Movement, mood, and cognition: Why PD is more than a movement disorder

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Education

B.S. Health & Wellness
M.S. & Ph.D. Kinesiology
Neuroscience emphasis

N

Neuroscience

Motor neuroscience
How the brain controls movement in adults

R

Research Focus

Reaching and grasping
Force control
Influence of cognitive processes

L

Leadership

Director, Brain and Behavior Lab
President, A-O PD support group

Why This Work Matters to Me

How we move reflects how we think, feel, and connect with the world around us, not just how our muscles work. While some of my work has focused on Parkinson's disease or ADHD, these principles extend to all adults. The way we move tells a story about what's happening in the brain.

PD is not just a movement disorder

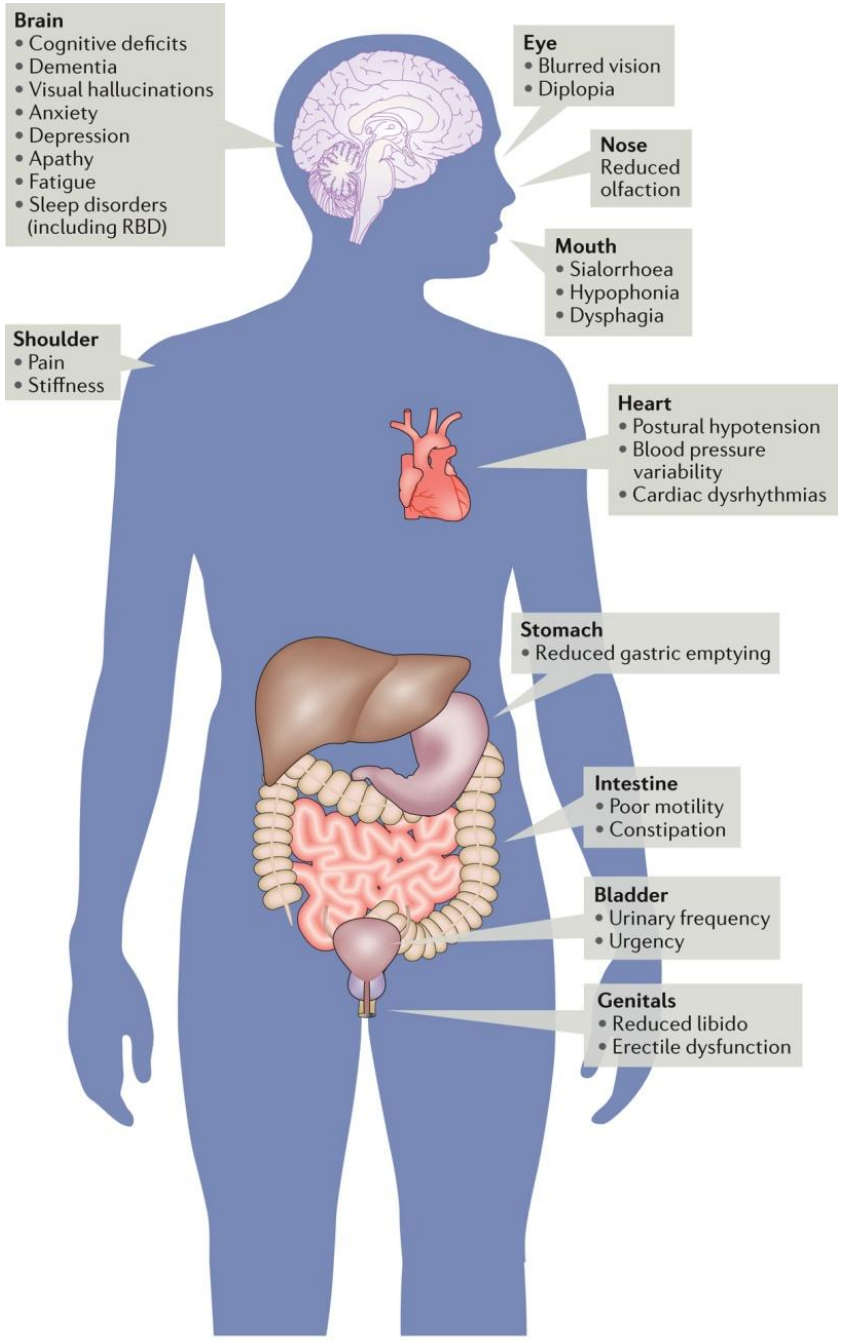
- PD is not just tremor, rigidity, and bradykinesia
- Non-motor symptoms
  - Extremely common
  - Often prodromal
    - Before the more recognizable signs and symptoms develop
  - Strongly predict quality of life

