MICHIGAN STATE UNIVERSITY

Parkinson's Disease Update: Communication Changes and Interventions

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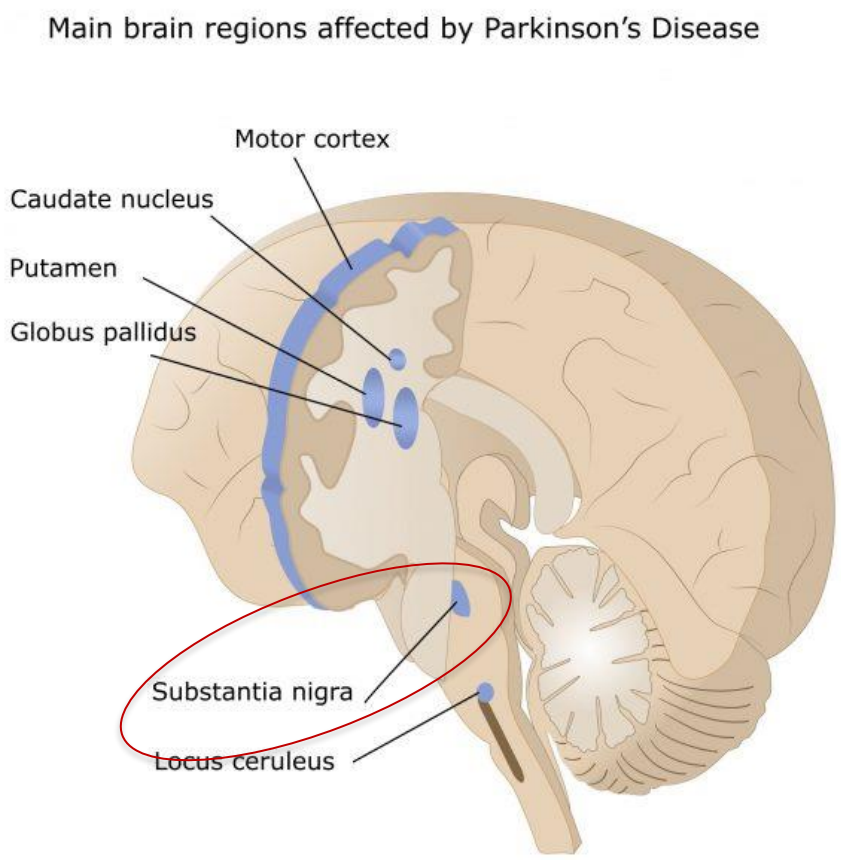
Outline

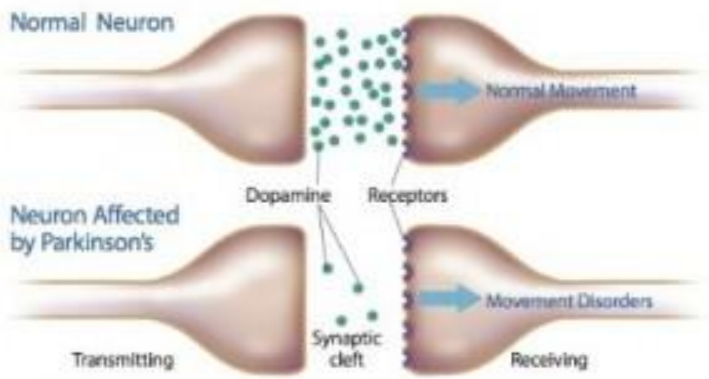
1. Aim 1: Brief review of PD & Communication Changes

2. Aim 2: Tx Approaches (beyond LSVT)

Parkinson's Disease: What is it?



Primarily a dopamine issue



Plus…

- Nerves producing norepinephrine – sympathetic nervous system
- Lewy bodies

Overview of Parkinson's Disease

By The Numbers

- Point Prevalence (existing):
  - 1 million USA
  - 10 million World
- Annual Incidence (new): 60K USA
- Direct+Indirect cost: $25 billion in the USA
  - Medication
  - Surgery
  - Therapies
  - care

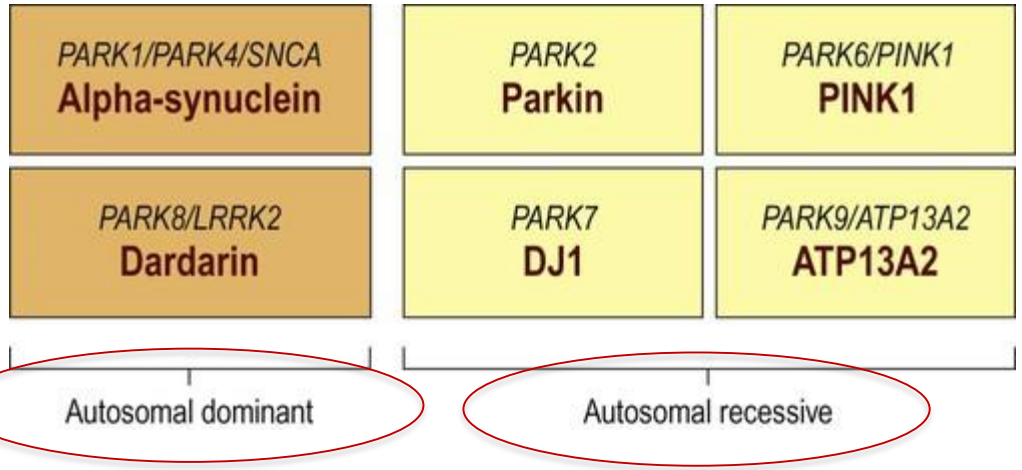
Overview: Etiology

unknown, presumed multifactorial

Genes
+ Environment
+ Lifestyle
+ Time +…

Genetic

- Familial PD (10%-15%)



Risk Factor modifiers – GBA

- Sporadic gene mutations (85%-90%)

