

# **EMOTIONAL & LIMBIC CHANGES IN PARKINSON'S: UNDERSTANDING AND MANAGING ANXIETY**

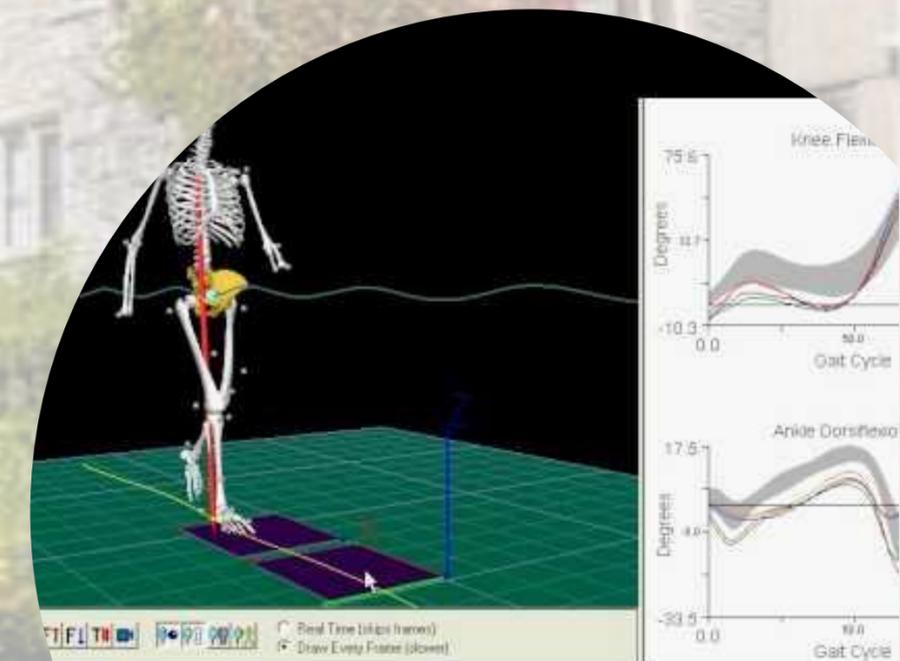
Erika Howe, PhD R.Kin

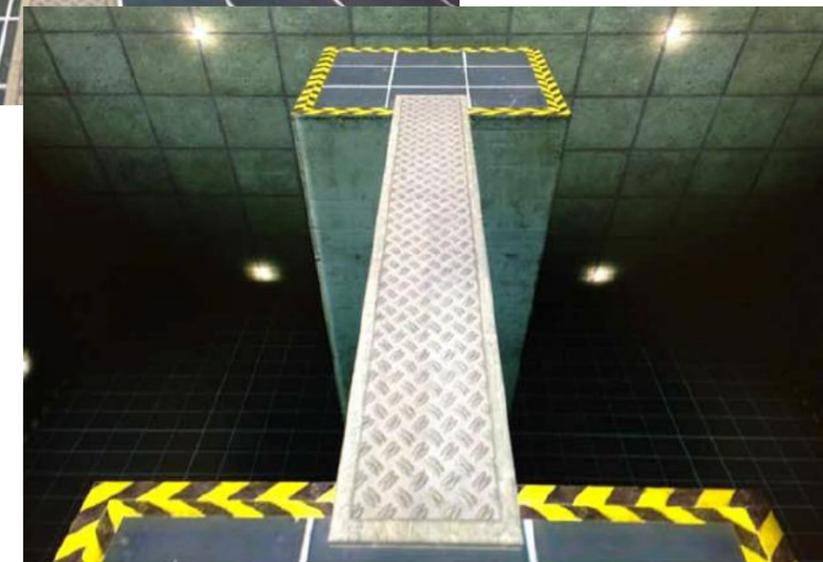
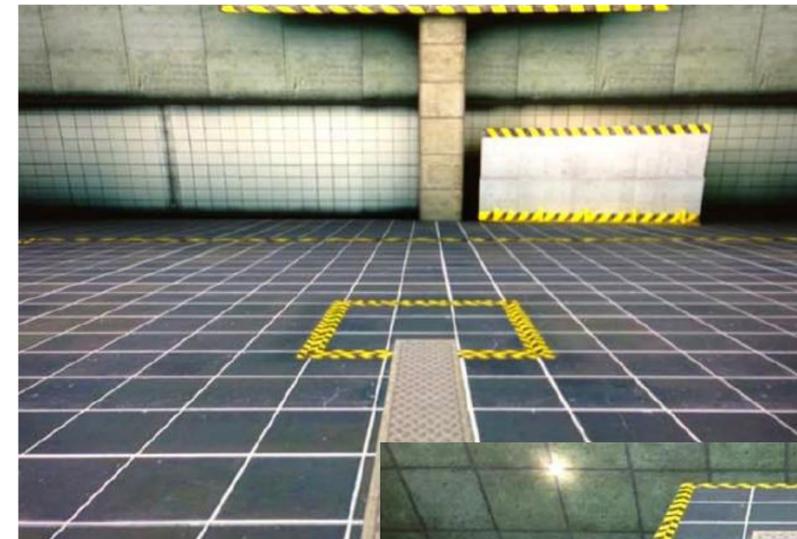
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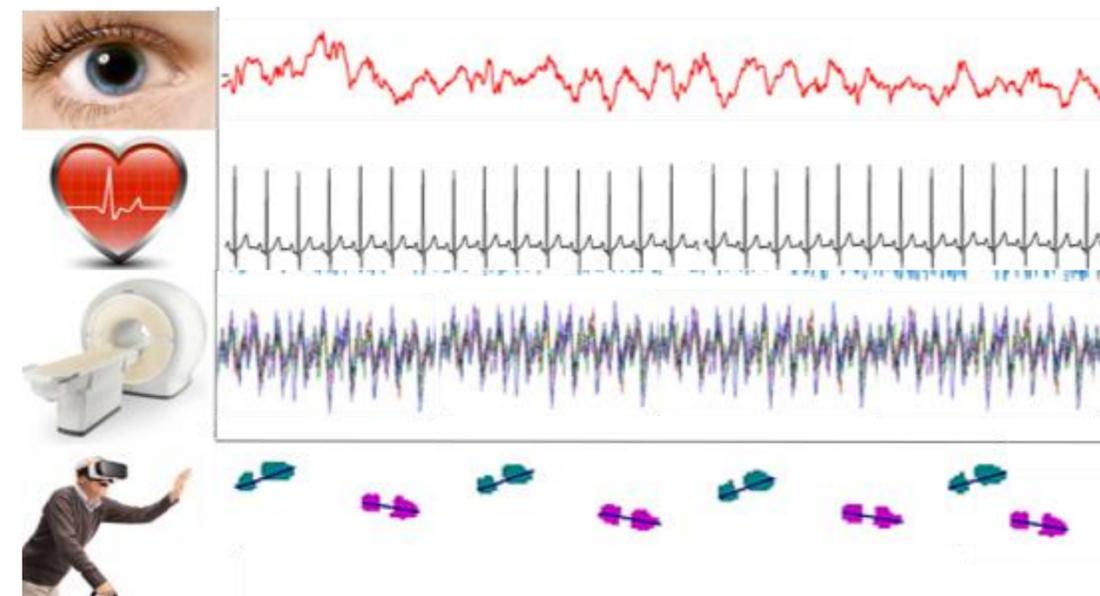
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2025

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**NEUROCOGNITION  
& MOBILITY LAB**





# BEYOND TREMOR AND STIFFNESS

## Parkinson's Affects More Than Movement

- PD affects motor and non-motor systems
  - Mood, anxiety, motivation can be involved
  - Symptoms are part of the condition —not personal weakness
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# WHAT IS THE LIMBIC SYSTEM?



