

# The effects of Lee Silverman Voice Treatment (LSVT) on speech and voice characteristics of LQGLYLGXDOV ZLWK 3DUNLQVRQ¶V GLVHDTVH \$ & ULW

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This critical review examines the effectiveness of Lee Silverman Voice Treatment (LSVT) in improving speech and voice characteristics, other than vocal loudness, of individuals with 3DUNLQVRQ¶V GLVHDTVH. The review includes: three randomized control trials, and two within group repeated measures design. Overall, the results of the review provide suggestive evidence for the efficacy of LSVT in improving various aspects of speech and voice, in addition to vocal loudness, in individuals with PD. Implications for clinical practice and recommendations for future research are discussed.

## Introduction

3DUNLQVRQ¶V GLVHDTVH is a neurodegenerative disease affecting motor and non-motor functions of the brain (Choi, 2011). Approximately 7 million people in the world suffer from PD (Ramig, Fox & Sapir, 2008), and up to 90% of these individuals develop related speech and voice difficulties (Pahwa, Lyons & Kuller, 2007). These speech and voice problems include reduced vocal loudness, breathiness, monotone, reduced pitch inflection, hoarseness, imprecise articulation, reduced range of articulatory movements and voice tremor (Sapir, Spielman, Ramig, Story & Fox, 2007). Collectively, these speech characteristics which are grouped under hypokinetic dysarthria (Duffy, 2013), can significantly impact intelligibility. Reduced speech intelligibility can affect an individual effectively, thereby negatively impacting their social, psychological and economic well-being (Baumgartner, Sapir & Ramig, 2001). In fact, communication difficulties is reported by patients and their families (Fox, Morrison, Ramig & Sapir, 2002). To date, the Lee Silverman Voice Treatment (LSVT) is one of the most commonly used therapy

approaches for hypokinetic dysarthria in PD (Salvage, R. S., Langlois & Macdonald, 2015).

LSVT, an intensive voice treatment program was developed by Ramig and her colleagues in 1987. The program was created to improve vocal fold adduction and respiratory effort phonation and self-monitoring, the primary goal of LSVT is to increase vocal intensity in individuals with PD (Ramig, Sapir, Countryman, Pawlas, 2007).

For over a decade, Ramig and her colleagues have conducted numerous clinical efficacy studies to investigate the effects of LSVT on individuals with PD. These studies have reported short and long term effects of LSVT on increasing vocal intensity. However, a number of studies have also reported improvements in other aspects of speech and voice such as frequency (pitch), hoarseness and breathiness, articulation and overall speech intelligibility. These findings are not surprising considering the dynamic nature of the laryngeal mechanism and the interrelatedness of different dimensions of speech and voice. The purpose of this review is to critically

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evaluate the current literature on the effects of LSVT on speech and voice characteristics, other than vocal loudness, of individuals with

Randomized controlled designs

Sapir, Spielman, Ramig, Story and Fox (2007) evaluated the effects of LSVT on

Objectives

The primary objective of this review is to critically evaluate the existing literature regarding the effects of LSVT on speech and voice characteristics, other than vocal loudness. A secondary objective is to provide speech language pathologists, who are interested in LSVT as an intervention option, evidence based practice recommendations regarding LSVT as a speech and voice therapy tool to improve aspects of speech other than vocal loudness.

Methods

Search Strategy

Computerized databases, including PubMed, PsycINFO, CINAHL, Cochrane library, Google Scholar and the Western University library search engine were searched.

.H\ZRUGV LQFOXGHG > 3DUNLQVRQ¶V GLVHVDVH AND (LSVT) OR (Lee Silverman Voice Treatment) AND (articulation) AND (speech)]

Selection Criteria

The studies selected for inclusion in this critical review were required to investigate the effects of LSVT in improving speech and voice deficits, other than vocal loudness, were set on research design characteristics of research participants including, etiology of disease, time since diagnosis, stage, or the severity of the disease.

SDWLHQWV ZLWK 3DUNLQVRQ¶V GLVHVDVH 1R OLPLWV

Data Collection

Results of the literature search yielded the following types of studies: randomized control trials (3) and within group repeated measures design (2).



The strength of this study is found in its randomized control design and the use of appropriate statistical analysis. In addition, the interrater and intrarater reliability measures were performed for perceptual ratings and yielded adequate agreement between raters and between ratings of breathiness and hoarseness by the same rater ensuring reliable findings.

The most important limitation of this study is the unequal sample size. The RET group had approximately half the number of participants as the LSVT group. This unequal sample size, although acknowledged by the authors, could significantly impact the results. As the authors explain, the small sample group could have prevented the results from showing statistically significant effects in the RET group. Moreover, the perceptual data were collected during the UHG LQJ RI WKH 35DLQERZ 3DVVDJH' RQO\ Reading aloud tasks are not natural and not representative of how people normally communicate. Therefore, the improvements in breathiness and hoarseness should be assessed in more normal speaking situations. Overall, Sapir et al. (2007) provide Level 1 evidence demonstrating improvements in hoarseness and breathiness following LSVT.

5DPLJ &RXQWU\PDQ 3DZODV 2¶%ULHQ  
Hoehn and Thompson (2001) evaluated the short and long-term effects of LSVT compared with RET in individuals with PD. The study evaluated effects of LSVT on vocal loudness as well as fundamental frequency and its variability. Only data pertaining to frequency will be discussed.

Thirty-three participants with IPD were recruited for the study. Participants were stratified on variables of age, time since diagnosis, severity rating according to the scores RQ XQLILHG 3DUNLQVRQ¶V GLVHVDH UDWLQJ scale stage of disease, and clinical severity.



Statistical analyses, MANOVA, was completed to evaluate the effects of treatment (pre versus post) on vowel articulation and C-V coarticulation. The results yielded a statistically significant increase in acoustic vowel space and vowel duration post-treatment. Together, these results indicate improved vowel articulation post-treatment. Results also revealed a statistically significant overall improvement in C-V coarticulation. It should be noted, however, that for anticipatory coarticulation only statistically significant improvements for the /b/ and /g/ voiced consonants were noted. The researchers also studied the relationship between acoustic vowel space, vowel loudness, and duration. Sauvageau et al. concluded that improvements in vowel articulation post-treatment were directly related to vowel loudness and duration. The study reports that improvements in articulation post-treatment were also directly related to vowel loudness. No differences in post-treatment values were observed between immediately post-treatment recordings and at 1 and 2 month follow up. Overall, Sauvageau et al. concluded that LSVT is effective in improving vowel articulation and C-V coarticulation patterns for average and high anticipatory articulation contexts (/bV/ and /gV/, respect







d) Evaluate the effects of treatment in more natural speaking situations (i.e. conversations) and natural settings outside of the clinic.

#### Clinical Implications

This critical review provides support for the use of LSVT in improving articulation, vocal

Sauvageau, V.M., Roy, J.P., Langlois, M.,  
and Macoir, J. (2015) Impact of LSVT on  
vowel articulation and coarticulation in  
3 D U N L Q V R Q Q Mica G Linguistic H  
and Phonetics, 1-17.  
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