



## Inattention, but not OCD, predicts the core features of Hoarding Disorder

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### ABSTRACT

Hoarding Disorder (HD), defined as the acquisition of and failure to discard large volumes of possessions, resulting in clutter that precludes normal use of living spaces, is a common and debilitating condition. Although hoarding has historically been conceptualized as a variant of obsessive-compulsive disorder (OCD), increasing evidence suggests that hoarding might be more closely associated with the symptoms of attention deficit-hyperactivity disorder (ADHD). The aim of the present study was to clarify the relationship between the core features of hoarding (clutter, difficulty discarding, acquiring), OCD symptoms, and ADHD symptoms. HD ( $N = 39$ ), non-hoarding OCD ( $N = 26$ ), and healthy control ( $N = 36$ ) participants underwent careful diagnostic interviewing and completed standardized self-report measures of the core features of hoarding (clutter, difficulty discarding, acquiring), OCD symptoms, negative affect, and the inattentive and hyperactive/impulsive symptoms of ADHD. Multiple linear regressions demonstrated that after controlling for global negative affect, OCD symptoms did not significantly predict any of the core features of HD. Conversely, the inattentive (but not hyperactive/impulsive) symptoms of ADHD significantly predicted severity of clutter, difficulty discarding, and acquiring. These results challenge current conceptualizations of hoarding as a subtype of OCD, and suggest an association with neurocognitive impairment.

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Hoarding Disorder (HD) is defined as the acquisition of and failure to discard large volumes of possessions, resulting in clutter that precludes normal use of living spaces (Frost & Gross, 1993; Frost & Hartl, 1996). With an estimated prevalence of 2–5% (Iervolino et al., 2009; Samuels et al., 2008), HD is associated with high levels of disability and impairment (Tolin, Frost, Steketee, Gray, & Fitch, 2008). Involvement of government agencies, including the public health department, is common due to complaints of unsanitary conditions and of fire risk due to hoarding (Frost, Steketee, & Williams, 2000).

Historically, hoarding has been conceptualized as a variant of obsessive-compulsive disorder (OCD) (e.g., Rasmussen & Eisen, 1992). However, as many as 83% of primary hoarding patients deny symptoms of OCD (Frost, Steketee, Tolin, & Glossner, 2010), and hoarding symptoms may correlate less well with OCD symptoms than with other symptoms such as depression (Wu & Watson, 2005). Hoarding has consistently emerged as a discrete symptom factor from other OCD symptoms (e.g., checking, washing) in factor analytic studies of OCD symptoms (see Bloch, Landeros-Weisenberger, Rosario, Pittenger, & Leckman, 2008, for a review), and the hoarding factor demonstrates relatively weak relationships

with other OCD symptom factors (Abramowitz, Wheaton, & Storch, 2008; Wu & Watson, 2005).

It could be argued that HD is more closely associated with the symptoms of attention deficit-hyperactivity disorder (ADHD) than with OCD. Recent self-report, neuroimaging, and neuropsychological data converge to suggest that impaired cognitive functions (particularly attention) might be a core feature of hoarding that contributes to decision-making problems. On self-report measures, hoarders describe high levels of attentional impairment (Grisham, Brown, Savage, Steketee, & Barlow, 2007; Hartl, Duffany, Allen, Steketee, & Frost, 2005). In one such study, 20% of hoarders, compared to 4% of OCD patients and 3% of community controls, met adult inattention symptom criteria for ADHD. Furthermore, a full 75% of the hoarding group scored 1 *SD* or more above the mean for age- and gender-matched controls on self-reported inattention symptoms (Ratchford, Frost, Steketee, & Tolin, 2009). Among adult OCD patients, those with hoarding symptoms have nearly a 10-fold risk of ADHD, compared to those without hoarding symptoms (Sheppard et al., 2010), although no such difference was found among child and adolescent OCD patients (Storch et al., 2007).