Made up of amygdala, hippocampus, anterior cingulate, insula, and parts of the frontal lobes



Closely linked to motor circuits



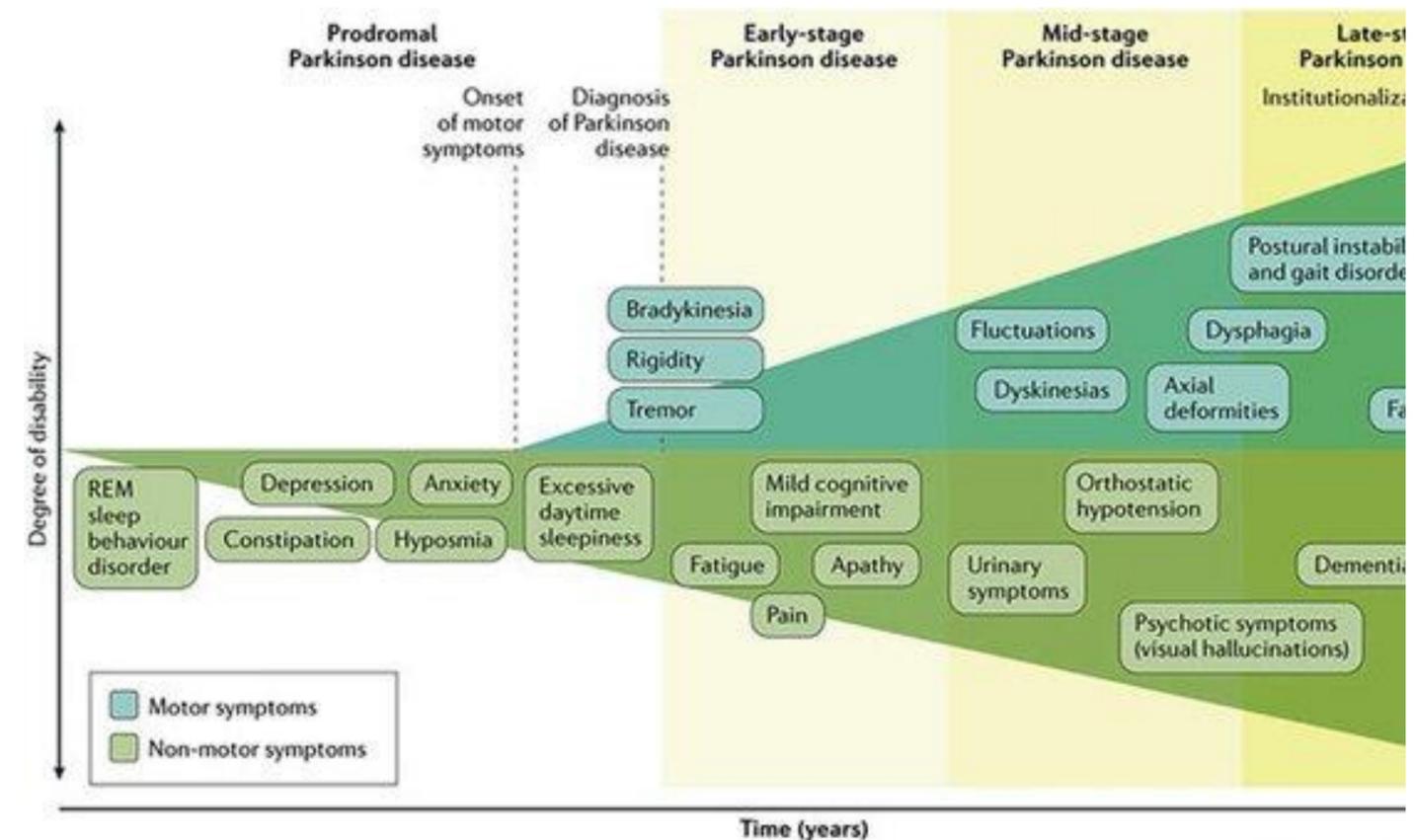
Helps us process emotions, threat, memories, and bodily sensations



