Efficacy of LSVT-Big™ for Gait Improvement in Patients with Parkinson's Disease

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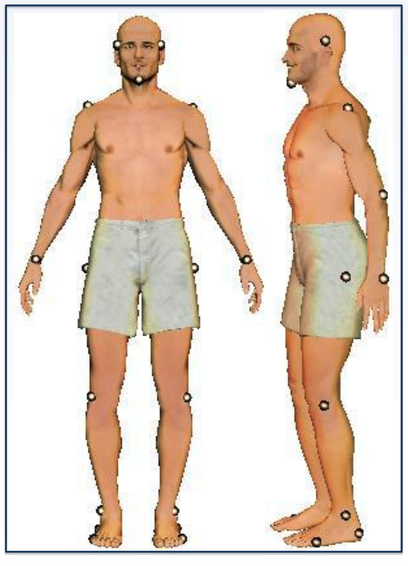
Introduction

People with Parkinson's Disease (PD) develop bradykinesia, postural instability, festinating gait, and freezing of gait. Movement difficulty increases with disease progression, decreasing patients' physical function and independence while putting them at increased risk for falls. One technique, Lee Silverman Voice Treatment, evolved into LSVT-Loud™. It is an accepted evidence-based treatment for bradykinesia of PD affecting speech.[1] The purpose of this study is to determine the efficacy of the sister technique, LSVT-Big™ to improve walking performance in PD beyond what is possible with verbal cueing alone. For most of us walking is largely a subconscious activity. The LSVT-Big™ protocol uses motor learning principles and concepts of neuroplasticity to help participants consciously control their walking to normalize stride length and walking speed, with the goal to regain automaticity.[2] Researchers and therapists continue to seek powerful treatments for gait difficulties in PD, to increase patients' physical function and independence while decreasing their risk for falls.

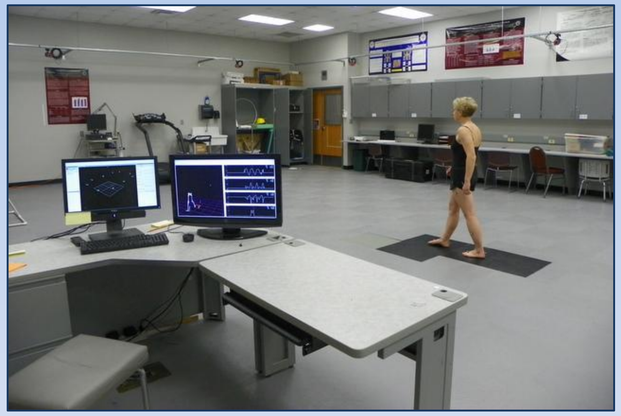
Methods

Participants were a convenience sample from Bon Secours Health System. This study used a within-subjects design with one pre-test, one post-test immediately following training, and a follow-up 8-12 weeks after training. Measures of walking performance included gait speed, stride length and step width. Patients were ON their regular medications.

Pretest, 1st condition: Walking 5-10 trials with any AD normally used
Pretest, 2nd condition: Walking 10-15 trials with verbal instructions
Posttest: Walking 10-15 trials without instruction
Follow-up: Walking 10-15 trials without instruction
We analyzed the average of the three best trials in each test.



Procedure



Six Hawk Digital Real Time cameras captured kinematic and kinetic data, analyzed using Cortex 1.3.675 software. Orthotrak software analyzed step length and step width, captured with two force plates from AMTI.

Results

This is a continuing study. One patient did not return for the posttest, and one patient did not perform the posttest before our deadline. This gave us data from two patients for discussion, displayed in the above table.
Participant 1 was in Hoehn and Yahr stage 3. Her baseline walking speed fell between dependence in ADLs and limited community ambulation. It seems that verbal cueing was detrimental to her performance. At posttest her gait speed approached that of independent community ambulation.[2] Although her gait speed declined somewhat at follow-up, it still showed an increase above baseline that is comparable to that found by Ramig, et al. Her step width at follow-up decreased markedly, indicating better dynamic stability in walking.[3]
Participant 3 was in Hoehn and Yahr stage 2. His results represent a confound because he was not taking prescribed medication at baseline.

Results Tables

Pretest	Walking Speed	Walking Speed with Instruct	Stride Length	Stride Length with Instruct	Step Width	Step Width with Instruct
Participant 1	64.4 cm/s	58.4 cm/s	88.2 cm	88.1 cm	11.9	12.3
Participant 3	113.5 cm/s	130 cm/s	133.9 cm	147 cm	11.5	14.1

Posttest	Walking Speed	Percent Change	Stride Length	Percent Change	Step Width	Percent Change
Participant 1	77.6 cm/s	+16.8%	97.3cm	+10.3%	10.3cm	-13.4%
Participant 3	103.4 cm/s	-8.9%	130.8cm	-2%	9.82cm	-14.6%

Follow Up	Walking Speed	% Change from Baseline	Stride Length	% Change from Baseline	Step Width	% Change from Baseline
Participant 1	73.6 cm/s	+10.8%	96.8 cm	+9.8%	8.3 cm	-30%

Walking speed age matched healthy norms: Participant 1 = 94.3 cm/s[4]
Walking speed age matched healthy norms: Participant 3 143.3 cm/s[4]

Conclusion

These results show that LSVT-Big™ effectively improved gait parameters in one of these patients and that the improvements were durable for at least three months after training.

Due to the small sample size and ongoing data collection we cannot yet generalize the effectiveness to an entire patient population. Future studies should include a larger sample size and a control group in order to demonstrate the effectiveness of LSVT-Big™ compared to other treatment plans, among patients varying more in age and stage of disease progression.

References

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This poster is adapted from 1) Adams K, Hodges K, Kirby J, Raisor A, Chong R. The effect of tactile sensory augmentation on postural orientation in Parkinson's disease located at http://www.gru.edu/alliedhealth/pt/documents/student-posters/2014/lighttouchpd.pdf