

A woman's profile is shown in silhouette against a background of bokeh light spots in various colors (yellow, orange, blue, green). Overlaid on her head is a glowing blue brain with several bright orange and yellow spots, suggesting neural activity or seizures. The title 'Epilepsy in Children' is written in large white font across the center. Below the title, the names of the authors are listed in a smaller white font. The overall aesthetic is soft and ethereal.

# Epilepsy in Children

Ariana Ochoa  
Emily Ramirez  
Julia Prok  
Shubnaz Jagpal  
Junior Quichocho

# What is Epilepsy

## Diagnosis and symptoms

- ★ Epilepsy is defined as “A disorder of the brain characterised by an enduring predisposition to generate epileptic seizures and by the neurobiologic, cognitive, psychological, and social consequences of this condition. The definition of epilepsy requires the occurrence of at least one epileptic seizure “
- ★ The most common seizures in children are tonic-clonic. The child will behave inappropriately prior to the seizure and during the tonic phase, they will lose consciousness for 20-30 seconds. The clonic phase then follows with jerking movements of the limbs and face. These movements will slowly stop and the child will awaken with irritability and confusion.
- ★ Diagnosis:
  - EEG (electroencephalogram)
  - An accurate history is the main diagnostic tool

# Physical Delays

- ★ Motor skill impairments that can cause children to perform slower and be more delayed in their daily tasks
- ★ Motor skill difficulties such as in:
  - Gross motor skills affect: walking, jumping, throwing/kicking
  - Fine motor skills affect: picking up objects, writing, using scissors, fastening buttons on clothes
- ★ It's important to take this into account before learning to drive, swim or even working certain jobs as it can pose for increased risk of injury

# Cognitive Delays

- ★ Seizures can impact brain maturation and cognitive function during a child's most vulnerable period of brain development
- ★ The most common cognitive delays are seen in memory impairments, mental slowness and attention deficits
- ★ Cognitive assessments are performed to properly diagnose learning and behavior problems
  - *Benign Childhood Epilepsy with Centrotemporal Spikes* (BCETS) experience reading disabilities and phonological difficulties (such as identifying words that rhyme, counting the number of syllables, and sentence construction)
  - *Focal epilepsy* affects ability of planning, organizing, attention to detail and problem solving
  - *Tuberous sclerosis complex* (TSC) shows 50-60% having mental retardation such as autism, and learning disabilities

# Goal

- ★ To reduce and to control seizures by doing certain activities to delay from having epilepsy.
- ★ While the goal of regular participation in physical activity in children and young people are clear to have a positive effect in reducing seizures and delays having epilepsy.
- ★ The goal is to have some type of physical activity which will improve the metabolic profile, bone mineral density, cardiorespiratory fitness and insulin sensitivity while lowering mortality risk in children who have epilepsy.
- ★ Importantly, the child will significantly reduce the risk of having triggers, and may improve seizure control through the child's improved overall health.



# The Solution

★ Lifestyle changes and/ or alternative treatments:

- Sleep schedule, aerobic exercise, meditation, yoga, and medications.

★ Physical Activity(aerobic): any type of running, swimming, walking, riding tricycle/bicycles, group activities, partner activities.

★ Cognitive activity(card games): gold fish, uno, memory match, etc....

-Junior Q.



# Cognitive Activities

- ★ Seizures can damage the hippocampus due to changes in brain activity, causing the hippocampus to “harden and shrink,” therefore affecting memory and learning (Epilepsy Foundation, 2022)
- ★ Effortful learning activities that utilize visuospatial and auditory stimuli should be frequently practiced over an extended period of time, promoting neurogenesis and thus improving learning and memory (Use it or Lose It, 2012) (Commonalities of visual and auditory working memory, 2021)
- ★ Neurogenesis promoted from activities can help reverse damage to hippocampus caused by seizures