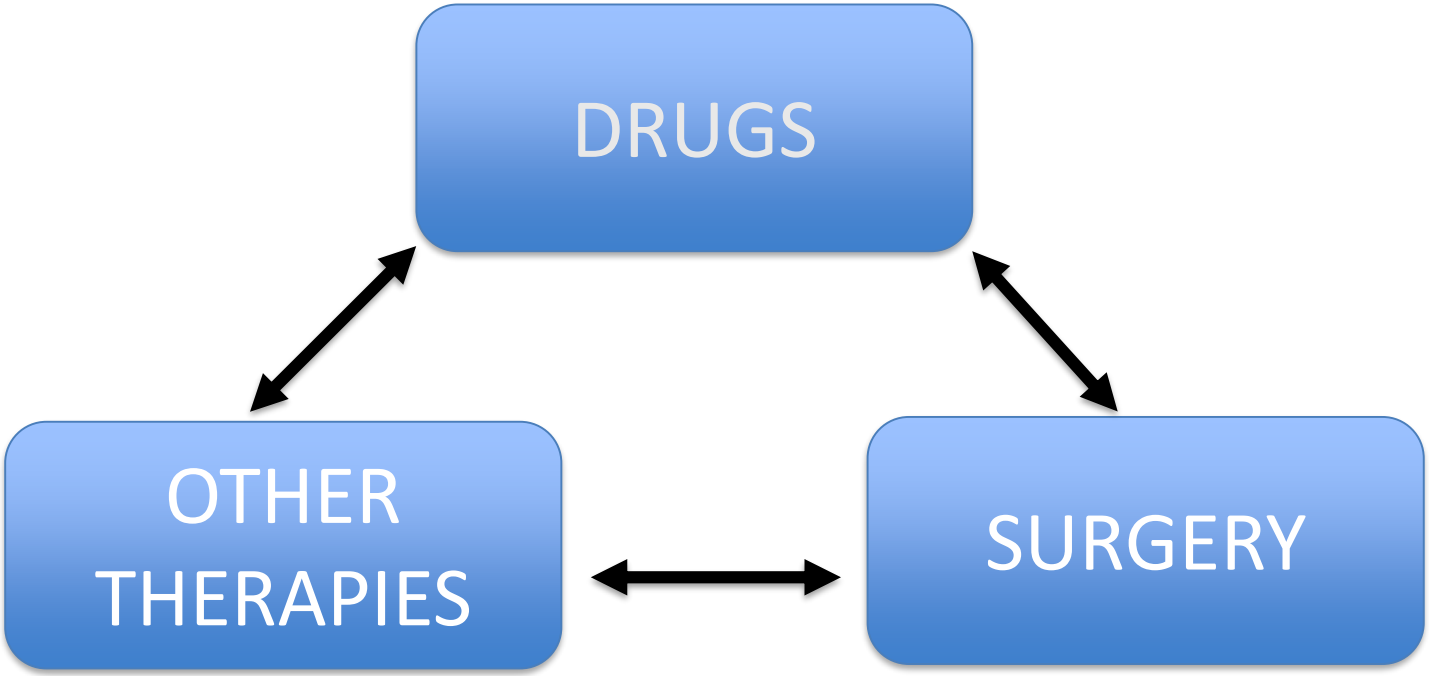
Overview: Etiology

<u>Environment</u> – Risks

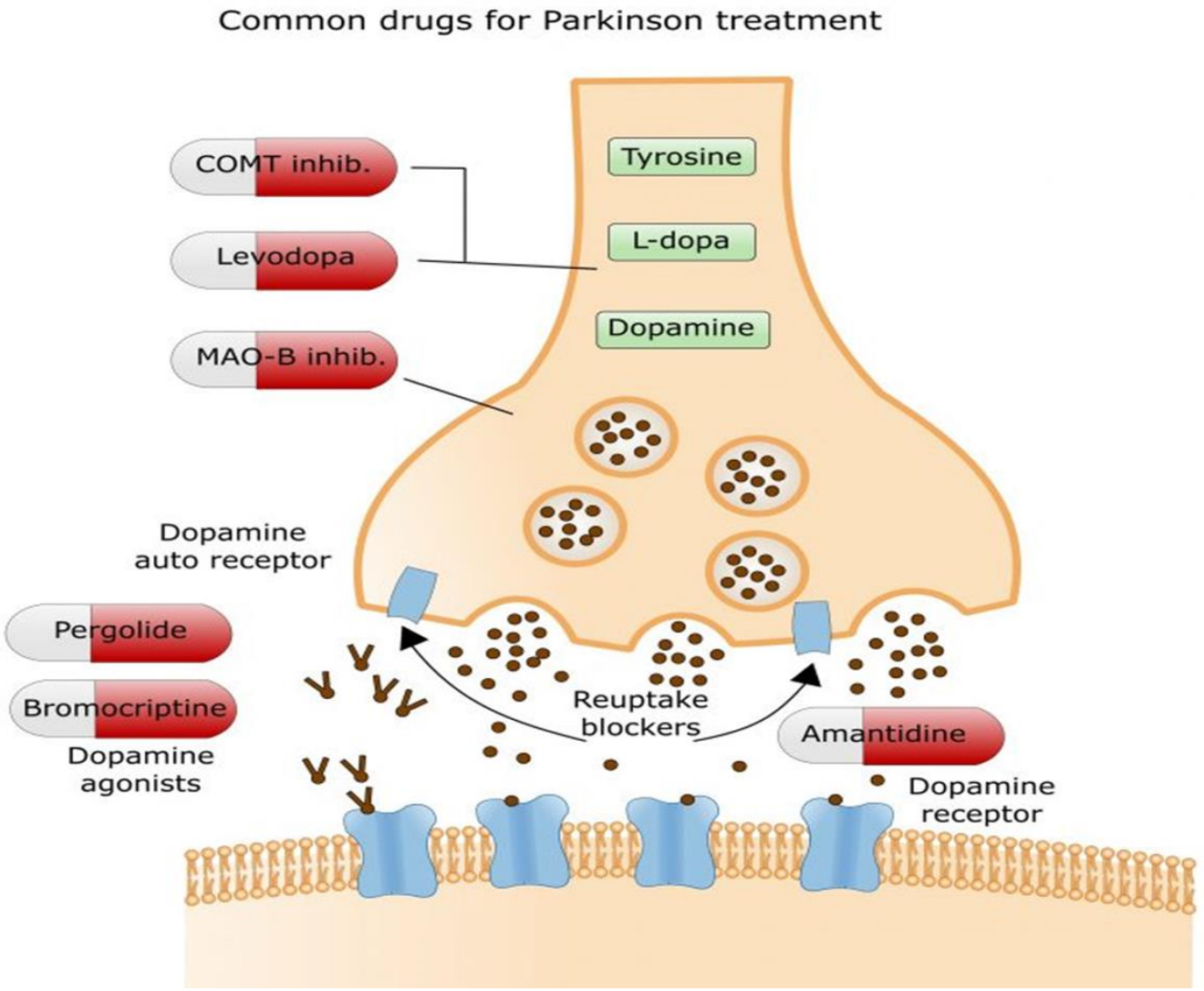
<u>EXPOSURES</u>
Pesticide**
Herbicide/Agent Orange
Metals
Solvents, Polychlorinated Biphenyls

?

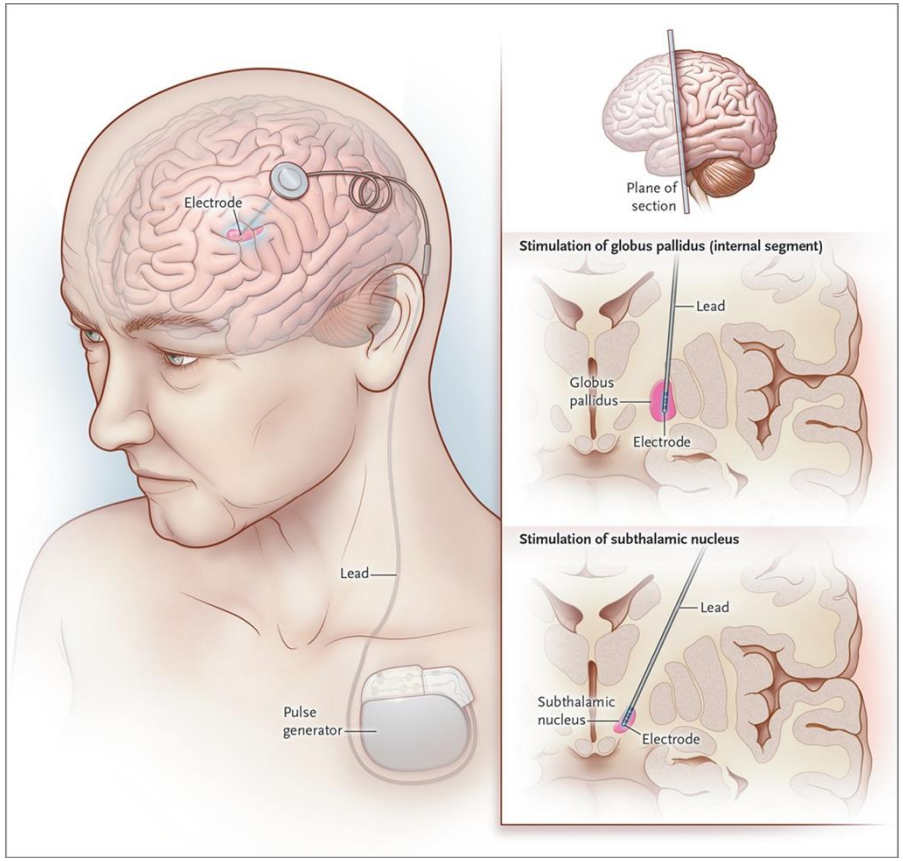
Treatment of PD



Drugs


Common drugs for Parkinson treatment
COMT inhib.
Levodopa
MAO-B inhib.
Tyrosine
L-dopa
Dopamine
Dopamine
auto receptor
Pergolide
Bromocriptine
Dopamine
agonists
Reuptake
blockers
Amantidine
Dopamine
receptor