PD is a multisystem, whole-person disorder

- Non-motor symptoms reflect widespread pathology beyond the dopamine system
  - Olfactory loss
  - Sleep dysfunction
  - Autonomic dysfunction
  - Pain
  - Fatigue
  - Cognitive impairment
  - Psychiatric disturbances

Non-motor features

- Reflect deficits in various functions of the central nervous system
- Appear before motor symptoms
- Most develop over the course of the disease



Schapira et al., 2017.

Nature Reviews | Neuroscience

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Cognitive impairment and psychiatric disorders

- Can be debilitating
- Greatest impact on quality of life
- Associated with greater physical and emotion burden for care partners and family
- Associated with higher costs of care

Cognitive changes in PD

What is cognition?

- Mental processes involved in thinking, knowing, decision making, planning, judging, and problem-solving.
- Acquisition, storage, manipulation, and retrieval of information (i.e., remembering).
- Cognition is not one unitary concept → cognitive “domains” for specific behaviors, actions, or functions

Cognitive impairment

- Cognitive decline is six times more likely in PwP (Biundo et al., 2025)
- **Subjective cognitive decline (SCD)**
  - Subjectively perceived by the PwP, but not clinically detectable
  - Prevalence rates vary, best estimate is 36% (Siciliano et al., 2024)
  - 10-20% of people with PD have changes at time of diagnosis (Weintraub et al., 2015)
- **Parkinson's disease-mild cognitive impairment (PD-MCI)**
  - Prevalence rate ~ 25-27% (Aarsland et al. 2010; Litvan et al., 2011)
- **Parkinson's disease-dementia (PDD)**
  - Prevalence changes with age and disease duration

Predictors of cognitive impairment

- Evaluation and identification of predictors is challenging
- Most likely predictors (Guo et al., 2021)
  - Advanced age
  - Men > women
  - Genetic variation in *APOE* or *MAPT*
  - Postural instability-gait disorder subtype
  - Greater disease severity
  - REM sleep behavior disorder
  - Psychiatric symptoms such as psychosis and depression

Treatment for cognitive changes

- **Medications: acetylcholinesterase inhibitors**
  - Rivastigmine and donepezil
- **Exercise**
  - Get moving and stay moving
- **Nutrition**
  - Mediterranean diet has been shown to improve cognition in PD (Tang et al., 2025)
- **Cognitive training** – maybe
- **Sleep**
  - See a sleep medicine specialist
- **Monitor cognition and monitor other risk factors**

Strategies for support

- **Establish routines (and keep them)**
  - Keep objects in designated and consistent places
- **Use memory aids**
  - Calendars, whiteboards, lists, medication alarms
- **Simplify**
  - No more multitasking, minimize distractions
  - Decrease visual clutter
  - Cooking
- **Safety**
  - Label medications &/or use safety devices
  - Door alarms or video

Psychiatric changes in PD

What are psychiatric disorders?

- Clinically significant disturbance in cognition, emotion regulation, or behavior that is
  - Associated with distress
  - Associated with functional impairment (i.e., social, occupational, academic)
- Other frequently used terms
  - Mental disorders
  - Mental illness
  - Mental health disorder
  - Psychological disorder
  - Affective disorder
  - Neuropsychiatric disorder

