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Metacognitions, anxiety, and distress related to motor fluctuations in Parkinson's disease

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ABSTRACT

Objective: This study tested the relationship between metacognitive factors, intolerance of uncertainty, anxiety, and the predictability of, and distress associated with, acute fluctuations in symptoms in idiopathic Parkinson's disease (PD), when controlling for disease parameters.
Method: 106 adults with idiopathic PD (30 females; $M_{age} = 65.3$; 90% white) participated in this study, with 93 of them reported experiencing off-periods. A cross-sectional design was employed that utilised: the Hospital Depression and Anxiety Scale, Movement Disorder Society revision of the Unified Parkinson's Disease Rating Scale, the Addenbrooke's Cognitive Examination — Revised, the Intolerance of Uncertainty Scale, and the Metacognitions Questionnaire 30. Correlation analyses, hierarchical regression analysis, and ordinal regression analysis were used to test the experimental hypotheses.
Results: Anxiety was not significantly associated with motor symptom severity or cognitive functioning, while metacognitive factors were significantly related to anxiety when controlling for motor experiences of daily living and intolerance of uncertainty, $R^2 = 0.56$, $F(1,82) = 15.04$, $p < 0.001$ (adjusted $R^2 = 0.53$). For participants with motor fluctuations, no association was found between predictability of, and distress associated with, off-periods. Metacognitions concerning uncontrollability and danger were significantly related to off-period distress when controlling for motor experiences of daily living, intolerance of uncertainty, and other metacognitive factors, $\chi^2(1) = 20.52$, $p = 0.001$.
Conclusion: Metacognitive factors play a role in anxiety and off-period distress in PD and this is discussed in terms of the Self-Regulatory Executive Function model. Interventions from metacognitive therapy are potential means to ameliorate off-period distress and anxiety in PD.

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Introduction

Parkinson's disease (PD) is a progressive neurological disorder with an estimated population prevalence of approximately 300 per 100,000, increasing to 1%, over the age of 60 years and up to 4% in the oldest age groups [1]. PD is typically considered a disorder of movement with symptoms of slowed and reduced amplitude voluntary action, tremor, and rigidity affecting limb and eye movement, in addition impaired control of balance, swallowing, and speech. A range of disabling non-motor symptoms are also commonly experienced including depression, anxiety, psychosis, cognitive impairment, autonomic dysfunction, fatigue, and pain. Motor and non-motor disability increase with disease progression despite symptomatic treatment using levodopa, dopamine agonists, or other drugs that modify brain dopamine levels. With disease progression and increasing duration of treatment, effectiveness gradually declines. In those treated with levodopa, fluctuations in symptom severity over the course of the day commonly develop. These include 'wearing off' (a relatively predictable re-emergence of symptoms towards the end of a medication dose); 'on/off fluctuations' (unpredictable and sudden recurrence of Parkinsonian symptoms); 'delayed on' (unpredictably increased time between ingestion of a dose and motor benefit), and 'dose failure' (unpredictable failure of a dose to provide usual benefit) [2]. In addition to worsening of motor symptoms during 'off-periods', the emergence or exacerbation of distressing non-motor symptoms is also reported by many individuals including pain, fatigue, drenching sweats, depression, and anxiety.

Currently, fluctuations and associated symptoms are managed by alterations in drug regimen but this becomes increasingly difficult with disease progression. This offers potential to develop adjunctive psychological approaches to manage individual symptoms (e.g. depressed mood, pain, or fatigue) or reduce the level of associated subjective distress. There is evidence that traditional CBT treatment approaches can be helpful in reducing depressive and anxiety symptoms in PD [3,4] although not specifically in the context of motor fluctuations. One challenge of CBT is the limits on reality-testing of thoughts and beliefs about PD (e.g.

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'there is no cure for this disease' or 'I have no control over my symptoms') as these may represent accurate appraisals of the disease, and may be challenging to test during 'in the moment' distress associated with off-periods. Key to developing a more targeted therapy is an understanding of the cognitive and attentional processes that contribute to the emotional difficulties experienced by some with PD including those associated with off-period distress. We propose that metacognitive therapy (MCT) [5], an effective treatment for depression and anxiety [6] may be particularly well-suited to the management of PD distress. MCT is based on the Self-Regulatory Executive Function model (S-REF) [7] and posits that psychological distress results from perseverative cognitive processes (e.g. rumination and worry) and attentional strategies (e.g. symptom focussing and hypervigilance). These are proposed to be governed by both explicit and implicit metacognitions and form a Cognitive Attentional Syndrome (CAS). Preliminary research has implicated metacognitions in distress in a small sample of people with PD [8]. S-REF proposes that specific CAS configurations are activated in response to inner events such as cognitions (including memories), emotions, and physical states. If an individual with PD experiences symptoms associated with an off-period and endorses positive metabeliefs about worry (e.g. "worry helps me to solve problems"), the response to this off-related symptom will be worry. An individual who holds negative beliefs about worry, such as 'my worry is uncontrollable', may be less inclined to make attempts to halt this cognitive process and instead to 'worry about worry', increasing distress further and helping to drive more worry. In both instances a stop-signal for this process is not received (i.e. the goal of solving a problem), resulting in worry perseveration and distress. The modifications of the metacognitions that are hypothesized to fuel maladaptive CAS configurations are a key target of MCT interventions.

In this study, we test the following hypothesis: that metacognitive factors explain a significant proportion of variance in anxiety and off-period distress after controlling for disease characteristics, cognitive function, off-period predictability, and trait intolerance of uncertainty.