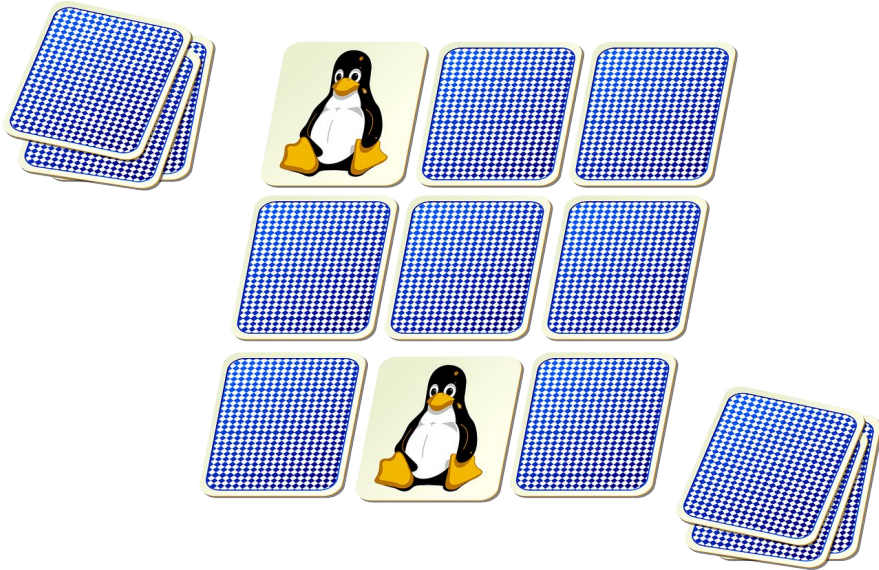
# Reading



- ★ Relevant for both language and memory related processing (Eye movements and Brain electric potentials during reading, 2012)
  - ★ Engages brain activity between both hemispheres
-



# Puzzles/Memory Match



- ★ Challenges thinking processes and promotes concentration
- ★ These activities can also encourage social engagement, which can help improve learning in a fun way

# Aerobic Exercise

- ★ It is a low to high intensity physical exercise where the goal is to use oxygen to generate energy to increase respiratory rate and heart rate.
- ★ Only low to moderate intensity is safe for those with epilepsy and can work to improve seizure control (Arida et al., 2013)
- ★ Can work to focus on:
  - Psychomotor skill development
  - Motor nerve coordination
- ★ The stimulating movement allows for the heart to pulsate and pump more blood and increase the oxygen levels as well as release hormones relating to happiness to elevate mood (Mayo Clinic Staff, 2022)
  - Releasing Serotonin, dopamine, oxytocin, and endorphins
- ★ This activity acts as a destresser as stress is a common trigger for seizures for those with epilepsy (Arida et al., 2013).

# Game of Tag



- ★ Utilizing walking, speed walking and running, children can engage in this activity of aerobic exercise
  - ★ This is also a social game, if a seizure does occur there are others to go notify someone for help
-

# Jumping Rope



- ★ Utilizing motor nerves and balance coordination to carry out the aerobic activity of jumping over a rope
  - ★ Allows for quick efficient way to generate energy with a low intensity activity
-

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# The Positive Effects of Exercise on Multiple Sclerosis

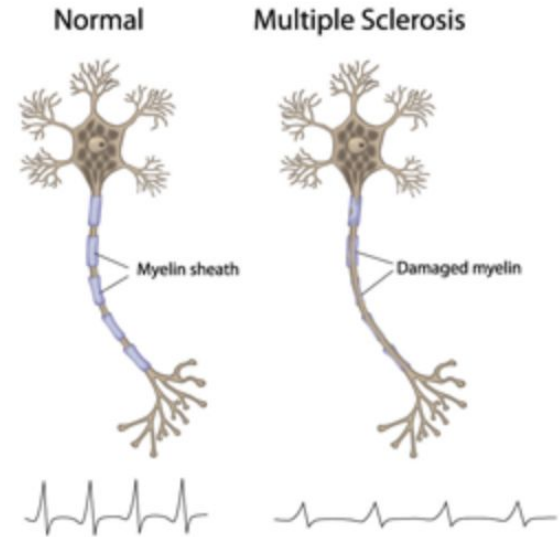
Aveneet Grewal, Lynise Perez, Nieves Ramirez,  
Rachel McClure, and Sofie Eberhardt





