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APPLIED
SCIENCES



WELLBEING
RESEARCH CENTRE

Effects of Square Stepping Exercise and Art Therapy on Nutritional Status, Cognitive and Psychological Well-being of Older Adults with Parkinson's Disease

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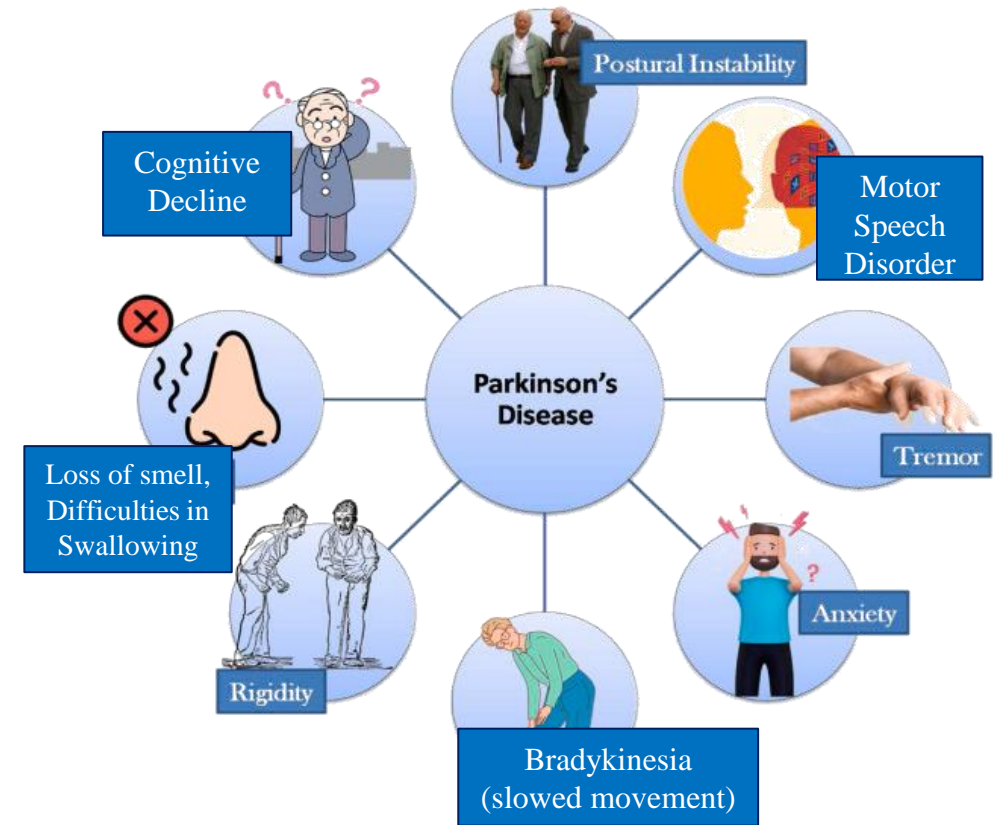
PARKINSON'S DISEASE (PD)

Neurodegenerative disorder characterized by progressive motor and non-motor symptoms

↑ Deterioration of the bodily functions
↓ Mobility

↑ Dependency
↑ Social isolation

↓ Reduce quality of life



(Nag & Jelinek, 2019; Pillai et al., 2023; Islam, 2024)

