UNIVERSITY OF Southampton

....and Rock and Roll

Music and dance for people with Parkinson's

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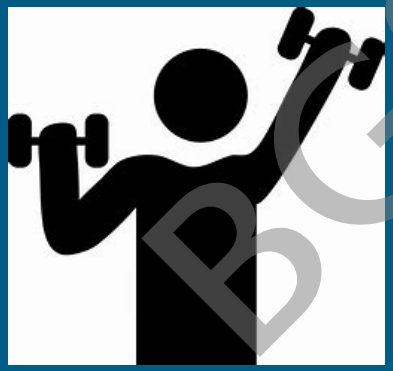
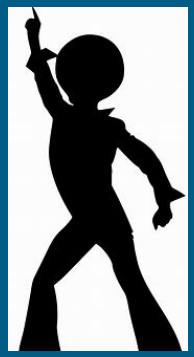
Background

- Some features of Parkinson's resistant to medication and can become incapacitating over time:

  e.g. Gait and balance deficits

- Physical activity interventions complement pharmacological treatments and encourage self-management and maintain quality of life.





Focus today

- Examine components
  - Exercise
  - Music
  - Rhythmical auditory cues
  - Dance
- How does it work?
- What are the benefits ?
- Two dance studies.
- Clinical implications.

Exercise in Parkinson's

- Habitual exercise [2-3]:
  - associated with preservation of motor and non-motor functions
  - Stimulates Dopamine synthesis in remaining dopaminergic cells
  - Enhances neuroplasticity
    - Intensive activity maximises synaptic plasticity
    - Complex activity promotes greater structural adaptation
    - Rewarding activities increase dopamine levels and promote learning and relearning
    - Dopaminergic neurones are highly response to activity/inactivity (use it or lose it)
    - Started early disease progression can be slowed

2 Sacheli MA et al. 2018; 3 Fox et al. 2006

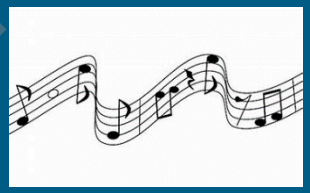
Music in Parkinson's

- Interest in music motivated by neuroimaging studies [4]:
  - Enhanced neuroplastiticy through musical training
- Listening to music:
  - Activates bilateral network of brain regions related to attention, semantic processing, memory, motor functions and emotional processing [5-6]
  - Influences movement due to the rhythm [7]
  - Enhances cognitive functioning [8]

4 Rodrigues et al. 2010; 5 Särkämö et al. 2014; 6 Brandt et al. 2010 7 Schiavio and Altenmueller 2015; 8 Peck et al. 2016.

Rhythmically modulated sound in Parkinson's?

- Rhythmical auditory stimulation influences the motor system [9]:
  - Through muscle entrainment
  - Improves gait parameters (speed, cadence, stride)
  - Even after stimulus stops [10]



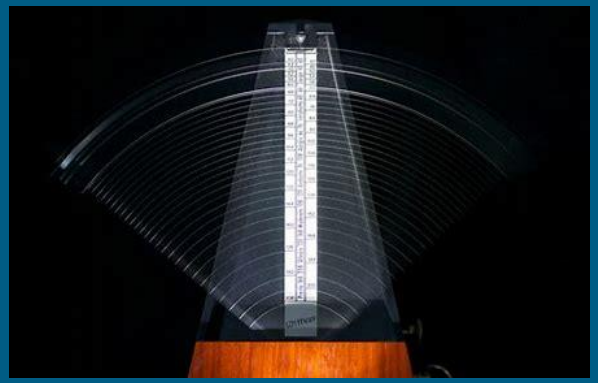
- Auditory stimuli most effective because [11-12]:
  - Auditory cue reaction time 20-50ms shorter than visual or tactile cues
  - Strong bias in auditory system to detect temporal patterns or periodicity and structure

