Exploring Exercise for PD

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Disclosures

- Speaker’s Bureau: Teva Pharmaceuticals, Adamas Pharmaceuticals, Neurocrine Biosciences, Acorda Therapeutics, Kyowa Kirin

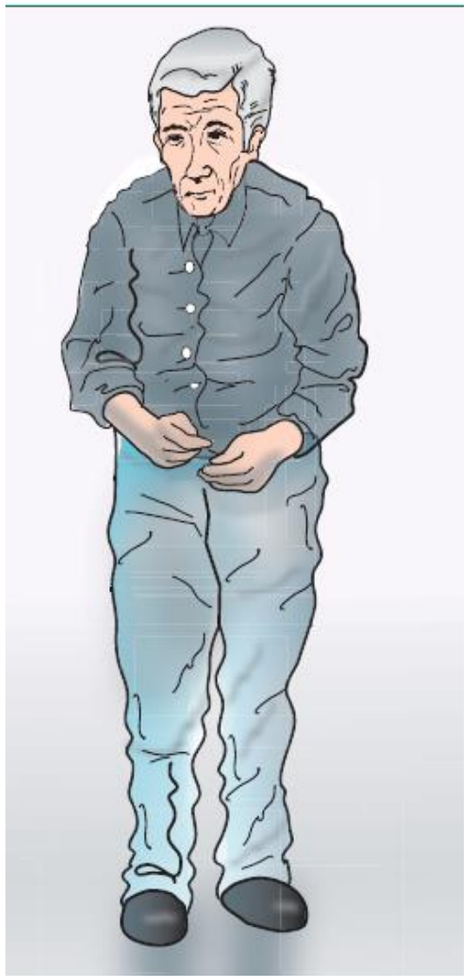
- Consultant: GLG, Guidepoint, GE Healthcare, LEK, Acadia, Genentech, Amneal, Biogen

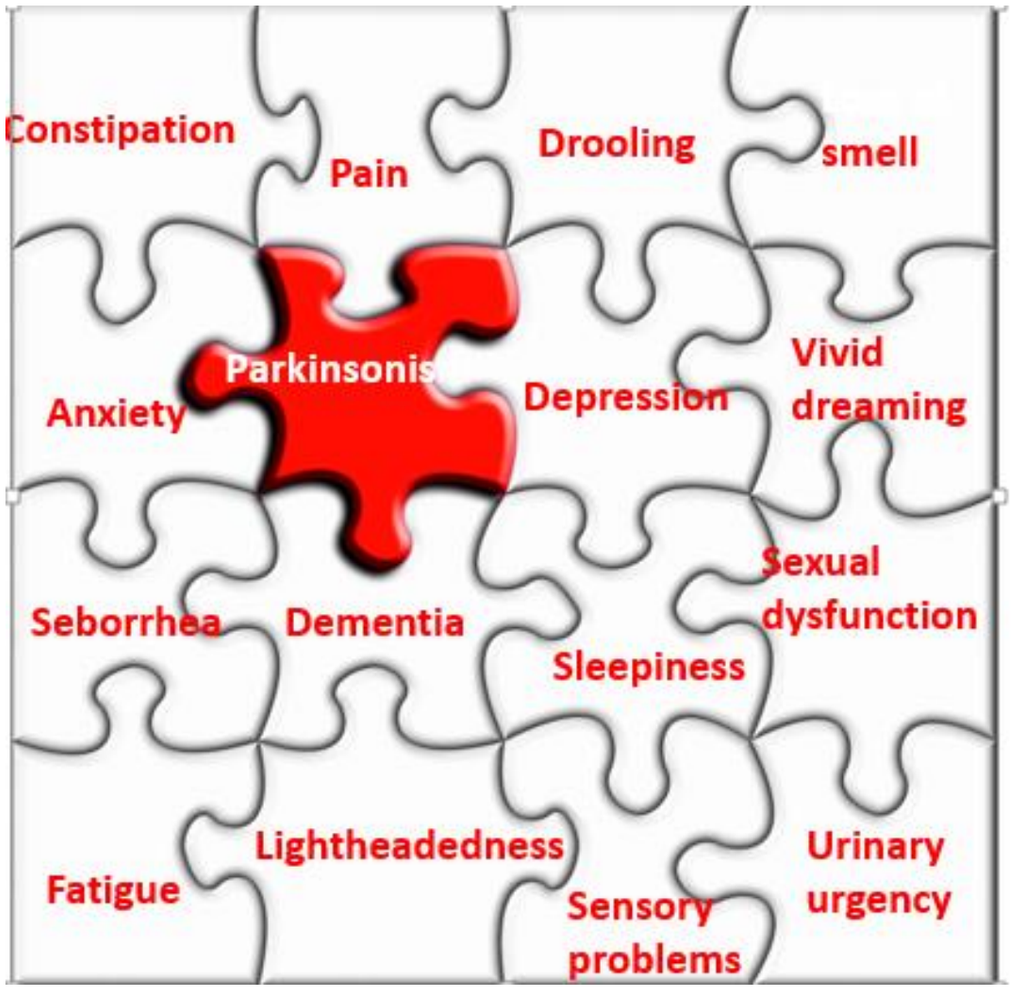
- Editorial board: Annals of Clinical & Translational Neurology