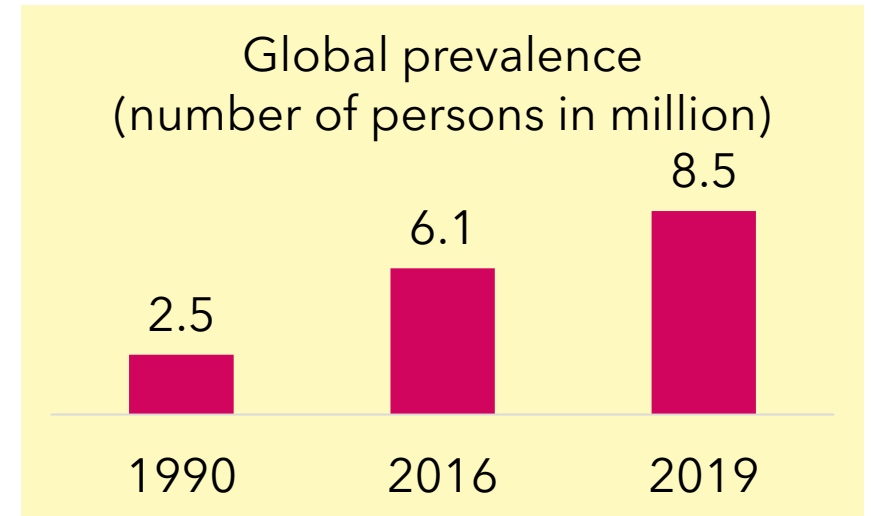
PARKINSON'S DISEASE (PD)

Fastest growing type of **neurological disorders** in terms of:

- **Prevalence:**

- Global prevalence: more than doubled in the past 25 years
- Malaysia: Increased by 26.4% between 1990 and 2016
- Among older adults (≥ 60 years): 34% in Serdang Hospital

- **Disability:** 5.8 million disability-adjusted life years (DALYs) in 2019 → an increase of 81% since 2000
- **Death:** 329,000 deaths in 2019 → >100% increased since 2000



(Dorsey et al., 2018; Sakdiah et al., 2018, Scheiss et al., 2022; WHO, 2023)

PARKINSON'S DISEASE (PD)

- Ageing is the number one risk factor for PD
 - Increasing longevity lead to a longer disease duration
 - PD is uncommon among individuals below 50 years old, but increased with age thereafter
 - Peaked between 85 and 89 years old
- Higher prevalence in men than in women

(Collier et al., 2017; Dorsey et al., 2018; Coleman & Martin, 2022)

- Motor symptoms usually resulted from low levels of dopamine in the brain → most pharmaceutical treatments aimed at replenishing or mimicking dopamine.
- Levodopa → most effective drug, but prolonged use at high doses may lead to dyskinesia or involuntary movement

(Nag & Jelinek, 2019)

NON-PHARMACOLOGICAL MANAGEMENT OF PD

Non-pharmacological management, such as exercise, and counselling on sleep & diet, may relieve motor and non-motor symptoms of PD patients

- In animal models:
 - Exercise → neuroprotective → promotes cell regeneration & reduces oxidative stress
- In PD patients:
 - Aerobic exercise → improve gait and balance
 - Tai Chi, yoga and dance → improve postural stability, reduced rigidity, and increased muscle strength
- Social connectivity and supportive social network → prolong independence and improve coping ability

(Nag & Jelinek, 2019; Scheiss et al., 2022; Subramanian et al., 2023)



SQUARE-STEPPING EXERCISE (SSE)

Developed by Shigematsu and Okura (2006). The SSE was found to:

- Improve physical health and reduce risk of falls among older adults.
- Improve cognitive functioning → need to memorize and repeat the steps in orderly manner
(Shigematsu et al., 2008; Teixeira et al., 2013)
- Reduce depressive symptoms → through social interaction (Pereira et al., 2014).

Among older adults with Parkinson's Disease, SSE:

- Improved executive functions (Liu et al., 2022)
- Improved balance and mobility (Ravinchandran et al., 2017)



ART THERAPY (ART)

Art therapy:

- Enhances mental health through active art making, creative process, and human experience
- Provides cognitive stimulation that can be effective in treating dementia and other age-related conditions
- Reduces stress → prevent or slow the progression of diseases

Social interaction and emotional processing through the practice of the arts → improve psychological health (e.g., reducing loneliness, depressive symptoms and anxiety)

(Galassi et al., 2022)

