2010 by Samantha Elandary (Parkinson Voice Project, 2010). SPEAK OUT!® is used to increase the vocal intensity and voice quality in individuals diagnosed with Parkinson's disease (Levitt, 2014, p. 21; Levitt et al., 2015, p. 14). The SPEAK OUT!® schedule is similar to the LSVT framework. Before being accepted into the SPEAK OUT!® program the patient must be evaluated on certain parameters to ensure patient success: the patient can tolerate hour-long therapy sessions, the patient can follow simple commands, the

patient shows improvement in two or more of the following when using intent, breath support, volume, vocal quality, articulation, and/or intonation of speech, and the patient has the capability to complete daily home exercises independently or has appropriate support system to assist. After meeting these criteria, patients participate in 12, one-hour therapy sessions over four weeks. The main target of these therapy sessions is to increase awareness of vocal intensity and pitch range. Intensity is monitored using a sound pressure level (SPL) meter and pitch is monitored by an SLP who gives feedback to the patient about how he/she is doing (Levitt, 2014, p. 21; Levitt et al., 2015, p. 14).

While there are many similarities between the Lee Silverman Voice Treatment and SPEAK OUT!®, there is one key difference (Levitt, 2014, p. 20; Levitt et al., 2015, p. 14). Part of the therapy in the SPEAK OUT!® program includes weekly group sessions that continue throughout the 12 weeks of the main program and then continue in perpetuity after that to serve as a maintenance program for the vocal intensity and pitch increases. These group sessions are called the LOUD Crowd®, and they provide a place for patients to practice the vocal techniques they learned in therapy, in a natural conversational setting (Levitt, 2014, p. 22; Levitt et al., 2015, p. 17).

Patients who participated in the SPEAK OUT!® program demonstrated a statistically significant increase in vocal intensity and pitch (Levitt, 2014, p. 22; Levitt et al., 2015, p. 17). These increases were measured at various points throughout the treatment program, at the end of the 12 weeks, after four LOUD Crowd® sessions, and after eight LOUD Crowd® sessions. These increases were also shown to last over time. Measurements were taken at six months and again at 12 months post treatment. Following the SPEAK OUT!® program, patients also reported an increase in quality of life (Levitt, 2014, p. 22; Levitt et al., 2015, p. 17). Most importantly, as

documented in LOUD Crowd® sessions, vocal intensity was shown to generalize to settings outside of the therapy room. This is a very important finding which could influence the number of people who seek out treatment for their vocal symptoms of Parkinson's disease (Levitt, 2014, p. 23; Levitt et al., 2015, p. 18).

Seeking Treatment

There are many reasons for why individuals do and do not seek out treatment. These reasons will be discussed in more detail in the following sections. First, some reasons for why individuals do not seek treatment and how the numbers of people who do seek treatment can be increased will be discussed. Second, reasons for why people do seek treatment, such as voice as a factor of identity will be considered.

Why People Do Not Seek Treatment. Even with the staggering numbers of individuals with Parkinson's disease who have voice symptoms, only 3%-4% of those individuals seek any form of voice treatment (Fox et al., 2002, p. 111; Ramig et al., 2004, p. 174). Individuals diagnosed with Parkinson's disease may not seek treatment because many of them believe that improvement during the treatment sessions will not generalize to real world situations (Fox et al., 2002, p. 111). Another reason that many individuals do not seek treatment is because there is no expectation that they will get better (Fox et al, 2002, p. 111). People do not survive Parkinson's disease and, therefore, feel that there is not a point in seeking treatment (Fox et al., 2002, p. 111).

Other reasons for why individuals do not seek treatment are revealed by multiple studies that have researched dysphagia, a swallowing disorder that can be a symptom of Parkinson's disease (Ekberg, Hamdy, Woisard, Wuttge–Hannig, & Ortega, 2002, pp; 139-146; Turley & Cohen, 2009, pp. 33-36). The results of these studies showed that many older adults, age 65 and above, believed that aging is a general cause of the decline in their vocal abilities (Ekberg et al.,

2002, p. 144; Turley & Cohen, 2009, p. 34). These individuals believed that dysphonia (difficulty in speaking) and dysphagia were all natural parts of the aging process. This belief kept individuals from seeking treatment (Ekberg et al., 2002, p. 144; Turley & Cohen, 2009, p. 34). While there are age-related changes to the larynx, which can impact swallowing and speech production, these changes tend to be slow progressing (Turley & Cohen, 2009, p. 33). Compensatory strategies, such as dietary changes and postural modifications, usually take care of the problem (Turley & Cohen, 2009, p. 33). Yet, even these changes can be improved with therapy (Turley & Cohen, 2009, p. 33). However, it is the particular individuals who suffer more extreme symptoms than the average age-related deteriorations who really need to be educated about treatment and therapy options (Turley & Cohen, 2009, p. 33). Primary care physicians who are not able to recognize the difference between average age-related declines and an actual disorder also need to be further educated on treatment and therapy techniques, as well as the types of questions that the patient should be asked, in order to make an accurate diagnosis of the individuals' voice disorder (Ekberg et al., p. 145, 2002; Turley & Cohen, 2009, p. 35).

Another pressing reason for why older individuals were not seeking treatment for their dysphagia and dysphonia was that they believed that there was no way to treat their disorders (Ekberg et al., 2002, p. 145; Golub, Chen, Otto, Hapner, & Johns, 2006, p. 1737; Turley & Cohen, 2009, p. 35). This result showed the lack of education that individuals receive related to communication and swallowing disorders (Ekberg et al., 2002, p. 145; Golub et al., 2006, p. 1737; Turley & Cohen, 2009, p. 35). Even when these individuals went to see their primary care physicians, the doctors still did not recommend any form of treatment (Ekberg et al., 2002, p. 145; Golub et al., 2006, p. 1737; Turley & Cohen, 2009, p. 35). The assumption made by the primary care physicians that the swallowing or communication disorders were age related and

that there were no treatments or therapies to help remedy them, was incorrect (Ekberg et al., 2002, p. 145; Golub et al., 2006, p. 1738; Turley & Cohen, 2009, p. 35). The education gap in communication and swallowing disorders needs to be narrowed, and everyone associated with the diagnosis and treatment of the individual needs to be better informed of the communication and swallowing disorders that can impact older populations (Ekberg et al., 2002, p. 145; Golub et al., 2006, p. 1737; Turley & Cohen, 2009, p. 35). They should also be aware of treatment options that can help decrease the symptoms of those disorders or possibly even cure them (Ekberg et al., 2002, p. 145; Golub et al., 2006, p. 1737; Turley & Cohen, 2009, p. 35).

Having a swallowing disorder has been shown to have significant negative impacts on quality of life (Ekberg et al., 2002, p. 145; Turley & Cohen, 2009, p. 35). These effects might include suffering anxiety during mealtime, withdrawing from social settings, increased depression, and/or an increase in morbidity and mortality (Ekberg et al., 2002, p. 145; Turley & Cohen, 2009, p. 35). These influences are all detrimental enough to a person's life satisfaction that they warrant more education in the area of treatment and therapy in order to improve peoples' lives (Ekberg et al., 2002, p. 145; Turley & Cohen, 2009, p. 35).

Why People Do Seek Treatment. For people who have been communicating primarily using speech their entire lives, their voices are a huge part of their identities. The loss of the ability to speak or the diminished quality of their voices not only impacts how well people are able to communicate, but also directly impacts peoples' self-esteem. Individuals' voices are not only important for their own self-concept; peoples' voices clue listeners into the speaker's emotional state (Bliss-Moreau, Owren, & Barrett, 2010, p. 558).

A person's voice has a key role in the formation of an individual's identity (Bliss-Moreau et al., 2010, p. 558). For many people, using their voice for speech is the main way that they

express themselves. A person's vocal characteristics, such as quality and pitch, cue the listener in to pertinent information about the speaker (Gobl & Chasaide, 2003, p. 193; Gregory, Green, Carrothers, Dagan, & Webster, 2001, p. 45). This information can cover a wide range of factors including the speaker's emotional status, social status, feelings, moods, attitude toward the listener, subject matter, and the situation. An example of the information that can be gathered from vocal characteristics is that high pitch levels with lots of varying intonation have been linked with emotions such as joy, anxiety, or fear, while low pitch levels with not as much varying intonation have been associated with sadness or calmness (Rodero, 2011, p. 31). Certain mental illnesses also have specific aspects of vocal characteristics linked to them. An example of this is depression, which is typically associated with decreased levels of pitch and not much intonation (Alpert, Pouget, & Silva, 2001, p. 56; Mundt, Snyder, Cannizzaro, Chappie, & Geralts, 2007, p. 59).

A person's voice is intertwined with his/her identity and with how the rest of the world sees him/her (Ferrand, 2012, p. 351). This is why there is such an impact on a person's life when the ability to successfully use his/her voice starts to become more and more difficult. The fact that individuals feel as if they are partially losing their identity when they develop a voice disorder is one of the reasons why people seek out treatment or therapy for their symptoms (Ferrand, 2012, p. 351). Unfortunately, sometimes these symptoms do not stem from a disorder and are just a natural part of the aging process.

The Aging Voice

As I argued previously, there are changes to the voice that are a natural consequence of the aging process and may not be diagnosed as a disorder (Turley & Cohen, 2009, p. 33). However, that does not mean that the changes cannot be improved with treatment (Turley &

Cohen, 2009, p. 33). Vocal decline has been shown to impact quality of life, and receiving therapy for these changes can help improve the effects that aging can have (Berg, Hapner, Klein, & Johns, 2008, p. 73).

Presbyphonia is the term that is used clinically to describe the condition of age-related decline of the voice; it is usually used in reference to general weakening of the voice or a hoarse vocal quality (Bloch & Behrman, 2001, p. 2022; Kendall, 2007, p. 137; Pontes, Brasolotto, & Behlau, 2005, p. 87). Otolaryngologists performing otolaryngological evaluation of the speech mechanism have found a number of possible causes for presbyphonia such as mild bowing of the vocal folds, a spindle-shaped glottis, prominent arytenoid cartilage vocal processes, and vocal fold edema (Bloch & Behrman, 2001, p. 2024; Pontes et al., 2005, p. 89). Other causes could be asymmetry of vocal fold vibration, which can lead to diplophonia (the vocal folds produce two separate tones at the same time) and a longer open phase, which can lead to breathiness (Winkler & Sendlmeier, 2006, p. 54). Having presbyphonia is linked to diminished psychosocial satisfaction and poorer health-related quality of life (Golub et al., 2006, p. 1738).

