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# The clinical utility of metacognitive beliefs and processes in emotional distress in people with multiple sclerosis

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ABSTRACT

*Aim:* Multiple sclerosis (MS) is a chronic demyelinating disease that poses significant life challenges. Depression and anxiety often occur in people with MS (PwMS). An information processing model of psychopathology, the Self-Regulatory Executive Function (S-REF) model specifies that maladaptive metacognitive beliefs play a fundamental role in the development and maintenance of distress. The model also asserts that a style of thinking known as the cognitive attentional syndrome (CAS), which consists of worry and rumination, focusing on sources of threat, and unhelpful coping responses, is common across all psychological conditions. This study investigated for the first time whether metacognitive beliefs explained additional variance in distress in PwMS, after accounting for demographic, clinical, and illness appraisal variables.

*Method:* One hundred and thirty-two participants with MS completed self-report questionnaires measuring distress, fatigue, pain, metacognitive beliefs, illness appraisals, and the CAS. Hierarchical regression modelling was used to test whether metacognitive beliefs accounted for distress. Mediational modelling examined if the CAS mediated the association between metacognitive beliefs and distress.

*Results:* Metacognitive beliefs made a unique contribution to distress, over and above demographic and clinical variables, and illness appraisals. The CAS fully mediated the relationship between positive metacognitive beliefs and distress, and partially mediated the relationship between negative metacognitive beliefs and distress.

*Conclusions:* Metacognitive beliefs are associated with emotional distress in PwMS, and the CAS mediates this relationship. Future studies should examine if modification of metacognitive beliefs and processes in PwMS will lead to effective alleviation of emotional distress.

## 1. Introduction

Multiple sclerosis (MS) is a chronic and progressive inflammatory disease of the central nervous system, which affects around 2.5 million people worldwide [1,2]. MS manifests in a variety of disabling symptoms, including motor and sensory disabilities, cognitive impairment, sexual dysfunction, pain, fatigue, and bladder and bowel disturbances [1,3–7]. The often variable and unpredictable nature of the clinical symptoms can be frightening for people with MS (PwMS) [2]. Along with physical, sensory and cognitive symptoms, there are profound psychosocial challenges [7]. The onset for many PWMS occurs around early-to-mid adulthood [1], and there is frequent disruption to employment, family life, social roles, and leisure activities [7]. Emotional distress adds further disruption to the lives of PwMS [8]. Approximately a third of PwMS meet the diagnostic threshold for anxiety, and around half for depression [9], although some studies suggest the prevalence of anxiety is higher than depression [8,10–12].

Acknowledging the significant psychosocial impact of MS, clinical guidance recommends cognitive-behavioural therapy (CBT) to treat distress in chronic physical health conditions [13]. While CBT has been shown to reduce distress in PwMS [14], effect sizes have been modest [15]. The limited efficacy of CBT could be due to the difficulties modifying negative cognitions. Research suggests PwMS often make realistic and accurate appraisals of their illness (e.g., “MS has major consequences on my life” and “MS is a serious condition”) [16], which is unsurprising given the challenging nature of the condition. A potentially more effective approach would be to address modifiable factors that maintain heightened distress. For example, persistent worry has been shown to be higher in PwMS compared to the healthy controls and is associated with higher levels of depression, fatigue and sleep disturbance [17].

The transdiagnostic Self-Regulatory Executive Function (S-REF) model [18,19] is an information processing model of emotional disorder that may be applicable to PwMS experiencing emotional distress.

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According to the S-REF model, it is not the content of negative thoughts or negative appraisals related to MS that prolong distress per se, but metacognitive beliefs that drive a deleterious style of thinking and responding to those thoughts, known as the cognitive-attentional syndrome (CAS) [20]. The CAS consists of engaging in worry/rumination (i.e., perseverative thinking), focusing attention on sources of threat (e.g., focusing attention on bodily sensations), and coping responses that backfire (e.g., avoidance, drinking too much alcohol). According to the S-REF model, all aspects of the CAS are activated and maintained by metacognitive beliefs [18]. Positive metacognitive beliefs (PMCBS) encourage the selection of worry/rumination as a coping response ("Worrying about the future keeps me prepared") with a heightened focus on threat monitoring (e.g., paying close attention to physical sensations). Negative metacognitive beliefs (NMCBS) further fuel distress because worry/rumination is appraised as uncontrollable and dangerous ("I have no control over my worry; I am losing my mind"), whilst also giving rise to unhelpful patterns of cognitive self-regulation (e.g., thought suppression, avoidance).

Although the utility of the S-REF model has been tested in several chronic health populations [21–24], so far, the model is untested in PwMS. Given that metacognitive therapy (MCT) [25] is an effective intervention for a range of anxiety and affective disorders [26], with techniques that target and modify metacognitive beliefs and interrupt the CAS [25], it raises the possibility that similar approaches may be applicable in chronic health populations such as PwMS. However, before MCT can be developed for PwMS, the predictions of the S-REF model must be empirically investigated whilst also considering how the predictions fit within current psychological understandings of the condition.