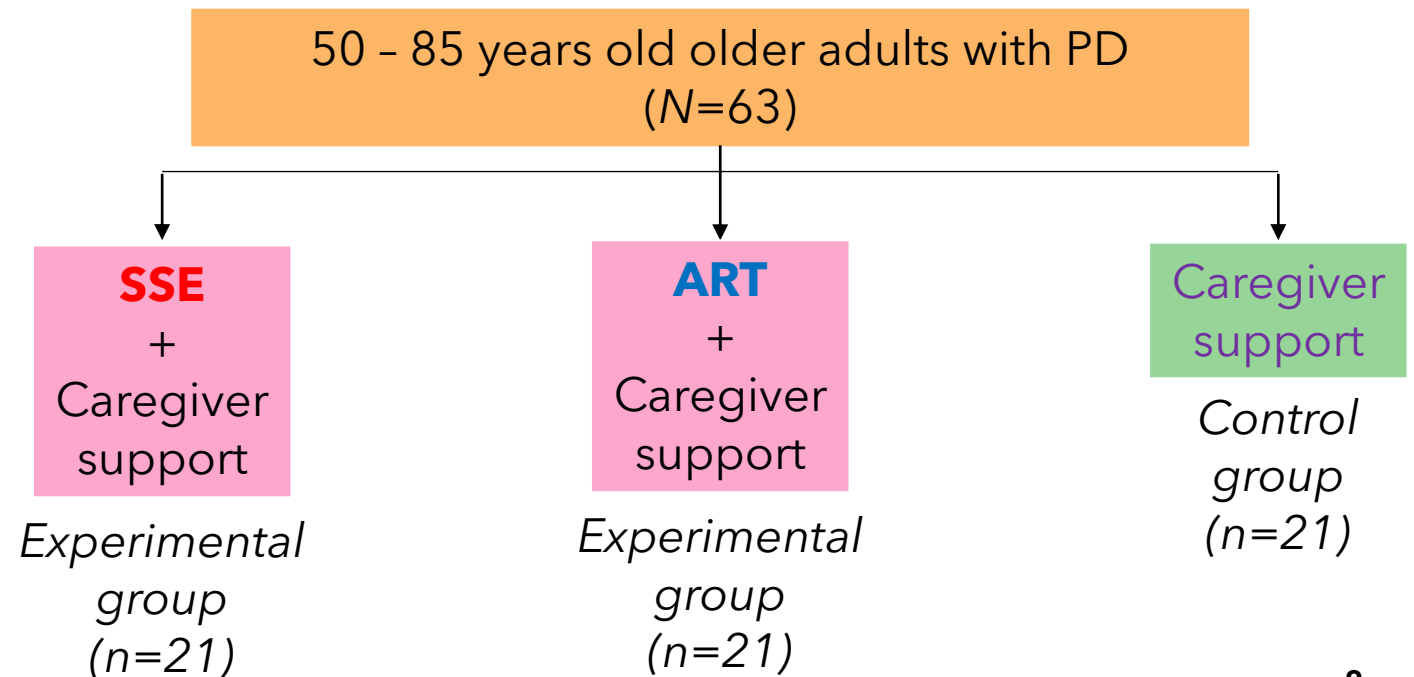


OBJECTIVE

To determine the effects of square stepping exercise (SSE) and art therapy (ART) in improving **nutritional status**, **cognitive** and **psychological** well-being of older adults with Parkinson's Disease (PD).

