

## Introduction

Parkinson's disease (PD), one of the most common progressive neurological diseases results from degeneration of the basal ganglia. The loss of dopamine, which is produced in the substantia nigra of the basal ganglia, leads to the symptoms of PD, notably hypokinetic dysarthria. Several voice treatment studies re: PD have been conducted to examine outcomes for vocal intensity and intelligibility. Ramig, Sapir, Fox and Countryman (2001) found vocal intensity increased after Lee Silverman Voice Treatment® (LSVT®), which is aimed at increasing vocal loudness by increasing phonatory effort. Levitt (2014) reported increases in vocal intensity in sustained /a/ with SPEAK OUT!®. Chen, Hsiao, Chung and Chung (2007) noted a small decrease in sustained /a/ with Resonance Voice Therapy. Cannito et al. (2011) found improved speech intelligibility post-LSVT®. Ramig, Countryman, Thompson and Horri (1995) determined that respiration treatment along with LSVT® showed significant increase in speech intelligibility. Participants in Tjaden, Sussman and Wilding (2014) used clear, loud and slow speech with resulting increases in intelligibility.

SPEAK OUT!® is an intensive voice treatment for individuals with PD that was developed by the Parkinson's Voice Project in partnership with Daniel Boone based on his teachings regarding speaking loud with intent (Boone, McFarland & Berg, 2005). SPEAK OUT!® is similar to LSVT® targeting vocal loudness, intense training and home programming. It is unique in that it requires 12 (vs. 16) individual treatment sessions and provides for maintenance via group treatment called The Loud Crowd®. SPEAK OUT!® follows a standard treatment protocol and uses pre-determined pre/post assessments. The purpose of this pilot study was to determine if vocal intensity improved in sustained /a/ and conversational speech and if intelligibility improved at the sentence level following SPEAK OUT!® treatment. The questions guiding this study were:

**Q1:** Did vocal intensity improve in sustained /a/ and in conversational speech pre- to post-Speak Out!® treatment?

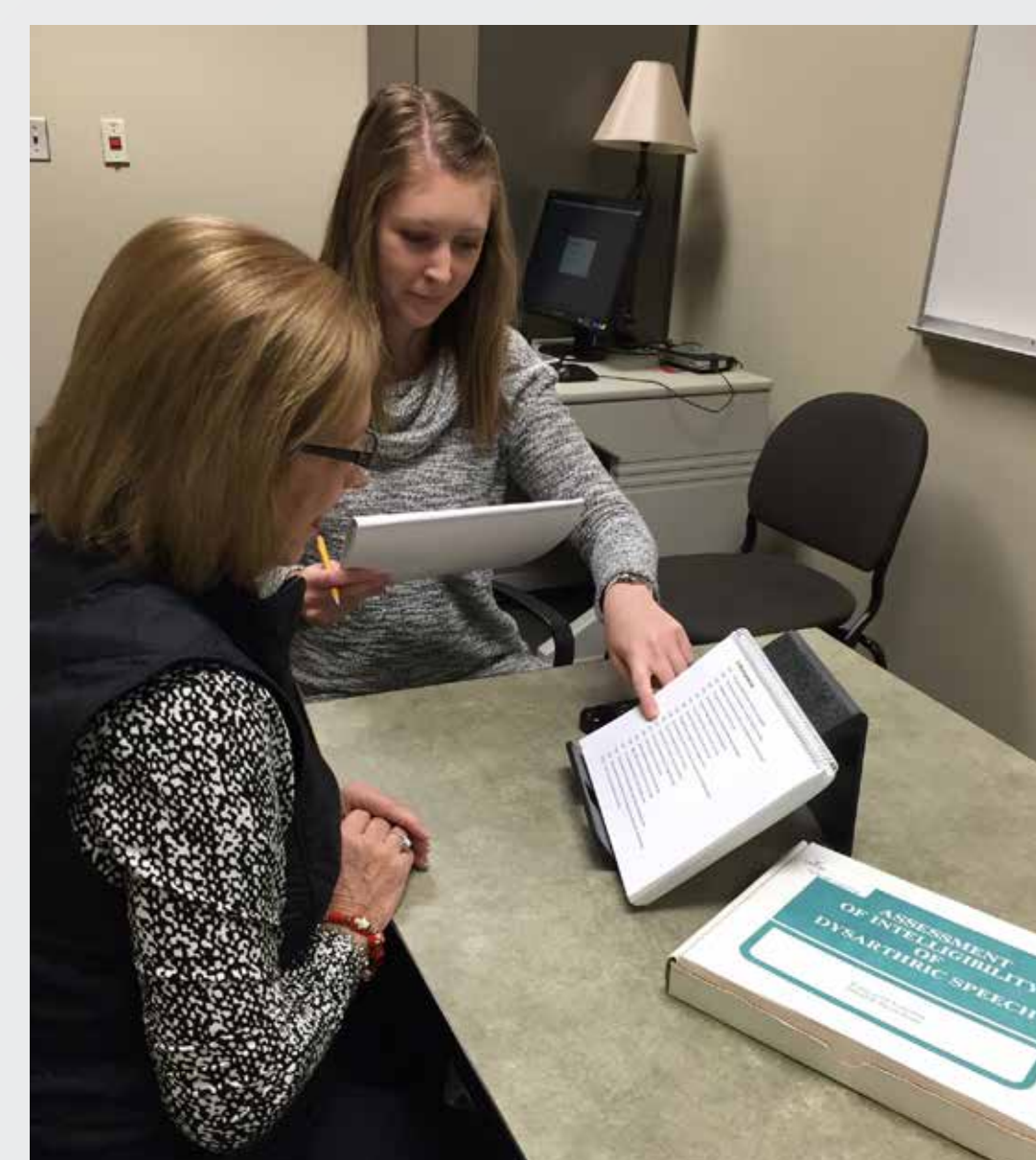
**Q2:** Did intelligibility at the sentence level improve pre- to post-Speak Out!® treatment?