Objectives

- PD – more than just a movement disorder
- The Role of Exercise in PD
- Evidence behind exercise for PD
- Your exercise prescription

PD: Motor & Non-Motor





Management

VEGETABLES
FRUITS
HEALTHY FOOD
HEALTHY LIFESTYLE
DIET
FITNESS
SPORT

Does Exercise Really Matter?

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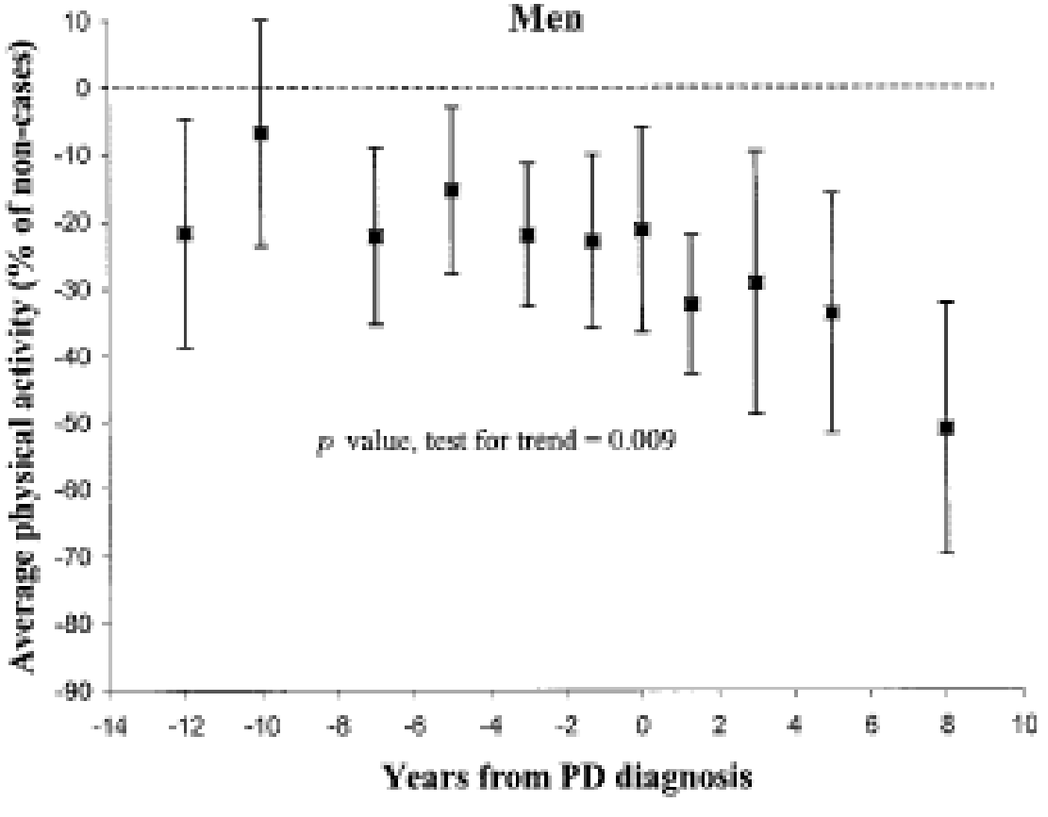