To date, five studies (Grisham et al., 2007; Grisham, Norberg, Williams, Certoma, & Kadib, 2010; Hartl et al., 2004; Lawrence et al., 2006; Tolin, Villavicencio, Umbach, & Kurtz, submitted for publication) have examined neuropsychological performance in

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patients with hoarding behaviors [a fifth study (Anderson, Damasio, & Damasio, 2005) assessing patients who developed hoarding behavior after acquired brain lesions will not be reviewed here]. The most robust finding across these studies has been impaired attention (Grisham et al., 2007; Tolin, Villavicencio et al., submitted for publication), with some additional positive findings in memory (Hartl et al., 2004) and executive functions (Grisham et al., 2010), a pattern reminiscent of that seen in ADHD patients (Epstein, Johnson, Varia, & Conners, 2001; Kessler et al., 2010).

The hyperactivity–impulsivity symptoms of ADHD may also play a role in hoarding. Excessive, often positively-reinforced acquiring behavior is common in hoarding (Frost & Gross, 1993; Frost et al., 1998; Frost, Tolin, Steketee, Fitch, & Selbo-Bruns, 2009), and hoarding symptoms are prevalent among excessive buyers (Frost, Steketee, & Williams, 2002). Hoarding symptoms have also been found in compulsive gamblers (Frost, Meagher, & Riskind, 2001) and in individuals with trichotillomania and skin picking (Samuels et al., 2002), suggesting some overlap with impulsivity. Using the Continuous Performance Test, Grisham et al. (2007) found that hoarders made more errors of commission than did healthy controls and mixed clinical controls, a finding consistent with impaired behavioral inhibition.

Although an increasing body of evidence suggests that problems of cognitive function (particularly attention) are common in HD, it could be argued that these problems are simply artifacts of other comorbid psychopathology. In particular, OCD, which is present in approximately one-fifth of individuals with HD (Frost et al., 2010), has been associated with impaired cognitive function (Greisberg & McKay, 2003; but see also Simpson et al., 2006). A similar argument could be made for depression, which can impair cognitive function (McDermott & Ebmeier, 2009) and is present in over half of individuals with HD (Frost et al., 2010). This issue has important implications for the current debate about whether HD should be considered distinct from OCD in DSM-5 (Mataix-Cols et al., 2010). If cognitive problems such as inattentiveness and impulsivity contribute to HD symptoms over and above the contribution of OCD, depression, and other psychiatric disorders, this would not only support the argument for a separate HD diagnosis, but would also highlight the importance of adding neurocognitive features to the current conceptual model of the disorder. Currently, the proposed DSM-5 diagnostic criteria highlight emotional distress and urges to save, but make no mention of neurocognitive functions.

The aim of the present study is to clarify the relationship between the core features of hoarding (clutter, difficulty discarding, acquiring), OCD symptoms, and ADHD symptoms. It is hoped that understanding the processes underlying hoarding behavior will facilitate treatment development, given the rather poor response of hoarding to traditional OCD treatments such as serotonergic antidepressants (Black et al., 1998; Mataix-Cols, Rauch, Manzo, Jenike, & Baer, 1999; Saxena, Brody, Maidment, & Baxter, 2007; Stein, Andersen, & Overo, 2007) and exposure and response prevention (Abramowitz, Franklin, Schwartz, & Furr, 2003; Mataix-Cols, Marks, Greist, Kobak, & Baer, 2002). We hypothesized that ADHD symptoms, but not OCD symptoms, would predict the core features of HD after controlling for general psychological distress. We further predicted that inattention would more strongly predict difficulty discarding, and that hyperactivity/impulsivity would more strongly predict acquiring behaviors.