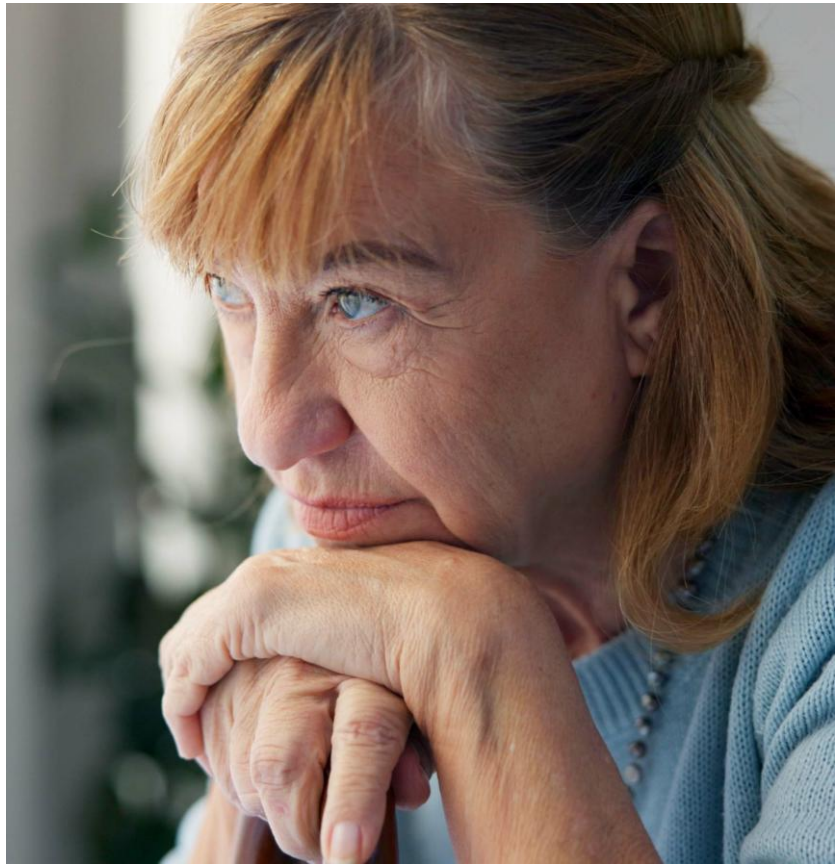
Prevalence of psychiatric disorders in PD

- Depression: 35%
- Anxiety: 60%
- Apathy and anhedonia: 60%
- Psychosis: 40%

Schapira et al., 2017.

Anxiety

- Symptoms
  - Generalized anxiety
    - Apprehension, fear, worry
  - Panic attacks
  - Social phobias
- Levels of anxiety increase with motor fluctuations (Storch et al., 2013)
- Often occurs before motor symptoms (Clark et al., 2013)
- More common in women, people with young onset, and people in advanced stages (Brown et al., 2011).



Depression

- Persistent feeling of sadness and loss of interest
  - PD-related depression is generally milder
- Often occurs before motor symptoms
- Risk increases over time

Symptoms of depression

- Persistent sadness
- Crying
- Loss of interest in usual activities and hobbies
- Decreased attention to hygiene, medical and health needs
- Feelings of guilt, self-criticism and worthlessness
- Increased fatigue and lack of energy
- Change in appetite or eating habits (such as poor appetite or overeating)
- Loss of motivation
- Aches and pains
- Feelings of being a burden to loved ones
- Feelings of helplessness or hopelessness
- Reflections on disability, death and dying
- Sleep difficulties (too little or too much)
- Poor attention or difficulty concentrating
- Feeling slowed down or restless
- Thoughts of death or suicide

Symptoms of depression **overlap** with PD

- Persistent sadness
- Crying
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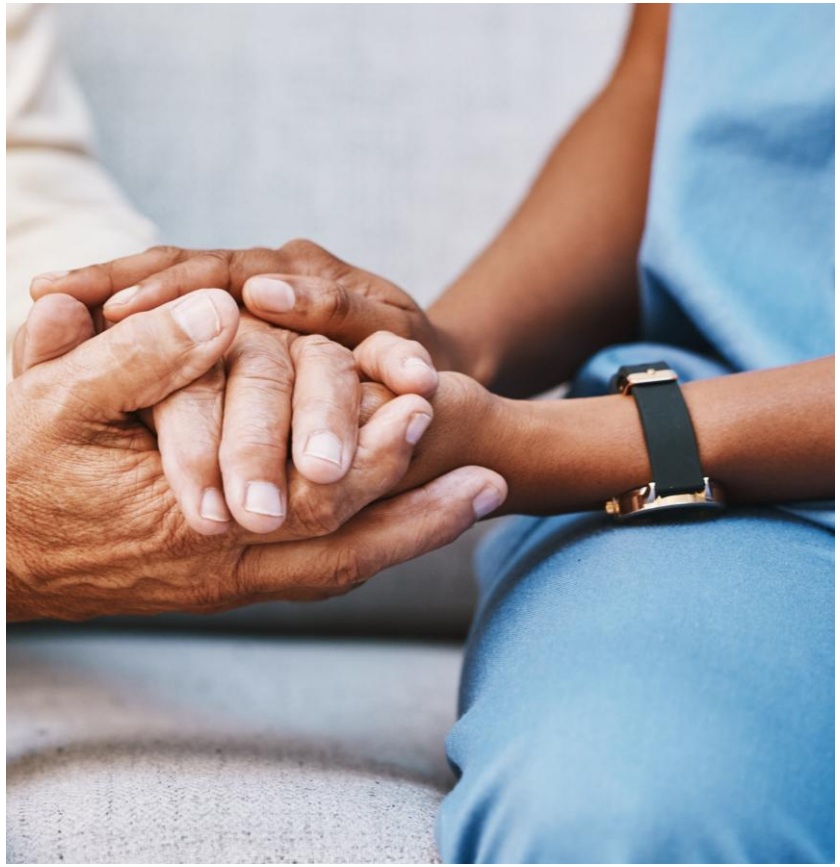
Diagnosis is complex