# Multiple Sclerosis (MS): What Is It?

- Chronic inflammatory disease of the Central Nervous System (brain and spinal cord)
- Immune system attacks myelin sheath
- Causes communication problems between the brain and the body
- Eventually can result in permanent damage or deterioration of the nerves





## Who is Most Affected by MS?

- Women (3x more common than men)
- Ages 20-40 more common

- Low vitamin D levels
- History of smoking
- Obesity
- Recent research: specific viruses
  - (i.e) Epstein-Barr virus (EBV)

# Diagnosis

No specific test for MS.

Detailed Hx, Physical, Neuro exam

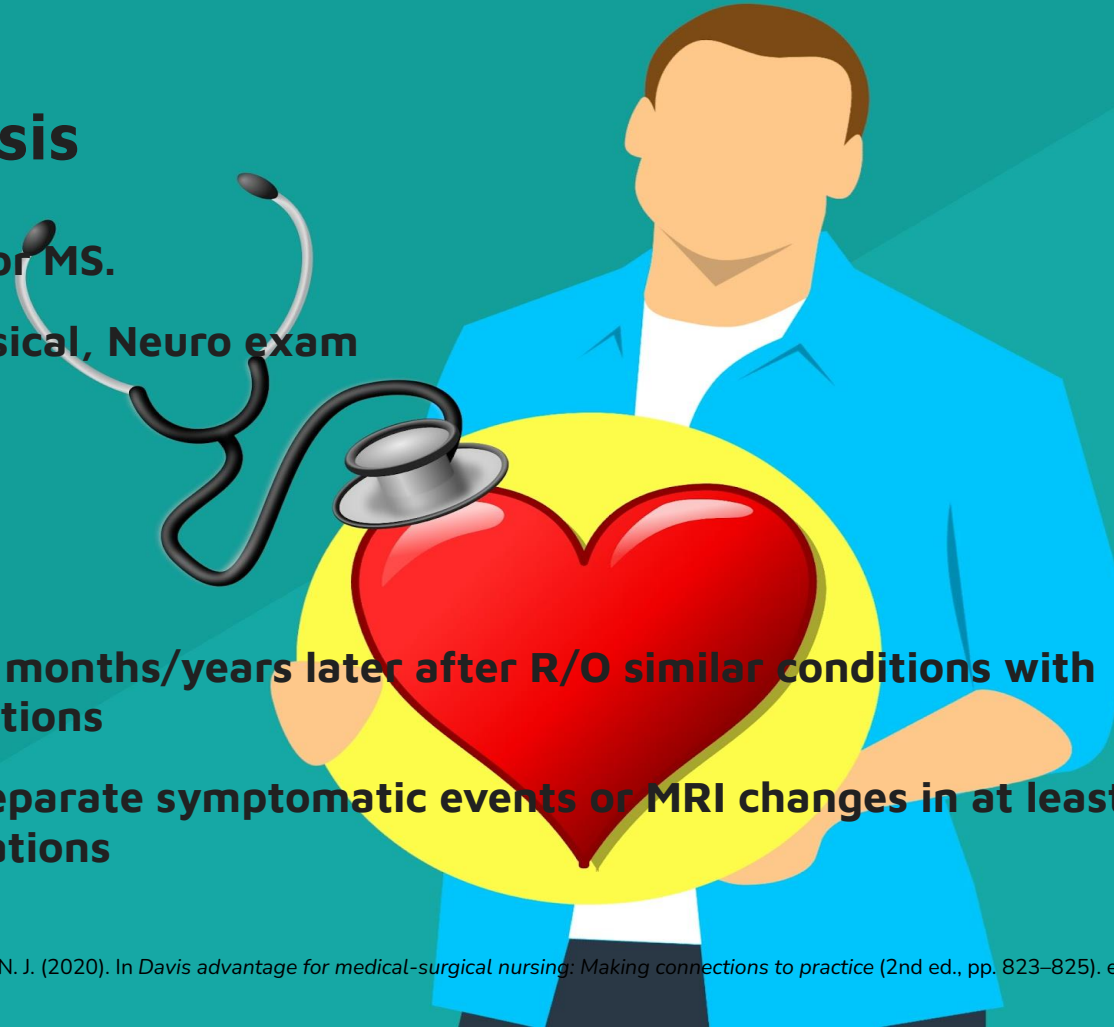
Blood samples

lumbar puncture

MRI

Dx is often made months/years later after R/O similar conditions with similar manifestations

