LSVT BIG

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LEARNING OBJECTIVES

Have an understanding of:
- What is LSVT BIG
- How LSVT BIG differs from traditional PD therapy approach
- Importance of skill acquisition and activity dependent neuroplasticity in rehabilitation
- How you can apply the principles of activity driven neuroplasticity in daily clinical practice to benefit PWP
WHAT IS LSVT BIG?

An intensive, whole body, amplitude-focused, evidenced-based treatment protocol for adults with Parkinson’s disease

LSVT Global, Inc
LSVT BIG BACKGROUND

Hypothesis-based/Parkinson’s specific
Derived from LSVT LOUD developed 1987

Neuroplasticity based
Forced exercise results in neuroprotective effects and improved motor function
Vigorous exercise may modify disease progression
Early exercise resulted in no behavioural impairment and attenuated dopamine loss
Identified fundamental principles of neuroplasticity
Identified key principles of exercise that can drive activity-dependent neuroplasticity

Research based
LSVT BIG developed 2010
Researched extensively
Based on the principles of activity dependent neuroplasticity
WHAT IS ACTIVITY (EXERCISE) DEPENDENT NEUROPLASTICITY?

“Modifications within the central nervous system in response to physical activity that promotes a skill acquisition process. As such; intensity, specificity, difficulty and complexity of practice appear to be the important parameters for driving neuroplasticity and potential lasting effect on both brain and behavior”

Enhancing neuroplasticity in the basal ganglia: The role of exercise in PD
Giselle et al. Mov Disord, 2010; 25(01); S141-S145
SKILL ACQUISITION & MOTOR LEARNING

3 stages:

Cognitive stage
developing an understanding of the skill

Associative Stage
learner demonstrates more refined movement through practice

Autonomous stage
The motor skill is mostly automatic
= skill acquisition
**FORCED AEROBIC EXERCISE & SKILLED ACQUISITION TRAINING- LSVT BIG**

**The Berlin LSVT BIG Study**
1:1 LSVT BIG (BIG) vs group nordic walk training (WALK) vs non-supervised exercises (HOME).
- 60 pts mild-mod PD randomly assigned to a group
- significant differences in UPDRs final score.
- superior to both groups
- significant improvement in TUG, UPDRS, and 10MWT
- spread of effects
- LSVT maintained at 16wks
- effective technique to improve motor performance in PD

Ebersbach et al. Movement Disord (2010)

**2nd study same cohorts- impact of LSVT BIG on reaction time**
- supervised movement therapy ↑ cognitive aspects of exercise
- ↑ readiness to go
- Improved cued reaction time

**LSVT BIG vs traditional outpatient physical therapy**
- achieved bigger, faster steps
- ↑ velocity when walking
- results maintained 3 months post program

Farley & Koshland (2013)

Randomised Comparative Pilot Study
Unpublished data
LSVT BIG BENEFITS NON MOTOR SYMPTOMS OF PD

statistically significant improvements in:
- UPDRS
- Beck Depression Inventory
- Modified Fatigue Impact Scale

Exercise also benefited the control non PD group

Dashtipour et al. (2015)
For PWP to Improve

Neuroplasticity
- Use it or lose it
- Use it and Improve it
- Specificity
- Repetition matters
- Intensity matters
- Time matters
- Salience matters
- Age matters
- Generalisation matters

Activity dependent neuroplasticity
- Intensity/forced effort
- specificity
- difficulty
- complexity of practice

**Barriers** - Mood, cognition, lack of carer support, transport, age, apathy and disease severity

Inactivity produces degeneration generally PWP least active at diagnosis
## Traditional PD Therapy vs LSVT BIG

<table>
<thead>
<tr>
<th>Traditional</th>
<th>LSVT BIG</th>
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<tbody>
<tr>
<td>Low to medium intensity</td>
<td><strong>High intensity</strong> &amp; high effort</td>
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<tr>
<td>Compensatory focused</td>
<td><strong>Specificity</strong>-1 treatment target of amplitude across motor systems</td>
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<tr>
<td>No treatments of sensory impairments</td>
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<tr>
<td>Avoid multitasking during ADLs</td>
<td><strong>Difficulty</strong>-dual task train</td>
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<td>Using cues to initiate and maintain movements</td>
<td>Relearn a new internal cue for amplitude scaling</td>
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<td>Divide complex movements into a series of simpler components of the overall task; execute sequentially</td>
<td><strong>Complexity</strong>-do not break down tasks</td>
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<td><strong>Calibrate</strong> effort into all occupations for longer lasting effects (&amp; not just during exercise)</td>
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Van der Mark et al. Parkinsonism & related disorders (2009)
LSVT BIG PARADIGM SHIFTS

