Cognitive Flexibility and Creativity in People with Parkinson*s: A Pilot Study Exploring the Influence of Dopaminergic Regulation on Cognitive Flexibility and Creativity, with an Emphasis on Visual Art

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Ethical review	Approved WMO
Status	Pending
Health condition type	Movement disorders (incl parkinsonism)
Study type	Observational non invasive

Summary

ID

NL-OMON56761

Source
ToetsingOnline

Brief title
Cognitive Flexibility and Creativity in People with Parkinson*s

Condition

- Movement disorders (incl parkinsonism)

Synonym
Parkinson's disease

Research involving

Human

Sponsors and support

Primary sponsor: Radboud Universitair Medisch Centrum
Source(s) of monetary or material Support: FWF;Der Wissenschaftsfonds (Austria) Connecting Minds Grant;CM 1100-B

Intervention

Keyword: Cognitive flexibility, Creativity, Dopamine, Parkinson□s

Outcome measures

Primary outcome

Primary outcome

1. Applicability and Feasibility: Given the potential symptom-related confounders in PD, such as severe motor issues (tremor, dystonia) and impulsive rejection of conducting tasks, it is critical to determine whether the tasks and the entire battery are practical and feasible.

2. Face Validity Assessment: This pilot will involve subjective evaluation by a research team (including psychologists) through observing participants during the tasks to assess if the tests cover the concept they purport to measure, thus gauging the face validity.

3. External Validity Assessment: We intend to visit people in their homes and interview both participants and caregivers, considering participants* daily life circumstances, issues, and behaviour to ensure the external validity (considering widening the results to their homes) of our findings.

Secondary outcome

The secondary objective is to get first insights into potential relationships of the explored outcomes of the test battery. Within this small cohort,

investigations into the relationships between PD, dopamine, creativity,

cognitive flexibility, and PD/dopaminergic-induced mood and behavioural changes

are considered explorative research.

Study description

Background summary

Research reveals that Parkinson*s disease (PD) can significantly alter condition, specifically cognitive flexibility and creative cognition. This has been shown specifically in visual artistry in affected individuals, suggesting that these changes in artistic output may reflect broader cognitive shifts important for creativity. Creativity involves generating innovative ideas and solutions, requiring cognitive flexibility, imagination, and the ability to switch between different tasks or thought paradigms. These cognitive processes seem to be influenced by PD and its treatments, especially dopamine replacement therapy (DRT).

PD is a chronic neurodegenerative disorder that impairs neurons responsible for producing dopamine, a neurotransmitter essential not just for motor control but also for various cognitive functions, including cognitive flexibility. This highlights the disease's complexity and the need for comprehensive research approaches. The impact of PD on creativity, particularly in visual arts, provides a unique perspective on cognitive changes in PD patients due to the expressive nature of art.

Key research findings include:
1. Shift in Creative Cognition and Artistic Production: Studies show that PD can enhance artistic skills and alter style, color, and tool usage, contrary to expectations of reduced creativity. These changes may be linked to deficits in visuo-spatial abilities and task-switching capabilities, affecting three-dimensional thinking and the ability to navigate between conceptual frameworks. Mood and color perception changes also play a role in altering artistic expressivity and style.
2. Effects of Dopamine Regulation on Creativity: Research examining creativity changes in PD patients, especially in relation to neuropsychiatric symptoms, suggests that fluctuations in dopamine levels due to neurodegeneration and DRT can either decrease or increase creativity.
3. Epidemiological Perspective: A study at Radboudumc found that 41% of PD patients reported changes in creativity, with more experiencing decreases than increases or fluctuations, indicating significant variability in creativity changes among this group.

4. Cognitive Flexibility and Dopamine*s Function: Investigations into cognitive flexibility in PD patients reveal a specific deficit in cognitive set-shifting, particularly when dealing with competing information, which relates directly to dopamine*s role in the brain's fronto-striatal circuitries.
5. Changes in Reinforcement Learning: A study by Tichelaar et al. explored dopamine's influence on reinforcement learning in PD, finding that medication-induced dopamine levels can affect cognitive processes and mood, crucial for creativity and cognitive flexibility.

Despite these insights, research has yet to systematically explore how PD-related dopaminergic regulation affects creativity and visual art production comprehensively. Many studies focus on specific PD cohorts or on underlying mechanisms like cognitive flexibility without examining how these changes manifest in visible output and behaviour, including interpersonal differences and personal expression.
Our study aims to bridge this gap by conducting a pilot study with a comprehensive battery of tests on individuals with young-onset PD, varying in DRT intake, and controls. The study will assess PD-related factors, global cognition, neuropsychiatric behavior, baseline creativity, and artistic activities. We will explore creative domains through a questionnaire based on the Amusement Park Theoretical model of creativity and conduct in-depth interviews to understand daily life creativity, the personal significance of art, and the impact of mood disorders or behavioural changes related to PD and medication.

Study objective

Our main objective is to conduct a pilot study testing the applicability and face/external validity of the battery in a young-onset PD cohort, alongside age-matched healthy controls. We aim to gain deeper insights into the complex interrelationships between visual art production, cognitive flexibility, dopaminergic regulation, and PD symptoms. This study primarily serves as a foundational step for testing the comprehensive battery of tests.
The secondary objective is to get first insights into potential relationships of the explored secondary study endpoints measured through the set of tests.

Study design

Our study utilises a mixed-methods design combining quantitative and qualitative methods to investigate the complex interactions between PD, dopaminergic regulation, cognitive flexibility, creativity, and visual art. The research protocol consists of five key test points: pre-questionnaire online, screening session, two sessions one during ON and one during an OFF state, and finally a semistructured interview carried out at the participant's home. These tests will employ a mixture of validated assessments and semi-structured interviews. Each test phase has been designed to ensure participants* comfort,

incorporating breaks to maintain the integrity of responses.

Study burden and risks

Participants will not experience a direct benefit by participating. However, they contribute significantly to research and the intervention that may lead to the development of new innovative intervention programs and clinical methods. This study can be classified as a moderate risk study, because there is a moderate chance of minimal damage, as well as, for some participants, minimal chance of serious damage.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)

Inclusion criteria

- 18 years of age or older
- diagnosed with idiopathic Parkinson*s disease
- willingness to participate in the intervention program and attend all scheduled test sessions
- young-onset Parkinson*s, i.e., symptoms appeared between the age of 18-40 years of age

Exclusion criteria

- received deep brain stimulation (brain surgery)
- severe co-morbidities or other additional neurodegenerative diseases or disorders (except PD/medication related mood disorders)
- legally incompetent adults who are unable to provide informed consent or manage their own affairs.
- requirement for full-time nursing care.
- absence of written informed consent from the participant.

Study design

Design

Study type:	Observational non invasive
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)
Control:	Active
Primary purpose:	Health services research

Recruitment

NL

Recruitment status:	Pending
Start date (anticipated):	01-03-2024
Enrollment:	16
Type:	Anticipated

Medical products/devices used

Registration:	No

Ethics review

Approved WMO Date:	08-05-2024
Application type:	First submission
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL85560.091.23