However, presbyphonia only accounts for vocal hoarseness in 10% of individuals 65 years and older (Woo, Casper, Colton, & Brewer, 1992, p. 140). The most common cause of hoarseness in the elderly is vocal polyps (Kandoğan, Olgun, & Gültekin, 2003, p. 140). Other less common causes include malignant lesions, vocal fold paralysis, and functional dysphonia (Kandoğan et al., 2003, p. 140). Chronic laryngitis and neurodegenerative conditions, such as Parkinson's disease, can also cause hoarseness (Hagen, Lyons, & Nuss, 1996, p. 205). It is extremely important that elderly patients are interviewed about any organic problems that may be causing vocal hoarseness. Treatment and management of disorders might be more beneficial

to the patient if they focus on various disease processes and not just aging (Hagen et al., 1996, p. 205).

Hoarseness is not the only symptom that can occur from the aging process; there are also changes in the acoustic characteristics of the voice. Respiration, phonation, and resonance are all impacted by aging (Baken, 2005, p. 317). General pulmonary function declines with age; this decline can first be measured around age 40 (Ripich, 1991, p. 150). Fundamental frequency also changes with age. Fundamental frequency is the average rate at which a person's vocal folds vibrate during speech. Fundamental frequency is related to habitual pitch, which is the average pitch at which a person speaks. Men's fundamental frequency rises as they become more elderly, and women's fundamental frequency lowers as they become more elderly (Linville, 1996, p. 196). Fundamental frequency has also been shown to be less stable in elderly men and women than in younger individuals (Deliyiski, 2001, p. 161). The highest frequency that men and women are able to phonate at also decreases, due to a shortened speaking range; amplitude (loudness) is also impacted, it becomes less stable (Linville, 1987, p. 197; Linville, 1996, p. 194). Habitual pitch also changes with aging (Zraick, Gregg, & Whitehouse, 2006, p. 136). Increased habitual pitch in men is associated with changes in the muscles and mucous membrane of the vocal folds, while in women there is a decrease in habitual pitch due to the hormones released post menopause (Honjo & Isshiki, 1980, pp. 149-150).

These age-related changes may also be related to physiological changes such as the lengthening of the vocal tract and/or oral cavity, which can be attributed to the lowering of the larynx and the lungs, a decrease in pulmonary function, laryngeal cartilage ossification, increased stiffening of the vocal folds, and a reduction in vocal fold closure (Zraick et al., 2006, p. 136). Speech intensity also changes during the aging process (Kahane, 1981, p. 25). Men

have increased intensity during conversations, and women have decreased intensity during conversations. Lengthening of the vocal tract in the elderly is thought to contribute to resonance changes. These changes include decreased maximum intensity in vowel productions and lowered vowel formant frequencies (Kahane, 1981, p. 30).

Some ways to help diminish the age-related declines of the voice include increasing the general fitness of an individual, as well as educating individuals on vocal hygiene (Ramig & Ringle, 1983, p. 26; Thomas & Stemple, 2007, p. 60). Exercises to improve vocal function have also been shown to be beneficial (Berg et al., 2008, p. 73). Specific work with an individual on respiratory control can also improve vocal quality (Berg et al., 2008, p. 73).

Estimating the prevalence of age related decline in the elderly population is difficult because of the lack of research. Another difficulty lies in the fact that only individuals who have sought treatment have been surveyed (Roy, Stemple, Merrill, & Thomas, 2007, p. 861). However, there are still many valuable findings from the research that has been completed. Researchers that surveyed 117 participants over age 65 showed that 47% reported a voice disorder at some point during their lifetime, with 29% reporting a current voice disorder. The increased risk factors included esophageal reflux, severe neck and/or back injury, and suffering from chronic pain. A number of aspects related to vocal decline were shown to harmfully impact quality of life including voice related effort and/or discomfort, increased anxiety and frustration, and the need to repeat oneself (Roy et al., 2007, p. 865).

As of 2014, 14.5% of the population of the United States was aged 65 or older (U.S. Bureau of the Census, 2014). This number is likely to increase dramatically in the coming years, as the "baby boomers" enter into late adulthood. This increase means that SLPs need to be more aware than ever of the age-related declines of speech and voice and be cognizant of the

prevention techniques, the ways to diagnose among disorders, and the therapies available (Berg et al., 2008, p. 74).

Conclusion

Parkinson's disease is a neurodegenerative terminal illness that impacts individuals' ability to move after the death of most of the dopamine producing cells in the substantia nigra of the brain (PD 101, 2014, para. 1). One of the aspects impacted by Parkinson's disease is the speech mechanism (Spielman et al., 2007, p. 96). The vocal symptoms affect many different features of the voice including ability to increase loudness, change intonation, and speak articulately. Fortunately, there are voice treatments to help diminish these symptoms. The most common voice treatment in use today is the Lee Silverman Voice Treatment and it has been shown to be beneficial at decreasing the vocal symptoms associated with Parkinson's disease (Spielman et al., 2007, p. 96). Unfortunately, not many individuals seek treatment for their vocal symptoms because Parkinson's disease does not have a cure. Many individuals believe that there is no hope that they will improve, and people do not believe that the treatment will generalize outside of the therapy session (Fox et al., 2002, p. 111). For most people, their voice is a part of their identity and how others view them (Bliss-Moreau et al., 2010, p. 558). The decreased ability to use one's voice can impact a person's identity and how he/she is perceived by the people around him/her (Gobl & Chasaide, 2003, p. 193). This possible loss of identity may motivate some individuals to seek treatment (Ferrand, 2012, p. 351). The Parkinson's disease voice therapy techniques can be used to diminish vocal symptoms of disorders or to help preserve the voice against the natural impacts of aging (Turley & Cohen, 2009, p. 33). In general, Parkinson's disease and its treatments, not just the voice treatments, need to be researched further so eventually there will be a cure and individuals will not have to

debate whether or not to seek treatment for their symptoms. In the next chapter, a detailed review of the methods will be discussed. This discussion will include demographics about the sample, a detailed description of the procedure for data collection, and examples of the questions included on the survey and in the interviews.

CHAPTER III

METHOD

The purpose of the study was to learn more about clinicians' general knowledge of the voice treatments used to remediate the vocal symptoms of Parkinson's disease. The methods section will explore details regarding the participants of the sample, the procedure of how data was collected, and the instrument that was used to collect the data. The participants' section will provide the demographics of sample. The procedure section will include a detailed description of how and where the data was collected. Finally, the instrument section will review the details of the survey.

Justification of Method

Survey research was ideal for my research question, which asked about clinician knowledge of Parkinson's disease voice treatments for the vocal symptoms of Parkinson's disease. Survey research is appropriate when trying to study the attitudes of large groups of people based on the responses of individual participants (Babbie, 2014, p. 261). The survey allows the researcher to collect data on a specific population of individuals too large to observe directly. Surveys allow participants' responses to be viewed together to get a larger picture of how entire populations of people feel about some topic. Online surveys, which were used in my study, are particularly useful because they are cost effective and can be sent to an even larger number of people than pencil and paper surveys. Typically, online surveys have a fairly high response and completion rate, around 75% (Babbie, 2014, p. 261).

In order to address the qualitative experience of patients seeking speech language therapy for their vocal symptoms of Parkinson's disease, the researcher contacted three Parkinson's disease support groups in Northeastern Ohio. The qualitative aspect of the study

was designed to gain insight into why certain people decided to seek treatment for their vocal symptoms, while most patients diagnosed with Parkinson's disease do not attempt to seek treatment for their vocal symptoms.

Unfortunately, due to challenges with participant recruitment, this portion of the research was not completed. The three Parkinson's disease support groups that were contacted were small and did not have many individuals who had participated speech therapy for their vocal symptoms. One of the support groups stopped meeting and does not resume meeting until the spring. Lastly, it was difficult to maintain correspondence with the support groups.

In order to complete the quantitative portion of this study, two types of nonprobability sampling were used. Nonprobability sampling means that not everyone in the population of study had an equal chance of participating in the study (Babbie, 2014, p. 199). The first type of nonprobability sampling that was used was purposive sampling. Purposive sampling is used when the researcher picks the types of participants that will be in the sample, based off of which participants will be most useful and lead to the most representative results (Babbie, 2014, p. 200). In this study, the researcher specifically picked five ASHA special interest groups to participate in the survey. The second type of nonprobability sampling that was used was snowball sampling. Snowball sampling is used when the researcher has a participant take a survey or participant in a study and then asks that participant to recommend other individuals who might want to participate in the study (Babbie, 2014, p. 200). In this study, two participants offered to send out the survey to more speech-language pathologists.

Participants

A total of 199 individuals clicked on the survey. Eleven participants did not consent to participate in the online survey and dropped out immediately. Therefore, 188 speech-language

pathologists, 131 (88.5%) female and 17 (11.5%) male, who were members of the American Speech-Language-Hearing Association completed the survey. This sample was separated into many different demographical categories. These categories included, clinician age (*n*=138, *M*=47.38 years, *SD*=12.75, *R*=25-88 years), year highest degree earned (*n*=118, *M*=1996, *SD*= 12.15, *R*=1958-2015), highest degree earned (MA/MS/MED=124 (83.8%), PhD/EdD/SLP-D/ScD=24 (16.2%)), years of clinical experience (*n*=143, *M*=18.97 years, *SD*=11.78, *R*=1-45 year(s)), work setting (See Table 1), whether the clinician considered him/herself to be a voice disorder specialist (Yes=46 (31.%), No= 101 (68.7%)), and the percentage of children (*n*=151, *M*=9.03%, *SD*=20.34%) and adults (*n*=151, *M*=71.17%, *SD*=39.95%) on clinicians' caseloads. It is important to note that when the participants were completing the survey, the percentage of children and adults on clinicians' caseloads had to add up to 100%. See Table 1.