Definitive Dx 2 separate symptomatic events or MRI changes in at least two separate locations





# Diagnosis

Criteria for diagnosis of multiple sclerosis in patients with an attack at onset

≥2 attacks; objective clinical evidence of ≥2 lesions or objective clinical evidence of 1 lesion with reasonable historical evidence of a prior attack

≥2 attacks; objective clinical evidence of 1 lesion

*Dissemination in space, demonstrated by:*

- ≥1 T2 lesion on MRI in at least 2 out of 4 MS-typical regions of the CNS (periventricular, juxtacortical, infratentorial, or spinal cord)  
OR
- Await a further clinical attack implicating a different CNS site

# Treatment

There is no formal cure for Multiple Sclerosis

Goals Improve speed of recovery from attacks, reduce number of attacks and slow progression of the disease

Treatment involves:

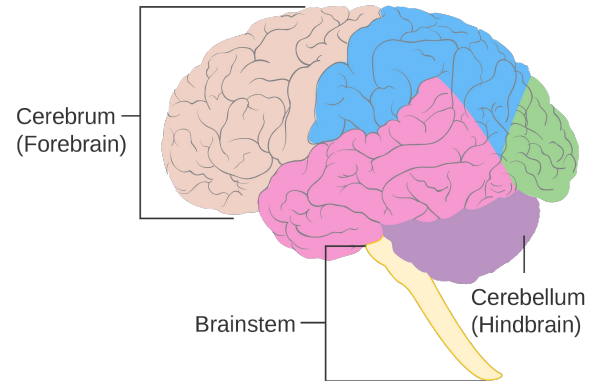
- Avoiding flare ups
- Lifestyle management
- Eating healthy balanced diet
- Rest
- Exercise
- Avoiding heat
- Avoiding stress

Medications:

- Immunosuppressants to slow progression of disease
- Corticosteroids and plasmapheresis to decrease the inflammatory and immunologic factors
- Muscle relaxants decrease spasms
- Physical Therapy helps strengthens muscles and improve daily function

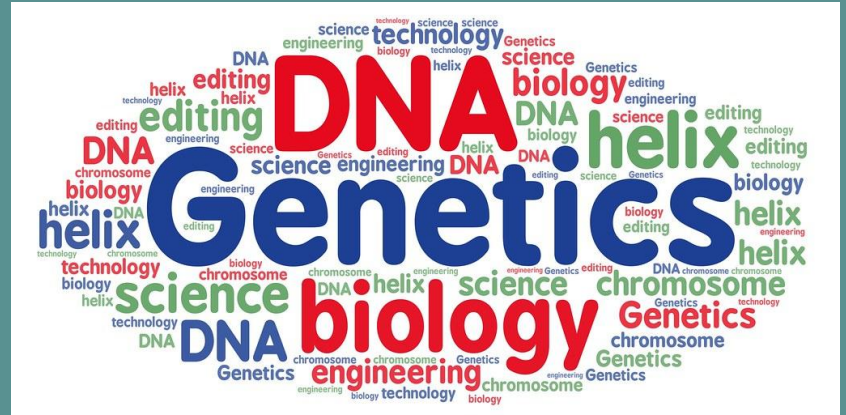
# How MS Affects the Brain

- MS leads to cognitive problems in individuals
- Brain signals are interrupted and may cause individuals to have difficulty
  - Remembering things
  - Remembering words
  - Problem solving and planning
  - Processing information
  - Concentrating
  - Judgement of size and distance
- Emotional Imbalance
  - Sadness
  - Anxiety
  - Low self-esteem
  - Stress