## Method

Participants included six males and five females (mean age = 72;2 years) from the Pacific Northwest. All reported their ethnicity as Caucasian. Participants were evaluated across various areas pre- and post-treatment. Treatment included 12 one-hour individual sessions over a 4-week period. Assessment and treatment were administered by first year graduate student clinicians under the supervision of a licensed speech-language pathologist (SLP) trained in SPEAK OUT!®. Sessions were conducted in a clinical setting in a quiet room.

**Table 1. Session Activities**

Activities
Conversational Sample
Warm-up Exercises
Sustained /a/
Glides
Counting
Reading Passage
Cognitive Exercise



**Figure 1. 12-Week Session Overview\***

Session	Activity	Example
Session 1	Complete each phrase with INTENT	Up and _____ Salt and _____
Session 16	Complete each phrase with INTENT	Name 5-10 items in a school Name 5-10 items that smell
Session 24	Discuss these topics	Talk about your last vacation Talk about your first car

\*includes home practice sessions (28 sessions total)

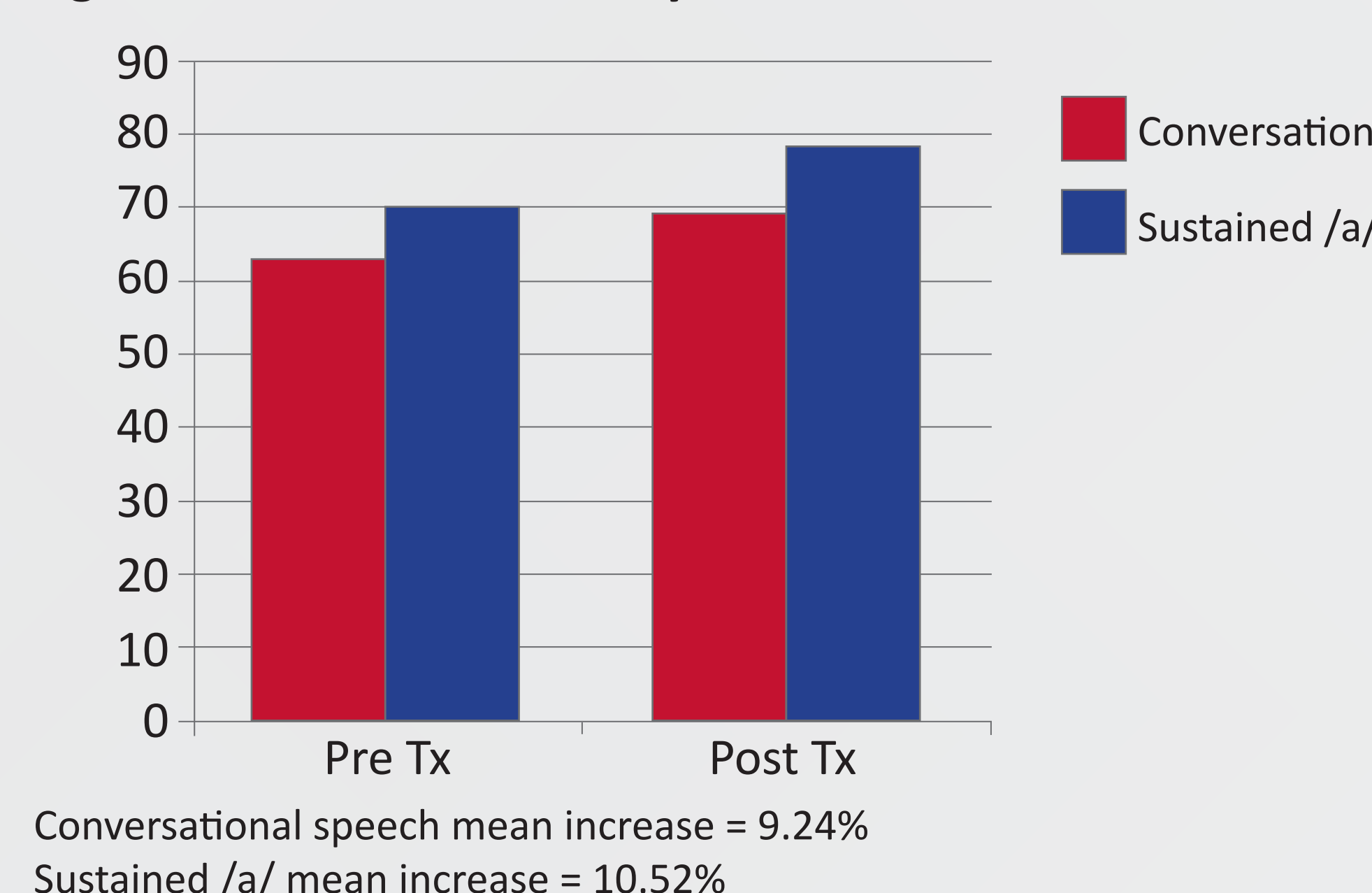
Sustained phonation and conversational samples were recorded with a Sony PMC-10 recorder placed 30 cm from the participant. Recorded data was organized using PRAAT acoustic analysis software. Speech intelligibility was measured with the Assessment of Intelligibility of Dysarthric Speech (ASSIDS; Yorkston & Beukelman, 1984). The ASSIDS was administered and scored according to manual guidelines. Pre- and post-vocal intensity data was analyzed with descriptive statistics to examine pre- and post-treatment change in vocal intensity with conversational speech and sustained /a/.