Table 1

Work Settings Reported by Participants

	Number of Participants (Percentage)
Other	62 (31.2%)
Hospital	53 (26.6%)
Skilled Nursing Facility	39 (19.6%)
School	11 (5.5%)
University	30 (15.1%)
Clinic	30 (15.1%)
Retirement Home	7 (3.5%)

Note. The majority of participants who chose "Other" reported that they worked in home health.

Procedures

The survey was posted four times throughout early and mid-January to five Special Interest Group community boards of the American Speech-Language-Hearing Association. The

Special Interest Groups were numbers 2 (Neurophysiology and Neurogenic Speech and Language Disorders), 3 (Voice and Voice Disorders), 10 (Issues in Higher Education), 15 (Gerontology), and 18 (Telepractice). Two speech-language pathologists also emailed the survey link to their colleagues. The data were kept anonymous and were collected using nonprobability purposive sampling and snowball sampling. It is important to note that when filling out the four different treatment sections of the survey (Traditional Speech Therapy, The Lombard Effect, SPEAK OUT!®, LSVT), if a participant answered the first question in the block, "How familiar are you with using X (Traditional Speech Therapy, The Lombard Effect, SPEAK OUT!®, LSVT) to treat the vocal symptoms in patients with Parkinson's disease" with a 1 which represented *not at all familiar*, the participant was automatically skipped to the next block of questions and did not see anymore questions regarding that specific treatment.

Instrument

After consenting to participate, each participant voluntarily completed an electronic survey. The instrument was an online survey consisting of 45 questions. The survey included: demographic questions (e.g., do you consider yourself to be a voice disorder expert?), questions about various Parkinson's disease voice treatments (e.g., LSVT), questions about how participants became familiar with the different treatments (e.g., graduate school), questions about how effective participants perceived the different treatments to be (very ineffective-very effective) questions about clinicians' caseloads (e.g., number of patients with Parkinson's disease), and questions about whether clinicians believed that there was a need for further education relating to Parkinson's disease. The survey also used different types of questions such as, 7-point Likert-scale, check all that apply, yes/no, drop down selection box, and open-ended.

All of the Likert-scale questions were rated on a scale where 1 represented the low/negative response and 7 represented the high/positive response. See Appendix A for a copy of the survey.

CHAPTER IV

RESULTS AND DISCUSSION

The research question of this study was focused on examining clinicians' general knowledge of voice treatments used to help remediate the vocal symptoms of Parkinson's disease. This section will report the statistical evidence that answers the research question. Following the main results and findings, a discussion section will present why the statistical findings make sense according to current research.

Main Results & Findings

This section will present the results of the 188 completed surveys. Before the study was completed, an alpha level of *p* is less than or equal to .05 was selected to determine statistical significance. The selection of .05 for a statistical significance level allows there to be a 5% chance of error. According to Babbie, .05 is an appropriate alpha level for social science research (Babbie, 2014, p. 214).

Participants were first asked to indicate if they knew of any voice treatments for the vocal symptoms of Parkinson's disease. Of the188 responses to this question, 183 (97.3%) recalled some sort of treatment and answered *yes* and 5 (2.7%) answered *no*. It is important to note that this question was a recall question and that the other questions about specific treatments were recognition questions. SLPs could have been familiar with treatments that they did not recall in the moment, but were able to recognize later. More SLPs were familiar with voice treatments for the vocal symptoms of Parkinson's disease than those who were not.

Participants rated their familiarity with each of four different treatment techniques (i.e., traditional speech therapy, the Lombard effect, SPEAK OUT!®, & the Lee Silverman Voice Treatment (LSVT)) on a 7-point Likert scale (1 = *not at all familiar* & 7 = *very familiar*). The

results indicated that traditional speech therapy and LSVT were the techniques with which most participants were familiar. Traditional speech therapy was rated as being somewhat familiar and LSVT was rated as being familiar. See Table 2.

Table 2

Familiarity with the Different Treatments

	M	*SD*	*n*	*range*
LSVT	5.95	1.51	161	1-7
Traditional Speech Therapy	5.45	1.52	188	2-7
The Lombard Effect	2.72	2.13	174	1-7
SPEAK OUT!®	2.70	2.03	164	1-7

Note. 1 represents *not at all* familiar and 7 represents *very familiar*.

Participants then indicated/reported how they became familiar with each of the four different treatment techniques. Some of the available options were undergraduate education, graduate education, conferences, and certification workshops. The results indicated that the majority of participants became familiar with traditional speech therapy at graduate school. The majority became familiar with the Lombard effect from scientific articles. The majority became familiar with SPEAK OUT!® from colleagues. Finally, the majority became familiar with LSVT at training and certification programs. See Figure 2 for the complete results of how participants became familiar with using the various treatment techniques.

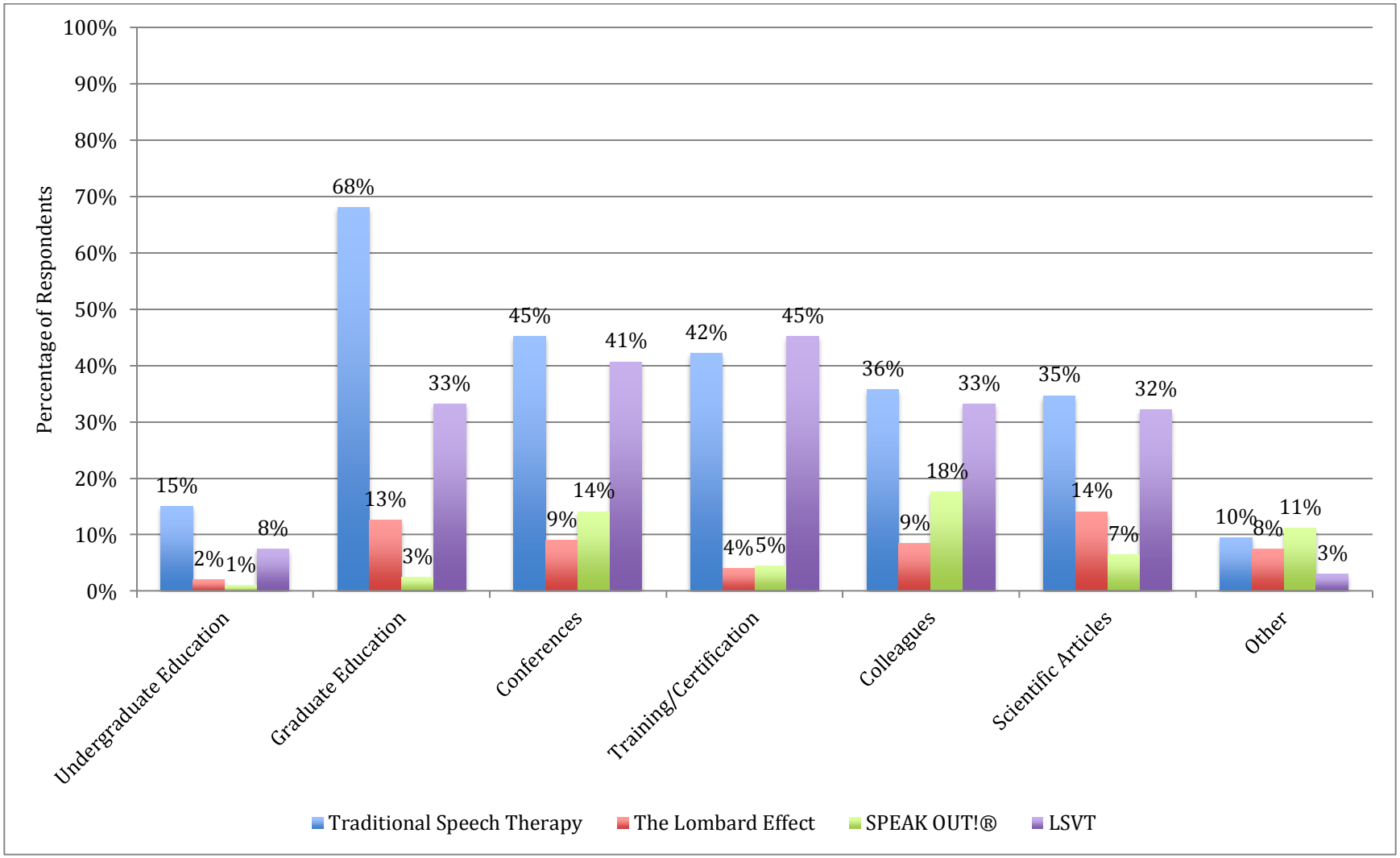

Figure 2. How participants learned about each voice treatment.

The researcher ran four correlations to assess the relationship between familiarity with a treatment and perception of its effectiveness. The four questions were on a 7-point Likert-scale, with 1 representing *not at all familiar/very ineffective* and 7 representing *very familiar/very effective*. The correlation between familiarity with traditional speech therapy (M=5.45, SD=1.42) and the perceived effectiveness of traditional speech therapy (n=175, M=4.61, SD=1.36, df=173) was not statistically significant (r =.112, p =.141). How familiar a clinician was with the treatment did not relate to the perceived effectiveness of the treatment. The correlation between familiarity with the Lombard effect (M=2.72, SD=2.13) and the perceived effectiveness of the Lombard effect (n=70, M=4.31, SD=1.16, df=68) was statistically significant (r=.304, p=.01). There was a small positive correlation such that, as the familiarity with the Lombard effect increased, so did the perceived effectiveness. The correlation between familiarity with SPEAK OUT!® (M=2.70, SD=2.03) and the perceived effectiveness of SPEAK OUT!® (n=66, M=4.92, SD=1.23, df=64) was statistically significant (r=.335, p=.006). There was a small positive correlation such that, as the familiarity with the Lombard effect increased, so did the perceived effectiveness. The correlation between familiarity with LSVT (M=5.95, SD=1.51) and the perceived effectiveness of LSVT (n=150, M=5.85, SD=.903, $df=148$) was statistically significant (r=.434, p<.001). There was a small positive correlation such that, as the familiarity with the Lombard effect increased, so did the perceived effectiveness.