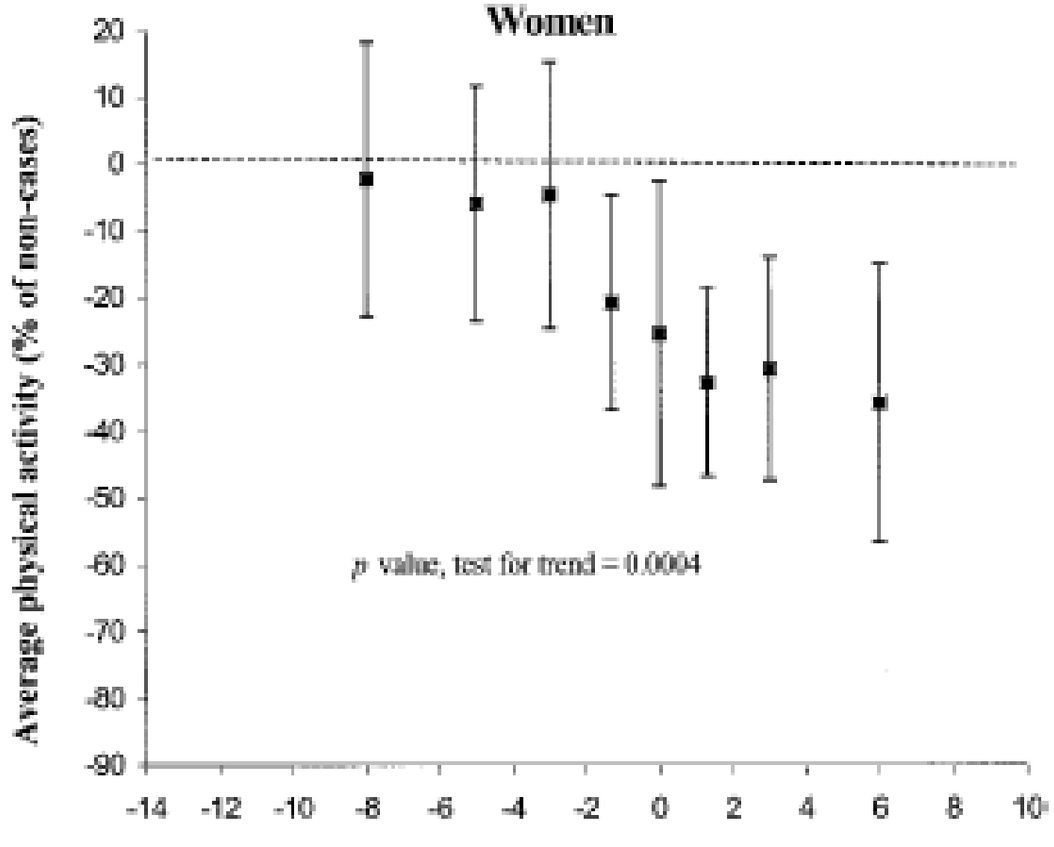

Figure 1. Average physical activity of Parkinson disease (PD) cases as percentage of noncases at different time points before and after the diagnosis in men, adjusting for age, age squared, and smoking status for each time period. The sample size at each time point ranges from 48 to 228. The reference line represents the average values of individuals without PD.

Chen, Neurology, 2005:

More physical activity at baseline in men was associated with lower risk of getting PD (those with the most physical activity had 30% less risk of having PD).

Parkinsonism and Related Disorders

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

Back to the basics: Regular exercise matters in Parkinson's disease: Results from the National Parkinson Foundation QII Registry study

O. Oguh [a, *], A. Eisenstein [b], M. Kwasny [c], T. Simuni [d]

- Looked at > 2,000 people with PD
- Split into 3 groups:
  - Non-exercisers = 0 min / week
  - Low exercisers = 1-150 min / week
  - Regular exercisers = > 150 min / week

- At 1 year, regular exercisers had:
  - Better quality of life
  - Better mobility
  - Less progression of disease
  - Less caregiver burden
  - Less cognitive decline

What Does Exercise Do?

- It may facilitate control of movement by formation of new connections between different parts of the brain (neuroplasticity).
- It may help make some movements more automatic.
- Exercise has been shown to promote brain growth factors.
- Exercise may increase release of dopamine.
- Addresses the mind and the body simultaneously.

Exercise Increases Caudate Dopamine Release and Ventral Striatal Activation in Parkinson's Disease

Matthew A. Sacheli, MSc,[1*] Jason L. Neva, PhD,[2] Bimal Lakhani, PhD,[2] Danielle K. Murray, MSc, MD,[1,3]
Nasim Vafai, MASc,[4] Elham Shahinfard, PhD,[4] Carolyn English,[4] Siobhan McCormick, MSc,[4] Katie Dinelle, MSc,[4]
Nicole Neilson, RN,[1] Jessamyn McKenzie, LPN,[1] Michael Schulzer, PhD,[1] Don C. McKenzie, MD, PhD,[5]

35 people with PD randomized to 36 sessions of aerobic exercise (3 months) vs control (stretching)