Integrates memories with emotional meaning

# EMOTIONAL CIRCUITS CHANGES

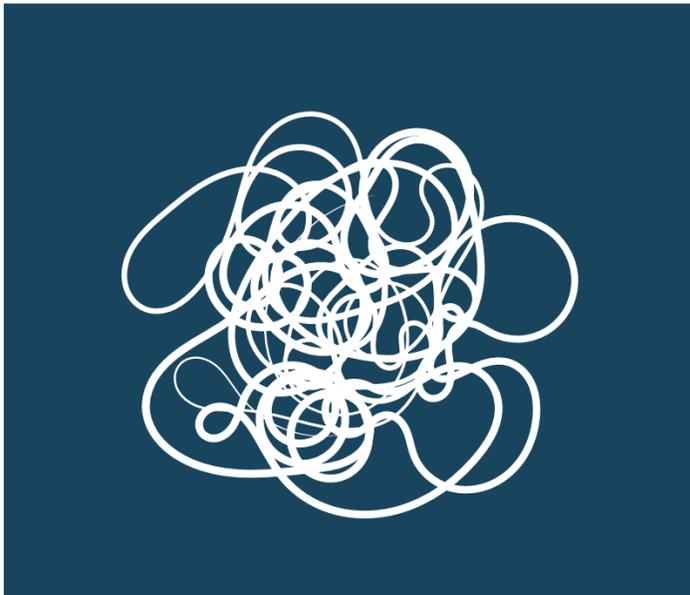
- Signaling changes in limbic regions
- Dopamine, serotonin, noradrenaline involved
- Changes may appear early



*Parkinson's affects brain circuits for emotion and stress regulation—not just movement. The same disease process that stiffens muscles can also 'stiffen' our emotional responses.*

# WHAT ANXIETY LOOKS LIKE IN PD

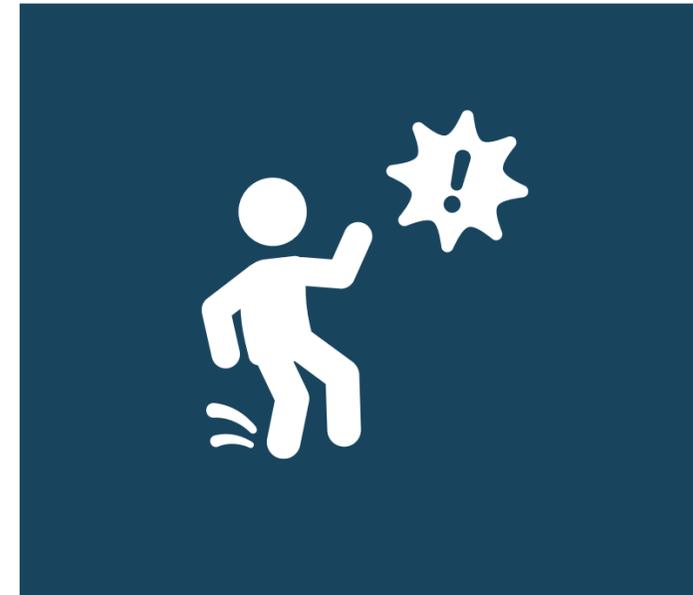
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**GENERALIZED WORRY OR  
PANIC**