STUDY DESIGN

- Randomized controlled trial (RCT)
- 8 Weeks, twice a week
- Malaysian Parkinson's Disease Association (MPDA) Centre
- Ethical approval: UCSI IEC (IEC-FAS-2024-0003)



SCREENING

- 50 – 85 years old
- Clinical diagnosis of PD
 - Hoehn and Yahr stages 1-3
 - Unilateral involvement - Mild/moderate bilateral involvement, some postural instability, but physically independent
- Stable anti-PD medication
- Able to walk 10 m with or without any assistive device
- Mini Mental State Examination, MMSE \geq 21
 - Normal / mild cognitive impairment
- No significant visual and/or hearing impairment or colour blindness
- Not diagnosed with terminal illness (e.g., cancer) or major psychiatric disorder (e.g., schizophrenia)



INTERVENTION

Square-Stepping Exercise (SSE):

- 10-minutes warming up, followed by a 40-minutes SSE, and ended with a 10-minutes cooling down exercise
- Perform on a 2.5 x 1.0 m thin mat partitioned into 40 squares
- Consists of a series of forward, backward, lateral and diagonal steps. With each sequence, the complexity of the steps combination increased
- 8 basic steps + 26 challenging steps



INTERVENTION

Art Therapy (ART):

1 hour session, based on theme/art activity as follows:

Topic	Medium
Participant introduction	Oil pastel - Draw something about themselves
Basic techniques of clay manipulation	Clay - Basic techniques in manipulating clay (coil, slab, pinch) → create any object that they wish
Basic painting	Paint on canvas - develop own paintings
Collage	Create an environment that they may like to live in by arranging and manipulating the materials provided
Immediate figurative arts	Pastel water colour or paint. Subject draw image of bridge & mark with a dot where they feel they are located on the bridge
Box making	Origami
Figure moulding miniature 3D human	Clay, paper, pipe cleaners and soft fabrics. Develop a unique human figure utilizing materials provided.
Group art	Mural



CONTROL

Caregiver support:

- Conduct in a group of 8-10 participants
- Open session
- Discuss their problems
- Identify caregiver-related stress, and prevent psychological, physical, behavioural and social problems among the caregiver



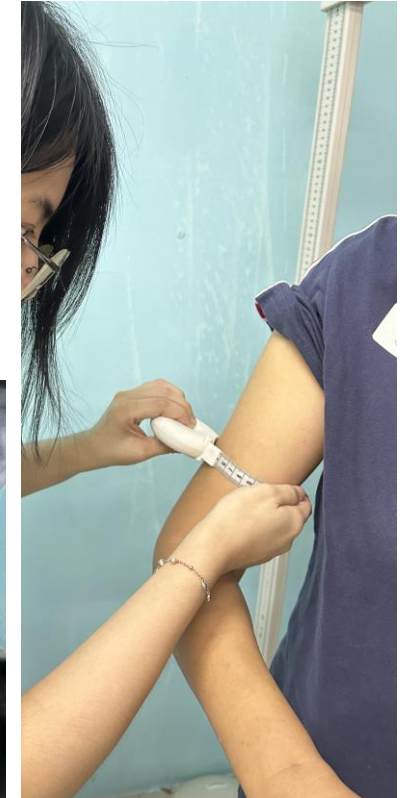
MEASUREMENTS

Nutritional Status

Mini Nutritional Status Assessment (MNA)

- Widely used to determine the risk of malnutrition in geriatric population (Guigoz, 2006; Vellas et al., 1999)
- Validated among elderly population in Malaysia (Suzana & Siti Saifa, 2007)
- Includes:
 - Anthropometric measurements
 - Global assessment
 - Dietary questionnaire
 - Subjective assessment

MNA score	Nutritional status
24 - 30	Normal
17 - 23.5	At-risk of malnutrition
< 17	Malnourished



MEASUREMENTS

Functional Mobility

Timed 'Up and Go' (TUG) test (Mathias et al., 1986; Podsiadlo & Richardson, 1991)