Functional MRIs were performed

Aerobic group had more cell responsiveness to dopamine and more dopamine release

Habitual Exercisers Versus Sedentary Subjects With Parkinson's Disease: Multimodal PET and fMRI Study

Matthew A. Sacheli, MSc,[1] Danielle K. Murray, MD,[1,2]

- 8 habitual exercisers vs 9 sedentary subjects with PD
- PET scans show release of dopamine
- Functional MRI showed activation of dopamine paths
- Showed greater dopamine release in habitual exercisers compared to sedentary subjects, and greater activation of dopamine pathways

Non-Motor Benefits of Exercise

- Reduce fatigue
- Decrease depression, improve mood (release natural endorphins/opioids)
- Improve cardiovascular health
- Improve immune function / anti-inflammatory effects
- Social interaction

= IMPROVES QUALITY OF LIFE

MOVE-PD: Motivators & Other Variables for Exercise in PD

Journal of Parkinson's Disease xx (20xx) x–xx
DOI 10.3233/JPD-171173
IOS Press

Research Report

Motivators and Barriers to Exercise in Parkinson's Disease

Mitra Afshari[a,b,*], Amy Yang[c] and Danny Bega[a]

What are the barriers?

– Prior study showed it was: time, access, falls

– In a survey of >100 non-exercisers with PD vs >100 exercisers with PD, we found that "low/no exercisers" had more: **fatigue**, **depression**, and **lack of motivation** (needed someone else to motivate them)

Non-Motor Symptoms are VERY Important

Studies and surveys show that the non-motor symptoms impact “quality of life” ratings more than motor symptoms.

Sydney study (20 yrs) conclusions: “The most disabling long-term problems of Parkinson’s disease relate to the emergence of symptoms that are not improved by L-dopa”

→ Depression

→ Cognitive deficits

Common Non-Motor Symptoms

Mood disorders
- Anhedonia (32%)
- Anxiety (30%)
- Apathy (31%)
- Depression (43%)

Autonomic dysfunction
- Orthostatic hypotension (21%)

Cognitive dysfunction
- Bradyphrenia
- Inattention (28%)
- Memory impairment (32%)
- Hallucinations (30%)

Fatigue (36%)

GI dysfunction / constipation (39%)

Sexual dysfunction
- Erectile dysfunction (28%)
- Reduced libido (42%)

Sleep disturbances
- Sleep fragmentation
- Vivid dreams (24%)
- REM behavior disorder (65%)
- Excessive daytime sleepiness (28%)
- Insomnia (36%)

Urinary dysfunction (30%)

The Therapeutic Potential of Exercise to Improve Mood, Cognition, and Sleep in Parkinson's Disease

Gretchen O. Reynolds, MA,[1] Michael W. Otto, PhD,[1] Terry D. Ellis, PhD,[2] and Alice Cronin-Golomb, PhD[1]*

TABLE 1. Exercise interventions for mood in PD

Authors	Study design	Mean age	Intervention	Sample size	Exercise frequency/ duration/setting	Control group	Mood outcome measures	Main results	Limitations
Canning et al., 2015[18]	RCT	71.0	40-60 Minutes of strengthening	231	3×/week for 6 months (in clinic + at home)	Usual care	PANAS	Improved affect in exercise group compared with usual care	No attention control; mood measures included as secondary outcomes
Park et al., 2014[78]	RCT (delayed start)	59.9	60 Minutes of combined aerobic and resistance	31	3×/week for 48 weeks (in clinic)	Delayed start at 24 weeks	BDI	Greater reduction in depression in early-start group compared with late-start group at 48 weeks	Greater social interaction in early-start group relative to late-start group
Shulman et al., 2013[79]	RCT	65.8	3 Exercise groups: (1) 30 minutes of high-intensity treadmill exercise; (2) 50 minutes of low-intensity treadmill exercise; (3) stretching and resistance training	67	3×/week for 3 months (in clinic)	Stretching and resistance exercise (comparative trial)	BDI	No change in depression within any group	No nonexercising comparison condition
Bridgewater and Sharpe, 1996[80]	Pilot RCT	67.3 (EX); 66.5 (CON)	20-30 Minutes of aerobic exercise (+ warm-up calisthenics and cool-down stretching)	26	2×/week for 3 months (in clinic)	Usual care + attendance at "interest talks" once every 3 weeks	LPDQ	Improved mood in exercise group	Small sample size; less social interaction in control group
Dashtipour et al., 2015[81]	Prospective, double-blind,, randomized trial	63.4	60 Minutes of combined aerobic and resistance	11	4×/week for 4 weeks (in clinic)	Exercise-based behavioral treatment (LSVT BIG)	BAI, BDI	Reduced depression in combined group	Small sample size; combined data analysis across both groups
Uc et al., 2014[82]	Uncontrolled phase I/II trial	65.5	45 Minutes of aerobic walking	49	3×/week for 6 months (at home)	None	GDS	Reduced depression across all completers	Lack of a control group