Deep Brain Stimulation

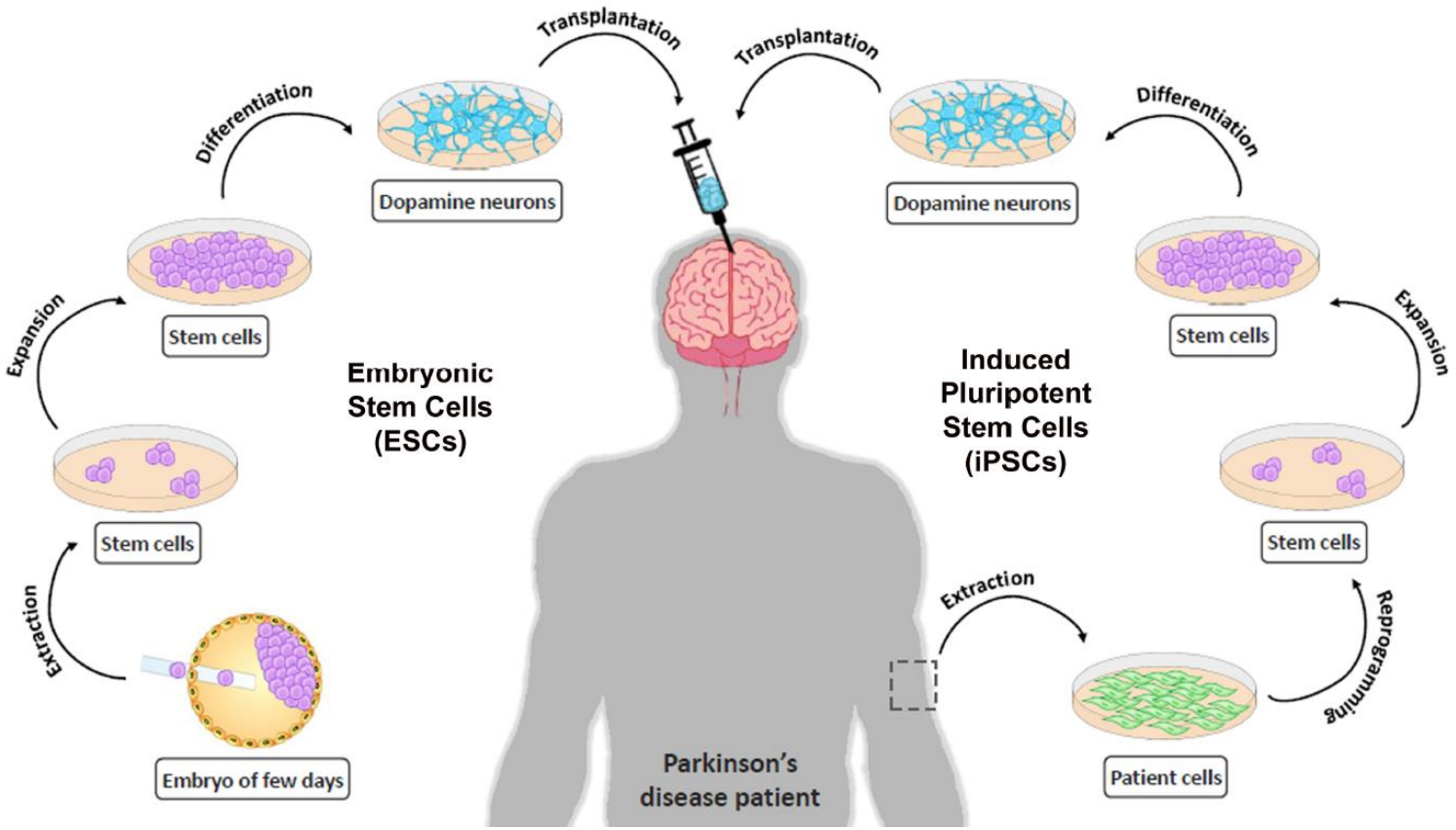


Nature. 2017 Aug 30;548(7669):592-596. doi: 10.1038/nature23664.

Human iPS cell-derived dopaminergic neurons function in a primate Parkinson's disease model.

Kikuchi T[1], Morizane A[1], Doi D[1], Magotani H[1], Onoe H[2], Hayashi T[2], Mizuma H[2], Takara S[2], Takahashi R[3], Inoue H[4], Morita S[5], Yamamoto M[5], Okita K[6], Nakagawa M[6], Parmar M[7], Takahashi J[1,8].

People Ask



https://parkinsontrial.ninds.nih.gov/

Diagnosis

- No specific test
- Combination of
  - History
  - Clinical exam for signs & symptoms
  - Variety of tests to rule out other possibilities

Diagnosis: Movement Disorder Society

Certainty Levels

- Clinically Established PD
- Clinically Probable PD

Two Stage Process

- Diagnosis Parkinsonism 1st
- Then look for Parkinson's disease

Parkinsonism

Bradykinesia

nice explanation of all 3 and distinction of PPS and PD

gait related; tremor,too

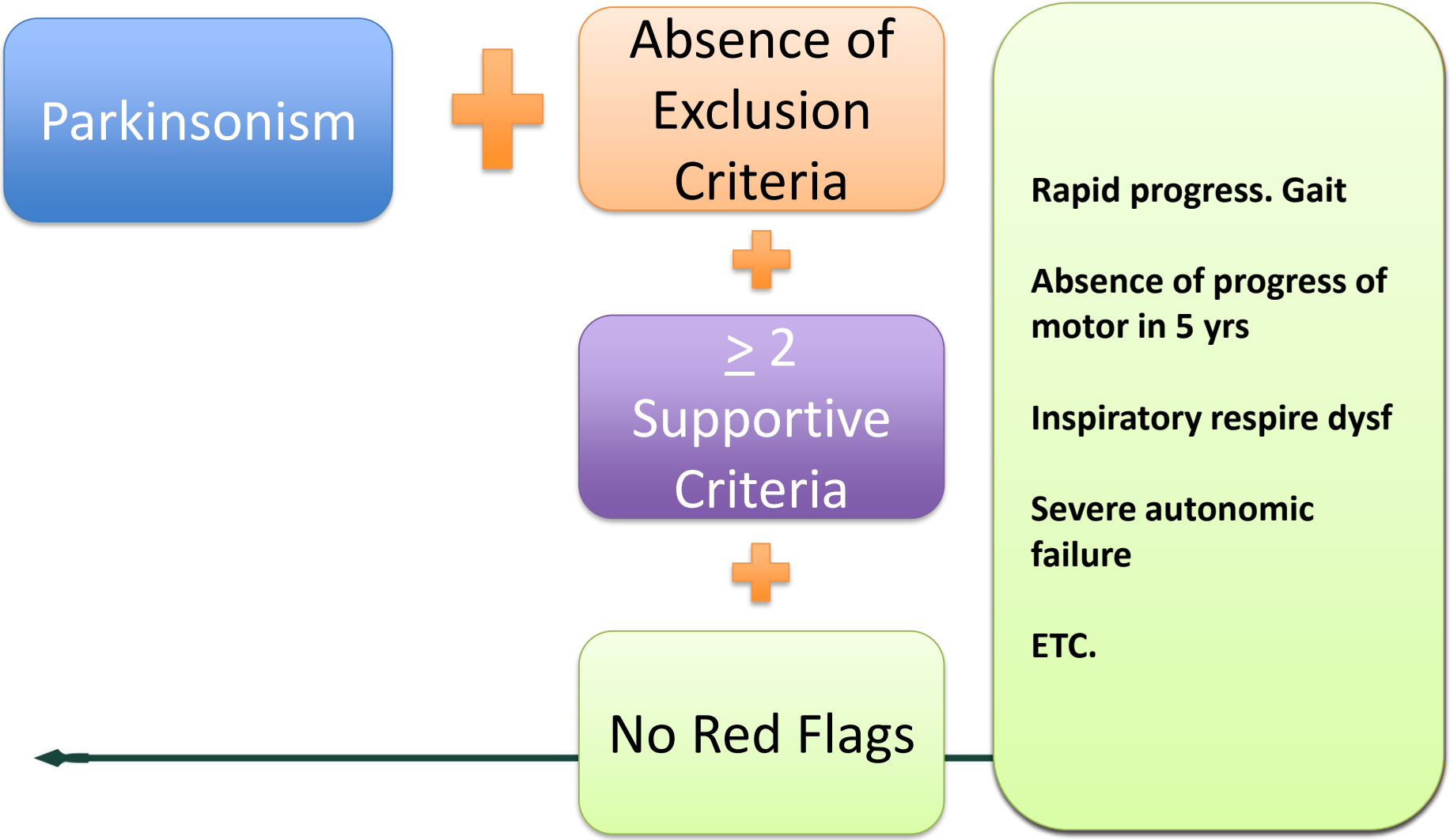
rigidity

Rigidity

AND/OR

Rest Tremor

Parkinson's disease [clinically est.]