TARGET AMPLITUDE WHY?
“the largest range of motion that can be performed with the highest effort with the most maximally efficient biomechanics every trial/every day” not random BIG but normal healthy movements

MODE = INTENSIVE AND HIGH EFFORT WHY?
Intensive effort is needed to override bradykinesia and hypokinesia
Increases muscle activation
Arouses the sensorimotor system- kinesthetic and proprioceptive change

SENSORY CALIBRATION= GENERALISATION WHY?
PWP learns and accepts the amount of effort needed to consistently produce bigger movements
PWP learns the relationship between increased movement effort and established movement output
PWP learns how to generalize/carry over this effort into everyday occupations
If you don’t feel like you are moving
“Too BIG”
You are not moving BIG enough!
**Intensity: Standardised**

**Dosage with Therapist:**
1:1
4 consecutive days a week for 4 weeks
16 sessions in one month

**Dosage for PWP:**
2 sessions 7 consecutive days a week for 4 weeks
30 sessions

**Repetitions:**
minimum 8-16 repetitions each exercise
Minimum 5 repetitions each functional component

**Effort:**
push for maximum patient-perceived effort each day
Aim for 8-9 on a scale of 1-10 with 10 being the max
PROTOCOL-LSVT BIG TREATMENT SESSION*

Maximal daily exercises
1. Floor to ceiling 8 reps
2. Side to side-8 reps each side
3. Forward step-8 reps each side
4. Sideways step-8 reps per side
5. Backward step-8 reps per side
6. Sideways step- 8 reps per side

Also seated and supine variations available

Functional Component tasks; x 5 reps
- dressing i.e. buttoning
-transferring i.e. low chair
-work tasks i.e. typing
-writing i.e. signature
-cooking i.e. moving/turning

Walking BIG
-Distance and time may vary

Hierarchy tasks i.e.
-Go to the cinema
-Dress independently top and lower half

Build complexity over 4 weeks

Carryover tasks

* Disclaimer: LSVT BIG protocol should only be delivered by a certified OT or Physio. LSVT Global, Inc
Case Study Mr D

- 73 year old male
- Idiopathic Parkinson’s disease diagnosed 2008
- Hoehn and Yahr scale stage 2
- Mild bradykinesia and dystonia left UL and LL
- Kinson 100/25mg 1&1/2 tabs QID
- Lives with wife, no services
- Independent mobility no aids
- 2 x falls tripping up over kerb-reduced clearance left foot
- Independent with shower, drying and grooming
- Requiring frequent assistance with putting shirts/jackets, fastening buttons and zips
**Mr D’S Goals**

**Functional Components**
- BIG walk
- Sit to stand
- Handwriting
- Getting coins out of his wallet
- Rolling in bed
- Getting a long sleeve top on and off

**Hierarchy Task**
Being able to get up from a chair, walk to the toilet and be able to unfasten his trousers and adjust underwear in time
MR D’S CARRYOVER TASKS

- Big walk
- Sit to stand
- Handwriting
- Getting coins out of his wallet
- Rolling in bed
- Getting a long sleeve top on and off

- Walk to the shops every day
- Stand up from chair in restaurant
- Write card for wife + shopping list
- Pay for morning newspaper
- Roll over in bed and manage to adjust the covers
- Dress independently
Exercise 1
Floor to Ceiling

Maximum sustained movements - seated

Purpose:
Re-train effort needed for sustained activation
Maximal sustained movement-seated

Exercise 2
Side to Side
Multidirectional Repetitive Movements

Exercise 3
Forward step

Purpose:
Completeness (start/stop)
Changing direction
Endurance balance
Strengthening
Multidirectional Repetitive Movements