Participants indicated their level of agreement with five statements concerning assessment and treatment of vocal symptoms in Parkinson's disease. The participants rated each statement on a 7-point Likert-scale, where 1 represented *strongly disagree* and 7 represented *strongly agree*. Participants somewhat disagreed that there is a lack of effective PD voice

treatments used to reduce vocal symptoms. By contrast, participants somewhat agreed or agreed with each of the other four statements. See Table 3 for the descriptive statistics

Table 3

Participants' Level of Agreement Concerning Assessment and Treatment of Vocal Symptoms in Parkinson's Disease

	n	*M*	*SD*
I feel that there are a lack of effective voice treatments for individuals diagnosed with PD used to remediate their vocal symptoms.	153	2.97	1.44
I feel that increased awareness of PD voice treatments would help SLPs feel more comfortable in treating the vocal symptoms in patients with PD.	153	5.78	1.11
I feel there is a need for more SLPs to work with individuals diagnosed with PD who want to remediate their vocal symptoms.	152	5.39	1.21
I feel comfortable assessing individuals diagnosed with PD to evaluate their vocal symptoms.	153	5.98	1.43
I feel comfortable providing therapy to individuals diagnosed with PD to remediate their vocal symptoms.	153	5.93	1.47

Note. All participants used the full 1-7 scale to complete the questions.

The researcher ran eight Mann-Whitney *U* tests whether a participant had ever treated any patients with Parkinson's disease (yes=145 (72.9%), no=4 (2.0%)) and the familiarity with using the four voice treatments (See Table 4) and perceived effectiveness of the four voice treatments (See Table 5). It is important to note that not every participant answered every question, which is why the yes an no groups do not add up to 188. The Mann-Whitney *U* tests were used because of the unequal distribution of the yes and no groups. The Mann-Whitney *U* test does not assume that the groups have to be normally distributed, like the Parametric

Independent samples *t* test (Cronk, 2012, p. 101). The results showed that there was a significant relationship between having treated patients with Parkinson's disease and familiarity with traditional speech therapy and the LSVT, but not between having treated patients with PD and familiarity with the Lombard effect and SPEAK OUT! ®. Participants were more familiar with traditional speech therapy and LSVT if they had treated patients diagnosed with PD before. The results were not significant for having treated patients with Parkinson's disease and the perceived effectiveness of the treatments. Participants did not view the treatments as being more effective if they had treated patients with PD before. The statistics for having treated a patient with PD and the perceived effectiveness of the Lombard effect were not computed due to insufficient participants in the group.

Table 4

Treating Patients with PD and Familiarity with Treatments

	Have you ever treated patients with PD?				
	Yes (*n*=145)		No (*n*=4)		
	M	*SD*	*U*	*Z*	*p*
Familiarity with LSVT	5.95	1.51	72.5	-2.80	.005*
Familiarity with Traditional Speech Therapy	5.45	1.52	84	-2.50	.013*
Familiarity with Lombard Effect	2.72	2.13	207.5	-1.05	.294
Familiarity with SPEAK OUT!®	2.70	2.03	280.5	-.118	.906

Note. *$p < .05$.

Table 5

Treating Patients with PD and Effectiveness of Treatments

	Have you ever treated patients with PD?						
	Yes	No					
	n	*n*	*M*	*SD*	*U*	*Z*	*p*
Effectiveness of LSVT	140	4	5.85	.903	180.5	-1.29	.196
Effectiveness of SPEAK OUT!®	61	2	4.92	1.26	30.5	-1.24	.216
Effectiveness of Traditional Speech Therapy	144	4	4.61	1.36	235	-.663	.507

Note. $*p < .05$.

The researcher ran descriptive statistics on the percentage of the participants' caseload that was patients with Parkinson's disease, how many years participants generally spend working with a patient with Parkinson's disease, and how many patients with Parkinson's disease the participant has worked with in the past year. See Table 6.

Table 6

Percentage of Patients with PD on Caseload, Number of Years Spent Working with Patients with PD, and Number of Patients with PD Treated in Past Year

	n	*M*	*SD*
Percentage of PD Patients on Caseload	142	17.20%	19.19%
Number of Years Spent Working with PD Patients	141	1.86	2.33
Number of PD Patients in the Past Year	143	9.12	7.03

The researchers ran a frequency count on where patients with Parkinson's disease were most often referred. The results showed that most patients were referred from their primary care physician. See Figure 3 for results.

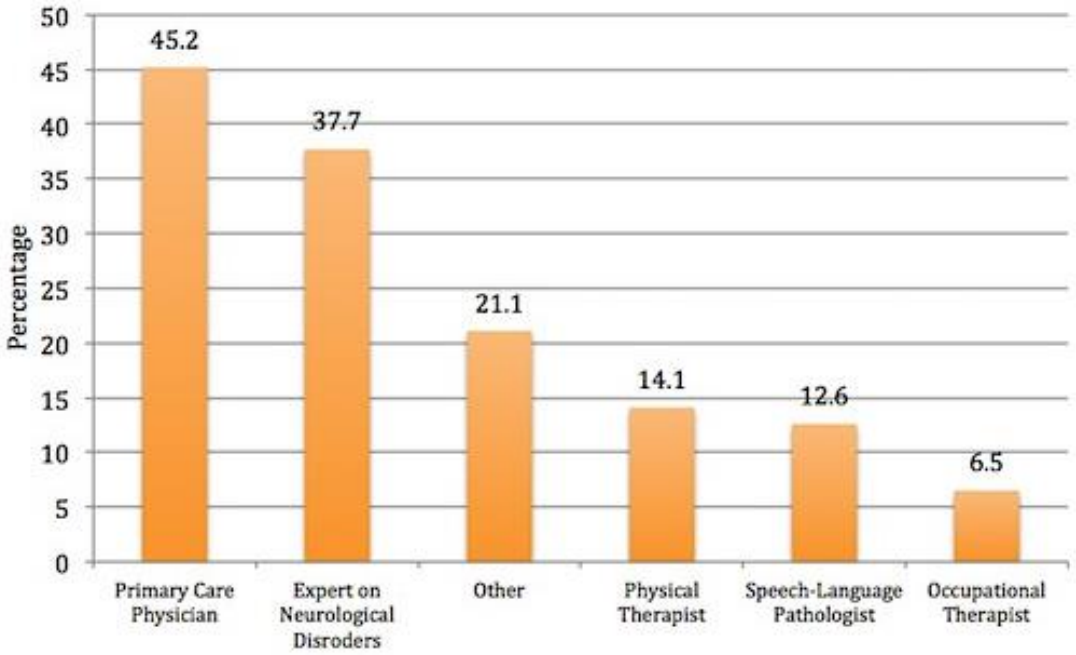

Figure 3. Percentage of respondents who indicated each referral source.

The researcher ran four Independent samples *t* tests on whether the participant considered him/herself to be a voice specialist (yes, no) and how familiar the participant was with the four vocal treatments (traditional speech therapy, the Lombard effect, SPEAK OUT! ®, LSVT). The familiarity question was set up as a 7-point Likert-scale, with 1 representing *not at all familiar* and 7 representing *very familiar*. The results were statistically significant for traditional speech therapy, the Lombard effect, and LSVT, participants who considered themselves to be voice disorder specialists were more familiar with those three treatments than participants who did not consider themselves to be voice disorder specialists. See Table 7 for the results.

Table 7

Treating Patients with PD and Familiarity with Treatments

	Do you consider yourself to be a voice disorder specialist?						
	Yes (*n*=46)		No (*n*=101)				
	M	*SD*	*M*	*SD*	*df*	*t*	*p*
Familiarity with LSVT	6.83	.486	5.53	1.63	131.7	7.29	<.001**
Familiarity with traditional Speech therapy	6.39	.977	5.11	1.42	122.34	6.35	<.001**
Familiarity with Lombard Effect	3.98	2.45	2.02	1.64	63.91	4.94	<.001**
Familiarity with SPEAK OUT!®	3.09	2.13	2.45	1.94	80.41	1.74	.074

Note. ** $p < .01$.

Discussion

As stated previously, the purpose of this study was to examine clinicians' general knowledge of four different voice treatments. These voice treatments were used to remediate the vocal symptoms in patients diagnosed with Parkinson's disease. Specifically, the researcher examined participants' familiarity and perceived effectiveness of four different voice treatments.

Results showed that 183 SLPs, out of the 188 who answered the question about recalling voice treatments, knew of at least some voice treatment for the vocal symptoms of Parkinson's disease. Only five SLPs indicated that they did not know of any voice treatments for the vocal symptoms of Parkinson's disease. The high percentage of participants who knew about voice treatments for the vocal symptoms of PD was an expected finding. Parkinson's disease is the second most common neurodegenerative disorder, following Alzheimer's disease (Tanner & Goldman, 1996, p. 317). As of 2014, the baby boomers are an estimated 14.5% of the population (U.S. Bureau of the Census, 2014) and many of them are being diagnosed with PD and are requiring treatment. These two reasons both point to why it would make sense that so many

participants would be familiar with voice treatments for Parkinson's disease. It is also possible that only clinicians who had heard of at least some type of voice treatment for the vocal symptoms of PD clicked on the survey and participated in the study. This could also be linked to finding that the majority of the clinicians who participated in the study had heard of voice treatments to reduce the vocal symptoms of Parkinson's disease.

The descriptive statistics gathered on the familiarity with the four different treatments for the vocal symptoms of Parkinson's disease indicated that participants were most familiar with the more popular treatments. The Lee Silverman Voice Treatment, which is the most frequently used treatment, was the treatment with which participants were most familiar (Spielman et al., 2007, p. 96). The LSVT is the most researched treatment technique and has the highest rate of success and long-term impact (Ramig et al., 2001, p. 495). The treatment that participants were second most familiar with was traditional speech therapy. Traditional speech therapy is the second most beneficial treatment and the second most common treatment that is mentioned in the literature (Sackley et al., 2014, p. 214). Although it may seem odd that anyone would choose the second most beneficial treatment when attempting to remediate his/her vocal symptoms, traditional speech therapy is far less time consuming than LSVT, which occurs over one month, four times a week for an hour (Ramig et al., 2001, p. 495). The last two treatments were the Lombard effect and SPEAK OUT!®. These were the treatments with which the SLPs who completed this survey were least familiar. The Lombard effect seems to primarily be used in research and has not yet had any application in the real world (Pinto et al., 2004, p. 551). The SPEAK OUT!® was only started in 2010, and is still in early stages of being researched (Parkinson Voice Project, 2010).

