



The profile of executive function in OCD hoarders and hoarding disorder



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ABSTRACT

Hoarding disorder is a new mental disorder in DSM-5. It is classified alongside OCD and other presumably related disorders in the Obsessive-Compulsive and Related Disorders chapter. We examined cognitive performance in two distinct groups comprising individuals with both OCD and severe hoarding, and individuals with hoarding disorder without comorbid OCD. Participants completed executive function tasks assessing inhibitory control, cognitive flexibility, spatial planning, probabilistic learning and reversal and decision making. Compared to a matched healthy control group, OCD hoarders showed significantly worse performance on measures of response inhibition, set shifting, spatial planning, probabilistic learning and reversal, with intact decision making. Despite having a strikingly different clinical presentation, individuals with only hoarding disorder did not differ significantly from OCD hoarders on any cognitive measure suggesting the two hoarding groups have a similar pattern of cognitive difficulties. Tests of cognitive flexibility were least similar across the groups, but differences were small and potentially reflected subtle variation in underlying brain pathology together with psychometric limitations. These results highlight both commonalities and potential differences between OCD and hoarding disorder, and together with other lines of evidence, support the inclusion of the new disorder within the new Obsessive-Compulsive and Related Disorders chapter in DSM-5.

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1. Introduction

The clinical presentation of obsessive-compulsive disorder (OCD) is heterogeneous with patients suffering from different, potentially non-overlapping symptoms. The disorder is characterized by obsessions, which are recurrent intrusive thoughts and/or compulsions, which are persistently recurring behaviours or mental rituals. Factor analytic studies have identified different symptom dimensions that have been associated with distinct patterns of co-morbid psychiatric conditions, treatment response,

genetic transmission and functional neural activity (Bloch et al., 2008). Thus, although performance on neuropsychological tasks often suggests worse performance in OCD cohorts compared to controls (Kuelz et al., 2004), findings are inconsistent possibly due in part to heterogeneity in symptom presentation obscuring the overall profile (Mataix-Cols et al., 2004; McKay et al., 2004). Hoarding consistently appears as a separate factor in many factor analytic studies and represents a possible source of variability in results. To date, most OCD symptom assessments have gauged hoarding symptoms at least to some degree, and historically these symptoms were conceptualized as being part of OCD (Goodman et al., 1989).

Recently, not only has OCD been reclassified in the DSM-5 (American Psychiatric Association, 2013), where it has been moved from anxiety disorders to a newly created chapter of Obsessive-Compulsive and Related Disorders (Fineberg et al., 2007; Hollander et al., 2009; Phillips et al., 2010; Stein et al., 2010), but also hoarding disorder is now considered a new disorder separate from OCD within this new category (Mataix-Cols et al., 2010;

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Pertusa et al., 2010). The diagnostic criteria for hoarding disorder include persistent difficulty discarding or parting with possessions, regardless of the value others may attribute to these possessions; the accumulation of a large number of possessions that fill up and clutter active living areas of the home or workplace to the extent that their intended use is no longer possible; the symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning (including maintaining a safe environment for self and others) (see also Frost and Hartl, 1996). Hoarding disorder is not diagnosed if the symptoms are better attributed to other conditions such as brain lesions, a neurodegenerative disorder, obsessions in OCD, lack of energy in major depression, or delusions in schizophrenia. Hoarding disorder is associated with high levels of serious disability and is often accompanied by reduced insight and although it typically onsets by early adulthood, if and when treatment is sought, it is usually later in life (Pertusa et al., 2010). Whilst hoarding disorder is now recognized as distinct from OCD but within the same DSM-5 chapter, there are both overlaps and differences between the two disorders in phenomenology, treatment, co-morbidity, genetic and neurobiological profiles (Saxena, 2008; Mataix-Cols et al., 2011). One important observation is prevalence rates: 18–40% of OCD patients exhibit some level of hoarding, yet the majority of individuals with hoarding difficulties do not display other OCD symptoms including obsessions or anxiety-related compulsions (Frost et al., 2000; Pertusa et al., 2008; Samuels et al., 2008).