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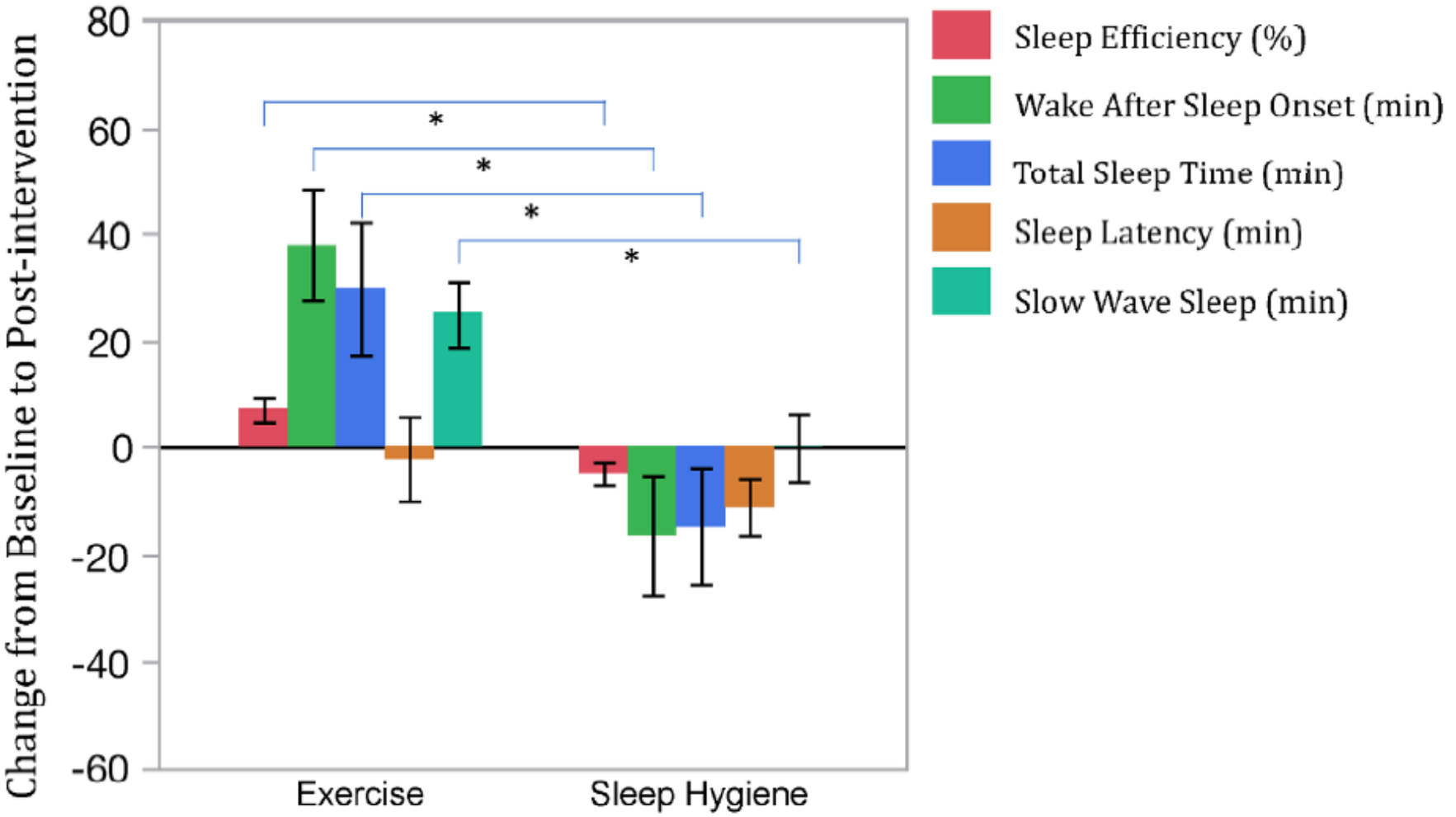
Randomized, Controlled Trial of Exercise on Objective and Subjective Sleep in Parkinson's Disease