The majority of participants became familiar with LSVT by attending training/certification workshops. One must be certified in LSVT in order to use it in practice, so this was an expected finding (Spielman et al., 2007, p. 97). Traditional speech therapy was learned most about in graduate school. Any clinician can use traditional speech therapy with a patient with PD; it would make sense that the majority of participants would have learned about this treatment method in school because it does not require any sort of special certification or any type of specialized knowledge (Sackley et al., 2014, p. 214). The Lombard effect was learned about through scientific articles. At present, the Lombard effect has purely been used in research, it makes sense that most speech-language pathologists would only be familiar with using the Lombard effect to help reduce the vocal symptoms of Parkinson's disease, if they had read about it in an article (Pinto et al., 2004, p. 551). Finally, SPEAK OUT!® was mostly learned about from colleagues. SPEAK OUT!® is such a new treatment, there are only a few scientific articles about it (Parkinson Voice Project, 2010). Therefore, it makes sense that SLPs would primarily become familiar with SPEAK OUT!® via word of mouth. In general, the four different voice treatments were all learned about in predictable ways.

The four correlations that were run to assess the relationship between familiarity with the different treatments and the perceived effectiveness of the different treatments yielded significant results for all the treatments, except for traditional speech therapy. It is possible that because traditional speech therapy is learned about in school, no special certification is required, and it is the simplest form of treatment, that how familiar participants are with the treatment does not impact how effective they think it will be. As stated previously, traditional speech therapy does not require special certification and it is far less time consuming than LSVT and SPEAK OUT!® (Sackley et al., 2014, p. 214). For the other three treatments (LSVT, the Lombard effect, and

SPEAK OUT!®) more specialized knowledge is required to understand how the treatments work. This might be an indicator for why the more familiar clinicians were with these treatments, the more effective clinicians perceived them to be. It is important to note that all clinicians had to be at least a little bit familiar with the treatments in order to answer the questions. Otherwise, the participant was skipped to the next block of questions.

The descriptive statistics run for the first of the five statements regarding participants' level of agreement concerning assessment and treatment of vocal symptoms in Parkinson's disease indicated that participants did not believe that there were a lack of effective voice treatments for individuals diagnosed with Parkinson's disease used to remediate their vocal symptoms. The Lee Silverman Voice Treatment is the most popular treatment and is also shown to be statistically effective at decreasing the vocal symptoms of Parkinson's disease (Ramig et al., 2001, p. 495). This could explain why participants thought that there were not a lack of effective voice treatments. The results for the second statement, which asked about increased awareness of PD voice treatments, showed that participants believed that increased awareness of the voice treatments used to remediate the vocal symptoms of Parkinson's disease would help clinicians feel more comfortable in treating patients. Increased knowledge of all of the treatment options for Parkinson's disease and how they differ and work would help clinicians feel more comfortable during treatment (Berg et al., 2008, p. 74). The results previously indicated that most clinicians were somewhat aware of some type of vocal treatment for the vocal symptoms of Parkinson's disease. It is likely that the increased knowledge would have to be more intensive and specialized than with what the general population of SLPs is already familiar.

The results from the third statement regarding a need for more SLPs to work with patients diagnosed with PD showed that participants believed that there was a need for more

clinicians to work with patients diagnosed with PD to help remediate their vocal symptoms. This result could have come from clinicians feeling like there are not enough specialists who are truly familiar with how to remediate the vocal symptoms of PD (Ekberg et al., 2002, p. 145). The majority of clinicians in this sample had at least heard of voice treatments for the vocal symptoms of Parkinson's disease, but they were not all very familiar with the four treatments. The last two results for clinicians feeling comfortable assessing individuals with PD to evaluate their vocal symptoms and clinicians feeling comfortable with providing therapy to individuals diagnosed with PD to help remediate their vocal symptoms, showed that many clinicians were comfortable both assessing and treating the vocal symptoms of Parkinson's disease. Considering Parkinson's disease is becoming more and more prevalent, this is not an unexpected finding. However, it also must be noted that many of the participants who took part in this survey were members of special interest groups that might have led them to be more familiar with assessing and treating Parkinson's disease vocal symptoms than the average SLP. Another possibility is that only clinicians who were comfortable with answering questions about patients with Parkinson's disease and Parkinson's disease voice treatments took the survey.

The results of eight Mann-Whitney *U* tests on the relationship between the familiarity and perceived effectiveness with the four different voice treatments and had the clinician ever treated a patient with Parkinson's disease provided two significant results. This results were between familiarity with traditional speech therapy and LSVT and having had treated a patient with PD before. Although there were only two significant results, all of the means suggested that people who had treated patients with PD before were more familiar with the voice treatments. These findings are straightforward; if a clinician has used the treatments before, he/she is more likely to be familiar with those treatments. There were no significant results from the perceived

effectiveness of the four voice treatments and whether or not the clinician had treated a patient with PD before did not give rise to any significant results. However, all of the means indicated that participants who had treated patients diagnosed with Parkinson's disease perceived the treatments to be more effective than those participants who had never treated a patient with Parkinson's disease. These results are also very straightforward. If a clinician has seen first-hand how effective the treatments can be, it would make sense that he/she would perceived those treatments to be more effective than a clinician who has only read or heard about the treatments.

Descriptive statistics indicated patients with Parkinson's disease were a small percentage of clinicians' total caseload. Descriptive statistics also showed that participants treated on average less than ten patients diagnosed with Parkinson's disease each year. Many patients diagnosed with Parkinson's disease never seek treatment for their vocal symptoms, which could explain why there was not that high of a percentage of patients with PD on clinicians' caseloads (Fox et al., 2002, p. 111).

Descriptive statistics also indicated that most participants spent around 2 years working with patients with Parkinson's disease. Most of the treatments take place over a fairly short period of time (1 month for LSVT and SPEAK OUT!®) and also most insurance companies do not pay for that many visits, which could be why most clinicians spent a short period of time working with their patients diagnosed with Parkinson's disease (Ho et al., 1991).

A frequency count showed that patients were most often referred to SLPs for treatment from either a primary care physician or an expert on neurological disorders. Most patients are diagnosed with PD by either their primary care physician or referred from their primary care physician to an expert on neurological disorders and then are diagnosed by that individual

(Diagnosis, 2014, How is Parkinson's Diagnosed?, para. 1). Therefore, it would make sense that most referrals would come from those two disciplines.

The four Independent *t* tests that were run on whether the participant considered him/herself to be a voice disorder specialist and the familiarity with the four treatments yielded significant results for all of the tests except for SPEAK OUT!®. SPEAK OUT!® was the only treatment technique for which being a voice disorder specialist did not make the participant more knowledgeable of the treatment than non voice disorder specialists. This could be because SPEAK OUT!® is still a very new treatment (Parkinson Voice Project, 2010). According to the previous results, many SLPs were not that familiar with it and it was most learned about by word of mouth. These two things could contribute to why voice disorder specialists and SLPs in general seem to not be very familiar with SPEAK OUT!®.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The final chapter will reiterate the main findings of the study in more generalized terms. This chapter will discuss possible implications of the research. It will also state some limitations to this study and ways that those limitations could be eliminated in future research. Finally, this chapter will mention the final thoughts of the researcher gained throughout completing this study.

Major Conclusions

There were two main insights gained from the results and discussion section of this study. First, there is in fact a need for more education on the various Parkinson's disease voice treatments used to remediate the vocal symptoms of Parkinson's disease. While some participants were very familiar with the four different treatments asked about in this study (Traditional speech therapy, the Lombard effect, SPEAK OUT!®, and LSVT), the majority of participants were not familiar with the lesser known treatments (The Lombard effect, SPEAK OUT!®) and could not speak to their effectiveness. This is potentially due to the fact that both of the treatments that participants were not as familiar with are fairly new. Therefore, there is not a lot of scientific literature regarding the treatments and exactly how effective the treatments are at this point in time. The only participants who were truly familiar with the different treatments were clinicians who were experienced with treating patients with Parkinson's disease, or participants who considered themselves to be voice disorder experts. However, it must be noted that the discrepancy between the number of participants in each group was very large and a nonparametric test had to be used to analyze the data. Yet, the data still produced significant results. It is good that there are at least some clinicians, mainly specialists, who were well

informed about the treatments, but with the baby boomers now entering late adulthood, more and more people are likely to be diagnosed with Parkinson's disease and there need to be more clinicians available to treat those individuals. Parkinson's disease is the second most common neurodegenerative disorder and there should be more general knowledge available about its different treatments (Tanner & Goldman, 1996, p. 317). While a majority of the participants had at least heard of some type of voice treatment for the vocal symptoms of Parkinson's disease, that does not mean that those participants had completed the training required to administer the treatments. The participants were not necessarily familiar with the specific details involved in each treatment.

The second main insight gathered from this study was related to the first insight about increasing education about the voice treatments used to treat the vocal symptoms with Parkinson's disease. The majority of clinicians indicated that they felt that increased knowledge and education about the voice treatments would lead to clinicians feeling more comfortable with working with patients diagnosed with Parkinson's disease. Specifically, participants stated that further education could help clinicians feel comfortable assessing the vocal symptoms of patients with Parkinson's disease.

Implications of the Research Findings

A way to potentially close the gap in this familiarity with the four treatments could be to start teaching all of the different treatment techniques in graduate programs or to just introduce all of the different treatment options. At least then clinicians will be aware of the different treatments and could choose whether or not to pursue learning about them further. The earlier that clinicians are exposed to the knowledge, the more likely they will choose to be voice disorder experts and become familiar with the varying treatments and possibly even become

certified in some of them. As discussed in the literature review, more and more baby boomers are entering into late adulthood and may end up being diagnosed with Parkinson's disease. It is up to the clinicians to make sure that they are knowledgeable about all of the treatment techniques so their patients can have the best outcome possible.

A final implication is related to the finding that most patients diagnosed with PD are referred to SLPs via primary care physicians. Primary care physicians need to be made more aware of the voice treatments for the vocal symptoms. The more aware physicians become, the patients will be referred for treatment.