## Method

### Participants

Eighty-seven adult participants met inclusion criteria of age 18–65; absence of lifetime bipolar, psychotic, or substance use

disorders; absence of metal in the body or pregnancy (participants were primarily being recruited for a functional magnetic resonance imaging study), and (for the clinical groups) symptom duration of 1 year or more. Furthermore, participants were included if they could be classified into one of three diagnostic groups: *Hoarding* (primary diagnosis of hoarding, no diagnosis of non-hoarding OCD;  $N = 32$ ), *OCD* (primary diagnosis of non-hoarding OCD, no diagnosis of hoarding;  $N = 22$ ), or *Healthy Controls* (no lifetime psychiatric diagnosis or treatment;  $N = 33$ ). Primacy of diagnoses was ascertained using clinical severity ratings (CSRs) from the *Anxiety Disorders Interview Schedule for DSM-IV* (ADIS-IV; Brown, Di Nardo, & Barlow, 1994).

### Materials

Psychiatric diagnoses were ascertained using the *ADIS-IV* (Brown et al., 1994). Reliability for the various DSM-IV categories contained in the ADIS-IV extends from good to excellent, with alpha coefficients ranging from .41 to .86 (Brown, Di Nardo, Lehman, & Campbell, 2001). In addition, clinical ratings demonstrate strong inter-rater reliability for the different dimensions of the DSM-IV anxiety and mood disorders. Assessors were trained to criterion (100% agreement on diagnostic classification and within one CSR point on all diagnoses), with regular inter-rater reliability checks to prevent rater drift. Hoarding diagnoses were made using the *Hoarding Rating Scale-Interview* (HRS-I; Tolin, Frost, & Steketee, 2010), a semi-structured interview that assesses the severity of clutter, acquisition, difficulty discarding, distress, and impairment, each on a 0–8 scale. Internal consistency was excellent in this sample ( $\alpha = .98$ ). HD participants received ratings of 4 (moderate) or greater on the clutter, difficulty discarding, and distress or impairment scales; non-HD participants did not meet this criterion, which reliably discriminates hoarding from non-hoarding participants (sensitivity = .97, specificity = .97) (Tolin, Frost et al., 2010).

Severity of the core features of hoarding (clutter, difficulty discarding, acquiring) was assessed using the *Saving Inventory-Revised* (SI-R; Frost, Steketee, & Grisham, 2004), a 23-item questionnaire of compulsive hoarding severity. Internal consistency is excellent for the total score and for the 3 subscales. The SI-R readily discriminates hoarders from OCD patients and community controls, and correlates significantly with ratings of clutter and impairment (Frost et al., 2004). Internal consistency was excellent in this sample (Clutter  $\alpha = .99$ , Difficulty Discarding  $\alpha = .97$ , Acquiring  $\alpha = .93$ , Total  $\alpha = .99$ ).

Although the ADIS-IV includes queries about specific OCD symptom dimensions, the psychometric properties of these questions are not known. Therefore, severity of non-hoarding OCD was assessed using the *Obsessive Compulsive Inventory-Revised* (OCI-R; Foa et al., 2002), an 18-item self-report measure that assesses severity of different OCD symptoms (washing, checking, ordering, obsessing, hoarding, and neutralizing) using five-point scales. The OCI-R has good internal consistency, convergent validity, and test–retest reliability in patients with OCD, other anxiety disorders, and non-anxious controls (Abramowitz, Tolin, & Diefenbach, 2005; Foa et al., 2002; Huppert et al., 2007). For the purposes of the present study, the hoarding subscale of the OCI-R was omitted. Internal consistency was good in this sample ( $\alpha = .88$ ).

Severity of ADHD-like symptoms was assessed using the *ADHD Symptom Scale* (ADHDSS; Barkley & Murphy, 1998). Based on DSM-IV criteria for ADHD, this 18-item self-report measure is comprised of 4 subscales: Adult Inattention (e.g., “Fail to give close attention to details or make careless mistakes in my work”), Adult Hyperactivity/Impulsivity (e.g., “Interrupt or intrude on others”), Child Inattention, and Child Hyperactivity/Impulsivity. The ADHDSS readily discriminates ADHD patients from community control

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