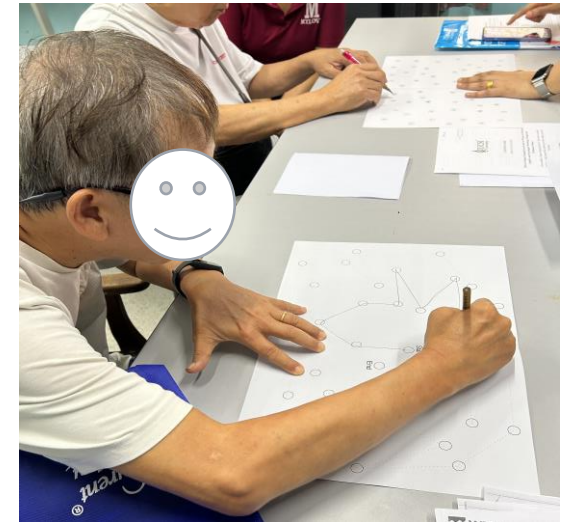
- Stand up from a chair → walk 3 metres → turn around → walk back to the chair → sit down again.
- The time from the patient rises from the chair until he/she sits down again will be taken and recorded in seconds.
- Longer time indicates poorer mobility and higher risk of falls



MEASUREMENTS

Cognitive Functions

- Memory
 - Wechsler Memory Scale - Fourth Edition
 - Visual memory
 - Visual working memory
- } Use picture, do not require reading
- Executive Function
 - Comprehensive Trail Making Test (Reynolds, 2002)
 - Connect series of stimuli (e.g., numbers, letters) in a specified order as quickly as possible
 - Global Cognitive Functions
 - Mini Mental State Examination (MMSE) (Folstein et al., 1975)
 - 11 items: orientation to time, orientation to place, registration, attention and calculation, recall, language



MMSE score	Severity level of cognitive impairment
21 - 26	Mild
15 - 20	Moderate
10 - 14	Moderately severe
0 - 9	Severe

(MOH, 2009)

MEASUREMENTS

Psychological Wellbeing

- Depression
 - Geriatric Depression Scale (GDS-15) (Sheikh & Yesavage, 1986)
 - Has been validated among elderly in Malaysia (Nikmat et al., 2021; The & Hasanah, 2004).
 - 15 items with a “yes” and “no” response
- Anxiety
 - Parkinson Anxiety Scale (PAS) (Leentjens et al., 2014)
 - 12 items, 3 subscales: persistent anxiety (5 items), episodic anxiety (4 items), and avoidance behaviour (3 items)
 - Rate the extend of each symptom in the past 4 weeks on a scale of 1 (not at all or never) to 4 (severe or nearly always)
 - Higher total score indicates higher anxiety level.

GDS-15 score	Category
0 - 4	Normal
5 - 8	Mild Depression
9 - 11	Moderate Depression
12 - 15	Severe Depression

(Greenberg, 2007)

MEASUREMENTS

Psychological Wellbeing

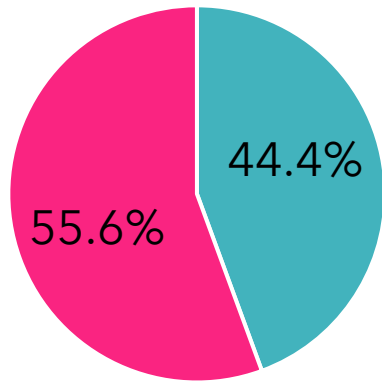
- Quality of Life
 - Health-related Quality of Life - Parkinson's Disease Questionnaire (PDQ)-39 (PDQ-39) (Jenkinson et al., 1997; Peto et al., 1995).
 - Disease-specific subjective measure of health status
 - 39 items, with 8 important domains for PD patients: mobility, activities of daily living, emotional well-being, stigma, social support, cognitions, communication, and bodily discomfort
 - Each item is scored on a 5-point scale ranging from 0 (never) to 4 (always)
 - Overall score = sum up all of the dimension total scores and divide it by 8
 - Higher total score indicates poorer quality of life



PRE-TEST FINDINGS

Sex (*n*=9)