Motor and Non-motor Symptoms

Motor

- Bradykinesia (77%-98%)
- Rigidity (89%-99%)
- Tremor (79%-90%)
- Postural instability (37%)

Non-Motor

- Dementia
- Depression
- Psychosis
- Autonomic dysfunction
- Oculomotor abnormality
- Olfactory changes

Communication Changes in PwPD

- ~90% report changes (Miller, 2017)

- Several areas potentially impacted
  - Voice
  - Resonance
  - Articulation
  - Prosody
  - Language

Communication Changes in PwPD: VOICE

- Decreased loudness (Ramig, et al, 2001)
- Decreased respiratory support (Mehanna & Jankovic, 2010)
- Hoarse-breathy vocal quality (Miller, 2017)
- Vocal tremor (Gillivan-Murphy et al., 2018)

Communication Changes in PwPD: ARTICULATION & RESONANCE

- Reduced articulatory precision
  - Vowels
  - Consonants
- Reduced intelligibility
- Resonance: hyper

(e.g., Bunton & Weismer, 2001; McAuliffe et al., 2006; Tykalova, et al., 2017)

Communication Changes in PwPD: Prosody

- Pitch and intonation changes; monopitch, monoloudness (Ma et al., 2010; Lowit & Kuschmann, 2012)
- Rate of speech – slower, faster (Hlavnicka et al., 2017; Kim et al., 2011; Lowit, et al., 2010)
- Pauses – number of, duration greater (Harel et al., 2004; Rosen et al., 2006)
- Imitating and processing of rhythmic models (Spath et al., 2016; Grahn & Brett, 2009)

All combined

Hypokinetic Dysarthria

Monologues

Grandfather Passage

What we know can work

LSVT – loudness, dB SPL increase; other positive changes

- Gains out to 2 years, but decreases the further away from the end of Tx
- LSVT challenges to even broader implementation
  - How many LSVT certified clinicians use it regularly?
  - Application outside the hands of experts, within other clinics
- From pt perspective LSVT may be less than what they want or need

Key Issues Prompting Search Beyond Standard LSVT

- Decay in outcomes post treatment
- Barriers to implementing intense treatment
- More expansive consideration of patient experience and goals

Decay of results – recognized need for follow ups beyond the four weeks

	Ramig et al., 2001	Gustafsson et al., 2018		Wright & Miller, 2015			
	Mono (lab)	Mono (lab)	Ambulat (life)	Mono (lab)	VHI	Intell	Partic
Immediate post LSVT	4.7	5.6	4.1	8.5	sig	sig	sig
1 yr post		3.8	1.4	3.4	sig	ns	ns
2 yr post	2.3			3.5	ns	ns	ns

Barriers for some patients and clinicians

Some people can't or won't complete LSVT

Sackley et al. Pilot and Feasibility Studies (2018) 4:30
DOI 10.1186/s40814-017-0222-z

Pilot and Feasibility Studies

RESEARCH Open Access

Lee Silverman Voice Treatment versus standard speech and language therapy versus control in Parkinson's disease: a pilot randomised controlled trial (PD COMM pilot)

Catherine M. Sackley[1], Christina H. Smith[2], Caroline E. Rick[3], Marian C. Brady[4], Natalie Ives[3], Smitaa Patel[3], Rebecca Woolley[3], Francis Dowling[3], Ramilla Patel[5], Helen Roberts[6], Sue Jowett[7], Keith Wheatley[8], Debbie Kelly[9], Gina Sands[11], Carl E. Clarke[7,10*] and on behalf of the PD COMM Pilot Collaborative Group

- 73% randomized to LSVT completed it (22/30) – intensity and time commitment cited
- Other items of interest
  - VHI & vocal loudness correl = -.16
  - VRQoL & loudness = -.12
  - When querried: "what's more important: loudness or ability to communicate?'
    - Prefer broader consideration
    - Recognized stress, dry mouth as impacts

Barriers

Neurology. 2017 Sep 12;89(11):1162-1169. doi: 10.1212/WNL.0000000000004355. Epub 2017 Aug 23.

Utilization of rehabilitation therapy services in Parkinson disease in the United States.

Fullard ME[1], Thibault DP[2], Hill A[2], Fox J[2], Bhatti DE[2], Burack MA[2], Dahodwala N[2], Haberfeld E[2], Kern DS[2], Klepitskava OS[2], Urrea-Mendoza E[2], Myers P[2], Nutt J[2], Rafferty MR[2], Schwalb JM[2], Shulman LM[2], Willis AW[2]; Parkinson Study Group Healthcare Outcomes and Disparities Working Group.

- 172,634 Medicare beneficiaries w/PD
- Followed over 2 yrs

Findings

1. SLP Tx: 14.6%
2. Lowest SLP Tx: African American @ 8.2%
3. Men>women for SLP Tx utilization rate

Did not ask “why” questions

Barriers

LSVT Folks recognize issues

Feasible delivery of intensive speech treatment: Telepractice and LSVT® Companion™.

Fox C, Ramig L, Halpern A. 2011 Convention of ASHA, San Diego, CA

" We realize that effective, intensive speech treatment LSVT® LOUD is not accessible to the majority of people with Parkinson disease (PD)

- Geographic barriers
- Financial constraints
- Inadequate numbers of speech clinicians all limit utilization"
- Clinician time

Their contextualization of the time/# problem

1 SLP: 7 PwPD for LSVT in 1 month x 12 months = 84 PxPD in year

Barriers

The Kansas Experience:
2007 (might be different now)

AIMS

1. Desribe LSVT service delivery in rural state

2. ID potential barriers

- N= 36 SLP with LSVT certif. listed
- N=29 responded to survey (81%)

Results: #s

1. n= 40 PwPD for LSVT/past yr
2. 1.4 PwPD, on average, per SLP
3. N=21 SLPs saw 0 in past yr; n=11 of these saw >1 PwPD for loud-focused, non-LSVT TX
4. 3 SLPs accounted for 63% of all PwPD seen for LSVT in the state (25/40)

The Kansas Experience:
2007 (might be different now)

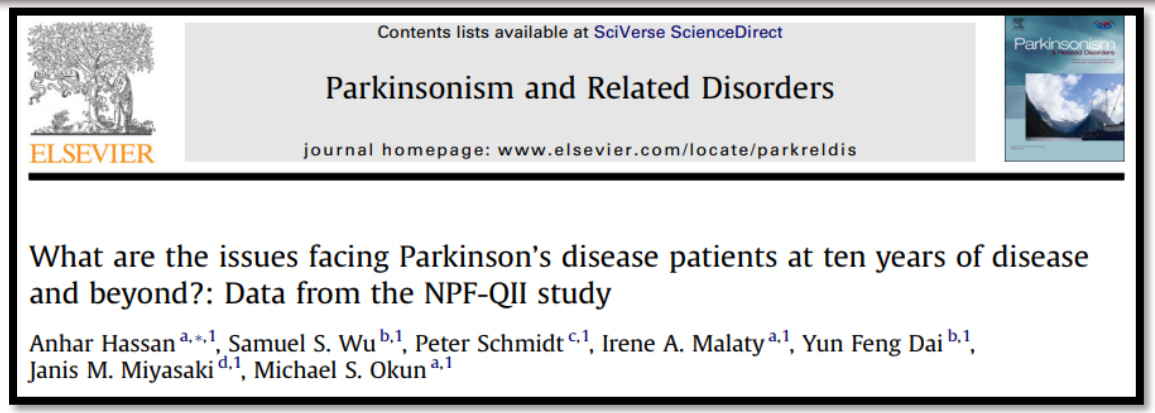
Results: barriers

1. Scheduling issues (intensity) prevented more use of LSVT = 13 SLPs (44%)

2. Patient transportation = 7 SLPs (24%)

3. Others listed:
    1. Pt. motivation
    2. Small PD caseload overall
    3. Reimbursement issues

18 SLPs (62%) reported they wanted to do more LSVT than they currently were doing.



Contents lists available at SciVerse ScienceDirect

Parkinsonism and Related Disorders

journal homepage: www.elsevier.com/locate/parkreldis

What are the issues facing Parkinson's disease patients at ten years of disease and beyond?: Data from the NPF-QII study

Anhar Hassan [a,*,1], Samuel S. Wu [b,1], Peter Schmidt [c,1], Irene A. Malaty [a,1], Yun Feng Dai [b,1], Janis M. Miyasaki [d,1], Michael S. Okun [a,1]

