Expanding LSVT: Treating Acquired Dysarthria Following Pediatric Brain Injury

Jennifer P. Lundine & Katie Kubitskey

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Jennifer P. Lundine, MA, CCC-SLP, BC-ANCDS & Katie Kubitskey, BA

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Lee Silverman Voice Treatment (LSVT/LOUD): What is it?
• Originally designed & validated for individuals with hypokinetic dysarthria due to Parkinson’s Disease (PD)

• Therapy delivered intensively
  • 4 days per week for 4 weeks
  • Hour-long sessions
  • Specific homework and carryover activities

• Single treatment target = increase loudness
LSVT: Background & premises

- Intensive, single-target, high-effort exercise
- Taught across simple to complex, functionally relevant speech tasks
- Consistent with principles of exercise, motor learning & neuroplasticity literature
- Designed to change behavior to promote maintenance
  - Not simply stimulating a transient behavior
  - Establishing lasting changes in neurophysiologic, motor-speech & internal sensori-motor systems

(Fox et al., 2006)

Effects of LSVT on multiple systems

- An example
- What do you feel??

(Apparently serves as a "trigger for distributed system-wide effects across the speech production system" (Fox et al., 2006)

Beyond phonation, improvements have been noted in*
  - Articulation (transition duration, rate, extent)
  - Facial expression
  - Swallowing

*See Fox et al., 2006 for specific study citations)
LSVT in persons without PD

- Several published studies have shown successful application of LSVT to select individuals with the following diagnoses (& different types of dysarthria):
  - Cerebellar ataxia (Sapir et al., 2003)
  - Multiple Sclerosis (Sapir et al., 2001)
  - Stroke (Wanke et al., 2008)
  - Traumatic Brain Injury (Wanke et al., 2008)
  - Aging Voice (Ramig et al., 2001)
  - Cerebral Palsy (Fox & Boliek, 2012)
  - Down’s Syndrome (Ramig & Fox, 2010)

Our study: LSVT in pediatric ABI

1. Determine the impact of LSVT on loudness, rate and perceptual measures of speech & communicative ability for adolescents with Acquired Childhood Dysarthria (ACD) secondary to Acquired Brain Injury (ABI)
2. Determine the degree to which LSVT treatment effects are maintained 3-months after treatment for adolescents with ACD
3. Determine whether (trained v untrained) listeners prefer baseline, post-treatment or follow-up speech samples of participants

Acquired childhood dysarthria (ACD)

- Chronic condition associated with some acute change
- No specific evidence base for this disorder
- Assess and treat like adult dysarthria?
- Chronic ACD can have negative impacts on school performance and quality of life
Why might LSVT work in ACD?

- Single treatment target
- Simple therapeutic goal
- Particularly appropriate for younger persons & those with cognitive challenges following ABI

Methods: Inclusion criteria

- Over age 12
- Chronic ACD secondary to ABI
- At least 6 months post-injury

Assessments

- Perceptual, acoustic, quality-of-life measures during 3 assessment phases
  - Prior to treatment
  - Immediately post-treatment
  - 3-month follow-up
- Periodic probes during treatment (2 sessions per week)
Probe Sentences

- Randomly chosen from the Assessment of Intelligibility of Dysarthric Speech (AssIDS)
- Sentences of varying length
  - 2 each
  - 10, 11, 12, 13, 14 word sentences
- Record loudness (dB SPL) and rate (total seconds for 10 probe sentences)

Subject 1 (S01)
- 19-year-old male
- 3.5 years post-injury
- TBI
- Flaccid Dysarthria
- Fast rate, low volume, imprecise articulation

Subject 2 (S02)
- 13-year-old male
- 2 years post-injury
- Posterior fossa tumor resection
- Spastic-Flaccid-Ataxic Dysarthria
- Pitch breaks, monotone, slow rate, strained/strangled vocal quality
Results

- Loudness
- Rate

Results

- Self Perceptual Ratings
- Parent Perceptual Ratings

Naturalness – what is it?

- Speech variable affecting speaker’s conversational abilities
- Related factors (Templin et al., 2008, Dagenais et al., 1998, 1999)
  - Vocal intensity
  - Vocal stress
  - Pitch range
  - Rate of speech
  - Articulatory precision
  - Prosody
  - Intelligibility
Naturalness – why does it matter?

• Perceptual measure of speech affecting listeners’ reaction to speaker
• Naturalness correlated with speaking ability (Dagenais et al., 2006)
• Not traditionally targeted in most speech therapies

Methods re: listener sessions

• 2 speakers, 16 sentence pairs each
  • Sentences randomly chosen and paired from pretreatment, post-treatment, and follow-up sessions
  • 8 sentences rated for naturalness
  • 8 sentences rated for intelligibility
• 3 groups of listeners, ~20 each (Dagenais et al. 2006)
  • Experienced speech-language pathologists
  • Second-year graduate students
  • Naïve listeners

Why Three Groups?

• Social attitudes are under-examined contextual factor when assessing functioning and disability outcomes as laid out by ICF (Brunnegard et al., 2009)
  • “Ratings provided by professionals do not necessarily reflect the attitudes of the community with whom the impaired speakers normally associate” (Dagenais et al., 2008)
• Attitudes may be affected by training, experience with the population in question (Liss, 2007)
Listener Outcomes

- By group
- By subject

Implications

Conclusions

- Results from individual treatment sessions were not overwhelming
- Results from listener sessions
- Appropriate for further investigation
Limitations & Future Directions

- Extent of cognitive and behavioral impairment
- Time post-injury
- Limited insight/awareness into speech impairments

References


Please contact me with questions or comments

Jennifer Lundine
Nationwide Children's Hospital
Ph: 614.722.8633
Email: jennifer.lundine@nationwidechildrens.org