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Retrospective memory for symptoms in patients with medically unexplained symptoms

Marta Walentynowicz[a,b], Katleen Bogaerts[b,c], Linda Stans[d], Ilse Van Diest[b], Filip Raes[e], Omer Van den Bergh[b,*]

[a] USC Dornsife Center for Self-Report Science, University of Southern California, Los Angeles, CA, USA
[b] Health Psychology, University of Leuven, Leuven, Belgium
[c] REVAL - Rehabilitation Research Center, Faculty of Medicine and Life Sciences, Hasselt University, Diepenbeek, Belgium
[d] Pulmonary Department, University Hospital Gasthuisberg, University of Leuven, Leuven, Belgium
[e] Learning Psychology and Experimental Psychopathology, University of Leuven, Leuven, Belgium

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ABSTRACT

Objective: Clinical assessment and diagnostic processes heavily rely on memory-based symptom reports. The current study investigated memory for symptoms and the peak-end effect for dyspnea in patients with medically unexplained symptoms and healthy participants.

Methods: Female patients with medically unexplained dyspnea (MUD) (n = 22) and matched healthy controls (n = 22) participated in two dyspnea induction trials (short, long). Dyspnea ratings were collected: (1) continuously during symptom induction (concurrent with respiratory measures), (2) immediately after the experiment, and (3) after 2 weeks. Symptoms, negative affect, and anxiety were assessed at baseline and after every trial. The mediating role of state anxiety in symptom reporting was assessed. The peak-end effect was tested with forced-choice questions measuring relative preference for the trials.

Results: Compared to controls, dyspnea induction resulted in higher levels of symptoms, anxiety, concurrent dyspnea ratings, and minute ventilation in the patient group. In both groups, immediate retrospective ratings were higher than averaged concurrent ratings. No further increase in dyspnea ratings was observed at 2-week recall. Retrospective dyspnea ratings were mediated by both state anxiety and concurrent dyspnea ratings. Patients did not show a peak-end effect, whereas controls did.

Conclusion: The findings show that patients' experience of a dyspneic episode is subject to immediate memory bias, but does not change over a longer time period. The results also highlight the importance of affective state during symptom experience for both symptom perception and memory.

1. Introduction

In health care, patients are repeatedly asked to report about their symptoms. These reports can pertain to concurrent and retrospective symptom experiences. Whereas factors biasing symptom perception have been thoroughly documented for patients with medically unexplained symptoms (MUS) [1–3], little attention has been given hitherto to symptom memory, despite the fact that clinical assessments and questionnaire studies largely rely on memory-based responses.

Studies involving both patient and healthy populations have consistently shown that symptom recall is typically overestimated (see [4,5] for reviews). However, only a few studies explored memory processes among patients with MUS [6,7]. In one study, it was shown that the peak-end effect, while quite robust in general [8–12], was absent in patients with medically unexplained dyspnea (MUD) after induced dyspneic episodes [6]. The peak-end effect is a cognitive heuristic implying that retrospective evaluation of an aversive episode is determined by the most distressing (peak) and the final (end) moments of the experience, and less so by its duration [11]. In another study [7], patients with MUD recalled fewer specific health-related autobiographical memories than healthy controls. These findings suggest that somatic episodes are processed and represented in memory with less sensory-perceptual detail in patients with MUS compared to controls. Interestingly, there is also consistent evidence that patients with MUS are not only more anxious [13–15], but also show exaggerated affective responses to somatic events [16,17]. The combined effect of less detailed processing of sensory-perceptual aspects of a somatic episode and exaggerated affective responses to it may make

* Corresponding author at: Health Psychology, University of Leuven, Tiensestraat 102, Box 3726, 3000 Leuven, Belgium.
E-mail address: omer.vandenbergh@kuleuven.be (O. Van den Bergh).

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persons with MUS particularly vulnerable to retrospective memory distortions. This fits with findings in non-clinical groups showing that retrospective ratings of daily symptoms and experimentally induced dyspnea increase over time in high compared to low habitual symptom reporters [12,18] and that this increase is mediated by affective responses to the somatic event [12,19].

The distinction between sensory-perceptual and affective-motivational components in symptom reporting is in accordance with neurobiological [20], behavioral [21], and psychometric research [22–24] and may be highly relevant to understand MUS and biases in retrospective symptom memory. According to a recent predictive coding model accounting for MUS, exaggerated affective responses and reduced sensory-perceptual processing result in less precise prediction errors related to somatic input, making symptom experiences more vulnerable to become dominated by strong priors (predictions) and, as such, become dissociated from physiological dysfunction [3]. In line with this, we assume that the affective-motivational component during a somatic episode will have greater influence on symptom ratings in patients with MUS. Moreover, its impact would also become more dominant over time [19], due to time-dependent effects of emotion on symptom memory [25–27] and memory processes in general [28,29].