Amy W. Amara, MD, PhD,[1,2*] Kimberly H. Wood, PhD,[1,2,3] Allen Joop, MS,[1] Raima A. Memon, MD,[1,4] Jennifer Pilkington,[1] S. Craig Tuggle, MA,[2,5] John Reams, MA,[2,5] Matthew J. Barrett, MD,[6] David A. Edwards, PhD,[7] Arthur L. Weltman, PhD,[7] Christopher P. Hurt, PhD,[2,8] Gary Cutter, PhD,[2,9] and Marcas M. Bamman, PhD[1,2,4,10]

Mov Dis, 2020



Cognitive and physical activity and dementia

A 44-year longitudinal population study of women

Jenna Najar, MD, Svante Östling, MD, PhD, Pia Gudmundsson, PhD, Valter Sundh, PhD, Lena Johansson, PhD, **Correspondence**

Methods

A population-based sample of 800 women aged 38–54 years (mean age 47 years) was followed from 1968 to 2012. Cognitive (artistic, intellectual, manual, religious, and club) and physical activity were assessed at baseline. During follow-up, dementia (n = 194), Alzheimer disease (n = 102), vascular dementia (n = 27), mixed dementia (n = 41), and dementia with cerebrovascular disease (n = 81) were diagnosed according to established criteria based on information from neuropsychiatric examinations, informant interviews, hospital records, and registry data. Cox regression models were used with adjustment for age, education, socioeconomic status, hypertension, body mass index, cigarette smoking, diabetes mellitus, angina pectoris, stress, and major depression.

Results

We found that cognitive activity in midlife was associated with a reduced risk of total dementia (hazard ratio [HR] 0.66; 95% confidence interval [CI] 0.49–0.89) and Alzheimer disease (HR 0.54; 95% CI 0.36–0.82) during follow-up. Physical activity in midlife was associated with a reduced risk of mixed dementia (HR 0.43; 95% CI 0.22–0.86) and dementia with cerebrovascular disease (HR 0.47; 95% CI 0.28–0.78). The results were similar after excluding those who developed dementia before 1990 (n = 21), except that physical activity was then also associated with reduced risk of total dementia (HR 0.67; 95% CI 0.46–0.99).

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What Type of Activity is Best?

Dance

Shown to improve balance, initiation of movement, and overall motor scores in PD (study of 19 patients doing Tango).

Requires balance and attention to control of movement and interaction with a partner.

Other forms of dance and music itself can also improve mood, quality of life, and motor function.

Hackney 2007

Boxing

Forced, intense exercise has been shown in studies to be particularly valuable in Parkinson's

<u>Boxing training can improve</u>:

– Balance
– Coordination
– Speed of movement
– Agility
– Strength
– Focus

Community-based group exercise for persons with Parkinson disease: A randomized controlled trial

Stephanie A. Combs*, M. Dyer Diehl, Casey Chrzastowski, Nora Didrick, Brittany McCoin, Nicholas Mox, William H. Staples and Jessica Wayman
Krannert School of Physical Therapy, University of Indianapolis, Indianapolis, IN, USA

31 PD patients were randomized to 12 weeks of boxing versus conventional exercise.

Only the boxing group had significant improvement in gait speed and endurance.

There were also improvements in balance, mobility, and quality of life.