Limitations

There are several limitations that need to be discussed. The first is that the sample could have been broader. Participants were selected via purposive sampling from The American Speech-Language-Hearing Association (ASHA) special interest groups. Only five groups were involved, meaning that not everyone in all of the special interest groups had a chance to participate in this study. This could have lead to an unrepresentative sample.

Another potential limitation of this study was due to the fact that an online survey was used to collect data. Participants could have easily misinterpreted questions and would not have been able to get their questions clarified. This could have lead to the data being incorrect, if participants answered questions wrong. The researcher received email questions in regards to the meaning of traditional speech therapy.

Another limitation involves how participants may have subjectively filled out the survey. Many questions asked participants to rate their familiarity with a certain voice treatment. It is highly likely that some participants stated that they were familiar with treatments, when in

actuality they were only somewhat familiar, but believed that they were more familiar than they actually were.

A final limitation that is important to mention is that only four Parkinson's disease voice treatments were included in this study. There are also other voice treatments for PD that could have been included and that should be researched in the future. Participants might have different knowledge about other treatments that were not present in the study.

Recommendations for Future Research

Future research in this area should include more Parkinson's disease voice treatments used to remediate the vocal symptoms of Parkinson's disease. The more voice treatments that are inquired about, the more complete of a picture can be gathered for where the knowledge gaps clearly lie. Future studies should also attempt to broaden the sample population to see what the entire population of speech-language pathologists knows about the different voice treatments for the vocal symptoms of Parkinson's disease. Future research could also include more research that is conducted in person so participants are able to clarify their questions. Another possibility is to use alternate ways of testing clinicians' knowledge of the various voice treatments that are not quite as subjective. For example, using true or false questions about the various treatments or interviewing participants and asking them more intricate questions about the different treatments. This could provide more insight into what knowledge clinicians truly have regarding the voice treatments. Lastly, future research should examine patient perspectives about the various voice treatments. If the patients receiving the treatment do not feel that the treatments are helping in any way, then more research needs to be done into how the treatments can be improved to increase patient satisfaction with the treatments and their outcomes.

Final Thoughts

The process of completing this independent study has helped me develop the passion I now have for researching neurodegenerative disorders. I have come to care about this area of research so much so, that I hope to complete research in this field later in life. I will be attending graduate school next fall to receive my Master's degree and I hope to have the chance to work with individuals who have been diagnosed with neurodegenerative disorders. Working with this population of individuals in graduate school will give me the hands on experience I need to clinically work with these people for the rest of my life and to potentially see where new areas of research should be targeted.

After receiving my Master's degree and certification of clinical competence, I intend to work towards getting my Ph.D. This is the final step I must achieve in order to be able to conduct research on neurodegenerative disorders. Even though this is years in the future, I am still excited at the prospect that someday I might be one of the authors of a scientific article that a student at the College of Wooster is citing for his/her Independent Study.

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APPENDIX A

IS Survey

1) Do you know of any voice treatments for the vocal symptoms in patients with Parkinson's disease? If yes, list.

- ❍ Yes _____
- ❍ No

Traditional Speech-Language Therapy

2) How familiar are you with using traditional speech-language therapy to treat the vocal symptoms in patients with Parkinson's disease?

- ❍ 1 Not At All Familiar
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 Very Familiar

If 1 Not At All Familiar Is Selected, Then Skip To The Lombard Effect

3) How did you become familiar with using traditional speech-language therapy for the vocal symptoms in patients with Parkinson's disease? Please check all that apply.

- ❑ Undergraduate Education
- ❑ Graduate Education
- ❑ Conference(s)
- ❑ Training/Certification Workshop(s)
- ❑ Colleagues
- ❑ Scientific Articles
- ❑ Other (Specify) _____

4) Have you ever used traditional speech-language therapy to treat the vocal symptoms in patients with Parkinson's disease?

- ❍ Never
- ❍ Rarely
- ❍ Sometimes
- ❍ Often
- ❍ All of the Time

APPENDIX A (Continued)

5) How effective do you perceive traditional speech-language therapy to be at reducing the vocal symptoms in patients with Parkinson's disease?

- ❍ Very Ineffective
- ❍ Ineffective
- ❍ Somewhat Ineffective
- ❍ Neither Effective nor Ineffective
- ❍ Somewhat Effective
- ❍ Effective
- ❍ Very Effective

6) Do you find that patients with Parkinson's disease have difficulty complying with traditional speech-language therapy protocols?

- ❍ Never
- ❍ Rarely
- ❍ Sometimes
- ❍ Often
- ❍ All of the Time

The Lombard Effect

7) How familiar are you with using the Lombard effect to increase vocal intensity in patients with Parkinson's disease?

- ❍ 1 Not At All Familiar
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 Very Familiar

If 1 Not At All Familiar Is Selected, Then Skip To SPEAK OUT!®

APPENDIX A (Continued)

8) How did you become familiar with using the Lombard effect to increase vocal intensity in patients with Parkinson's disease? Please check all that apply.

- ❑ Undergraduate Education
- ❑ Graduate Education
- ❑ Conference(s)
- ❑ Training/Certification Workshop(s)
- ❑ Colleagues
- ❑ Scientific Articles
- ❑ Other (Specify) _____

9) Have you ever used the Lombard effect to increase vocal intensity in patients with Parkinson's disease?

- ❍ Never
- ❍ Rarely
- ❍ Sometimes
- ❍ Often
- ❍ All of the Time

10) How effective do you perceive the Lombard effect to be at increasing vocal intensity in patients with Parkinson's disease?

- ❍ Very Ineffective
- ❍ Ineffective
- ❍ Somewhat Ineffective
- ❍ Neither Effective nor Ineffective
- ❍ Somewhat Effective
- ❍ Effective
- ❍ Very Effective

11) Do you find that patients with Parkinson's disease have difficulty complying with using the masking device to induce the Lombard effect?

- ❍ Never
- ❍ Rarely
- ❍ Sometimes
- ❍ Often
- ❍ All of the Time

SPEAK OUT!®

APPENDIX A (Continued)

12) How familiar are you with using the SPEAK OUT!® voice treatment for reducing the vocal symptoms in patients with Parkinson's disease?

- ❍ 1 Not At All Familiar
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 Very Familiar

If 1 Not At All Familiar Is Selected, Then Skip To End of Block

13) How did you become familiar with using the SPEAK OUT!® voice treatment for reducing the vocal symptoms in patients with Parkinson's disease? Please check all that apply.

- ❑ Undergraduate Education
- ❑ Graduate Education
- ❑ Conference(s)
- ❑ Training/Certification Workshop(s)
- ❑ Colleagues
- ❑ Scientific Articles
- ❑ Other (Specify) _____

14) Have you ever used the SPEAK OUT!® voice treatment for reducing the vocal symptoms in patients with Parkinson's disease?

- ❍ Never
- ❍ Rarely
- ❍ Sometimes
- ❍ Often
- ❍ All of the Time

15) How effective do you perceive the SPEAK OUT!® voice treatment to be at reducing the vocal symptoms in patients with Parkinson's disease?

- ❍ Very Ineffective
- ❍ Ineffective
- ❍ Somewhat Ineffective
- ❍ Neither Effective nor Ineffective
- ❍ Somewhat Effective
- ❍ Effective
- ❍ Very Effective

APPENDIX A (Continued)

16) Do you find that patients with Parkinson's disease have difficulty complying with the SPEAK OUT!® program?

- ❍ Never
- ❍ Rarely
- ❍ Sometimes
- ❍ Often
- ❍ All of the Time
- ❍ Uncertain

The Lee Silverman Voice Treatment

17) How familiar are you with using the Lee Silverman Voice Treatment to reduce the vocal symptoms in patients with Parkinson's disease?

- ❍ 1 Not At All Familiar
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 Very Familiar

If 1 Not At All Familiar Is Selected, Then Skip To Is there another voice therapy techni...

18) How did you become familiar with using the Lee Silverman Voice Treatment to reduce the vocal symptoms in patients with Parkinson's disease? Please check all that apply.

- ❑ Undergraduate Education
- ❑ Graduate Education
- ❑ Conference(s)
- ❑ Training/Certification Workshop(s)
- ❑ Colleagues
- ❑ Scientific Articles
- ❑ Other (Specify) _____

19) Have you ever used the Lee Silverman Voice Treatment to reduce the vocal symptoms in patients with Parkinson's disease?

- ❍ Never
- ❍ Rarely
- ❍ Sometimes
- ❍ Often
- ❍ All of the Time

APPENDIX A (Continued)

20) How effective do you perceive the the Lee Silverman Voice Treatment to be at reducing the vocal symptoms in patients with Parkinson's disease?

- ❍ Very Ineffective
- ❍ Ineffective
- ❍ Somewhat Ineffective
- ❍ Neither Effective nor Ineffective
- ❍ Somewhat Effective
- ❍ Effective
- ❍ Very Effective

21) Do you find that patients with Parkinson's disease have difficulty complying with the Lee Silverman Voice Treatment?

- ❍ Never
- ❍ Rarely
- ❍ Sometimes
- ❍ Often
- ❍ All of the time

22) Is there another voice therapy technique not previously mentioned that can be used to reduce the vocal symptoms in patients with Parkinson's disease? If yes, please specify.

23-27) Please select the response that most accurately reflects your opinion.
Strongly Disagree, Disagree, Somewhat Disagree, Neither Agree nor Disagree, Somewhat Agree, Agree, Strongly Agree

- ❍ I feel that there are a lack of effective voice treatments for individuals diagnosed with Parkinson's disease used to remediate their vocal symptoms.

- ❍ I feel that increased awareness of Parkinson's disease voice treatments would help speech-language pathologists feel more comfortable treating the vocal symptoms in patients with Parkinson's disease.
- ❍ I feel there is a need for more speech-language pathologists to work with individuals diagnosed with Parkinson's disease who want to remediate their vocal symptoms.

- ❍ I feel comfortable assessing individuals diagnosed with Parkinson's disease to evaluate their vocal symptoms.
- ❍ I feel comfortable providing therapy to individuals diagnosed with Parkinson's disease to remediate their vocal symptoms.