9 Thaut et al. 1996, 10 Nieuwboer et al. 2009, 11 Lim et al. 2005; 12 Thaut et al. 1999

Dance

- Rhythmical music used in dancing might [13]:
  - Act as an auditory cue
  - Activate neurons serving motor control
    - Increase blood flow (hippocampus, frontal temporal and parietal cortices)
  - Facilitate neuroplasticity:
    - Improves movement, balance and cognition

13 Dhami et al. 2015



Dance a multidimensional activity

- As a group based treatment for Parkinson's combines [1]:
  - Physical exercise (balance, stepping, turning)
  - Cognitive tasks (remembering steps)
  - Sensory stimulation (Music, sensory motor timing)
  - Auditory rhythmical cues (Music beat)
  - Tactile and visual cues (partner, teacher)
  - Emotional expression
  - Social interaction

1 Blaesing et al. 2012

Which dance interventions?

- Many have shown benefits [14-16]:
  - Argentine tango, Ballet, Ballroom, modern, contemporary, Morris dancing, Irish set dancing, Salsa
  - Weight of the evidence on Tango because most researched

- European guidelines recommend dance [17]

- 14 Aguiar et al. 2016, 15 McRea et al. 2018, 16 de Dreu et al. 2015, 17 Keus et al. 2007

A randomized controlled feasibility trial exploring partnered ballroom dancing for people with Parkinson's disease

D Kunkel, C Fitton, L Roberts, RM Pickering, HC Roberts, R Wiles, S Hulbert, J Robison, A Ashburn Sho

First Published February 1, 2017 | Research Article | Check for updates
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NHS National Institute for Health Research

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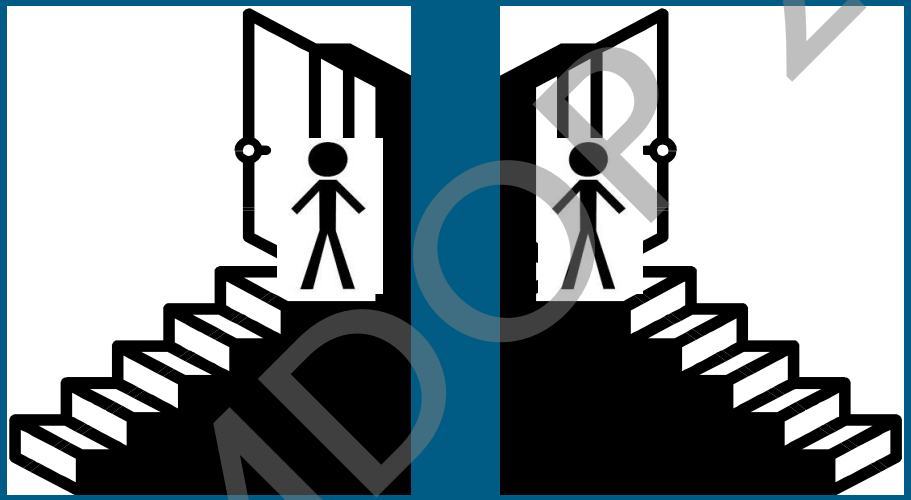
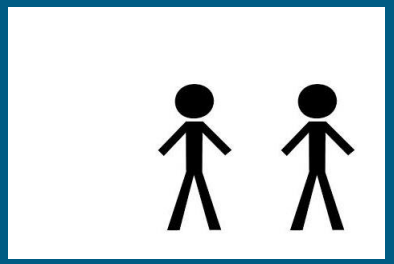
Dance