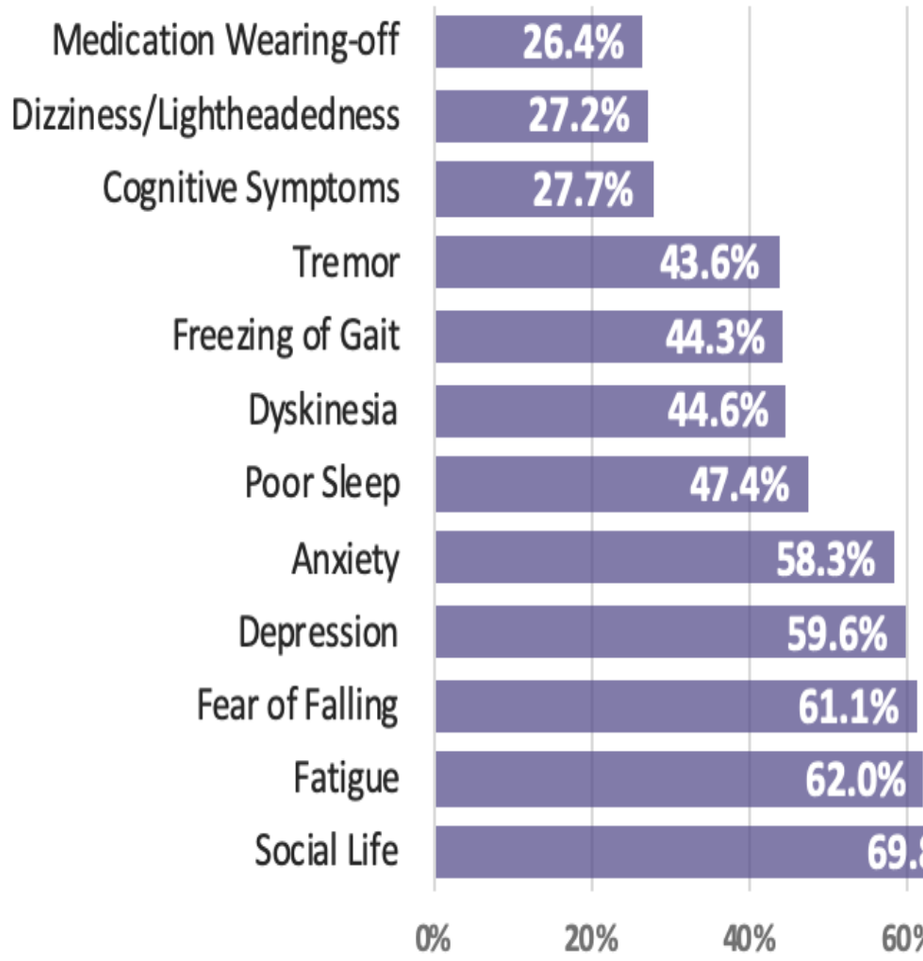
RSB Survey

2,054 responded!

The majority of participants reported that RSB improved their social life (70%), fatigue (62%), fear of falling (61%), depression (60%), and anxiety (58%).

Compared to never-participants, current and previous participants had better PDQ-39 scores (25 vs 32, p <0.01) and better SEE scores (54 vs 48, p <0.01).

99% of current participants would recommend RSB.

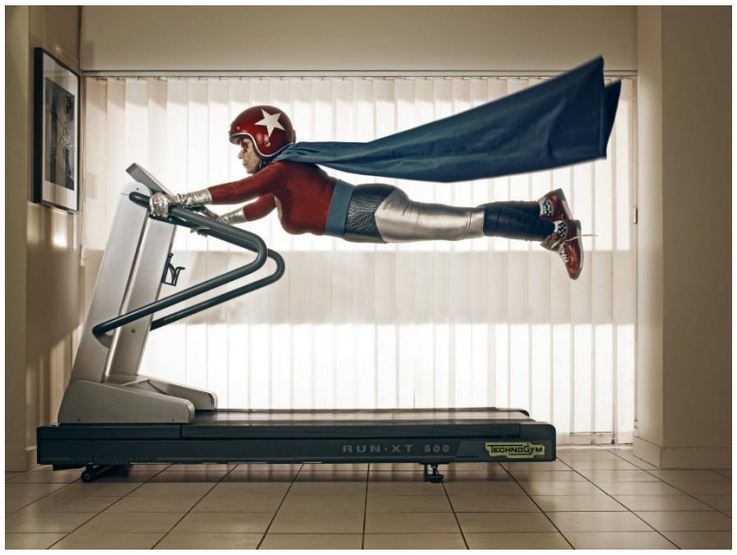


Not yet published, in prep. (Larson, Bega)

JAMA Neurology | Original Investigation

Effect of High-Intensity Treadmill Exercise on Motor Symptoms in Patients With De Novo Parkinson Disease
A Phase 2 Randomized Clinical Trial

Margaret Schenkman, PhD, PT; Charity G. Moore, PhD; Wendy M. Kohrt, PhD; Deborah A. Hall, MD, PhD; Anthony Delitto, PhD, PT; Cynthia L. Comella, MD; Deborah A. Josbeno, PT, PhD; Cory L. Christiansen, PhD, PT; Brian D. Berman, MD, MS; Benzi M. Kluger, MD; Edward L. Melanson, PhD; Samay Jain, MD; Julie A. Robichaud, BS-PT, MHS, PhD; Cynthia Poon, PhD; Daniel M. Corcos, PhD



- 128 participants
- Lowest decline in motor score in
  "high intensity" (80-85% max HR) group