APPENDIX A (Continued)

28) Estimate the percentage of children and adults on your current caseload. Please respond so the total equals 100.
_____ Children (
_____ Adults (18+ years of age)

29) Have you ever treated any patients with Parkinson's disease?
❍ Yes
❍ No

30) What percentage of your caseload are patients with Parkinson's disease?
❍ 0%
❍ 1%
❍ 2%
❍ 3%
❍ 4%
❍ 5%
❍ 6%
❍ 7%
❍ 8%
❍ 9%
❍ 10%
❍ 11%
❍ 12%
❍ 13%
❍ 14%
❍ 15%
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❍ 22%
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❍ 27%
❍ 28%
❍ 29%

APPENDIX A (Continued)

- ❍ 30%
- ❍ 31%
- ❍ 32%
- ❍ 33%
- ❍ 34%
- ❍ 35%
- ❍ 36%
- ❍ 37%
- ❍ 38%
- ❍ 39%
- ❍ 40%
- ❍ 41%
- ❍ 42%
- ❍ 43%
- ❍ 44%
- ❍ 45%
- ❍ 46%
- ❍ 47%
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- ❍ 49%
- ❍ 50%
- ❍ 51%
- ❍ 52%
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- ❍ 67%
- ❍ 68%

APPENDIX A (Continued)

- ❍ 69%
- ❍ 70%
- ❍ 71%
- ❍ 72%
- ❍ 73%
- ❍ 74%
- ❍ 75%
- ❍ 76%
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- ❍ 78%
- ❍ 79%
- ❍ 80%
- ❍ 81%
- ❍ 82%
- ❍ 83%
- ❍ 84%
- ❍ 85%
- ❍ 86%
- ❍ 87%
- ❍ 88%
- ❍ 89%
- ❍ 90%
- ❍ 91%
- ❍ 92%
- ❍ 93%
- ❍ 94%
- ❍ 95%
- ❍ 96%
- ❍ 97%
- ❍ 98%
- ❍ 99%
- ❍ 100%

APPENDIX A (Continued)

31) How many years do you generally spend working with a patient with Parkinson's disease?

- ❍ Less than a year
- ❍ 1 year
- ❍ 2 years
- ❍ 3 years
- ❍ 4 years
- ❍ 5 years
- ❍ 6 years
- ❍ 7 years
- ❍ 8 years
- ❍ 9 years
- ❍ 10+ years

32) How many patients with Parkinson's disease have you had in the past year?

- ❍ 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7
- ❍ 8
- ❍ 9
- ❍ 10
- ❍ 11
- ❍ 12
- ❍ 13
- ❍ 14
- ❍ 15
- ❍ 16
- ❍ 17
- ❍ 18
- ❍ 19
- ❍ 20+

APPENDIX A (Continued)

33) If you have patients with Parkinson's disease on your caseload, where were those patients referred from? Check all that apply.

- ❑ Primary Care Physician
- ❑ Expert on Neurological Disorders
- ❑ Speech-Language Pathologist
- ❑ Occupational Therapist
- ❑ Audiologist
- ❑ Physical Therapist
- ❑ Other (Specify) _____

34) Do you use informational counseling (counseling the patient about factual information related to Parkinson's disease and its treatment) with your patients?

- ❍ Yes
- ❍ No

35) Do you use personal adjustment counseling (counseling the patient diagnosed with Parkinson's disease about his/her emotional state) with your patients?

- ❍ Yes
- ❍ No

36) Do you refer your patients with Parkinson's disease to counseling?

- ❍ Never
- ❍ Rarely
- ❍ Sometimes
- ❍ Often
- ❍ All of the time

37) In your opinion, what would make speech-language pathologists more comfortable working with individuals diagnosed with Parkinson's disease to address their vocal symptoms?

38) In what year did you earn your highest degree?

39) What is your highest degree?

- ❍ BA/BS
- ❍ MA/MS/MED
- ❍ PhD/EdD/SLP-D/ScD

APPENDIX A (Continued)

40) What setting do you work in? Check all that apply.

- ❑ School
- ❑ University
- ❑ Clinic
- ❑ Lab
- ❑ Retirement Home
- ❑ Hospital
- ❑ Skilled Nursing Facility
- ❑ Other (Specify Below) _____

41) How many years of clinical experience do you have?

- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7
- ❍ 8
- ❍ 9
- ❍ 10
- ❍ 11
- ❍ 12
- ❍ 13
- ❍ 14
- ❍ 15
- ❍ 16
- ❍ 17
- ❍ 18
- ❍ 19
- ❍ 20
- ❍ 21
- ❍ 22
- ❍ 23
- ❍ 24
- ❍ 25
- ❍ 26
- ❍ 27
- ❍ 28

APPENDIX A (Continued)

- ❍ 29
- ❍ 30
- ❍ 31
- ❍ 32
- ❍ 33
- ❍ 34
- ❍ 35
- ❍ 36
- ❍ 37
- ❍ 38
- ❍ 39
- ❍ 40
- ❍ 41
- ❍ 42
- ❍ 43
- ❍ 44
- ❍ 45

42) Are you a member of any ASHA SIG group(s)? If yes, specify.

- ❍ Yes _____
- ❍ No

43) Do you consider yourself to be a voice disorder specialist?

- ❍ Yes
- ❍ No

44) What is your sex?

- ❍ Female
- ❍ Male
- ❍ Other (Specify) _____

45) What is your age?

APPENDIX B

CONSENT TO PARTICIPATE IN A RESEARCH STUDY

THE COLLEGE OF WOOSTER

Clinician Knowledge of Voice Treatments for Parkinson's Disease Vocal Symptoms and Patient Motivations for Seeking Speech Therapy

Principal Investigator: Angela Marie Wiley, Department of Communication

Purpose

You are being asked to participate in a research study. We hope to learn more about your knowledge of the various voice treatments for the vocal symptoms of Parkinson's disease.

Procedures

If you decide to volunteer, you will be asked to answer a number of questions about Parkinson's disease voice treatments.

Risks

There are no risks to you, if you decide to participate in the study.

Benefits

You may learn more information about the voice treatments for Parkinson's disease vocal symptoms while completing the survey.

Anonymity

All data collected from this study will be anonymous. The data will be kept on a password-protected computer.

Costs

There is no cost to you beyond the time and effort required to complete the procedure described above.

Right to Refuse or Withdraw

APPENDIX B (Continued)

You may refuse to participate in the study. If you decide to participate, you may change your mind about being in the study and withdraw at any point during the survey.

Questions

If you have any question, please ask me. If you have additional questions later, you can contact me, Angela Wiley, by email at awiley16@wooster.edu. You may also contact my advisor, Dr. Joan Furey, at jfurey@wooster.edu.

Consent

Your selection of the agree box below will indicate that you have decided to volunteer as a research subject, that you have read and understand the information provided above, and that you are at least 18 years of age.

APPENDIX C

Hello All,
I am writing this prompt to give you the opportunity to participate in a research study that is being conducted as part of an independent study thesis to complete my senior year at the College of Wooster. This study will investigate clinician general knowledge of Parkinson's disease and voice treatments for the vocal symptoms of Parkinson's disease. I have already received human subjects research approval from the College of Wooster board. If you choose to participate, the study will not take more than 10 minutes. You will be asked to complete a brief survey. Your results will be kept anonymous. There is no harm that can come to you from participating in this study. There are also no direct or indirect benefits that participants will receive from participating in this study. If you participate in this study and then decide to withdraw, you may do so at anytime. If you wish to participate or have any questions, please email me at awiley16@wooster.edu. Please see
link: https://wooster.co1.qualtrics.com/SE/?SID=SV_cGwOyrCzGAkP1SB
Thank you,
Angela Wiley

Angela Wiley
Wooster, OH

Hello,

My name is Angela Wiley and I am writing this email to ask if you would be willing to post a link to my survey in your special interest group at ASHA. It would give all of the SIG members the opportunity to participate in a research study that is being conducted as part of an independent study thesis to complete my senior year at the College of Wooster. This study will investigate clinician general knowledge of Parkinson's disease and voice treatments for the vocal symptoms of Parkinson's disease. I have received human subjects research approval from the board at the College of Wooster. All results will be kept anonymous. There is no harm that can come from participating in this study. There are also no direct or indirect benefits that participants will receive from participating in this study. If you participate in this study and then decide to withdraw, you may do so at anytime. If you wish to participate or have any questions, please email me at awiley16@wooster.edu.

Here is the link to my
survey: https://wooster.co1.qualtrics.com/SE/?SID=SV_cGwOyrCzGAkP1SB
I have also attached a prompt that you can post with the survey that will inform people what the study is about.

Thank you,

Angela Wiley

APPENDIX D

To: Angela Wiley
From: Joan Furey, HSRC Chair
Subject: Protocol #2015/11/41
Date: 12/08/2015

The protocol Clinician Knowledge of Voice Treatments for Parkinson's Disease Vocal Symptoms and Patient Motivations for Seeking Speech Therapy has been approved by the HSRC Chair under the rules for expedited review on 12/08/2015 pending the following revisions:

- Add the information that the interview will be recorded to the recruitment email and the procedure part of the consent form.

The approval of your study is valid through 12/07/2016, by which time you must submit an annual report either closing the protocol or requesting permission to continue the protocol for another year. Please submit your report by 11/09/2016 so that the HSRC has time to review and approve your report if you wish to continue it for another year.

If you have any questions, feel free to contact me.