**AMPLIFIED IN  
OFF STATE**

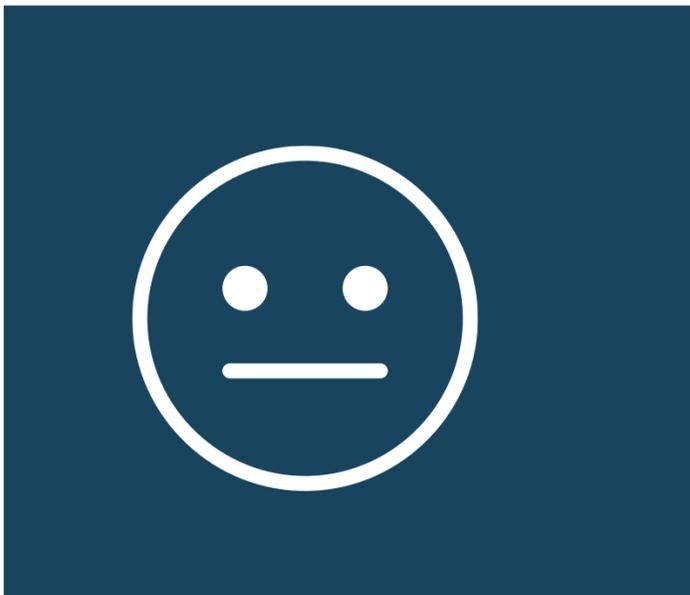


**FEAR OF  
FALLING**

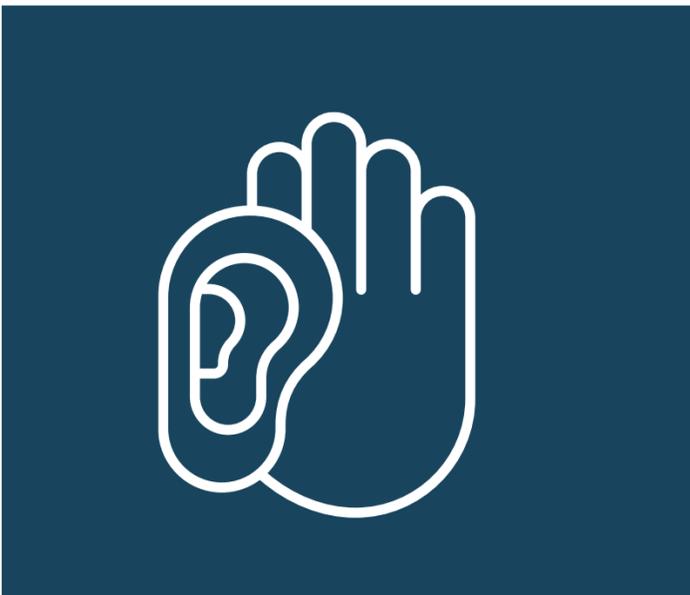


# CHANGES IN EMOTIONAL PROCESSING

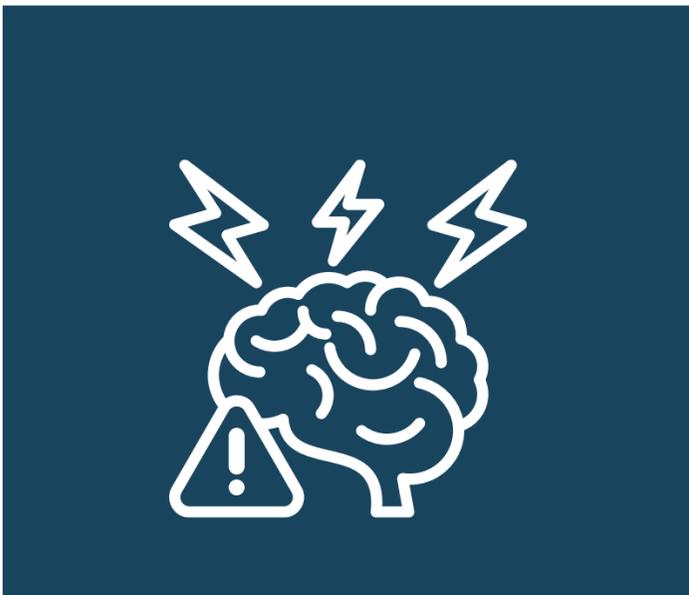
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**DIFFICULTY RECOGNIZING  
FACIAL EXPRESSIONS**