- The gold standard for diagnosis is to decide if a symptom is because of the disease OR the depression.
- This approach does not work in PD.
- Complex
  - May be a consequence of PD, a reaction to PD-associated changes, a separate phenomenon, or a combination of all of these (Even & Weintraub, 2012)

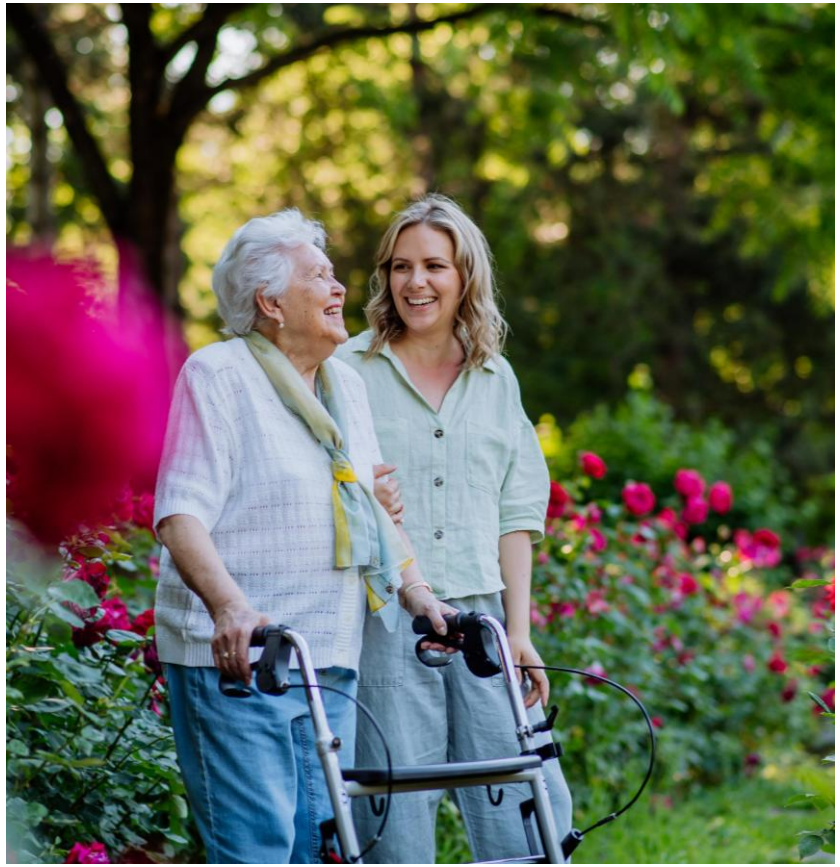


Depression can be a vicious cycle

- PD is progressive and requires continuous adaptation
- Coping is a bigger challenge than for many other physical diseases
- Increased disability may lead to functional impairment
  - Employment
  - Household management
  - Friendships
  - Relationships
- Result is usually social isolation and loneliness
  - Risk factors for cognitive issues and overall mortality