# Genetics

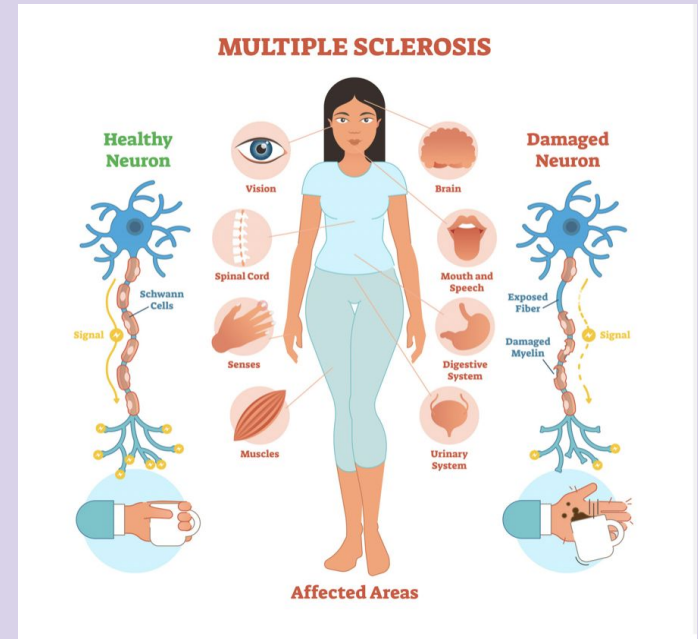
- Autoimmune disease
- Not genetic disease
  - Genetic variations may increase the risk
- Higher chances of Multiple Sclerosis if close relative is diagnosed





# How MS Affects the Body

- Depends where nerve damage occurs, difficult for brain to communicate to body.
- Along with brain interruptions...
- Vision
- Swallowing
- Breathing
- Weak immune system
- Poor hand-eye coordination
- Cardiovascular
- Balance
- Muscle weakness





# Our Plan



## Who is in the group?

- Our plan is designed for women 20 to 40 years old
- Women with and without a diagnosis of Multiple Sclerosis are welcome

## What is the intention of the group?

- To decrease the likelihood of developing multiple sclerosis and slow the progression of multiple sclerosis for those who are already diagnosed

## What is our plan?

Group Exercise regimen including:

- Yoga
- Walking
- Jogging
- HIIT
- Range of motion

Able to do indoors and outdoors with limited equipment.

Equipment required:

- Yoga mat
- Light hand weights
- Walking shoes





# Why Exercise Helps

The benefits of exercise in improving physical performance, mental function and general wellbeing are indisputable, we now know these benefits extent to possible neuroprotection of the nervous system

Growing research in human studies indicates the neuroprotective role of exercise against stroke, Parkinson's disease and MS [10,11]. In persons with MS, exercise can decrease neural apoptosis and neurodegeneration, and may be effective at stimulating neuroplasticity, as overall exercise increases neurological functioning [10].

In human studies, evidence from exercise intervention studies indicates exercise improves outcomes measured by neural imaging and improves peripheral biomarkers associated with neural health [13], and that exercise may assist in overall brain preservation [14].



# Different Types of Exercise

- Aerobic exercises
- Stretching/ Range of Motion
- Progressive strength training
- Yoga
- Task-specific training (ex: Gait training, balance deficits)

# Additional Benefits of Plan: Social Aspect

- Group exercise creates an environment where individuals can converse with others. Having a community of women, specifically others with similar diagnoses may provide a safe place to share one's feelings and experiences.
- Group exercise may increase motivation and attendance since there are others counting on you. Group exercise has also been proven to improve physical and cognitive functioning as well as quality of life



- A 12 week study was conducted to compare the effects of a group exercise program. Exercising 3 times a week had a larger positive impact on mental health than exercising twice a week. Exercise also helps assist the elderly in maintaining their independence.
- <https://www.youtube.com/watch?v=gyhlnxlyehA>

Rugbeer, N., Ramklass, S., Mckune, A., & van Heerden, J. (2017). The effect of group exercise frequency on health related quality of life in institutionalized elderly. *The Pan African medical journal*, 26, 35. <https://doi.org/10.11604/pamj.2017.26.35.10518>

A stylized illustration of a woman with dark hair, wearing an orange jumpsuit, sitting in a meditative lotus position. Her eyes are closed, and her hands rest on her knees. The background is a large, bright yellow oval. In the top left corner, there is a small grey and white graphic element.