Executive function performance in OCD patients with hoarding is of interest given the noted heterogeneity in the literature. In particular, difficulties in executive function, which are likely mediated by frontostriatal neural substrates, are believed to characterize OCD and contribute to symptom development and maintenance (Chamberlain et al., 2005). Nevertheless, neuropsychological studies often include mixed samples of patients or exclude those suffering from primary hoarding symptoms (Kuelz et al., 2004). To date, there have been only a few studies examining executive function performance in moderate to severe hoarders. Abnormalities specific to hoarding have been suggested in prefrontal areas such as the dorsal anterior cingulate and ventromedial prefrontal cortex over and above the fronto-striatal abnormalities typically found in OCD (Saxena, 2008; Mataix-Cols et al., 2011), suggesting that executive functions may be specifically informative in characterizing hoarders with and without OCD. Studies of hoarders where most or all had comorbid OCD have reported deficits in spatial memory and sustained attention (Grisham et al., 2007). Evidence regarding the Iowa Gambling Task (IGT) in OCD hoarders is mixed (Lawrence et al., 2006; Grisham et al., 2007; Blom et al., 2011), possibly because of between-study differences in hoarding severity and OCD symptom frequency. Other studies have examined individuals with hoarding symptoms, the majority of which did not meet criteria for OCD (Hartl et al., 2004; Grisham et al., 2010; Tolin et al., 2011). Difficulties were found in spatial planning, and spatial memory and organizational strategies (Grisham et al., 2010; Hartl et al., 2004). However, recent studies testing hoarders with no OCD did not find evidence for executive function difficulties, including spatial planning (Tolin et al., 2011) or on the IGT (Tolin and Villavicencio, 2011). Individuals with hoarding symptoms have also been found to have unimpaired cognitive flexibility, inhibitory control for emotional stimuli, decision-making and verbal organization strategies (Grisham et al., 2010).

Previous neuropsychological studies of executive functions in OCD patients specifically without hoarding symptoms (typically exhibiting washing and checking obsessions and compulsions) have reported worse performance in response-inhibition, cognitive flexibility, spatial working memory and spatial planning tasks

(Chamberlain et al., 2007a, 2007b), though a recent study did not find response-inhibition difficulties (Blom et al., 2011). The evidence for decision-making difficulties is inconsistent (Cavedini et al., 2002; Nielen et al., 2002; Chamberlain et al., 2007a) and organizational deficits have been implicated in memory difficulties that are sometimes observed (Savage et al., 1999). Deficits in stop-signal response-inhibition and cognitive flexibility but not decision-making have also been demonstrated in the unaffected first-degree relatives of such OCD patients, suggesting these particular cognitive functions may play a key role in identifying endophenotypes of OCD (Chamberlain et al., 2007b). In summary, there are limited data on response-inhibition as assessed by the stop-signal task in hoarding, despite its significance in OCD (Chamberlain et al., 2005; Blom et al., 2011). This task is particularly suited to examine response-inhibition as it requires suppressing already-initiated motor responses, enlisting greater inhibitory demands and less action selection than go/no-go tasks which have yielded varied results in OCD samples (Morein-Zamir et al., 2013). Likewise, as noted above, the evidence regarding cognitive flexibility and decision making is inconsistent. Such inconsistencies may have been due to differing degrees of overlap with OCD between the various hoarding samples, and the use of different tasks across studies.

Here we examined the executive function profile of OCD patients with prominent and severe hoarding symptoms, comparing them to a healthy control group. Given that hoarding is now considered a distinct disorder (Pertusa et al., 2008; Mataix-Cols et al., 2010; American Psychiatric Association, 2013), a separate group of patients meeting criteria for hoarding disorder but no comorbid OCD was also assessed. Performance measures were obtained for response inhibition, cognitive flexibility, spatial planning and decision-making, on executive functions tasks previously used to characterize cognitive deficits in non-hoarding OCD patients. Should both hoarding groups have a similar profile to non-hoarding OCD, difficulties compared to controls would be hypothesized in response-inhibition (stop-signal reaction time; SSRT), cognitive flexibility as measured by extra-dimensional (ED) shifting and spatial planning as measured by problems solved in the Tower of London (TOL), but not decision-making as measured by a gamble task. A probabilistic learning and reversal task was also employed, as evidence for deficits in OCD have been inconsistent in both behaviour and functional brain imaging (Clarke et al., 2004; Remijnse et al., 2006; Chamberlain et al., 2007a; Ersche et al., 2011). Such tasks depend on intact orbitofrontal and cingulate function (Cools et al., 2002; Fellows and Farah, 2003), which is believed to be impaired in OCD, particularly in hoarders (An et al., 2009; Mataix-Cols et al., 2011). In sum, this study investigated the cognitive profile of OCD patients with prominent hoarding symptoms and of individuals with hoarding disorder who do not have comorbid OCD. Following the main analyses, we then compared the resulting cognitive profiles of the two groups with those previously obtained in the same tasks, in a sample of non-hoarding OCD patients (Chamberlain et al., 2006, 2007a).

2. Methods

2.1. Participants

Twenty-four severe hoarders meeting DSM-IV-TR criteria for OCD and 22 individuals with severe hoarding who did not meet criteria for OCD participated in the study. Hoarders were recruited from specialist OCD and hoarding clinics and through independent charities. All were assessed by experienced clinicians (N.F., D.M. and A.P.) supplemented with the MINI (Sheehan et al., 1998) to establish diagnosis and meeting inclusion criteria. Inclusion criteria included severe hoarding as indicated by the criteria outlined by Frost and colleagues (Frost and Hartl, 1996; Steketee and Frost, 2003) and a Savings Inventory-Revised (SI-R) (Frost et al., 2004) score above 35. All hoarders confirmed that their hoarding was chronic and

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