Consistent with the common-sense model [27,28], the S-REF model also predicts that negative illness appraisals will be associated with distress, theoretically in the form of negative intrusions related to the illness, or as the specific of content of worry/rumination (e.g., "Nothing I do will affect my MS"). However, the S-REF model makes a further prediction that metacognitive beliefs will explain additional variance in distress after controlling for illness appraisals. This is because according to the model, it is not necessarily the content of thoughts or illness-specific appraisals that are fundamental to emotional distress, but the psychological factors involved in the control and regulation of cognition. Positive and negative metacognitive beliefs are hypothesised to influence distress via different pathways. Research examining the pathways between metacognitive beliefs and depression, via rumination support these predictions, with levels of rumination fully mediating the relationship between PMCBS and depression, and partially mediating the association between NMCBS and depression [29].

Metacognitive beliefs and processes are associated with emotional distress in other neurological populations [23,24], therefore this study tested the predictions of the S-REF model in PwMS, whilst controlling for demographic and clinical variables, and illness appraisals [18,19,27,28]. Specifically, this study makes the following predictions; 1) metacognitive beliefs will be positively associated with distress, 2) metacognitive beliefs will explain significant variance in distress after controlling for established covariates (i.e., demographic and clinical variables, and illness appraisals), and consistent with previous research [29], 3) the CAS will fully mediate the relationship between PMCBS and distress, and partially mediate the relationship between NCMBS and distress, whilst controlling for potential clinical and socio-demographic confounders (i.e., education, pain, fatigue and treatment control illness appraisals). These predicted pathways are based on the premise that PMCBS lead to distress indirectly by promoting the selection of unhelpful coping responses (e.g., worry/rumination), and NMCBS directly result in distress because these beliefs are both intrinsically distressing when worrying/ruminating, and in parallel they fuel distress promoting maladaptive coping responses (i.e., thought suppression, avoidance).

## 2. Method

### 2.1. Design

This study reports data collected from an online cross-sectional survey. The study was approved by the University of Liverpool Ethics Committee (Reference: IPHS-1516-30).

### 2.2. Participants and procedure

One hundred and thirty-two participants were recruited consecutively via an advert placed on the MS Society, MS Trust and National MS Society websites. PwMS were invited to complete an anonymous survey asking them about their beliefs about worry, perceptions of their illness and experiences of fatigue, pain, and depression and anxiety. They were informed before taking part that if they completed the survey they could enter a prize draw for a chance to win one of three £50 retail vouchers. Inclusion criteria were; 1) current diagnosis of MS, 2) aged 18 and over, and 3) the ability to understand written English. Data was obtained by self-report questionnaires using an online survey platform (Qualtrics).

### 2.3. Measures

#### 2.3.1. Dependent variable

The Hospital Anxiety and Depression Scale (HADS) – Total Score [30] was used to measure distress. The HADS has been used widely in physical health populations [31] and has also been validated for use in PwMS [32]. In the present study, a cut-off score of eight or more for both the anxiety and depression subscales was used to define caseness of depression and anxiety [32,33]. The HADS consists of 14 items, which are statements about symptoms of depression or anxiety, scored on a 4-point scale (e.g., 0 = *not at all* to 3 = *most of the time*; 0 = *definitely as much* to 3 = *hardly at all*). The HADS- Total showed adequate levels of internal consistency in this sample ($\alpha = 0.85$).

#### 2.3.2. Independent variables

Demographic and clinical data was collected which included; gender, age, years in full-time education, ethnicity, employment status, duration of MS, clinical course, and history of treatment for depression and anxiety (i.e., current and past treatment for depression or anxiety).

The Fatigue Severity Scale (FSS) [34] was used to assess severity of fatigue. The FSS contains nine items, which are questions about how fatigue interferes with a range of activities, each scored on a 7-point scale (1 = *strongly disagree* to 7 = *strongly agree*). In this study, a mean score was used as an index for fatigue (i.e., total score/number of items). However, to designate severe levels of fatigue, a cut-off total score of 36 and over was used [34]. The FSS was designed and validated for use in MS and shows good psychometric properties [34]. The scale showed high internal consistency in this sample ($\alpha = 0.94$).

Pain was measured with a visual analogue scale, a unidimensional measure used extensively in adult physical health populations [35]. Participants were asked to select a level of pain intensity on a visual continuum ranging from 0 to 100. A higher score indicated greater pain.

The Illness Perception Questionnaire-Revised (IPQ-R) [36] was used to measure cognitive appraisals of MS. The IPQ-R is valid and reliable measure in MS samples [36,37]. This study used the core section of questionnaire, which consists of 38 items assessing beliefs and emotional responses to MS (e.g., "Nothing I do will affect my MS; There is very little that can be done to improve my MS"). Participants responded to each item using a 5-point scale (1 = *strongly disagree* to 5 = *strongly agree*). The IPQ-R has seven subscales; timeline (acute vs. chronic), consequences (effects and outcome), personal control, treatment control, coherence, timeline cyclical, and emotional representations. In the present study, as the scale was used to assess cognitive appraisals of MS,