Control

36 17 18



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Intervention and Follow up

Quality of life

Balance

Confidence

Walking

Turning

Posture

Activity

Falls

Baseline

3 months

6 months

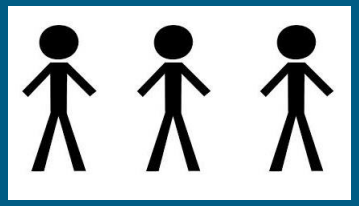
Costs

Results

Dance

Control

35



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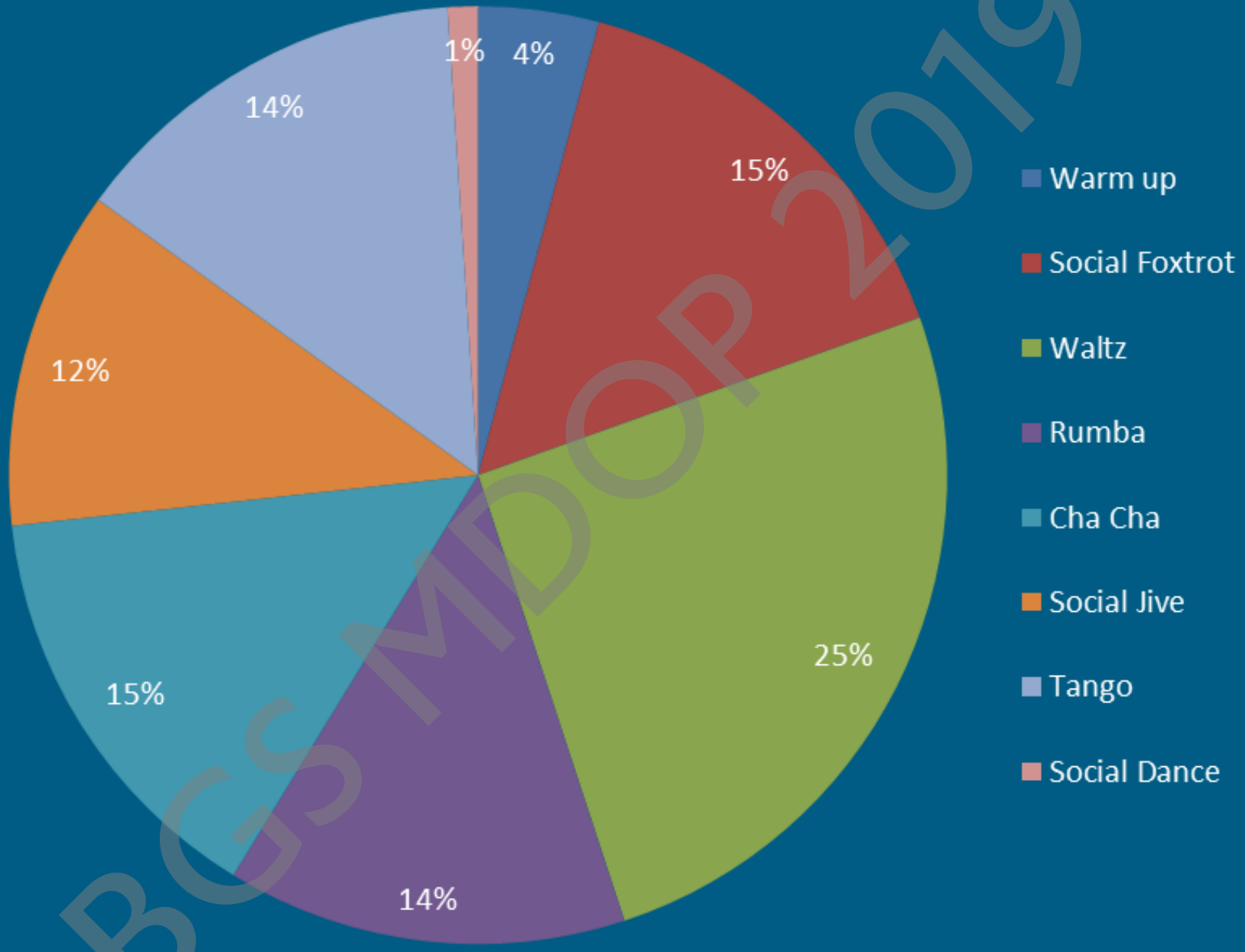
Participant Characteristics