■ Male ■ Female

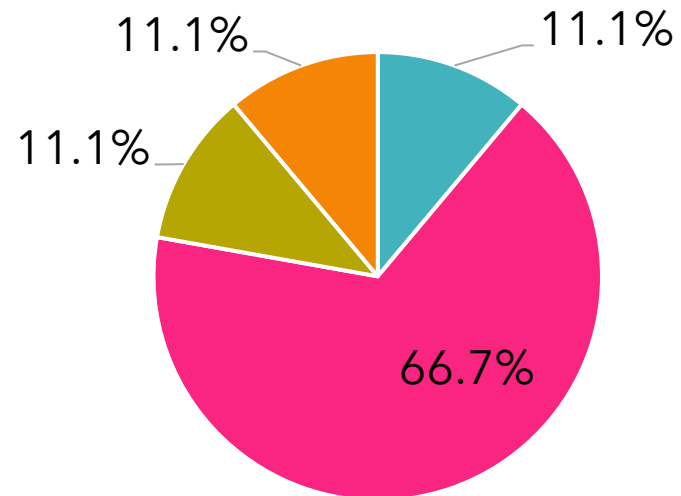


Mean age:

68.00 ± 7.43 years old

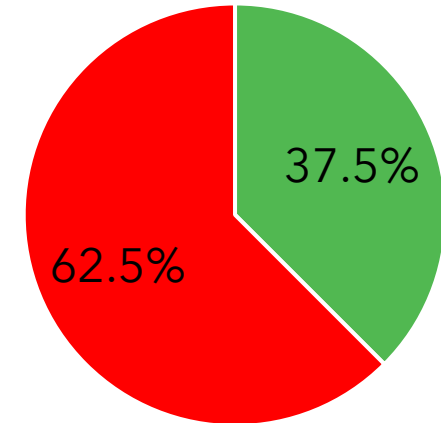
Ethnicity (*n*=9)

■ Malay ■ Chinese ■ Indian ■ Others



Risk of Malnutrition (*n*=9)

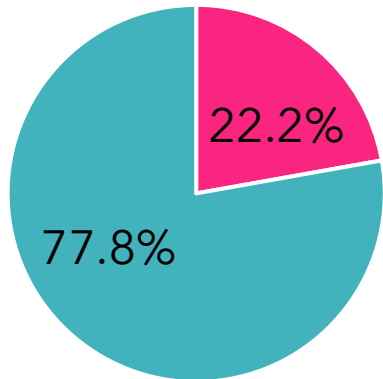
■ At-risk ■ Normal



PRE-TEST FINDINGS

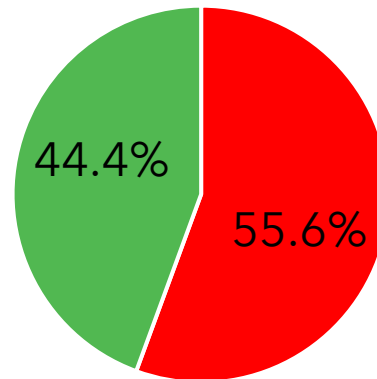
Cognitive Impairment (*n*=9)

■ Mild impairment ■ Normal



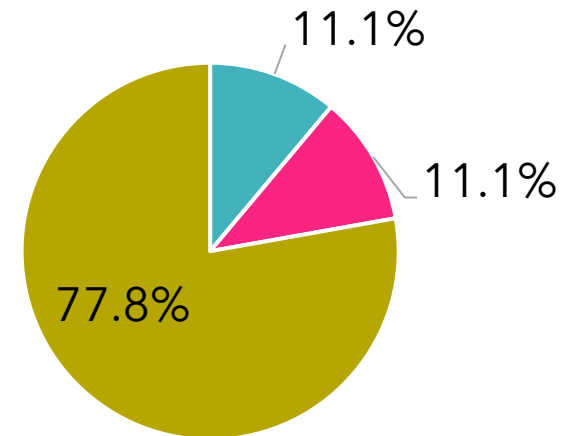
Anxiety (*n*=9)

