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Mood-congruent recollection and anosognosia in Alzheimer's disease

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ABSTRACT

The aim of the study was to investigate experimentally the impact of current mood state on anosognosia or awareness of symptoms in AD patients, in which mood state was manipulated by giving tasks that were either easy (success condition) or very difficult (failure condition). Twenty-two patients with mild to moderate AD participated. Four success-failure manipulation (SFM) computerized tasks were used as mood induction procedures, two based on reaction time tasks and the other on memory tasks. Level of awareness and the current mood state were assessed before and after each task, using a modified version of the Anosognosia Questionnaire for Dementia and a self-reported questionnaire respectively. For both types of task, the results indicate that the emotional state of the participants was similar before performing the tasks and that only the failure conditions induced a negative mood state. Additionally, regarding the level of awareness, there were no significant differences after the reaction time tasks but for the memory tasks, there was greater awareness of symptoms after performing the task in the failure condition. To the best of our knowledge, this study is the first exploring experimentally the impact of mood on anosognosia in AD. The results showed an improvement of awareness of symptoms after negative mood induction, but only when the task used in the SFM was memory-based.

1. Introduction

Anosognosia refers to a lack of awareness about deficit or condition as found in various neurological conditions, such as aphasia, hemiplegia and also dementia (Mograbi, Brown, & Morris, 2009; Ries et al., 2007; Stuss, 1991; Stuss, Rosenbaum, Malcolm, Christiana, & Keenan, 2005). Unawareness regarding the disease or cognitive impairments is a common characteristic of Alzheimer's disease (AD) (Agnew & Morris,

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1998; Morris & Hannesdottir, 2004), with estimates obtained with large samples reaching almost 80% (Antoine, Antoine, Guermonprez, & Frigard, 2004; Mograbi, Ferri, et al., 2012; Sousa et al., 2015). Lack of awareness has several important clinical implications (Bertrand, Landeira-Fernandez, & Mograbi, 2013; Spalletta, Girardi, Caltagirone, & Orfei, 2012), which go from diminished treatment adherence (Arlt, Lindner, Rösler, & Von Renteln-Kruse, 2008), increased engagement in high-risk situations (Seltzer, Vasterling, Yoder, & Thompson, 1997; Starkstein, Jorge, Mizrahi, Adrian, & Robinson, 2007), earlier institutionalization (Horning, Melrose, & Sultzer, 2014; Steele, Rovner, Chase, & Folstein, 1990) to increased caregiver burden (Clare et al., 2011; DeBettignies, Mahurin, & Pirozzolo, 1990; Rymer et al., 2002; Seltzer et al., 1997; Turró-Garriga et al., 2013).

The relationship with mood is an important aspect of anosognosia and has been explored using three main approaches (Mograbi & Morris, 2014). First, studies show mixed results when exploring awareness for different objects in dementia, with some findings suggesting that patients with AD present greater unawareness for cognitive deficits relative to behavioral changes (Kotler-Cope & Camp, 1995) and others results indicating also an "affective anosognosia" (Verhülsdonk, Quack, Höft, Lange-Asschenfeldt, & Supprian, 2013), that is, a lack of awareness for mood disturbance. Second, the literature suggests that people with AD may present an emotional response to failure situations even in the absence of explicit awareness. For example, Mograbi, Brown, Salas and Morris (2012) showed that, in a failure situation, patients with AD exhibited the same emotional reactivity as did controls, despite unawareness of their performance. Third, when exploring the relation between level of awareness of deficits and the presence of depressive symptoms, numerous studies indicate that patients with AD who have a higher level of depression show more awareness or less anosognosia (Clare et al., 2012; Harwood, Sultzer, & Wheatley, 2000). Two possible explanations for these results can be found in the literature. On one hand, depressed patients may show "depressive realism" or present apparently more awareness because of a negative bias when reporting problems. On the other hand, increased awareness of difficulties might lead to higher depression, through a reactive depression process. Investigating the role played by emotional factors in anosognosia for hemiplegia, Besharati, Kopelman, Avesani, Moro, and Fotopoulou (2015) showed that experimentally induced negative feelings improved awareness for motor deficits in anosognosic patients with right-hemisphere lesions. However, the question of a causal link between awareness and mood and the direction of this relationship still remains.

Another way to explore this link is through the well-known relationship between mood and memory. The most robust effects of mood on memory in the literature are the phenomena of mood-dependent memory (MDM) and mood-congruent memory (MCM). The former, as part of the global phenomenon of state-dependent memory, is improved memory for material when the subject's mood is the same at the time of encoding and retrieval, this occurring independent of the material content (Bower, 1981; Eich & Metcalfe, 1989; Nutt & Lam, 2011). The latter refers to facilitated recovery of material when the emotional valence of this material is congruent with current mood (Bower, 1981). For example, when a person is currently in a positive mood state, the retrieval of positively toned material will be easier in comparison to the retrieval of negative items. Most of the studies exploring MCM were conducted with young adults, but there are differential older adult effects. Specifically, Knight and Durbin (2015) reviewed studies with older adults and found a greater bias for recalling negative information when in a sad mood, compared to younger adults. Additionally, in a study including also AD participants, Fleming, Kim, Doo, Maguire, and Potkin (2003) demonstrated that AD patients remembered more negative items in an immediate recall memory task than neutral and positive words; healthy younger and older adults did not show this bias toward negatively toned material. The authors suggested the MCM effect as an explanation for these results. However, as current mood was not assessed, the data may not fully support their conclusions. Additionally, to the best of your knowledge, there is no published study exploring specifically the MDM and/or MCM effects in AD patients.

The aim of the current study was to investigate the impact of the current mood state on awareness of symptoms in AD patients, more specifically on the recollection of memories linked to their condition. For this purpose, we induced specific mood states using two experimental success-failure manipulation paradigms, one involving a reaction time task and the other a memory task. Participants were asked to answer questions regarding their condition before and after each mood manipulation. By using this method, we intended to explore not only the impact of mood on awareness but the additional influence of the context (memory *vs* reaction time) on awareness as well. We hypothesized that the induction of a negative mood state would increase the retrieval of details regarding the patient's own deficits. However, we anticipated that the type of task would affect differentially the level of anosognosia, with a more marked increase of awareness after memory tasks in comparison to reaction time tasks.

2. Methodology

2.1. *Participants*

Twenty-four participants with mild to moderate AD (17 females) were recruited from the Center for Alzheimer's disease and Related Disorders (CDA) of the Institute of Psychiatry of the Federal University of Rio de Janeiro (IPUB-UFRJ), Brazil. The clinical diagnosis of AD was made by a psychiatrist using clinical interviews with the patients and caregivers, cognitive screening tests, laboratory tests, and imaging. The participants were diagnosed with possible or probable AD according to Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV-TR, American Psychiatric Association, 2000) and National Institute of Neurological and Communicative Diseases and Stroke/Alzheimer's Disease and Related Disorders Association