Exercise 4
Sideways step
Multidirectional Repetitive Movements

Exercise 5
Stepback
Multidirectional Repetitive Movements

Exercise 6
Forward rock and reach
Multidirectional Repetitive Movements

Exercise 7
Sideways rock and reach
Functional Component

Sit to stand
BIG Walk
Walking with obstacles
## Outcome Measures

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<tr>
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<th>Pre LSVT BIG</th>
<th>Post LSVT BIG</th>
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<tbody>
<tr>
<td><strong>Kinson 10:00 test at 11.30</strong></td>
<td></td>
<td></td>
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<tr>
<td>MOCA:</td>
<td>26/30</td>
<td>27/30</td>
</tr>
<tr>
<td>UPDRS:</td>
<td>48</td>
<td>22</td>
</tr>
<tr>
<td>BERG:</td>
<td>51/56</td>
<td>56/56</td>
</tr>
<tr>
<td>TUG:</td>
<td>6.94 secs</td>
<td>6 secs</td>
</tr>
<tr>
<td>STS:</td>
<td>1.53 +arms</td>
<td>1.02 -arms</td>
</tr>
<tr>
<td>Sup to stand:</td>
<td>6.04</td>
<td>3.70</td>
</tr>
<tr>
<td>Sup to side:</td>
<td>2.81</td>
<td>2.79</td>
</tr>
<tr>
<td>6MinWT:</td>
<td>535 metres</td>
<td>640 metres</td>
</tr>
<tr>
<td>10MWT:</td>
<td>14 steps/6.56 secs</td>
<td>14 steps/6 secs</td>
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Pre LSVT BIG: Kinson 10:00 test at 11.30
Post LSVT BIG: Kinson 10:00 test at 11.30
Drawbacks of LSVT

- copyrighted program delivered by certified OT’s and Physios- can’t use “principles”, “based on” LSVT
- 1:1, no group format available as yet
- 2 day intensive course or 18 hour online training
- Access- 3 certified therapists in WA
- Cost- 1 public site, labour intensive impact on ABF
- Intensive for PWP- currently focusing on high level patients with own transport and can manage twice daily sessions

How can we make sure all PWP regardless of disease severity can benefit from activity?
**FORCED AEROBIC EXERCISE**

**High cadence cycling**
Forced vs voluntary group
- Forced cycled 30% ↑ effort (approx. 75-85 rpm)
- Aerobic fitness improved for both groups.
- Only forced group showed improvements in motor performance UPDRS & bimanual dexterity test

Ridgel et al. Front Neurol (2015)

**Treadmill Training for PD Cochrane review**
- Improved gait speed and stride length

Mehrholz et al. 2015.

**Recumbent stationary cycling**
Healthy controls vs 19 early PD supervised, high intensity (3 times/week/12 wks/40mins)
- fMRI ↑ functional activity in the hippocampus, striatum and cerebellum which correlated with actual functional improvements.

Duchesne et al. 2016.

**PD Warrior** - group program based on the extensive research in exercise that is readily available
- Delivered by certified OTs and Physio’s
**FORMALISED PATTERN TRAINING**

**Tai chi**

Tai Chi vs resistance training vs stretching for effects on postural stability
(60 mins/2times/week/24wks)
- Tai Chi consistently better
- Lower incidence of falls
- Stride length and functional reach.


**Therapeutic Dancing**

Lit review of 15 RCTs
- Safe/feasible for mild to moderately severe PD
- Benefits include; improved walking, freezing of gait and improved quality of life


Systematic review on effects of exercise on cognition in PD
- Forced aerobic, resistance and dance improves cognition in PD
- Especially executive function in PD

Murray et al.
MODE OF DELIVERY

Comparison of:
1:1 Group
HEP

Results
- Only 1:1 significantly improved
- HEP least effective

WHAT HAVE WE LEARNED FROM RESEARCH

Active PWP vs Inactive PWP

- Less incidence of falls
- Improved mobility
- Better cognition
- Improved motor symptoms
- Improved non motor outcomes
- Improved occupational performance
- Improved Quality of life and Social Inclusion

It’s a no-brainer to focus therapy on activity
CLINICAL APPLICATIONS

Promote early intervention to maximise neuroprotective benefit
Team focus on activity
Apply activity principles of activity dependent neuroplasticity in all therapy
Empower the PWP with knowledge on how exercise and activity may help them take back some control of their symptoms
Identify barriers and assist them to overcome
Individually customize your rehabilitation to meet PWP needs – regardless of disease severity
PWP can learn how to internally adjust their movements with appropriate force
PWP can learn to override hypokinesia and bradykinesia
Ensure whatever you do has carry over into everyday occupations for longer lasting benefit
REFERENCES

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