■ Presence of anxiety
■ No anxiety



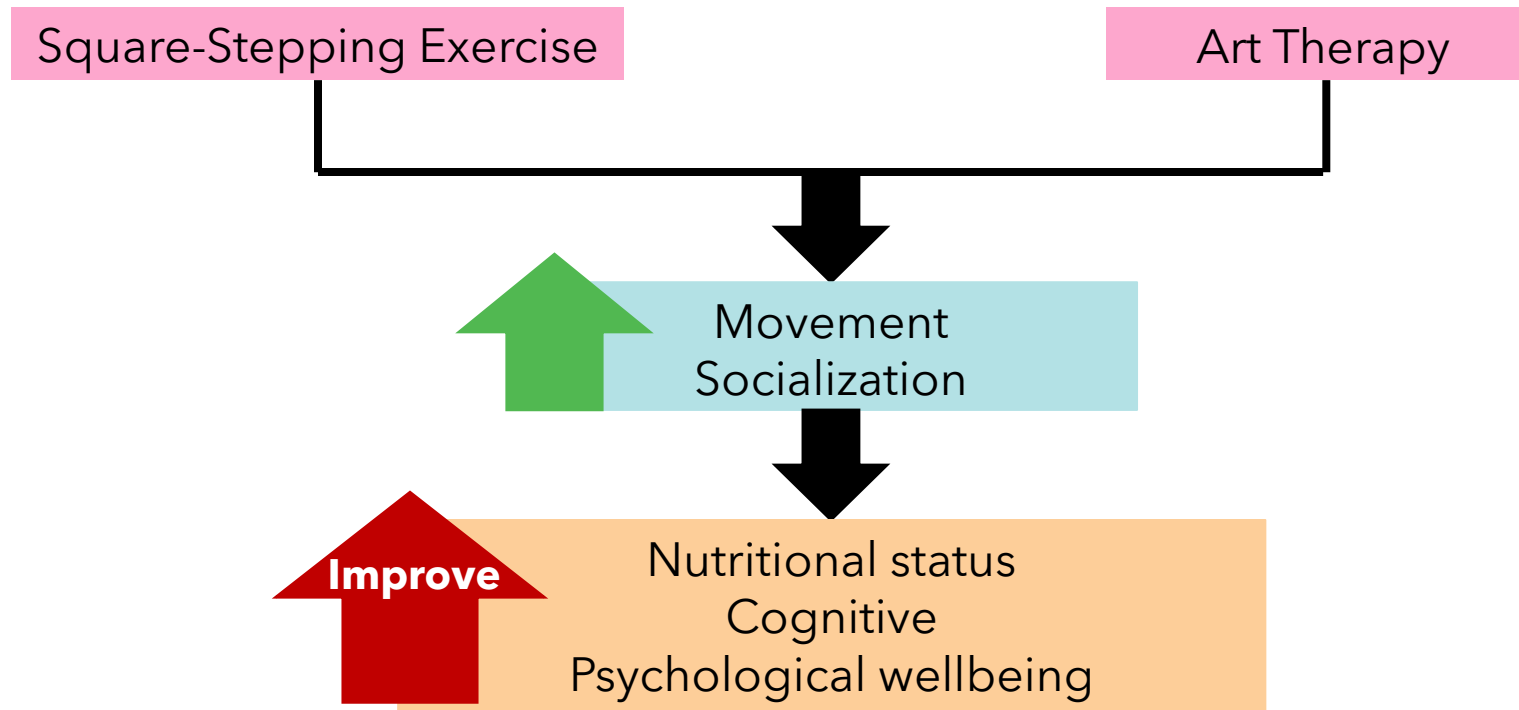
Depression (*n*=9)

■ Mild ■ Moderate ■ Normal



CONCLUSION

- Older adults with PD are at risk for malnutrition, cognitive impairment, and psychological disorders.
- This study is expected to be able to improve nutritional status, cognitive and psychological well-being of older adults with PD.



Thank you



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