Cognitive Rehabilitation for Individuals with Parkinson’s Disease

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May 28, 2015
Introduction
Parkinson’s disease (PD) is a progressive neurodegenerative disorder affecting approximately 100,000 Canadians.

Cognitive impairment is experienced by over 50% of people with the diagnosis.
Distinct pattern of cognitive impairment in PD typically includes impairments in:
- attention (sustained, selective, alternating, and divided)
- information processing speed
- memory recall
- visuospatial skills
- psychomotor functions
- executive functions
Statement of the Problem

- Cognitive impairment in PD has a profound effect on health-related quality of life.

- Effective interventions are needed to counteract cognitive symptoms and reduce functional impairment.

- Cognitive rehabilitation may reduce impairment in occupational performance and improve quality of life for people with PD and their caregivers.
Significance of the Study

- Cognitive status and occupational performance in PD are associated

- Individualized cognitive treatment programs in realistic environments are needed to encourage translation of training to bADLs and iADLs

(Disbrow, Russo, Higginson, Yund, Ventura, & Zang, 2012; Foster & Hershey, 2011; Koerts, van Beilen, Tucha, & Brouwer, 2011; Pyun, Yang, Lee, & Yook, 2009; Rosenthal, et al., 2010)
Very little research published on the effects of cognitive rehabilitation in PD – 10 studies to date

Most studies agreed that cognitive rehab is beneficial

Only one study attempted to measure the relationship between cognitive status and occupational performance in PD

(Edwards, et al., 2013; Mohlman, et al., 2010; Molhman, et al., 2011; Naismith, et al., 2013; Nombela, et al., 2011; Paris, et al., 2011; Peña, et al., 2014; Petrelli, et al., 2014; Sammer et al., 2006; Sinforniani et al., 2004)
Summary of the Literature on Cognitive Rehabilitation in PD

Most studies used computer-based cognitive training programs; some studies used pencil-and-paper cognitive exercises; one study used Sudoku exercises.

Training frequency ranged from daily to weekly, over 3 weeks to 6 months.

Various tests of executive functions and memory were used as outcome measures.

Improvements seen in most cognitive areas tested.

Improvements maintained for at least 1-3 months.

(Edwards, et al., 2013; Mohlman, et al., 2010; Molhman, et al., 2011; Naismith, et al., 2013; Nombela, et al., 2011; Paris, et al., 2011; Peña, et al., 2014; Petrelli, et al., 2014; Sammer et al., 2006; Sinforiani et al., 2004)
The Cognitive Orientation to Daily Occupational Performance (CO-OP)
No best practice guidelines yet exist

Guidelines are currently under development but not yet available for wide distribution
Purpose of the Study

To determine the applicability of the CO-OP as a meta-cognitive rehabilitation strategy for individuals with Parkinson’s disease-related cognitive impairment
Objectives of the Study

To Determine:

- 1. Efficacy
- 2. Generalizability
- 3. Transferability
- 4. Maintenance of results after 3 months
- 5. Participants’ perceptions
Methodology
Research Design

- Concurrent mixed methods procedure
  - Quantitative / Qualitative design
- A-B-A single subject design
Unique Features of a Single-Case Study

- Each case study is a bounded entity
- Each case’s data is analyzed separately and can be combined to answer the study objectives
Procedure

- Participant Screening Measures
- Pre-Intervention Descriptive Measures
- Baseline A Phase
- Intervention B Phase
- Post-Intervention A Phase
- 3-Month Follow-Up
### Inclusion Criteria

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<thead>
<tr>
<th>Criteria</th>
<th>Details</th>
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<tr>
<td>Diagnosis of typical PD later than age 45</td>
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<td>Mild cognitive impairment (MoCA score 17-25/30)</td>
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<td>60-90% on Schwab &amp; England ADL Scale</td>
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<td>Stage 1 – Stage 3 on Hoehn &amp; Yahr</td>
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<td>Absence of significant mental illness</td>
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<td>Live-in caregiver willing to participate in study (MoCA score &gt;16/30)</td>
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CO-OP Treatment Protocol

1. Participant-chosen treatment goals
2. Intervention based on “dynamic performance analysis”
3. “Goal- Plan- Do- Check”
4. “Guided discovery”
5. Involvement of the participant’s caregiver

(Polatajko & Mandich, 2004)
Participant #2:

- His treatment goal: “To type an e-mail with no more than 1-2 spelling mistakes.”
- His plan: “1. To be attentive when I’m typing; 2. To try to avoid times of tremors from Parkinson’s. 3. If not sure of spelling, check dictionary.”
- Do: followed his plan
- Check: he found that he had several spelling mistakes

Revised plan to include two additional steps:
- “4. Handwrite a draft e-mail prior to typing;
- 5. Type for short periods of time only and save the draft e-mail in between typing episodes until I am ready to send it.”

- Do: followed revised plan
- Check: no spelling errors in e-mail message
Analysis

(Photo Source: Microsoft Clip Art)
According to single-case research design methodology, data from each participant and caregiver will be evaluated separately and scores from different individuals will never be combined.

(Kazdin, 2011)
Quantitative Data Analysis

Visual Analysis
- Data from each individual participant and caregiver are being graphed and visually analyzed

[Graph of data]

Hypothetical data (Kazdin, 2011)

Statistical Analysis
- Two-standard deviation band method in combination with a celeration line and the C statistic will be used to analysis and compare data between each data collection phase for the COPM, PDQ-39, and ZBI
Qualitative Analysis

Data from participant and caregiver interviews, clinical observation record, and reflective journal log are being coded, categorized, and analyzed using interpretive description.