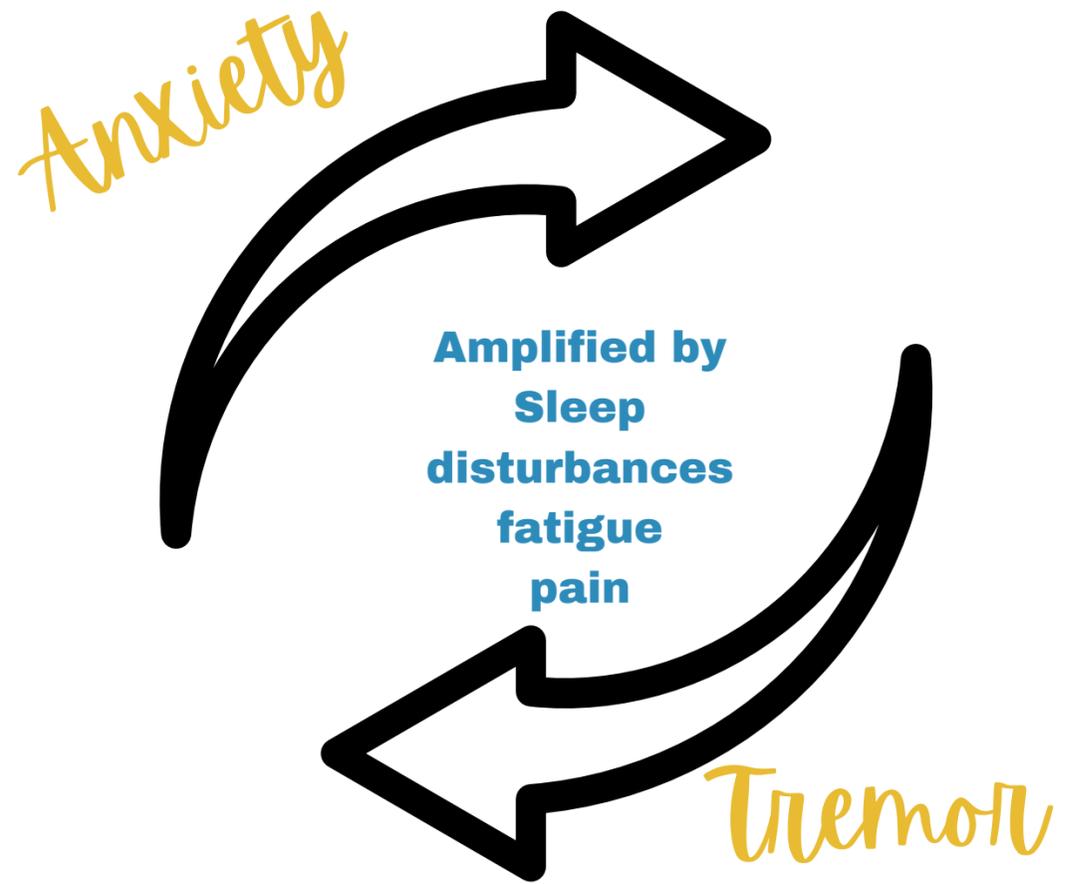


**TROUBLE READING  
SOCIAL CUES**



**HEIGHTENED  
SENSITIVITY TO STRESS**





## STRESS- MOTOR LOOP

Stress/ Anxiety can be both the source and the consequence of motor symptoms - such as tremor, rigidity and freezing of gait