**Thank You!**

**We hope you learned from our presentation!**

**Any Questions?**



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# Effectiveness of Tai Chi in Patients with Parkinson's Disease



Joshua Stridiron, Juan Gonzalez, Joshua  
Spowart , Xian Joseph, Edwin Ramirez

## Study characteristics and goal of research

- Male, XY
- 60-65+ Senior population
- Studies come from the U.S participants are American with the exception of one from Korea.
- All participants must be within stage 1-3 of Parkinson's disease
- All studies included programs with TC and other forms of exercise to obtain an accurate timeline for these supposed benefits to take effect
- Goal of our research was to find whether TC has a significant impact to consider this as a possible treatment.



# Parkinson's Disease and risk factors

Parkinson's disease is a neurodegenerative disease that reduces the amount of dopamine neurons in the nigrostriatal pathway.

Treatable but cannot be cured

Risk factors include:

Age, Sex, Genetics

External risk factors include:

Head trauma, metals, chemicals





## 3 Phases of PD

- Pre-symptomatic Phase
  - Olfactory symptoms
  - Constipation
- Non-motor Phase
  - Mood disorder
  - Sleep Disorder
- Motor Phase
  - Tremor, Rigidity, Dementia
  - POSTURAL INSTABILITY
  - 5 Different Stages



# Five Stages of PD

- First Stage - the initial stage, the person displays mild symptoms that generally do not interfere with daily activities. Movement symptoms occur in one side of the body and changes in posture, walking, and facial expressions can occur.
- During stage 2, the person's symptoms start getting worse. Tremors and rigidity are now present in both sides of the body.
- Stage 3 presents significant changes to the function of a patient. Loss of balance and significantly slower movements are the major changes that are experienced by the patient.
- Stage 4 symptoms become a significant jump from stage 3. The symptoms become more limiting and more severe. Daily activities require assistance and simple tasks like walking may require a walker.
- Stage 5, is the most crippling stage. They may be unable to stand or walk at all due to stiffness of the legs.

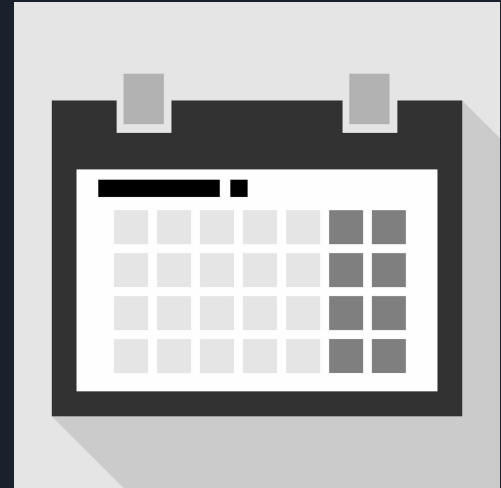
# What is Tai Chi ?

- Martial Art
- Practiced for over 5,000 years to today
- Most common style practiced is Yang style
- A series of movements which provide gentle stretching and physical movement.
- Based in the philosophy of Taoism



# Proposed Program

- 3 months
  - 4 times a week
  - 60 minute session
- Individual or group sessions
- Functional Tests done before & after the program
  - Arm curl
  - 30 second chair stand test
  - Timed up and go test
  - Back scratch test





# Effects of Tai Chi on PD

- Groups participating in Tai chi program demonstrated significantly better balance (Ćwiękała-Lewis, 2017).
- Groups demonstrated better results in all functional tests compared to control groups (no Tai Chi).
- Improvements in Emotional well being/Quality of Life (Nocera, 2013)