- N = 1835 pwPD
- All at ≥ 10yrs post Dx

"Due to having PD, how often during the last month have you …

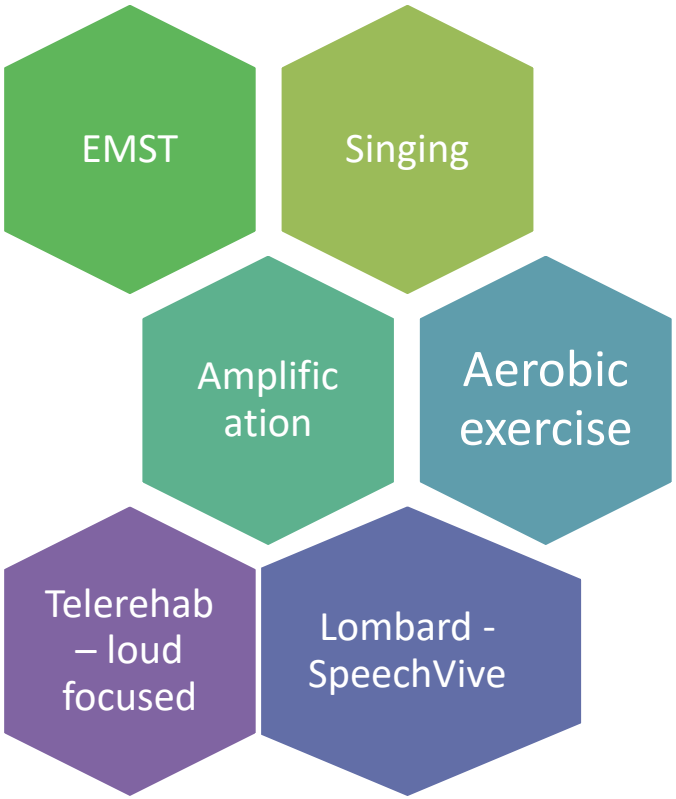
#34. …had difficulty with your speech?"

#35. …felt unable to communicate with people properly.

#36…. Felt ignored by people.

- SLP Tx: 15.4%
- PDQ-39 Communication: remains a persistent problem

Prompting continued searching in addition to LSVT



What's showing up in the literature?

- Telerehabilitation
- Singing
- SPEAK OUT!®
- EMST
- Lombard – SpeechVive
- Self-management

Telerehabilitation: around for a while now

- LSVT eLOUD
  - Fox et al., 2011 (ASHA presentation)
  - LSVT eLOUD certification = additional training
- Initial feasibility studies:
  - Theodoros et al. (2006):n =10; pre-post; sig improve
  - Tindall et al. (2008): n=24; pre-post; sig improve
  - Howell et al. (2009): n=3; pre-post; “broadly similar treatment gains”

On-line was not inferior to LSVT

Telerehabilitation: Non inferiority studies

Int J Lang Commun Disord. 2011 Jan-Feb;46(1):1-16. doi: 10.3109/13682822.2010.484848.

Treating disordered speech and voice in Parkinson's disease online: a randomized controlled non-inferiority trial.

Constantinescu G[1], Theodoros D, Russell T, Ward E, Wilson S, Wootton R.

N= 34 PwPD; mild-mod
Non-inferiority based on acoustic (SPL, mpt, max F0 range; perceptual = R, B, artic precision, ASSIDS)

Am J Speech Lang Pathol. 2016 May 1;25(2):214-32. doi: 10.1044/2015_AJSLP-15-0005.

Clinical and Quality of Life Outcomes of Speech Treatment for Parkinson's Disease Delivered to the Home Via Telerehabilitation: A Noninferiority Randomized Controlled Trial.

Theodoros DG, Hill AJ, Russell TG.

N= 31 metro area randomized to online vs. ftf
N= 21 non metro into online
Non-inferiority based on acoustic, perceptual, QOL

Telerehabilitation: others

- Everyone seems on board at this point
- Still no large scale studies

Codas. 2016 Apr;28(2):176-81. doi: 10.1590/2317-1782/20162015161.

Voice telerehabilitation in Parkinson's disease.

[Article in English, Portuguese]
Dias AE[1], Limongi JC[1], Barbosa ER[1], Hsing WT[1].

N=22
LSVT-X with Tele delivery
Improved GRBAS
Positive feedback

J Telemed Telecare. 2017 Jan 1:1357633X17691865. doi: 10.1177/1357633X17691865. [Epub ahead of print]

The effectiveness of Lee Silverman Voice Treatment therapy issued interactively through an iPad device: a non-inferiority study.

Griffin M[1], Bentley J[2], Shanks J[1], Wood C[3].

Singing – why?

- Conceptually
  - Connectedness: self, music, others
  - Flow: singing increases sensitivity to rhythm
  - Improves motor

(Beutow et al., 2014)

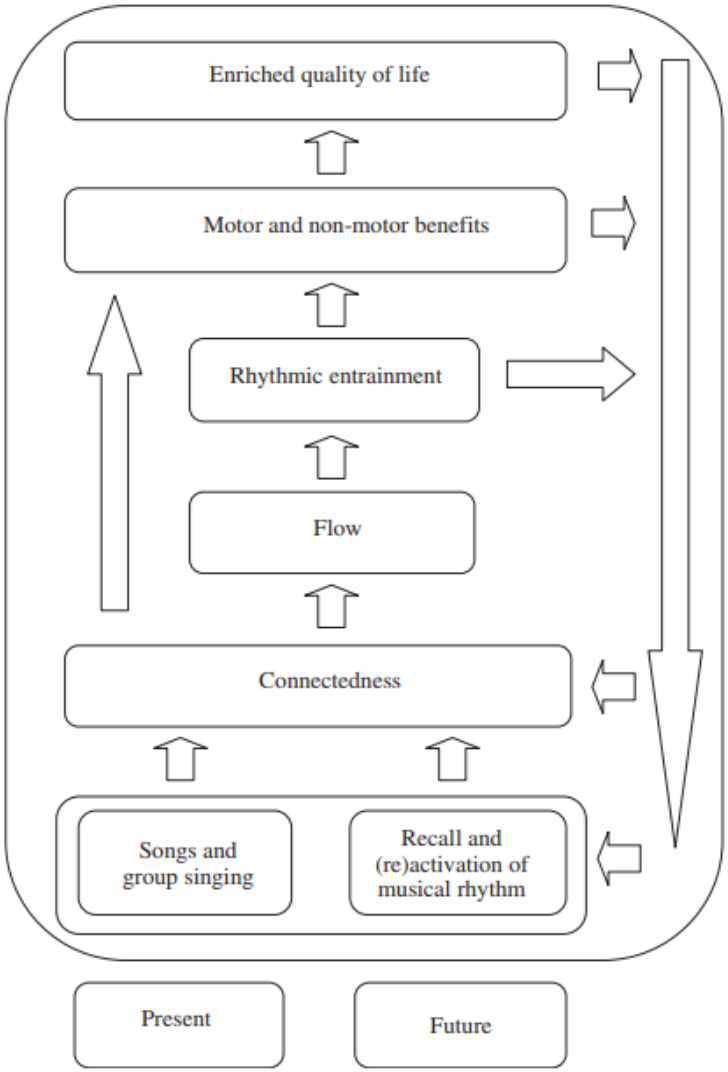


Figure 1. A conceptual model of how group singing may enrich the quality of life of people with movement disorders such as Parkinson's disease.

Singing – why else?

- Move beyond ‘impairment’ focus
- Increased respiratory control and strength generally needed
- QOL, well being often increase in healthy pops
- Social isolation
- Complementary to other SLP treatments?

Singing – outcomes in PwP
mixed results

SING-PD study

(Shih et al., 2012)

- 15 PwPD with speech/voice complaint
- Voice analysis: entry, 1- and 12-weeks post Tx
- 90 minute, once a week, 12 weeks
- Primarily choral singing – focused to LSVT type principals roughly

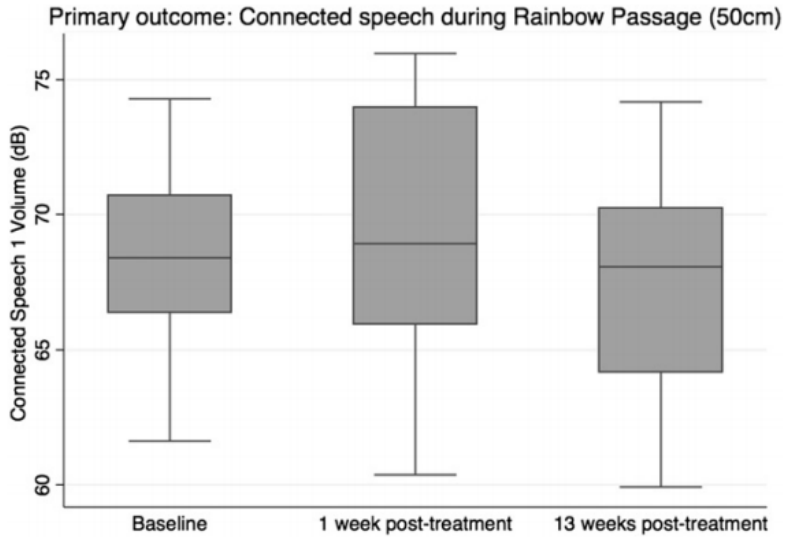


Fig. 1. Sound pressure level (SPL) during reading of the Rainbow Passage (Connected speech 1) did not improve among the cohort from baseline to either 1 week or 13 weeks post-treatment (Kruskal–Wallis chi-square = 0.697, $p = 0.71$).