# What can help?



**TALK THERAPIES  
(CBT)**



**MINDFULNESS,  
YOGA, BREATHING**



**MEDICATIONS**

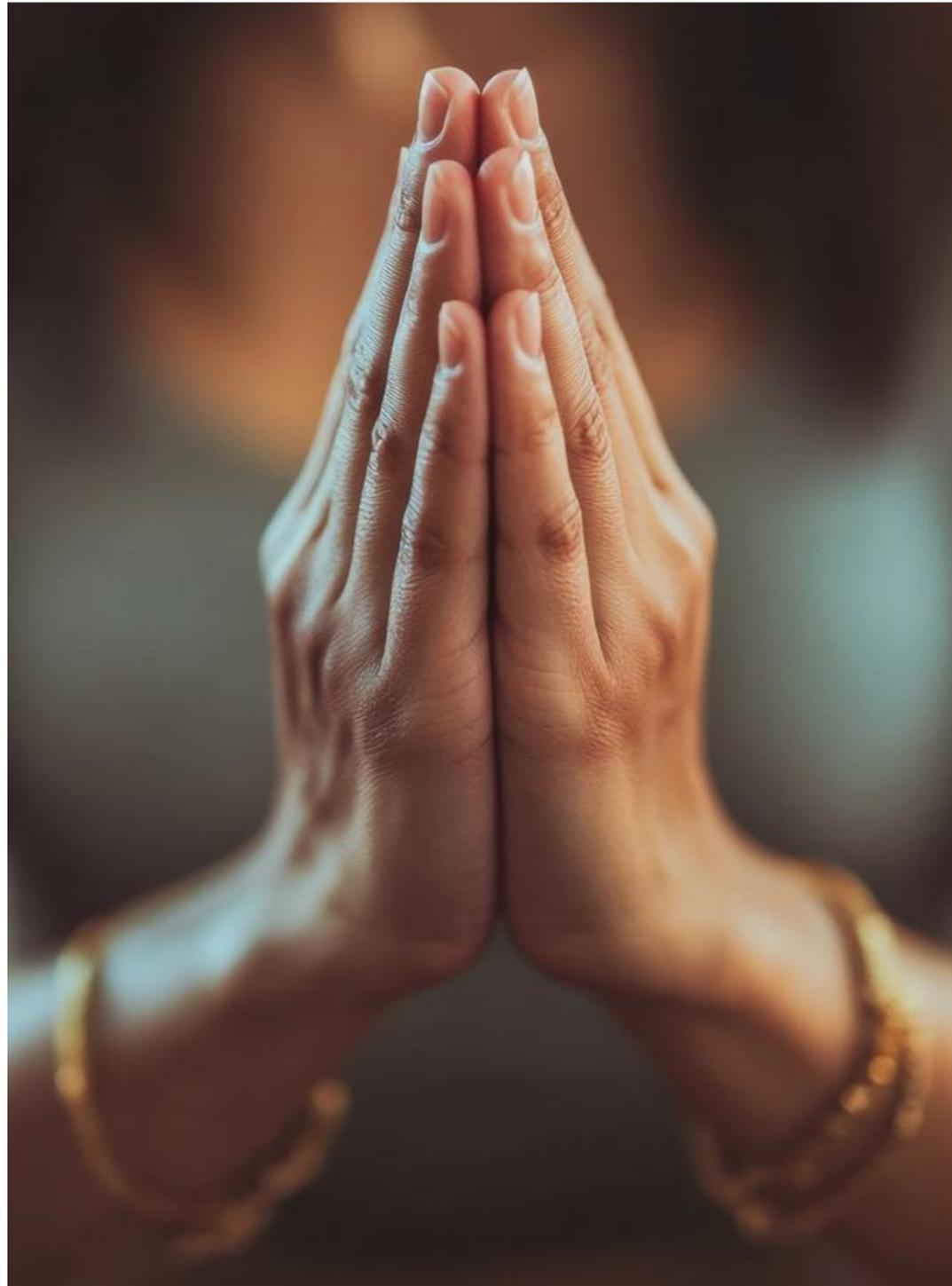


# COGNITIVE BEHAVIOURAL THERAPY

The most supported non-  
medication therapy

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- Reduces anxiety/depression
- Teaches skills to challenges worry thoughts
- Skills-based
- Works online or in person



# **MINDFULNESS, YOGA, BREATHING**

## **Calming the Limbic System**

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- Reduce stress
- Improve mood
- Adaptable for all levels



# MEDICATIONS

## When medication helps

- SSRIs/SNRIs for anxiety & depression
- Adjusting dopamine medications may help OFF-related anxiety
- DBS targeted for anxiety is emerging
- Team-based decisions with neurologist/GP

# PRACTICAL TAKE -HOME TIPS

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1. Atomic Habits (Micro-steps)
2. Slow, Belly breathing
3. Progressive Muscle Relaxation
4. Guided Imagery



# ATOMIC HABITS

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- Small enjoyable activities
- 5–10 minutes
- Boosts motivation



# SLOW YOUR BREATH

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- Slows heart rate
- Activates rest-and-digest
- Useful during OFF anxiety



# PROGRESSIVE MUSCLE RELAXATION

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- Reduces tension
- 5–10 minutes seated
- Gentle practice



# GUIDED IMAGERY

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- Visualize safe place
- Shift worry to calm images by downregulating sympathetic “fight or flight” system
- Pair with breathing