Methods

Participants and procedure

Participants with a clinical diagnosis of PD were recruited from a cohort of patients involved in a separate longitudinal study (n = 512), PROMS-PD [9]. We approached individuals that had expressed a willingness to engage with additional research, who were judged at their last assessment to have capacity to consent, and had sufficient sensory and motor function to complete a booklet of questionnaires. Those who had been seen for assessment for the main study in the past three months or due to receive an assessment in the coming three months were not approached to prevent overburdening them with requests. Of 178 eligible individuals, 106 returned completed questionnaires (59.6%). Table 1 provides the participant characteristics.

Ethics approval for the study was obtained from the local research ethics committees. All of those returning return questions gave informed consent to participate in the study.

Measures: self-report questionnaires

Depression, anxiety and distress

Depression and anxiety were assessed using the Hospital Anxiety and Depression Scale (HADS) [10]. This 14-item self-report measure provides a total score as well as separate depression (HADS-D) and anxiety (HADS-A) scores, with higher scores representing more severe symptoms. The HADS was originally designed for use in patients with physical health conditions and has been validated for use in patients with PD [11]. A cut-off of eight out of 21 on the depression and anxiety subscales indicates significant symptomatology. A single-item measure was used to measure distress associated with off-periods. Participants reporting motor fluctuations (see below) indicated how distressing they found off-periods on a five-point Likert-type scale: [1] "I have no distress (or I do not experience off-periods)"; [2] "I can feel a little upset during OFF times, but it does not trouble me much"; [3] "I feel mildly distressed during OFF times"; [4] "I feel moderately distressed during OFF times"; and [5] "I feel extremely distressed during OFF times".

Cognitive and metacognitive constructs

The English version of the 27-item Intolerance of Uncertainty Scale (IUS) [12] was used to assess trait intolerance of uncertainty. It has been shown to be associated with worry and anxiety and possesses good psychometric properties [12], but has not been reported previously in patients with PD. The Metacognitions Questionnaire 30 (MCQ) [13] is a 30-item self-report measure that assesses five-factors pertaining to metacognition: [1] positive beliefs about worry (MCQ 1; e.g. "Worrying helps me cope"); [2] negative beliefs about thoughts concerning uncontrollability and danger (MCQ 2; e.g. "When I start worrying I cannot stop"); [3] cognitive confidence (MCQ 3; e.g. "My memory can mislead me at times"); [4] beliefs about the need to

Table 1
Participant characteristics

Characteristic	Fluctuators	Non-fluctuators	Combined
n	93	13	106
Gender	63 male; 30 female	10 male; 3 female	73 male; 33 female
Mean age in years (SD; range)	65.3 (9.4; 43–85)	68.1 (8.3; 50–80)	65.6 (9.3; 43–85)
Mean MDS-UPDRS 2 (SD; range)	17.36 (6.56; 5–36)	13.00 (5.64; 6–22)	16.85 (6.58; 5–36)
Mean MDS-UPDRS 3 (SD; range)	34.38 (12.59; 13–78)	30.55 (10.81; 8–44)	33.94 (12.40; 8–78)
Mean ACE-R: total (SD; range)	88.59 (8.34; 51–100)	90.64 (8.39; 70–100)	88.83 (8.33; 51–100)
Mean ACE-R: attention and orientation (SD; range)	17.53 (0.88; 14–18)	17.54 (0.78; 16–18)	17.50 (0.96; 13–18)
Mean ACE-R: memory (SD; range)	21.86 (3.52; 11–26)	22.92 (2.90; 16–26)	21.93 (3.44; 11–26)
Mean ACE-R: fluency (SD; range)	10.38 (2.56; 3–14)	10.46 (2.07; 7–14)	10.37 (2.47; 3–14)
Mean ACE-R: language (SD; range)	24.87 (1.25; 20–26)	24.69 (1.32; 22–26)	24.83 (1.24; 20–26)
Mean ACE-R: visiospatial (SD; range)	15.18 (1.20; 11–16)	15.15 (1.57; 11–16)	15.15 (1.25; 11–16)
Mean MDS-UPDRS − 4: item 4 (SD; range)	2.87 (1.43; 0–4)	N/A	N/A
Mean distress during off-periods (SD; range)	1.83 (1.13; 0–4)	N/A	N/A
Mean HADS A (SD; range)	9.38 (2.50; 5–16)	7.46 (1.39; 5–10)	9.17 (2.48; 5–16)
Mean IUS (SD; range)	52.74 (18.52; 27–113)	45.25 (11.01; 31–66)	51.86 (17.92; 57–113)
MCQ 1	9.18 (3.08; 6–20)	9.31 (2.63; 6–15)	9.19 (3.02; 6–20)
MCQ 2	10.35 (3.84; 6–20)	7.69 (1.97; 6–12)	10.02 (3.75; 6–20)
MCQ 3	13.10 (4.34; 6–24)	12.08 (4.01; 6–20)	12.97 (4.30; 6–24)
MCQ 4	10.90 (3.33; 6–24)	10.08 (1.93; 8–14)	10.80 (3.20; 6–24)
MCQ 5	12.49 (3.34; 6–24)	10.69 (2.87; 6–17)	12.27 (3.33; 6–24)

Note. MDS-UPDRS = Movement Disorders Society — Unified Parkinson's Disease Rating Scale; ACE-R = Addenbrooke's Cognitive Examination — Revised; HADS A = Hospital Anxiety and Depression Scale (anxiety subscale); IUS = Intolerance of Uncertainty Scale; MCQ = Metacognitions Questionnaire 30.

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