

# Improving functional hand actions in Parkinson's through home-based observation and imagery training: a pilot randomised controlled trial of ACTION-PD

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## Background and Objectives

- Viewing another person's actions (action observation; AO) and imagining actions (motor imagery; MI) engage sensorimotor brain areas to facilitate movement and learning, particularly when AO and MI are combined (imagining while watching; AO+MI)<sup>1</sup>.
- Combined AO+MI has been found to influence simple hand movements in people with Parkinson's in the lab<sup>2</sup>, but has not been tested within an intervention.
- ACTION-PD is a home-based AO+MI intervention to improve everyday functional hand movements, delivered via a tablet computer app.
- The intervention offers flexible, personalised training. It was co-developed with people with Parkinson's, with input from focus groups and preliminary testing<sup>3</sup>.

A pilot randomised controlled trial (RCT) examined the acceptability and potential effects of home-based observation and imagery training.

## Methods

### Participants

- 10 people with mild to moderate Parkinson's
- Self-reported difficulty with hand movements

### Design

- Baseline assessment
- Randomised to Intervention (n=6) vs. Control (n=4)
- Weekly phone contact
- Second assessment (approx. 10 weeks)

### Intervention

- Independent home practice for 6 weeks (target 120 minutes/week); schedule based on individual preference (e.g., 4 x 30 minutes)
- 3 personally-selected plus 2 'core' functional actions
- E.g., buttoning, writing, opening containers, sorting coins



Training involved (i) simultaneous observation and kinaesthetic imagery of actions from third- then first-person perspectives; (ii) physical practice.

### Acceptability measures

- App usage (secure recording)
- Semi-structured interviews

### Exploratory measures

- Timed action performance in the lab (trained and untrained)
- Difficulty ratings for actions
- Dexterity for everyday actions (DextQ-24)
- Kinaesthetic and visual motor imagery (KVIQ)
- Simple and choice reaction times

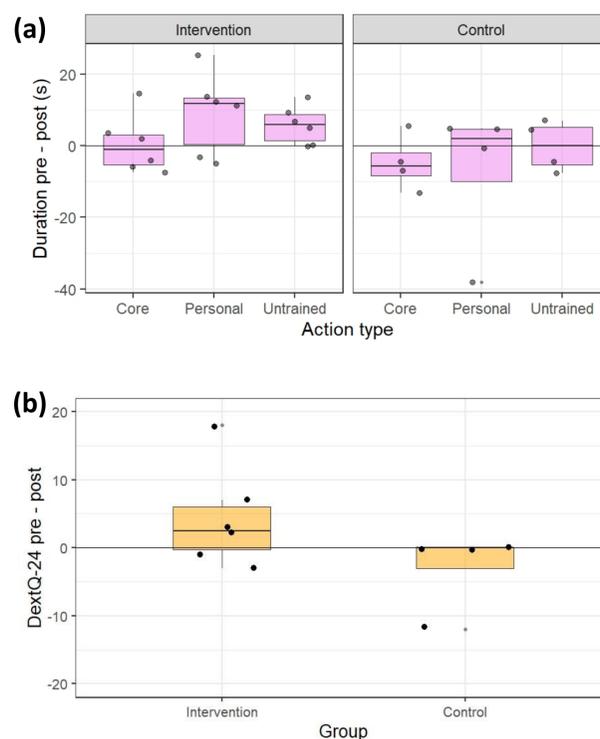
## Results

### Acceptability

- All participants achieved the weekly training target
- Participants found the app and training protocol usable and acceptable
- Post-training interviews indicated:
  - Potential physical and psychological benefits
  - Some transfer to everyday tasks
  - Importance of personalisation, flexibility and motivation
  - Individual differences in ability to use and benefit from motor imagery
  - Need for more choice, variety, progression and feedback

### Exploratory outcomes

- Preliminary evidence for improvements:
  - Timed action performance (a)
  - Dexterity (DextQ-24) scores (b)
  - Action difficulty ratings
  - Simple and choice reaction times
- No improvement in motor imagery (KVIQ)



## Conclusions

- Home-based, personalised AO+MI training delivered via an app is **usable and acceptable** for people with mild to moderate Parkinson's.
- Preliminary findings indicate **potential improvements** in everyday functional manual actions, as well as psychological benefits.
- Greater variety and challenge would improve the intervention.
- Additional MI instructions/training may enhance engagement and efficacy.
- A larger RCT to test feasibility of the intervention is planned.

### References:

- Eaves DL et al. (2016). *Frontiers in Neuroscience*, 10, Article 514. doi: 10.3382/fnins.2015.00514
- Bek J et al. (2019). *Parkinsonism and Related Disorders*, 61:126-131. doi:10.1016/j.parkreldis.2018.11.001
- Bek J et al. (2016). *Parkinson's Disease*, Article ID 7047910. doi: 10.1155/2016/7047910