Interpretive description is inductive and ideal to capture maximum variation on themes and patterns.

Analysis of data from reflective journal log will assist with development of clinical impression/clinical utility.
Results from qualitative data analysis will inform and explain results from quantitative data analysis according to mixed methods research approach (Creswell, 2009)
Results

(Photo Source: Microsoft Clip Art)
Participant 1

- 75-year-old Caucasian male, grade 12 education
- Baseline MoCA score: 18/30

- CO-OP treatment goals as determined with the COPM:
  1. “To remember names of familiar people.”
  2. “To remember details of conversation.”
  3. “To remember what is next on a travel route.”
  4. “To keep my computers running at optimum level.”
  5. “To be more involved in interactions in social settings.”

- Number of CO-OP treatment sessions needed: 8
Participant 1 – Quantitative Results

COPM Average Performance Scores for PD1

PDQ-39 SI Scores for PD1

Pre-Intervention  Intervention  Post-Intervention  F/U  Pre-Intervention  Intervention  Post-Intervention  F/U
Participant 2

- 83-year-old Caucasian male, university education
- Baseline MoCA: 20/30

CO-OP treatment goals as determined with the COPM:
1. “To not make more than one or two spelling mistakes on e-mails.”
2. “To make my e-mails more complete without missing information.”
3. “To improve my ability to remember what people have said in conversation so that I can respond back.”
4. “To be able to get through the 2013 version of Quicken and get familiar with it.”
5. “To improve my capacity to come to decisions.”

Number of CO-OP sessions needed: 8
Participant 2 – Quantitative Results

COPM Average Performance Scores for PD2

COPM Average Satisfaction Scores for PD2

Pre-Intervention  Intervention  Post-Intervention  F/U  Pre-Intervention  Intervention  Post-Intervention  F/U
Participant 3

- 69-year-old Caucasian male, grade 12 education
- Baseline MoCA score: 19/30

CO-OP treatment goals as determined with the COPM:
1. “To take my medication on time for all 5 doses in one day.”
2. “To improve my skills with navigating while driving.”
3. “To be more reliable with remembering to put things back where they belong (at home).”
4. “To remember which colour I’m shooting when playing pool (stripes or solids).”
5. “To be aware of the correct day of the week and the correct date on the calendar.”

- Number of CO-OP treatment sessions needed: 7
Participant 3 – Quantitative Results

COPM Average Performance Scores for PD3

ZBI Scores for C3

Pre-Intervention | Intervention | Post-Intervention | F/U

Pre-Intervention | Intervention | Post-Intervention | F/U
Qualitative Cross-Case Analysis

At the pre-intervention interviews, all three participants were highly motivated to undertake this program:

“I would really like to improve my ability to remember those kinds of things (names) when we talk about and when they become part of a group conversation.” (P1)
By mid-intervention, all three participants had begun to use different ways to approach tasks, and continued into the post-intervention phase:

“have your problems with your memory...changed at all since you began participating in the treatment program?” (interviewer); “Yes, I think they’ve improved somewhat, just because I’m more conscious of it now. Trying to meet the goal.” (P3)
By post-intervention, all three participants felt that the CO-OP had helped them to see things differently and to structure their thinking:

“has this (difficulty with learning new tasks) changed since your participation in the treatment program?” (interviewer); “Definitely. It definitely has, yeah. It’s like you prepare better for everything, you know? Because you know you’re expecting you may have difficulty.” (P2)
Qualitative Cross-Case Analysis

Inclusion of caregivers throughout all treatment phases appeared to have an important impact:

- “she got more aware, too, of my difficulties, you know?... She got a lot of patience with it.” (P2)
- “I think she’s getting more tolerant.” (P3)
- “I do understand, I have a better…inkling of his difficulty, so that I can accommodate, you know?” (C2)
Progression of PD symptoms and other life and health circumstances made it difficult for 2 of the participants to continue using the CO-OP after the active treatment phase.

After 3 months, only one participant was still using the CO-OP regularly.
Unique Aspects of This Study Compared to Other Known Studies on Cognitive Rehab in PD

- An examination of the effect of a “real world” function-based treatment intervention for cognitive impairment in Parkinson’s disease
- First known examination of the effect of the CO-OP in the Parkinson’s population
- Client-centred
- Single-case A-B-A study design
- Mixed methods study
- An examination on the effect of a cognitive rehab program on “real world” function (one other known study)
- Long-term follow-up (two other known studies)
Practice Implications

- When selecting appropriate candidates for CO-OP treatment, it is crucial for participants to be highly motivated.
- Inclusion of caregivers during CO-OP treatment is critical to support, guide, and give meaningful feedback to individuals with PD.
- The CO-OP is effective to improve awareness of cognitive abilities and limitations for both individuals with PD and their caregivers.
- Improved awareness for caregivers leads to improved understanding, patience, and tolerance of cognitive difficulties in individuals with PD, as well as improved communication.
- The CO-OP is effective to teach individuals with PD to think differently, and to provide structure to their thinking.
- Small improvements in COPM scores, but did not reach statistical significance.
- No measurable change in quality of life for individuals with PD or in caregiver stress.
Special thanks to:

Dr. Douglas E. Hobson, MD
Dr. Deirdre Dawson, PhD
All six study participants
Thank You!
References