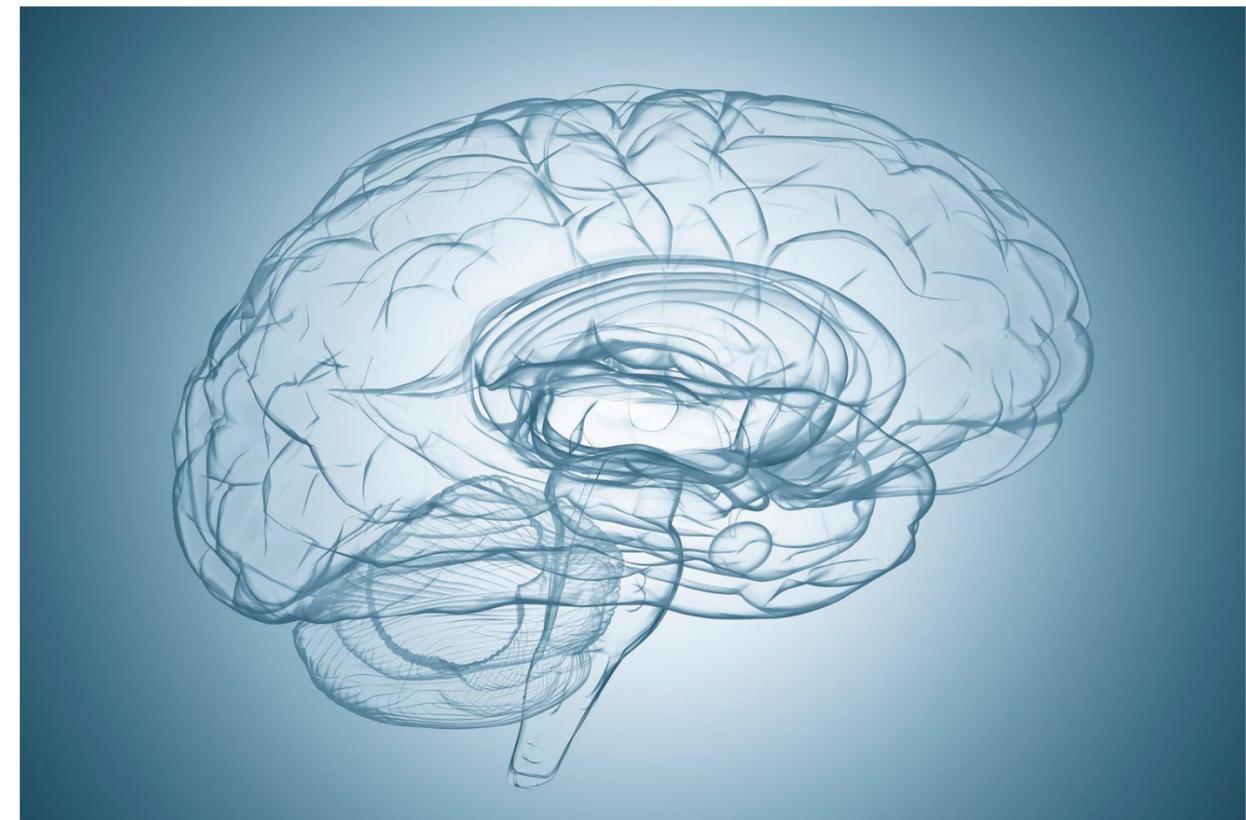
*“Imagine a place where you feel safe and at ease. Notice what you see, hear, feel in your body. Imagine yourself there as you are now, with your PD, and notice one small thing you can do comfortably in that place.”*



# KEY TAKE AWAYS

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- Emotional symptoms are common in PD
    - Limbic system is structurally and chemically affected
  - Treatments exist
  - Daily practices help
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# Examining the impact of stress and anxiety on mental and physical capacity to control mobility

## *Who?*

- People with PD **and** healthy controls
  - Able to 20m walk unassisted

## *What?*

- Online Questionnaire
- Walking in VR and sensory testing

## *Time required?*

- 1 hour - virtual
- 3 hours – in lab



# Piloting a Mindful Movement Program for Freezing of Gait

## *Who?*

- People with FOG
  - Able to 20m walk unassisted

## *What?*

- Balance and Walking Clinical Assessments pre and post therapy
- 6 biweekly sessions of Mindful Movement Program

## *Time required?*

- 8 session, 1-3 hours each



# Anti-Freeze Clinical Drug Trial for reducing Freezing of Gait

## *Who?*

- People with PD with Freezing of Gait
  - Able to 10m walk unassisted
  - *Do not have DBS*

## *What?*

- Walking conditions to provoke and measure freezing of gait in both the OFF and ON medication
- MRI imaging

## *Time required?*

- 3 sessions 1 week apart,
- each 3-6 hours long



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Participating in  
our Research?**



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**THANK YOU**



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