Singing – outcomes

Stegemoller et al. (2017)

- N=27 PwPD
- 2 singing doses
  - Low: 1hr per week x 8 weeks (n=18)
  - High: 1hr twice per week x 8 weeks (n=9)
- Music Therapist led
- Pre & Post (immed)
  - SPL (vowels)
  - Mpt
  - Semitone ange
  - Max inspire and expir pressures
  - V-RQOL

stegemoller comments

RESULTS

1. No Tx dose difference
2. Both groups significantly improved on
   1. MIP & MEP
   2. MPT (/a/ not /i/)
   3. V-RQOL
3. SPL did not increase
4. Semitone range did not increase

Singing … and another

- N = 10
- Group singing: 60 minute/week for 20 weeks
- Baseline, 10 weeks in, end of 20 weeks
  - Speech & Singing acoustics (MDVP)
  - VHI
  - Depression scale

Results

1. Spoken passage acoustic measure = unchanged (dB, F0 measures, etc.)

2. Singing = most all measures changed for better

3. Slight (but signif) worsening of VHI physical subscale; others unchanged

J Music Ther. 2012 Autumn;49(3):278-302.

The effect of group music therapy on mood, speech, and singing in individuals with Parkinson's disease--a feasibility study.

Elefant C[1], Baker FA, Lotan M, Lagesen SK, Skeie GO.

Singing

- Jury is out re: impact on speaking voice
- Pretty clear PwPD like it (QOL, participant feedback)

Disabil Rehabil. 2016;38(10):952-62. doi: 10.3109/09638288.2015.1068875. Epub 2015 Jul 22.

Choral singing therapy following stroke or Parkinson's disease: an exploration of participants' experiences.

Fogg-Rogers L[1,2], Buetow S[2], Talmage A[2], McCann CM[2,3], Leão SH[2,3], Tippett L[2], Leung J[2,3], McPherson KM[4], Purdy SC[2,3].

Health Psychol. 2017 Jan;36(1):55-64. doi: 10.1037/hea0000412. Epub 2016 Sep 1.

Group singing and health-related quality of life in Parkinson's disease.

Abell RV[1], Baird AD[2], Chalmers KA[1].

we feel better when we sing

Related – SPEAK OUT!® and The LOUD Crowd

- Newer, not much out there in peer-reviewed lit

- SPEAK OUT! ®
  - 12 indiv sessions
  - 4 weeks total
  - Focus:
    - “speak with intent” = purposeful cognitive focus on speech production
    - Cues: “CEO voice,” “say it with gusto”
  - Tasks
    - Warmups, vowels, glides, counting, reading, cog exer [while speaking with intent]

- The LOUD Crowd®
  - Weekly group follow-up
  - “conversation,” “social setting,” “singing”

LOUD Crowd musicals

SPEAK OUT!® and The LOUD Crowd®

- Levitt (2014)
  - N=6
  - Pre, 4 week SPEAK OUT!, 4 weeks The LOUD Crowd, 8 weeks The LOUD Crowd
- Results
  - SPEAK OUT!
    - 5-26 dB SPL gains
    - V-RQOL physio improved significantly
  - The LOUD Crowd – gains “generally maintained”

SPEAK OUT!® [only]

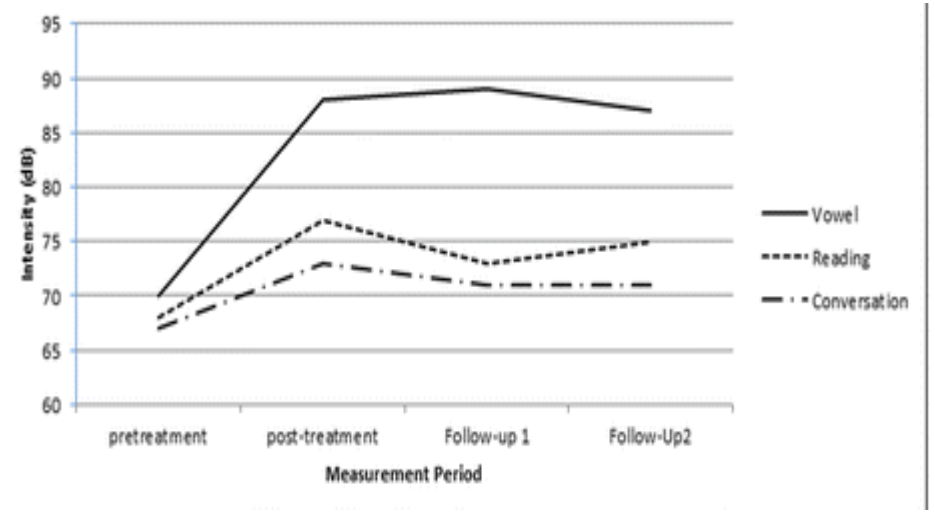
A retrospective study of long-term treatment outcomes for reduced vocal intensity in hypokinetic dysarthria

Christopher R. Watts

BMC Ear, Nose and Throat Disorders 2016 **16**:2
https://doi.org/10.1186/s12901-016-0022-8

- Retrospective, n=78
- dB vowels, reading, conversation
- Pre, post, 6 mos, 12-mos post

- Results: signif for all 3 tasks



Expiratory Muscle Strength Training (EMST)

Voice [other lit on swallow]

Am J Speech Lang Pathol. 2017 Nov 8;26(4):1159-1166. doi: 10.1044/2017_AJSLP-16-0132.

The Impact of Expiratory Muscle Strength Training on Speech Breathing in Individuals With Parkinson's Disease: A Preliminary Study.

Darling-White M[1,2], Huber JE[1].

- N=12 PwPD w/mild-mod speech deficits
- EMST
  - 4 weeks baseline (pretraining)
  - 4 weeks training = 5 sets of 5 breaths 5 days week into EMST with threshold set
- Measures
  - MEP
  - Lung volume init/term
  - Lung volume excursion
  - Utterance length
  - SPL

Results

1. Lung volumes closes to norms
2. Utterance length & SPL didn't consistently change

Lombard --- SpeechVive

ELSEVIER

Journal of Communication Disorders

Volume 48, March–April 2014, Pages 1-17

Increased vocal intensity due to the Lombard effect in speakers with Parkinson's disease: Simultaneous laryngeal and respiratory strategies

Elaine T. Stathopoulos [a], Jessica E. Huber [b, 1], Kelly Richardson [a, 2], Jennifer Kamphaus [a, 2], Devan DeCicco [a, 2], Meghan Darling [b, 1], Katrina Fulcher [a, 2], Joan E. Sussman [a, 2]

Detects when speaking [accelerometer on throat]

When threshold crossed, device introduces multi-talker babble into the ear == Lombard effect

Lombard --- SpeechVive

- N=33 PwPD (some who had LSVT previously)
- Large set of measures – main = SPL

Results

1. SPL increased
2. Individualized physiological responsws (respire/laryngeal)

PwPD Impressions of SLP Tx

Rehabil Res Pract. 2015;2015:839895. doi: 10.1155/2015/839895. Epub 2015 Jul 8.

Subjective Experiences of Speech and Language Therapy in Patients with Parkinson's Disease: A Pilot Study.

Spurgeon L[1], Clarke CE[2], Sackley C[3].

- N=9
- Semi-structured interview with Thematic Network Analysis (core themes)

- Themes that emerged:
  - Emotional impact
  - Practical concerns
  - Physical effects
  - Expectations

- Stroke Rehab lit = improved outcomes when taking into consideration the patient's subjective experience

Figure 1: Thematic Network Analysis: emotional impact.