		People with Parkinson's	Partner/ Spouses	Dance volunteers
Age	mean (SD) min-max	70.8 (7.2) 49-85	69.5 (6.6) 52-81	67.8 (9.2) 56-91
Gender	male female	25 (49%) 26 (51%)	13 (38%) 21 (62%)	6 (38%) 10 (63%)

Disease Severity		Dance	Control
Hoehn & Yahr	1 2 3	11 (31%) 10 (28%) 15 (42%)	3 (20%) 7 (47%) 5 (33%)

Dance Centre and Dance Classes



The challenges…

- Most challenging-

  waltz and cha cha

- Repetitive practice
- Focus on the direction
- Starting slowly
- Use verbal cues
- Practice with teachers

The key ingredients for success…

- Preparation
- Dance centre and team
- Attendance

Findings from participant interviews

Getting there

- Travel, parking and venue

The taxi made all the difference to having the courage to do it….

DM DANCE CENTRE DM Dance Centre

- Teaching….instructors are great
  - Assessed and responded to your needs
  - Maintained high expectations
  - You felt encouraged supported and motivated

The teaching was excellent.
Excellent, I mean he was very amusing. *Yes.*
And he got everybody to work quite hard really.
Yeah, he was good, very good.

They were very sympathetic and patient with us all.
Yes, they needed to be didn't they! They were first class

Challenges:

- Learning and remembering the steps
- Keeping up with the music
- Difficulties with turning
- Coping with pain
- Managing medication

The first lesson I had, I wouldn't say I was nervous, but I really had to concentrate. I found it really quite difficult, listening to what they were telling me to do and moving my feet and you know I kept looking, I danced the whole time looking at my feet I think to make sure they were going in the right direction. But after that I suppose you gradually learn the steps and it was good fun.

Outcomes of dancing:

- Sense of enjoyment:
  - A sense of achievement
  - Pleasure in dancing

It was nice moving to the music…

Both my morale and confidence were lifted when I came to the end of each class and I was still up and running.

  - A rewarding social interaction

Relationships, meaningful ones, are not easily won but I found that group so easy to get on with….. Certainly relationships got beyond the trivial, just sitting in the waiting room, the camaraderie and the sort of nudge-nudge wink-wink comments to be looked forward to and to be part of.

- Improved balance and mobility

I think it has been beneficial. I don't seem to have so many falls now. There's a certain discipline in it and you can't mess about with short hesitant steps…

It's improved her mobility, it's improved her confidence, improved her balance ….

- Getting out and about more?

I think it's taught me to sort of try and overcome things, try to sort of re-programme the body a bit.

Partner issues

- someone you know
  - moral support, shared travel,
  - feels comfortable
  - learning something new together
  - make plans to continue dancing

I wouldn't have gone if [husband] hadn't been my partner I don't think. I liked that very much, I liked it a lot.

- or a volunteer/[total stranger]
  - developing a new relationship
  - [a dancing enthusiast?]

I thoroughly enjoyed it. It was great fun, certainly with my partner. She had **a sense of humour** and **she made sure I didn't fall over.**

Conclusion

- Dance feasible, successful and enjoyable
- The successful experience was heavily influenced by their dance partners
- Interest in continuing to dance
- Trial procedures were not onerous

Video

Benefits of dance

- Improved [14-19]:
  - Gait
  - Balance
  - Walking endurance
  - Turning ability
  - Quality of Life
  - Cognition
  - Community participation

14 Aguiar et al. 2016, 15 McRea et al. 2018, 16 de Dreu et al. 2015, 17 Keus et al. 2007, 18 Sharp et al. 2014, 19 Strassel et al. 2011

Ongoing dance class participation

- Aim: To explore **walking endurance and balance** in people with Parkinson's who have **regularly attended weekly, community dance classes for 12 months or longer** compared to people with Parkinson's who do not dance but take part in other community based activities.

