

# Action Imagery and Observation in Neurorehabilitation for Parkinson's Disease (ACTION-PD): A pilot RCT of a home-based intervention to improve functional actions

Ellen Poliakoff<sup>1</sup>, Judith Bek<sup>1</sup>, Chesney Craig<sup>2</sup>, Zoe Franklin<sup>2</sup>, Matthew Sullivan<sup>2</sup>,

Emma Gowen<sup>1</sup> Stefan Vogt<sup>3</sup>, Trevor Crawford<sup>3</sup> & Paul Holmes<sup>2</sup>

<sup>1</sup>University of Manchester, <sup>2</sup> Manchester Metropolitan University, <sup>3</sup> Lancaster University



## Introduction

- There is a need for effective non-pharmacological therapies to increase quality of life in Parkinson's.
- We have developed ACTION-PD to target dexterity, which is under-researched despite its impact on activities of daily living and independence. We have drawn on input from people with Parkinson's (Bek et al., 2016) and clinicians.
- Both action observation (AO: watching another person moving) and motor imagery (MI: imagining the sensations associated with moving) increase motor activity in the brain. Preliminary findings using AO or MI to facilitate movement in Parkinson's have been encouraging (e.g. Buccino et al., 2011; Pelosin et al., 2013).
- The training combines AO and MI, which can produce strong motor effects in healthy adults (Eaves et al., 2016). It has been hypothesised that combined AO+MI may be particularly effective in Parkinson's (Caligiore et al., 2017) and we have observed increased imitation for AO+MI (Bek et al., 2019). However, AO and MI have not yet been combined in a Parkinson's intervention.

We conducted a pilot randomized controlled trial of a prototype AO+MI intervention. We explored feasibility and acceptability of the intervention and trial design, and measured preliminary outcomes.

## Trial Design

**Participants:** 10 people with mild to moderate Parkinson's.

- Screened for cognitive impairment and visual acuity
- Self-reported difficulty with fine hand movements

### Personalisation

- Choose 6 functional hand actions interested to train from list

### Pre-training Measures

- Self-reported dexterity (DextQ-24) and quality of life (PDQ-39)
- Motor imagery ability (KVIQ) and reported use of motor imagery
- Kinematic measures in lab (6 chosen actions + 2 core)

### Randomised

#### Intervention Group (N=6)

- Home-based training with app and props
- 3 chosen and 2 core actions
- Aim for 120 mins/week
- Flexible timing
- Rate difficulty of actions
- Weekly survey

#### Control Group (N=4)

- Weekly phone call to maintain contact (6 weeks)

Interview

Post-training Measures

## References

- Bek et al. (2019) *Parkinsonism & Related Disorders*, 61:126-131.  
 Bek et al. (2016) *Parkinson's Disease*, article ID 7047910.  
 Buccino et al. (2011) *Movement Disorders*, 26: 1963-1964.  
 Caligiore et al. (2017) *Neuroscience and Biobehavioural Reviews*, 72:210-22.  
 Eaves et al. (2016) *Frontiers in Neuroscience*, 10:514.  
 Malouin et al. (2007) *Journal of Neurologic Physical Therapy*, 31:20-29.



Ellen.Poliakoff@manchester.ac.uk  
<http://beamlab.lab.manchester.ac.uk>  
 @BEAM\_Manchester



## Intervention

Prepare:  
"You will need the coffee jar"



Participants provided with props needed for practice

AO+MI:  
"Imagine the feeling of making the movements"



Third and first person perspective presented sequentially

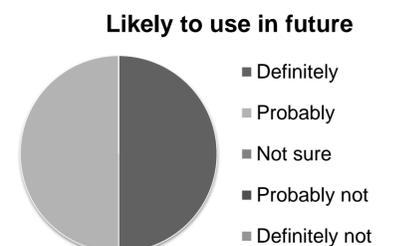
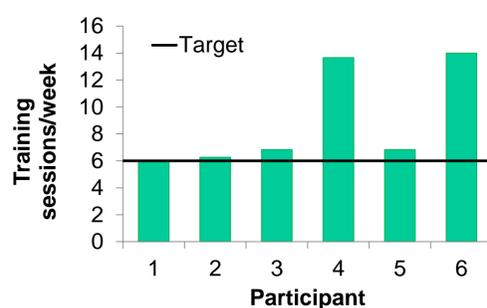
Physical practice  
"Practice the action to the best of your ability"



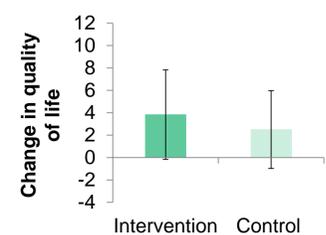
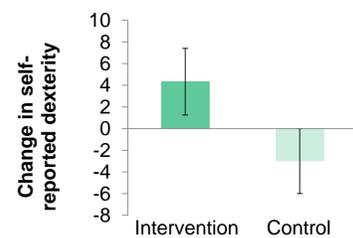
Static image during practice

The intervention is delivered via an app interface which allows recording and secure cloud storage of usage data.

## Results



- The intervention group met or exceeded the training target and would be likely to use a similar app in the future.



- The intervention group improved in self-reported dexterity but not in overall quality of life.

Data from the interviews indicated that:

- Some actions were not challenging enough
- More variety of actions was desired
- Training load was manageable for a finite period
- Increased confidence and change in approach to actions reported, but may be difficult to apply to everyday situations under pressure
- Variability in response to motor imagery – some reported finding it easier over time, others reported disengaging

## Conclusions

- This home-based action observation and motor imagery (AO+MI) intervention is acceptable to people with Parkinson's and an RCT is feasible.
- Preliminary outcomes are also promising, with numerical improvements in self-reported dexterity (the primary outcome).
- Participants' experiences indicate that the intervention would benefit from a greater choice of actions and improved understanding of motor imagery.