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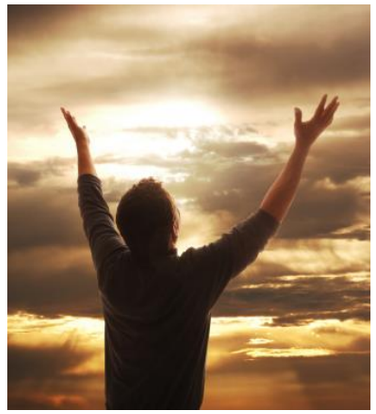
Mind-Body Interventions



Tai Chi

Chinese martial art, involves meditation

Balance-based exercise

Focuses on slow choreographed movements, breathing, and maintaining postures (shifting weight)

Improves balance and motor control in people with PD (study of nearly 200 patients)

Li, NEJM, 2012

Table 3. Self-Reported Falls during the 6-Month Intervention, According to Group.*

Falls	Tai Chi (N=65)	Resistance (N=65)	Stretching (N=65)
Total falls†	62	133	186
No. of falls — no. of participants (%)			
Any	19 (29)	31 (48)	26 (40)
1	3 (5)	8 (12)	4 (6)
2	4 (6)	7 (11)	2 (3)
≥3	12 (18)	16 (25)	20 (31)
Rate — no./participant-month	0.22	0.51	0.62

* Falls were defined as unintentionally coming to rest on the floor or the ground or falling and hitting objects such as stairs or pieces of furniture.
† A significant difference was found in the incidence-rate ratio between the tai chi and stretching groups (P=0.005); a nonsignificant difference was found between the tai chi and resistance-training groups (P=0.05).

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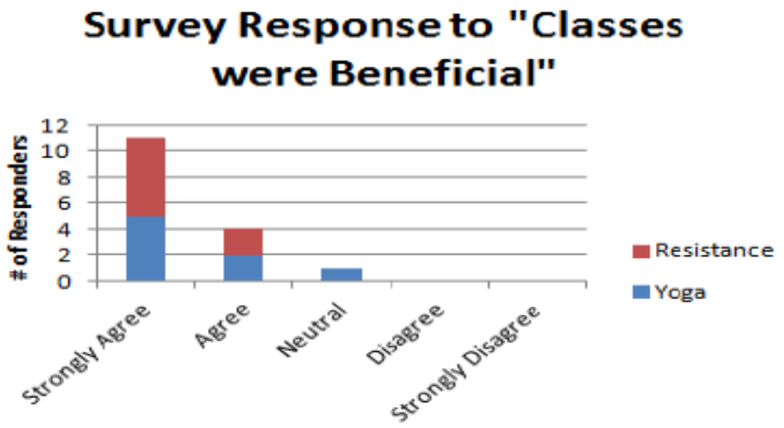
Yoga & Physical Therapy

Bega et al., J Yoga Phys Ther 2016, 6:1
http://dx.doi.org/10.4172/2157-7595.1000222
http://dx.doi.org/10.4172/2157-7595.1000222

Research Article Open Access

Yoga Versus Resistance Training in Mild to Moderate Severity Parkinson's Disease: A 12-Week Pilot Study

Danny Bega[1*], Jill Stein[1], Cindy Zadikoff[1], Tanya Simuni[1], Daniel Corcos[2], David Victorson[3], Melinda Ring[4] and Borko Jovanovic[5]



- **Both groups improved on motor functions.**
- **Both groups improved on general health and function questionnaire.**
- **Anxiety score improved more in yoga group.**

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Exercise Program Suggestions

- Involve goal-based practice for acquisition of a skill.
- A supervised environment to help with learning through reinforcement.
- Something enjoyable.
- Something social.
- Well-trained instructors who understand PD.
- Appropriate level classes.

Patient Name:_____

Address:_____ Date:_____

Rx

Exercise Prescription

1. Keep active: find a physical activity that you enjoy!

2. Aerobic activity: 30 minutes of moderate intensity (get the heart rate up) activity 5 days per week (brisk walk, cycling, boxing, swimming, etc).

3. Strength building: Use weights or resistance bands for 30 minutes 2x per week (may need a trainer or therapist to show you technique such as squats, lunges, rowing, etc).

4. Balance training: Consider tai chi, yoga, or dance therapy for 30 minutes 2x per week. Interventions with mind-body benefits are preferable

MD:_____

Signature:_____

Conclusions

- **Motor & Non-Motor issues in PD have an impact on quality of life.**

- **Exercise and healthy lifestyle can address the spectrum of PD-related issues.**

- **Exercise can improve quality of life and slow down decline in physical function.**

- **Exercise is an essential part of the treatment of PD.**