Sabrina Rose, Rhian George, Dorit Kunkel 2018

Method

Cross-sectional observational study

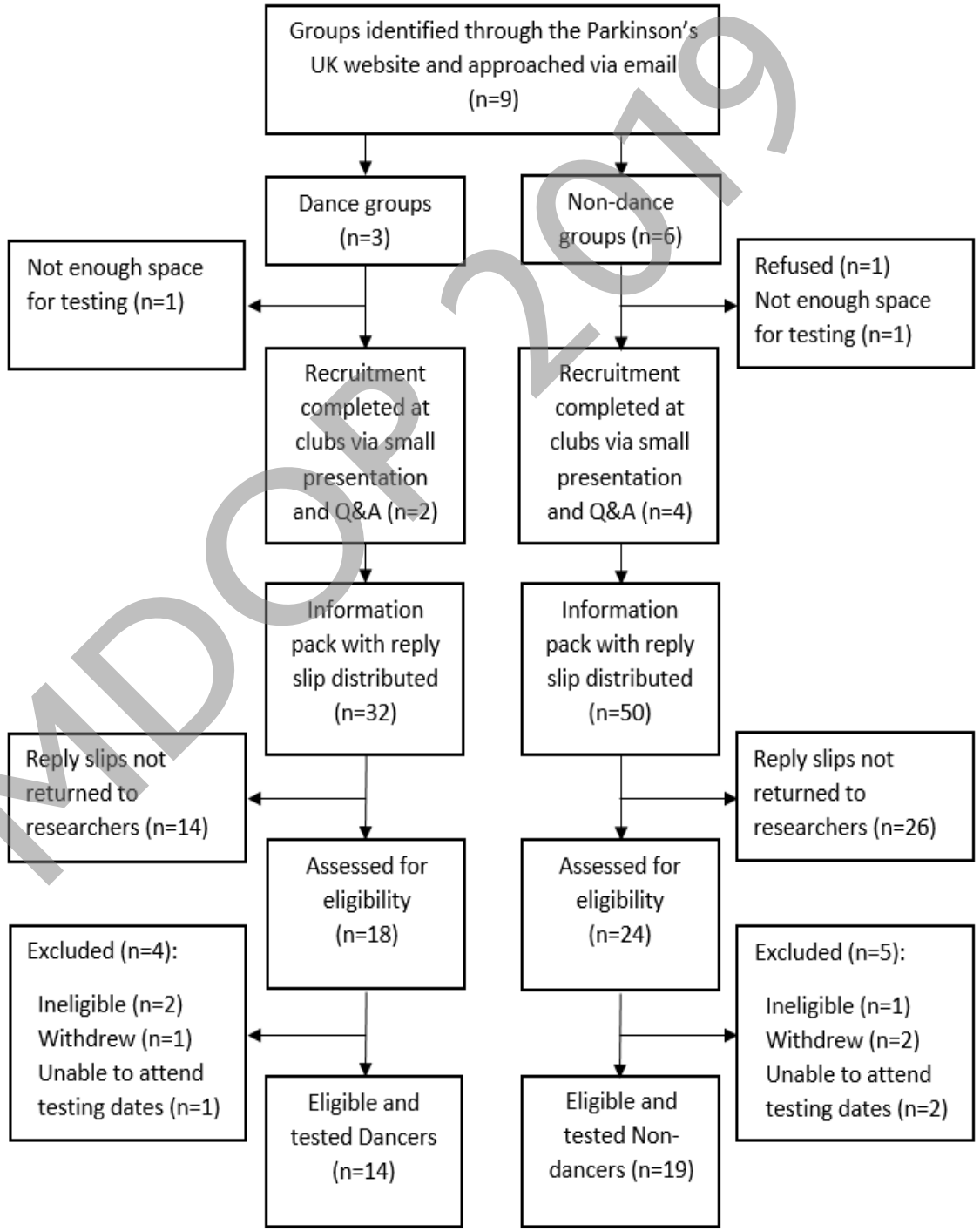
- Recruit dancers
- Recruit age/gender/severity matched non-dancers
- Test balance and walking endurance
- Compare results

Groups:

- Bournemouth Dance Club
- Dorchester Dance Club
- Portsmouth Support Groups
- Winchester Support Group
- Fareham Support Group

Criteria:

- Have Parkinson's
- By the day of testing, have been **dancing for 12 months or more** OR **never been dancing.**
- Can walk 10 metres independently (with or without a walking aid)
- <4 Hoehn and Yahr



Tests

1: Mini BESTest

14 stage balance test.