## Results

**Table 2. Vocal Intensity**

	Conversational Speech		Sustained /a/	
	Pre	Post	Pre	Post
Mean Number of Trials	18	17.5	5.15	8.55
Mean dbSPL (SD)	62.95 (6.78)	69.36 (5.02)	70.32 (6.65)	78.59 (6.84)
Range dbSPL	45.8-71.5	59.0-77.0	61.5-80.5	67.5-87.5

**Figure 2. Growth in Intensity**



**Table 3. Sentence Intelligibility**

	Sentence Intelligibility	
	Pre	Post
Mean (SD)	91% (12.0)	97% (5.0)
Range	60-100%	86-100%

Sentence Intelligibility mean increase = 8.3%

## Discussion and Clinical Implications

Results showed improvement in vocal intensity and speech intelligibility. Participants demonstrated a 10.52% dbSPL increase for sustained /a/; however, this gain was lower than previous research by Ramig et al (LSVT® - 16.1% dbSPL) and Levitt (SPEAK OUT!® - 22.6% dbSPL). However, vocal intensity in conversational speech increased 9.2% dbSPL compared to an average increase of 7.4% dbSPL with LSVT® (Ramig et al, 2001). The finding for improvement in speech intelligibility at the sentence level was consistent with previous research. Data from the current study indicated an average of 8.3% growth in speech intelligibility pre- to post-SPEAK OUT!® treatment. This finding was similar to Tjaden et al., who found intelligibility in individuals with PD improved an average of 9% after treatment focusing on speaking clear and loud. Cannito et al. also found a mean increase in intelligibility of 6.17% with LSVT®.

The current study's participants' strong pre-treatment vocal intensity and speech intelligibility scores may have affected the results. These participants were also involved in activities offered by a local resource center for people with Parkinson's and their motivation level was high. Limitations included small sample size, lack of ethnic diversity in participants and insufficient information regarding PD severity and medications.

Even with these limitations, the results are positive and support the use of SPEAK OUT!® as a viable alternative to LSVT®. While most participants began the study with strong vocal intensity and speech intelligibility, all showed gains in intensity and most showed gains in intelligibility (8/11) given the treatment program. SLPs should consider the positive clinical outcomes of SPEAK OUT!® when determining a treatment approach to use with clients with PD.

Currently, follow-up evaluations are being conducted with these participants. Based on the clinical outcomes of the current study, the first two authors are seeking a grant to fund a larger controlled investigation of the clinical outcomes of SPEAK OUT!® which will include maintenance measures post-treatment.

## Selected References

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