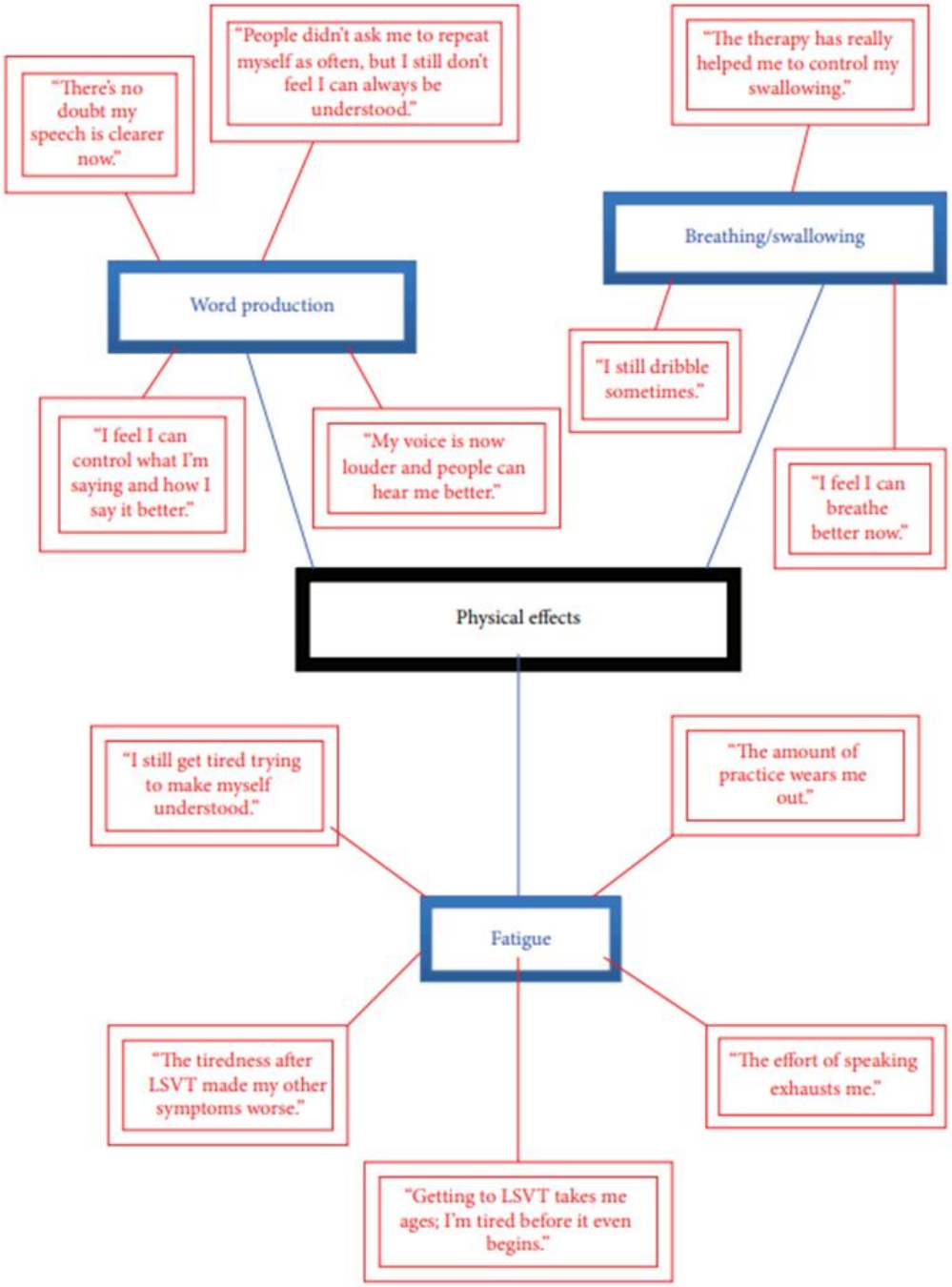


FIGURE 2: Thematic Network Analysis: physical effects.

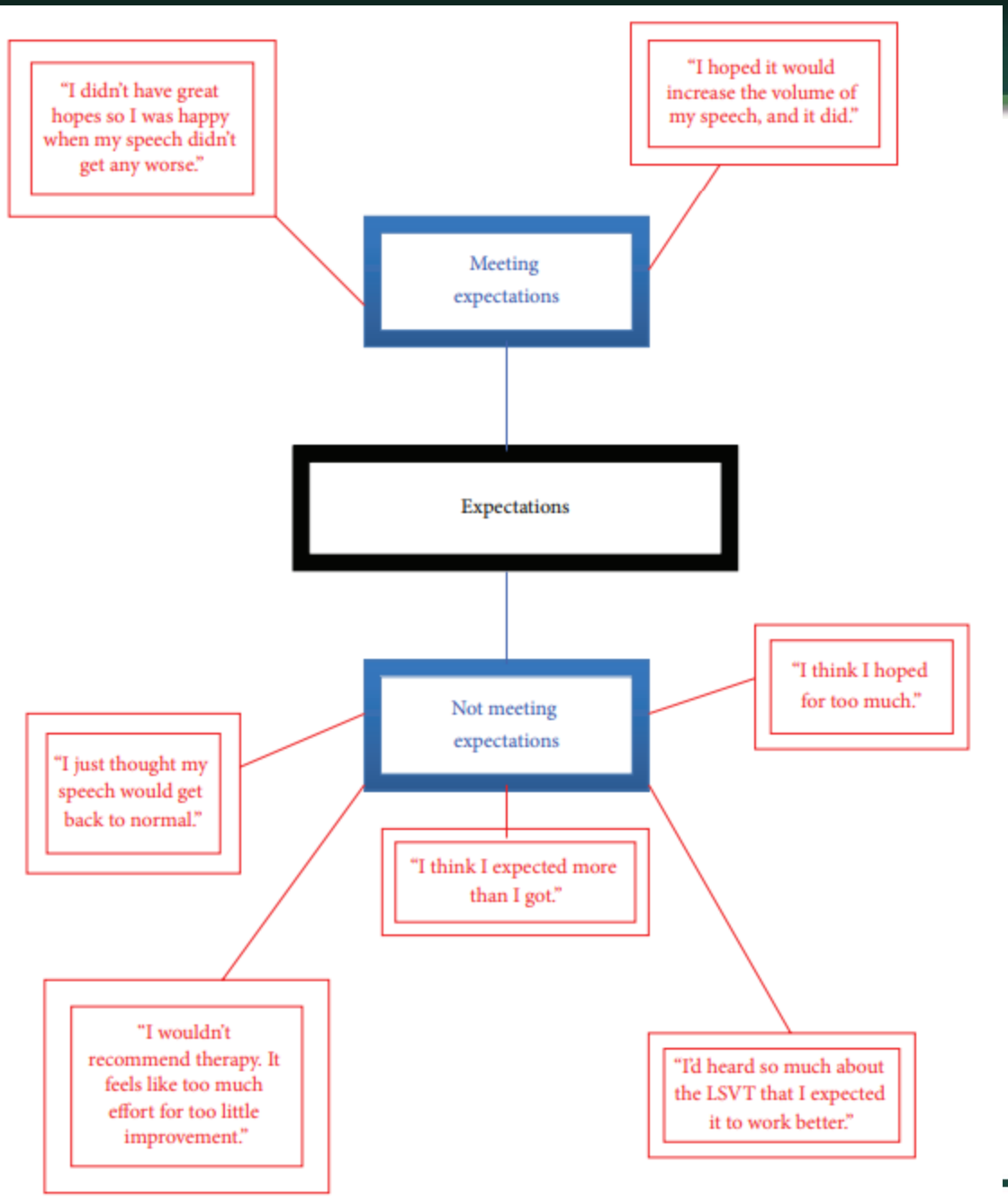


FIGURE 4: Thematic Network Analysis: expectations.