Small tasks e.g. standing on one leg or standing on tip toes.

Mann Whitney U test

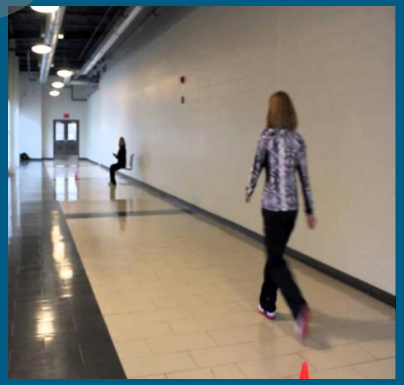
2: 5x Sit to Stand

Standing from a chair 5x as quick as you can.

Mann Whitney U test

3: 6MWT

Walking between cones for 6 minutes.



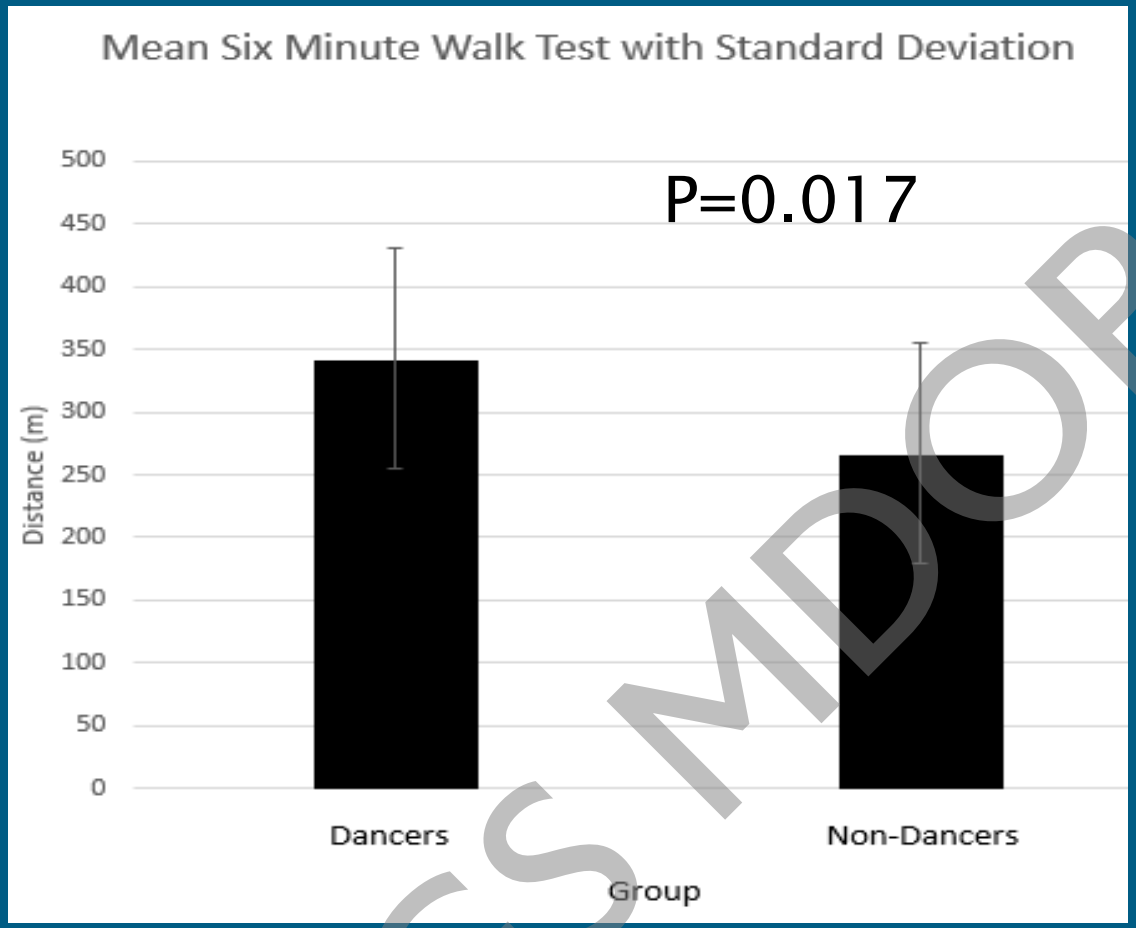
Independent Sample t-test
Multiple Linear Regression