In the present study, we examined how symptom ratings of an experimentally induced dyspneic episode change over time among patients with MUD complaints, also known as behavioral dyspnea [6,30]. Patients with MUD are characterized by a number of symptoms in different bodily systems, such as urge to breathe, chest tightness, and fatigue that do not originate from an underlying cardiovascular or respiratory disorder. The symptoms are experienced as distressing and disruptive and are associated with excessive worrying, anxiety, and frequent medical consultations [16,17,30]. We also wanted to replicate the absence of a peak-end effect in MUD patients. Therefore, dyspnea was induced in two rebreathing trials [31]. A short trial ended at the most intense level of dyspnea, whereas a long trial additionally included a partial recovery period. Relative preference for the trials (if they were to be repeated) was assessed as a test of the peak-end effect [6,11], which typically shows up as a preference for the long trial relative to the short, despite more overall distress in the long trial. Participants rated experienced dyspnea concurrently during the induction trials, immediately after the experiment, and after two weeks. Based on abovementioned arguments, our predictions were: (1) Patients would rate concurrent dyspnea as more intense than healthy controls; (2) Immediate retrospective dyspnea ratings would be higher than concurrent ratings, with greater overreporting in patients; (3) Retrospective ratings would increase over time only in patients;(4) This overreporting would be mediated by the affective responses to the dyspnea trials; (5) The peak-end effect would be observed in the control but not in the patient group [replicating 6].

2. Methods

2.1. Participants

The study was part of a larger two-part questionnaire and experimental study investigating memory in patients with medically unexplained dyspnea (MUD). The data from the questionnaire study are reported elsewhere [7]. The Medical Ethics Committee of the University Hospital of the University of Leuven approved the protocol. A €15 reimbursement was provided to the participants.

Participants in the patient group (n = 30, all women) were recruited from the outpatient pulmonology clinic of the Leuven University Hospital (Gasthuisberg). Patients were classified as having MUD after a systematic medical work-up procedure which excluded organic reasons for multiple somatic symptoms such as breathing distress, dyspnea, numbness, and fatigue, and after a systematic interview (the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition Axis I Disorders [32]) by a qualified psychologist which excluded psychiatric causes for experienced dyspnea other than somatization disorder. Exclusion criteria were: a self-reported history of pulmonary, cardiovascular, gastrointestinal, or neuromuscular disease; medical conditions that likely affect respiratory capacity, such as acute illnesses, fever, or flu; mental disorder other than somatoform disorder (self-reported via a general item); pregnancy or breastfeeding.

Two patients reported use of selective serotonin reuptake inhibitors (escitalopram, sertraline). Healthy controls (n = 24, all women) were recruited via local advertisements and matched for age, body mass index, and education level. To be included in the study, they also had to score < 75 on the Checklist for Symptoms in Daily Life [24,33]. Two controls and eight patients were excluded from the analyses because of technical difficulties (e.g., unstable filter) or problems with completing the experiment as instructed (e.g., stopping the trial, not returning the follow-up questionnaires). Therefore, reported results are based on data from 22 patients and 22 controls. The groups did not differ with regard to demographic characteristics (Table 1).

Table 1
Group comparisons of demographic and personality trait characteristics.

Variable	Patients (n = 22)	Controls (n = 22)	Statistics
Age, mean (SD)	36.86 (9.58)	37.59 (9.94)	$t(42) = -0.25$, $p = 0.81$
BMI (kg/m^2)	23.53 (4.05)	22.07 (2.38)	$t(33.93) = 1.46$, $p = 0.15$
Working, n (%)	18 (81.8)	18 (81.8)	$\chi^2(1, n = 44) = 0$, $p = 1.00$
Marital status, n (%)			$\chi^2(3, n = 44) = 1.35$, $p = 0.72$
Married or cohabiting	15 (68.2)	14 (63.6)	
Single	4 (18.2)	5 (22.7)	
Divorced	2 (9.1)	3 (13.6)	
Widow	1 (4.5)	0 (0)	
Education level, n (%)			$\chi^2(2, n = 44) = 1.93$, $p = 0.38$
High school	8 (36.4)	4 (18.2)	
College	7 (31.8)	10 (45.5)	
University	7 (31.8)	8 (36.4)	
NA	29.45 (7.40)	16.14 (4.63)	$t(42) = 7.16$, $p < 0.001$
BDI-II	19.32 (9.41)	4.50 (4.48)	$t(30.06) = 6.67$, $p < 0.001$
CSD	115.50 (17.51)	62.68 (7.82)	$t(29.05) = 12.92$, $p < 0.001$

Note. SD = standard deviation; BMI = Body Mass Index; NA = Negative Affectivity; BDI-II = Beck Depression Inventory; CSD = Checklist for Symptoms in Daily Life.

2.2. Measures

2.2.1. Negative affectivity

Trait and state negative affectivity (NA) were measured with the Dutch version of the Positive and Negative Affect Schedule [34,35]. Using a 5-point Likert scale ranging from *not at all* to *very much*, participants rated to what extent they experience 10 positive and 10 negative emotions in general (trait) or now (state). Cronbach's alphas for both trait and state versions ranged from 0.83 to 0.92.

2.2.2. Depression

Depression was measured with the Dutch version of Beck Depression Inventory-II (BDI-II) [36], a 21-item questionnaire assessing