AJSLP

Research Article

Speech Versus Speaking: The Experiences of People With Parkinson's Disease and Implications for Intervention

Kathryn Yorkston,[a] Carolyn Baylor,[a] and Deanna Britton[b,c]

- Looking beyond impairment
- Psychosocial considerations as important impact on SLP Tx

- N=24 PwPD
- Semistructured interviews – two of them 6-months apart
- Thematic analysis

AJSLP

Research Article

Speech Versus Speaking: The Experiences of People With Parkinson's Disease and Implications for Intervention

Kathryn Yorkston,[a] Carolyn Baylor,[a] and Deanna Britton[b,c]

- Theme 1: Speaking
  - Occasionally mention quality of speech
  - Stronger emphasis = process & success
  - Subthemes
    - Thinking about speaking
    - Value vs. effort
    - Feelings
    - Environmental contexts
    - PD and speaking

AJSLP

Research Article

Speech Versus Speaking: The Experiences of People With Parkinson's Disease and Implications for Intervention

Kathryn Yorkston,[a] Carolyn Baylor,[a] and Deanna Britton[b,c]

- Theme 2: Treatment Experiences
  - Choosing to decline treatment (25% = none; 2 more only briefly)
    - Logistic issues
    - Tx side effects (fatigue, hoarse voice)
    - Consider if speech gets worse
  - The Clinician
    - Positive impressions
    - Viewed as directive – too much so at times
    - Measurement role
    - Disagreements wit clinical judgement

AJSLP

Research Article

Speech Versus Speaking: The Experiences of People With Parkinson's Disease and Implications for Intervention

Kathryn Yorkston,[a] Carolyn Baylor,[a] and Deanna Britton[b,c]

- Theme 2: Treatment Experiences
  - Drills and Exercise
    - repetitive
    - Tedious, lacking relevance – less practice
    - Deciding not to practice
  - Suggestions for Change
    - 'community' – with other PwPD; get family involved
    - Helping to do more home practice – not drills
    - SLP to understand it is both physical and cognitive demands
    - SLP to understand social isolation

AJSLP

Research Article

Speech Versus Speaking: The Experiences of People With Parkinson's Disease and Implications for Intervention

Kathryn Yorkston,[a] Carolyn Baylor,[a] and Deanna Britton[b,c]

- PwPD == comm issues = broader than voice
- Physical, cognitive, emotional demands
- Speech vs. speaking
  - Speech = can be described physiologically, perceptually, acoustically; can be viewed w/o social context
  - Speaking = active process, social context is important

Incorporating the Principles of Self-Management into Treatment of Dysarthria Associated with Parkinson's Disease

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- Goal = more patient-centered care
- N=11 PwPD
- Semistructured interviews

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- Treatment Expectations
  - Generally had modest goals: slow, prevent speech deterioration; expected small improvement
  - Learn situational strategies
  - Goals related to how they felt about communication rather than how they sounded ("more comfortable with my speech")

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- Treatment Experiences & Impact
  - Mixed opinions on benefit
    - "more aware of…speech, what they can do
    - More confidence when talking
    - Positive daily impacts for some
    - Others = no meaningful impact
  - Boring, repetitive
  - Recognized need for practice – not always doing it

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- Treatment Experiences & Impact
  - Recognized tools to speak, not permanent change
  - Tools = helpful but not sufficient for breadth of communication problem
    - More 'tools'
    - Absence of focus on cognitive changes

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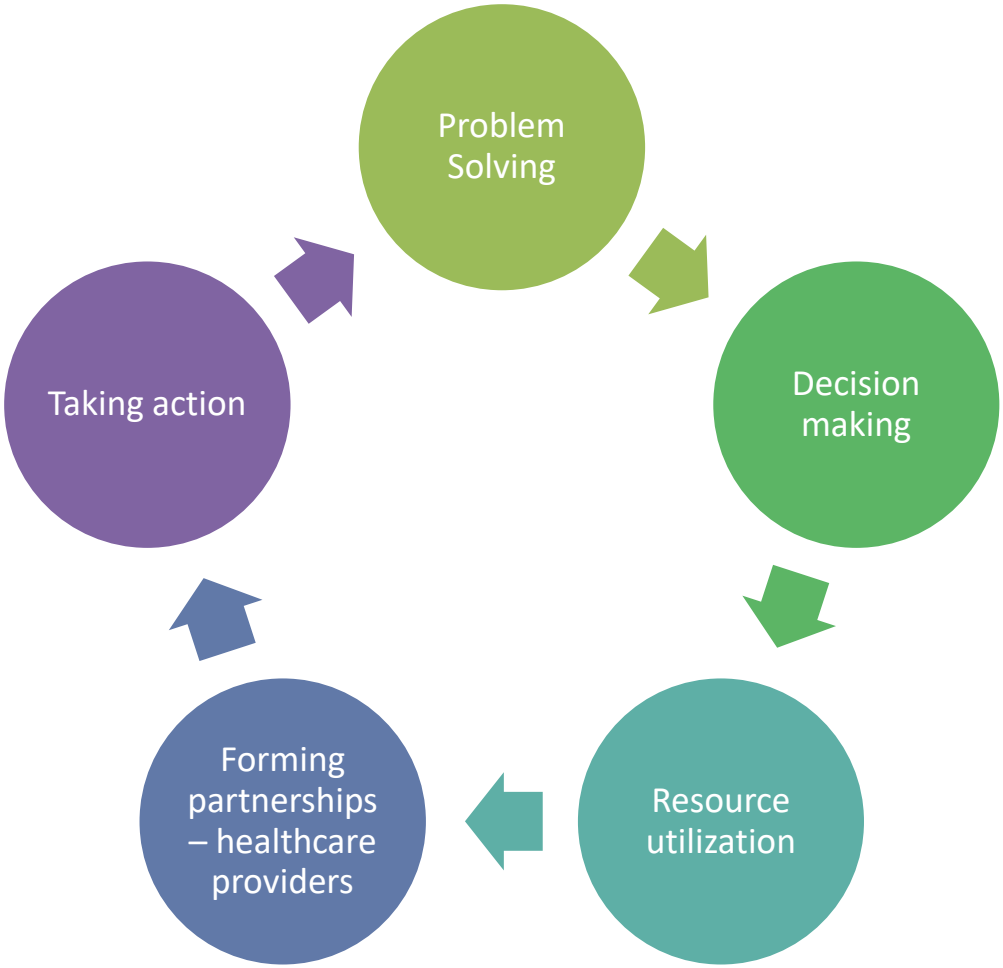
- Tool Box Concept
  - Loud focused/physiology focused = one tool; but not sufficient from patient perspective
  - Lens of self-management
    - Pt as active participant
    - Individualized, needs focused assessment
      - Motivational interviewing – what's important
      - Goal attainment scaling – what is meaningful progress for the person

Self-Management Approach



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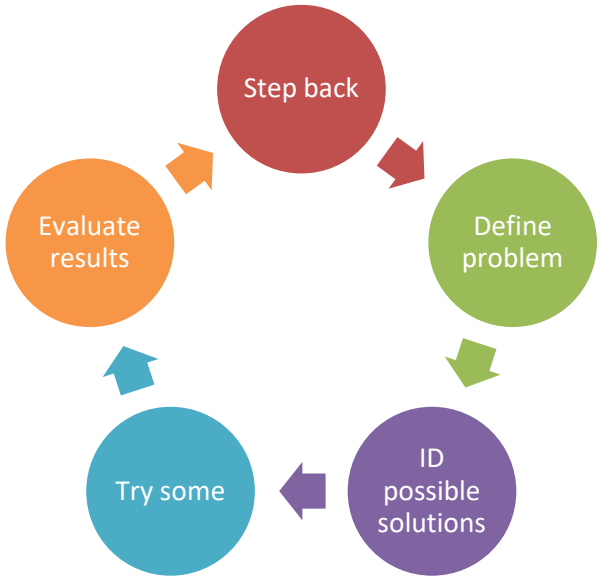
- Core Self-Management Skills
  - Problem solving – not SLP directed; guide client to develop own solutions



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- Core Self-Management Skills
  - Decision Making– solid knowledge of condition, what to expect = required for good decision making

We tend to do this pretty well (we think)

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- Core Self-Management Skills
  - Resources– identify and use what's available
    - Support groups
    - Nonprofits
    - Literature
    - Connection to research

    Not just ID them, help contact them

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- Core Self-Management Skills
  - Relations with Health Care Providers– effective relationship needed
    - Help clients assess quality and strength of those relationships
    - Vulnerable populations in healthcare situations
      - Prepare for visit – what to say, focus on; questions to ask
      - Help organize info, process info post visit

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- Core Self-Management Skills
  - Taking Action
    - Formulate feasible action plan
      - Small steps
      - Specific steps

Clin Rehabil. 2008 Jan;22(1):14-22.

How do I sound to me? Perceived changes in communication in Parkinson's disease.

Miller N[1], Noble E, Jones D, Allcock L, Burn DJ.

- https://voiceaerobicsdvd.com/
- http://www.speechvive.com/