4: Borg RPE

Walking up and down a room as many times as you

Mann Whitney U test

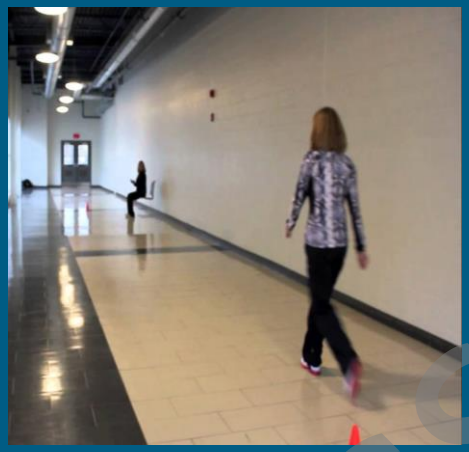
Category Mean ±SD or Nr (%)	Dance group (n=14)	Non-Dance group (n=19)
Gender		
Male	7 (50%)	13 (68%)
Female	7 (50%)	6 (32%)
Age (years)	70 ± 7.15	70.84 ± 8.54
Time since Parkinson's diagnosis (years)	7.39 ± 5.10	5.23 ± 4.89
Hoehn and Yahr Score	1.65 ± 0.41	1.79 ± 0.67
1	2 (14%)	5 (26%)
1.5	7 (50%)	5 (26%)
2	4 (29%)	4 (21%)
2.5	1 (7%)	3 (16%)
3	0 (0%)	2 (11%)
Time attending dance class (months)	27± (17)	n/a



- Mean difference 76.73, 95% CI: 13.70 to 139.75) large effect size (eta squared = 0.17).
- Mini-BESTest score (p=0.038).
- No significant difference in Five times sit to stand scores (p=0.76) or Borg RPE (p=0.96).

Multiple linear regression

- Dance status= if non-dancer B= -74.095, p=0.010
- Disease severity= HY rating B= -55.326, p=.030
- age (B= -3.113, p=0.094),gender= if female B= -43.127, p=0.129).



- The model explained 46.8% of the variance:

*6MWT distance = 789.737m + (-3.113*age) + (-55.326*HY rating) + (-74.095*1 if non-dancing or *0 if dancing) + (-43.127*1 if female or *0 if male).*

Significant predictor of 6MWT distance, F(4,28) = 6.160,p= <.001

Non-dancers walked shorter distances.

Conclusion

- Ongoing attendance in dance classes may slow disease progression in relation to walking endurance and balance ability in comparison to attending other community activities.
- Findings need to be viewed with caution

Clinical implications

- Exercise:
  - Start early
  - neuroprotective: exercise 150 min or more per week[20-21], the longer duration the better
  - Benefits are seen in 90 min x1 per week ongoing dance class [22]
  - Moderate aerobic and strength exercises
- Walking, water exercises, robotic gait training, virtual reality training, mental practice, aerobic training, boxing and Nordic walking

20 Parkinson's Outcomes Project; 21 Ahlskog et al. 2011. 22 Rose et al. 2018.

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