Joan Furey,
HSRC Chair

jfurey@wooster.edu

APPENDIX E

Item 1

After therapy programs (community-based) can be effective in improving adherence and maintaining improvements. Occasionally RVT are incorporated for those patients with a tendency towards straining for loudness
Big and Loud
DAF
EMST-150
expiratory respiratory muscle strength trainer
I had one pt recently who had difficulty increasing loudness unless he produced a cough or throat clear first, then LSVT and environmental expectations were effective.
Increasing breath support
I use vocal warm ups that are similar to vocal exercises, such as humming, pitche changes, and singing scales. This focuses on breath support, strengthening the VFs themselves, pt contolling their range, informing pts of their own vocal quality and potential, and when they paractice thse 5x/week in addition to LSVT, they remain appropriate loudness and can be understood.
LMRVT if there is hyperfunction; yawn-sigh to decrease roughness
No
no
Perhaps you include training in diaphragmatic breathing, sustained vocalizations, and exaggerated speech to be considered "traditional" approaches.
Respiratory exercise programs have been tried, but are not as successful
Semi-occluded vocal tract exercises
Speak Out seems to be a clone of LSVT
Speak up for Parkinsons. An application I use on my iPad.
Stemple Vocal Function Exercises
The Agin Approach to Voice Projection in those with Parkinson's disease.
Training in general speech intelligibility stategies (slowed rate, overarticulation, deep breath, renew breath often) as well as education re: fostering a supportive communication environment
vocal hygiene
working on breath support

APPENDIX F
Item 37

Evidence-based standards of care, low cost training programs offering consistent treatment protocols
A better knowledge of symptoms to look for to change treatment to be more effective, to improve clinician decision making based on patient response to treatment
Cheaper access to the certification programs.
Knowledge and skills
more hands-on therapy sessions/ education/ practice, practice, practice
More knowledge
We need to be more involved with the Parkinson's communities we serve (voluteering with the local Parkinson's Associations); More conferences related to PD
More direct hands on assessment and treatment with a standard program like SPEAK Out!.
Greater hands-on experience
Easy access to information about Parkinson's from credible sources.
More training in grad school
information in grad school, I came from an education based program
More training. I know that I currently am working in schools, but I get many requests to provide Lee silverman voice, even though I am not currently available. very few folks in my area are certified. I have to turn people away.
More experience with the population
Education RE: Parkinson's disease in general. It seems to me that many therapists do not have a good grasp of what PD entails.
More continuing education opportunities
more information about assessment and treatment options
training and awareness of the literature
more sessions devoted to voice treatment at state level SLP conferences
Complete LSVT.
More experience and knowledge of treatment protocol
My perception is that because LSVT is regarded so highly in our field (but also requires a certification course) that many SLPs refrain from treating the voice symptoms of those with PD until they are trained in LSVT. Then beyond the training, comfort only comes with actual patient contact on a semi-regular basis
Great information and hands-on training
Better techniques, financially accessible training to the techniques currently available, better coverage for devices such as SpeechVive
Better education about the cause of voice problems in people with PD and effective treatments.
Txs that result in longer-lasting improvements w/ greater generalization
educational opportunities.
Experience
Easy access to courses that are affordable
Education and motivation.
understanding demands of communication, anatomy/physiology knowledge, individualized tx
Training
more public knowledge about voice treatments other than LSVT

APPENDIX F (Continued)

for clinicians to complete continuing education and independent study regarding voice and/or the neurological disease of PD
hands on training in school or clinical rotations, networks for shared materials & education
Further training
Receive appropriate training in voice diagnostics and treatment.
Formal training of LSVT really helped me
a dedicated one-day workshop, focussing on 1) *functional* carry-over of skills, 2) profiles of more successful candidates for treatment
knowledge of vocal symptoms of Parkinsons Disease, tools to treat patients, funding to pay for services
Training in the disease process
CE
Having a good voice intuition regarding methods to improve voice quality and overall intelligilibity when protocols don't work.
Gaining more experience throughout the educationa and training process. Desire to treat this population.
Increasing comfort and skill level among SLP to be a voice clinician. Fewer SLPs have "good ears" necessary to be a confident, effective vocie clinician.
more education
Knowing that there is good research behind the methods they utilize, knowing that people's vocal quaility can improve with speech therapy as long as the pt is motvated and compliant with vocie programs.
more CE opportunities
More thorough voice training in college
more education
Certification workshops, observation of therapy, mentors
Increased skill development in the area of voice
A textbook or seminar specificall dealing with treatment.
More indepth voice classes while in school
Attend LSVT LOUD conference, either a course (preferred) or online. It is unfortunate that the cost of the conference is prohibitive to many SLPs. It is the single most useful tx technique I have in my "clinical toolbox"
Additional training resources and references through ASHA
Coursework in specific therapy techniques such as LSVT
Having a background and comfort level with voice disorders first. I don't think a clinician should use LSVT, SPEAKOUT, or Lombard if they do not already have a solid background with voice disorders and treatment. None of these approaches work for the atypical voice disorder for a Parkinson's patient. Some Parkinson's patients need what I call a "clean up first" before you start placing high vocal demands on the vocal cords. If they just go to a conference and go back and see a patient and they don't recognize the difference in a different type of voice disorder other than the typical voice disorder seen in a Parkinson's patient, then the clinician can cause real harm.
More accessible post-graduate education, i.e., less expensive.
Having supervised hands-on practice with PD patients

APPENDIX F (Continued)

More knowledge and education
More continueing education and more training in graduate school.
Most SLPs I know are comfortable, although some lack advanced knowledge about laryngeal function, safe modeling, and hygiene.
Attending conferences for PD
Graduate training is sparse in voice treatment in general. None of my practice involved voice evaluation or treatment. I learn most of my voice treatment through seminars and certification workshops. Yet I still need someone to bounce ideas off after the initial training. So, having a mentor in voice disorders and treatment would have been very beneficial.
Access to training
if LSVT approach didn't have barriers to entry such as certification cost
workshops - Allied Team Training for PD, sponsored by NPF
more training and exposure in graduate school and during clinical fellowship
Workshop with hands on meeting of patient's with parkinson's to tell their stories of success and failure
Education as a graduate student and continuing education as a professional
More education through under- and graduate school
LSVT certification
Education and awareness of the available options and their outcomes
More education
Better education, insurance to cover it
Evidence supporting a program it has a realistic patient therapist availability frequency of treatment, realistic insurance reimbursement frequency of treatment andthat has improved carryover
more training
Access to clients with varying degrees of Parkinson's in order to become proficient with whichever treatment approach is being used
experience and dedicated coursework
Education in alternatives to LSVT
Understanding the physiology of PD to choose the appropriate treatment intervention.
Familiarity with the research. Attending PD conferences directed towards consumers as well as professional training conferences. Utilize numerous opprtunities for webinars and podcasts
more clinicians need to get additional certifications
more training and mentoring
Continuing education
More educational opportunities
If they aren't comfortable, they should pursue additional education--continuing ed is part of the job!
specific training in therapies that are effective
Training in specific treatment techniques
Training--I feel very comfortable after my LSVT Loud training.
incerased training/increased experience, even at the graduate level
more comprehensive information

APPENDIX F (Continued)

More accessible training for SLPs. I have very limited experience working with Parkinson's but mostly that is due to the limited number which have been referred to our outpatient clinic. I feel training should be online and accessible anywhere at any time.
More training on various methods to treat; counseling training
More ceu
Better working knowledge of treating voice and motor speech disorders in general
Training in effective methods which carryover into day-to-day speaking situations
Education, training, having a mentor
More exposure during graduate school.
Experience and education

APPENDIX G
Item 33

Nursing
families
PACE program
Hospitalist
Parkinsons Association
home health nurse
Parkinson's support group
LTC or TCU
Nurses, PT or OT
Skilled nursinh
Otolaryngologist
laryngologist/ENT
laryngologist
patient self-referral
Work Referral
ENT
nursing
home health agency
Local PD support Group
Screened in snu
Home health nurses
Home Health
Often self-referred
hospital case managers
self referred
self-referred
ENT
ENT
Nursing
Acute Care
other persons with Parkinson's disease
self-referral
self
Nurse
not applicable
self
Sel referred
family members
Nursing Home
Hospitalist
Pt's are referred to SNF from hospital
Nurse Case Manager

APPENDIX H
Item 40

Other (Specify Below)
Home health and outpatient
Client homes
Home health
Healthcare tecnology
Developmental Centre
PACE Program
In a P.A.C.E. program in Southern California
home health
worked in healthcare for over ten years
home health
Rehab to Home
Home health - patients house
Home health and outpatient
Private practice office
Outpatient
Home Health
Early intervention
Home health
home care
ENT practice
private practice, home health
home health care
Long term care for DD
Private Practice
ENT office
Long Term Care
Private practice
Home health
Outpatient rehabilitation facility
Home Health
Acute rehab
Home care
Outpatient Hospital Setting
Private practice office
currently not working
homes
Home health
OPT clinic
Home health
Subacute Unit
private practice
Home health
private practice and Community based program for Parkinson's

APPENDIX H (Continued)

Home Health
homes of patients
Telepractice
private practice
outpatient center
Home health
Voice and swallowing clinic associated with ENT
ENT office
Private practice
SubAcute rehab unit
Outpatient Clinic
Home Health
private practice
Home Health Care
Home health

APPENDIX I
Item 42

15
Gerontology
SIG 15
Dysphagia, gerontology
Swallow, Gerontology
Swallowing, Gerontology, and Neuro
15
SIG 12/13/15
13, 15
Gerontology
Dysphagia
SIG 15
Gerontology
15
02, 13, 15
15
1,13,16,18 (maybe more, can't remember)
SIG 15
11, 13, 15
13 and 15
15
dysphagia and gerontology
Gerontology
3, 15, 19
15
11, 13, 15
11, 13, 15, 2
Swallowing and gerontology
SIG 3
SIG 3
3
3 and 13
2, 10, 13, 15
2
3, 13
Voice, Dysphagia, Neuro
3
neurogenic, voice
Voice and Swallowing SIGS
Gerontology, Neurogenic Disorders, Dysphagia
Telepractice, hearing loss
3, 13
02,12,16
SIG 3

APPENDIX I (Continued)

3 Voice
15
Gerontology and Neurphysiology
2 and 10
SIG 3
2 and 13
2
Swallow. Child Lang. Neuro. Grrontology
3
SIG 3 and 4
10,17,18
SIG 3, 10,11,18
3, 11
swallowing & Gerontology
Neuro and aac
2,12,10
13
13
13; 18
2, 13
10, 11
2, 13
2
Voice
3 and 13
SID3
2, 13
SIG2, SIG12, SIG15
3, 13
Voice
3, 9, 13
3, 13
School, Gerontology
3
SIG 3
3
2,10,15
3
3
3
Sig 2
3,13
geriatrics, dysphagia, neurogenics
15

APPENDIX I (Continued)

3. 13.
15,09,14
2, 3
SIG 2, 13, 18
3,14,18
2, 13
13, 2
10, 13, 3, 18
Sig. 10
2
2, 10, 13, 15
2, 13
SIG 2