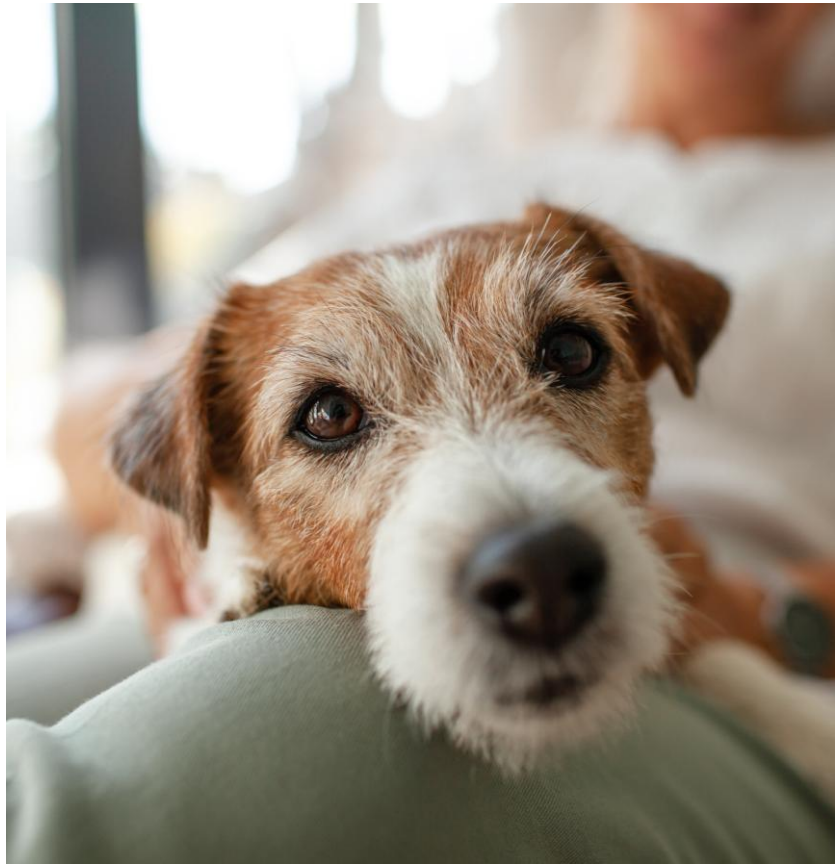
Treatments for depression

- Holistic, comprehensive approach
- Medication
- Therapy or counseling sessions
- Exercise
- Transcranial magnetic stimulation for treatment-resistive depression
- Complementary therapies
    - Massage, meditation, music, art



Strategies for support

- Stay connected – combat isolation
  - Help each other keep commitments
- Get moving and stay moving
- Engage in hobbies
- Pets for companionship
- Work with a therapist or counselor
- Support groups



Prevention

Cognitive Reserve

- The brain's ability to improvise, adapt, and find alternative ways to complete tasks.
- Agility to solve problems when faced with challenges
- Developed through experience
  - Software – not hardware
- Term originated in the Alzheimer's research area in the 1980s
  - Post-mortem brain studies showed changes in the brain (the hardware) consistent with Alzheimer's disease, but the individuals did not have symptoms
    - Their cognitive reserve offset the "hardware" damage

Building cognitive reserve

- **Learning**
  - Years of education
  - Lifelong learning
  - Staying engaged in stimulating activities

- **Cognitively, socially, and physically stimulating activities**
  - Reading
  - Playing games
  - Going to museums and concerts
  - Playing music
  - Getting outdoors

What can we learn from Alzheimer's research?

- Low education in childhood
- Hearing loss
- Traumatic brain injury
- High blood pressure
- High LDL
- Excessive alcohol consumption
- Obesity
- Smoking
- Depression
- Visual impairment
- Social isolation
- Physical inactivity
- Air pollution
- Diabetes

Livingston G, Huntley J, Liu KY, et al. Dementia prevention, intervention, and care: 2024 report of the Lancet standing commission.

Key Takeaways

- **PD is a whole-person disorder**
  - Non-motor symptoms are common, often appear before motor symptoms, and strongly predict quality of life
- **Cognitive and psychiatric changes are significant**
  - Cognitive decline is 6x more likely in PD; depression (35%), anxiety (60%), and apathy (60%) are highly prevalent
- **Treatment requires a holistic approach**
  - Medication, exercise, nutrition, therapy, cognitive training, and strong social support all play a role
- **Prevention and cognitive reserve matter**
  - Lifelong learning, physical activity, social engagement, and healthy lifestyle choices can build resilience against cognitive decline
- **More research is needed**
  - PD research is catching up to Alzheimer's research, and lifestyle modifications remain sound advice

Thank you!

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