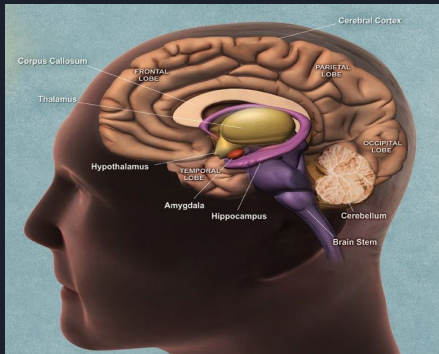
# Images of brain while doing TC for PD patients

This study shows the effect of different exercises on the brain. As shown the areas light up in prefrontal cortex, basal ganglia and thalamus

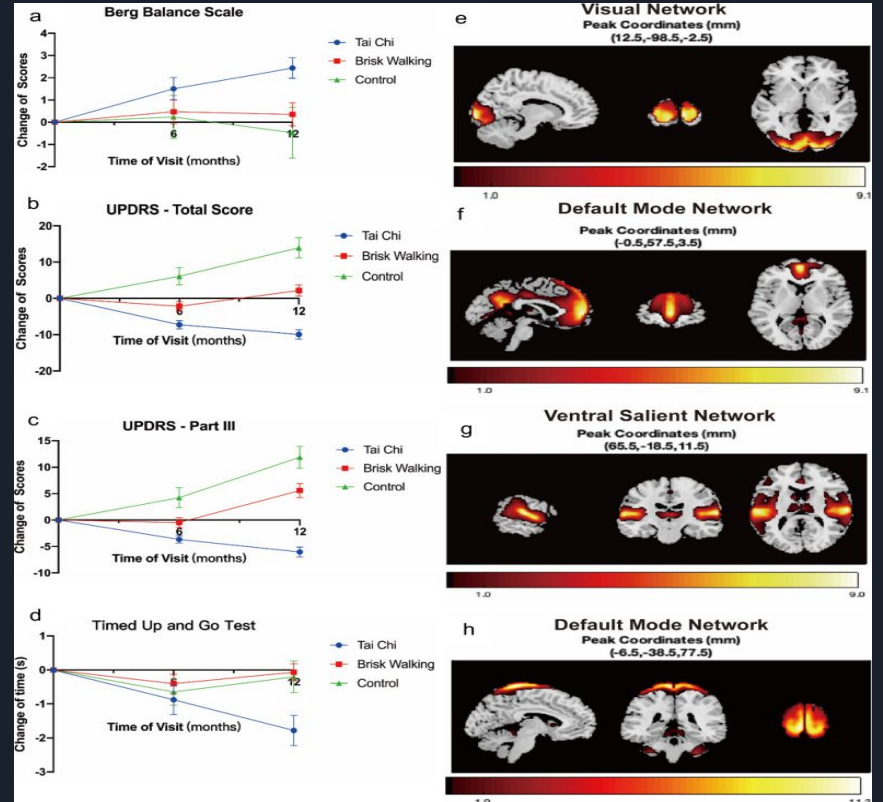
Prefrontal cortex= executive functioning

Basal Ganglia= motor control

Thalamus= relay station for the movement.



Sources: doi: 10.1186/s40035-022-00280-7.



# Psychological Benefits of Tai Chi on PD Patients

- Parkinson's Disease patients who participated in Tai Chi were concluded to have improvements in psychological well-being.
- PD Patients expressed improvements in self-esteem, belonging, and a higher sense of community
- PD Patients who participated in Tai Chi revealed a decrease in stress, anxiety, depression, and mood disturbance
- Tai Chi is used to prevent and treat psychosomatic disorders in Parkinson patients as well as other diseases worldwide.





# Conclusion-YES!

Various studies discussed above have shown the improvements on the physical and mental well-being of those practicing TC as a way of combating the effects of Parkinson's. TC is a holistic approach which can have a positive impact on the disease neurodegenerative process. One biological benefit to TC is the fall prevention that comes with the physical benefits. A psychological benefit is the reduction of stress in those that practice TC. A social benefit is TC is often practiced in groups making it an ideal setting to connect with others.



# Questions



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