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Sex-Specific Clinical Correlates of Hoarding in Obsessive-Compulsive Disorder

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Abstract

Little is known about whether the clinical correlates of hoarding behavior are different in men and women with obsessive-compulsive disorder (OCD). In the current study, we evaluated the association of hoarding with categories of obsessions and compulsions, psychiatric disorders, personality dimensions, and other clinical characteristics separately in 151 men and 358 women with OCD who were examined during the OCD Collaborative Genetics Study. We found that, among men but not women, hoarding was associated with aggressive, sexual, and religious obsessions and checking compulsions. In men, hoarding was associated with generalized anxiety disorder and tics whereas, among women, hoarding was associated with social phobia, post-traumatic stress disorder, body dysmorphic disorder, nail biting, and skin picking. In women but not men, hoarding was associated with schizotypal and dependent personality disorder dimensions, and with low conscientiousness. These findings indicate that specific clinical correlates of hoarding in OCD are different in men and women and may reflect sex-specific differences in the course, expression, and/or etiology of hoarding behavior in OCD.

Keywords

Obsessive-compulsive disorder; hoarding; comorbidity; personality disorders; personality; sex differences

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Hoarding behavior has been called "pathological collecting" and is characterized by the acquisition of, and unwillingness or inability to discard, large quantities of seemingly useless objects (Greenberg, Witztum & Levy, 1990; Frost & Gross, 1993). The behavior can lead to significantly cluttered living space in the home and can cause considerable distress and impairment in functioning for individuals and their family members (Tolin et al., 2008). The clutter may interfere with the normal use of space for basic household activities and increase the risk of injuries due to fire and falling, and illnesses due to poor sanitation, as well as legal citations and evictions from home by public health authorities (Frost, Steketee, & Williams 2000). Although hoarding behavior can occur in several psychiatric conditions, including dementia, mental retardation, schizophrenia, and eating disorders (Damecour & Charron, 1998), it appears to occur most frequently in the context of obsessive-compulsive disorder (OCD), presenting in 20–30% or more of patients with this condition (Rasmussen & Eisen, 1992; Frost, Krause, & Steketee, 1996).

Over the past decade, considerable evidence has accumulated that OCD-affected individuals with hoarding behavior show clinical differences from those without hoarding behavior. These differences include greater severity of OCD, as measured by the Yale-Brown Obsessive Compulsive Scale (YBOCS) (Goodman et al., 1989); higher scores on measures of general psychopathology, anxiety, and depression; greater prevalence of social phobia and generalized anxiety disorder; and higher levels of family and social disability (Frost, Krause, & Steketee, 1996; Samuels et al., 2002; Steketee & Frost, 2003). In addition, hoarding individuals have a greater prevalence of personality disorders, especially schizotypal, dependent, avoidant, and obsessive-compulsive (Frost, Steketee, Williams, & Warren, 2000; Mataix-Cols, Baer, Rauch, & Jenike, 2000; Samuels et al., 2007a). Moreover, OCD patients with hoarding behavior often have poorer insight into their symptoms and can be less responsive to treatment with serotonin-reuptake inhibitors or cognitive-behavioral therapy than other OCD patients (Winsberg, Cassic & Koran, 1999; Black et al., 1998; Mataix-Cols et al., 1999; Mataix-Cols et al., 2002; Saxena et al., 2002).

Recently, Wheaton et al. (2008) reported that, in a sample of patients from an adult OCD clinic, there were many clinical differences between female patients with and without hoarding symptoms, but few differences among male patients. In the 289 women with OCD, patients with hoarding symptoms had, on average, an earlier age at onset of OCD; greater severity of OCD; and greater lifetime prevalences of bipolar I disorder, panic disorder, alcohol and substance abuse disorders, and binge eating disorder than did patients without hoarding. The women who hoarded also reported greater prevalence of sexual, religious, somatic, and symmetry obsessions and repeating compulsions. In contrast, in the 184 men with OCD, the only differences were greater prevalences of social phobia and symmetry obsessions in those with, compared to those without, hoarding. To our knowledge, this is the first report of sex-specific correlates of hoarding behavior in OCD.

Previously, in the OCD Collaborative Genetics Study sample, we compared OCD-affected individuals with and without hoarding behavior, but we did not investigate clinical differences separately in men and women (Samuels et al., 2007a). The aim of the current study was to determine if correlates of hoarding were different in men and women with OCD in this sample. Based on the findings of Wheaton et al. (2008), we hypothesized that clinical differences between individuals with and without hoarding would be greater in women than men with OCD. These differences might reflect differences in the etiology and development of hoarding behavior in men and women and have implications for designing strategies for the prevention and treatment of hoarding in OCD.

Method

Participants

As described previously (Samuels et al., 2006), the OCD Collaborative Genetics Study (OCGS), which commenced in 2001, was a collaboration among investigators at six sites in the United. The OCGS targeted families with OCD-affected sibling pairs, and extended these when possible through affected first- and second-degree relatives. Individuals were recruited into the study from outpatient and inpatient clinics, referrals from clinicians in the community, web sites, media advertisements, self-help groups, and annual meetings of the Obsessive Compulsive Foundation. At each site, recruitment efforts were focused on individuals living in the local or regional area (Baltimore; Boston; Los Angeles; New York; Providence, Rhode Island; and Washington DC) or on patients presenting for treatment at the site; in addition, the Johns Hopkins site recruited and evaluated participants throughout the United States (several Canadian families also participated). Family history interviews were conducted to determine that there were at least two OCD-affected siblings in the family who were willing to participate and to identify additional affected relatives. All first- and second-degree relatives were considered for inclusion, and families were extended through the first-degree relatives of all affected cases.

To be considered affected, a participant had to meet DSM-IV OCD diagnostic criteria at any time in his/her life (American Psychiatric Association 1994). Probands were included if, in addition to meeting DSM-IV criteria, their first onset of obsessions and/or compulsions occurred before 18 years of age. Probands with schizophrenia, severe mental retardation, Tourette disorder, or secondary OCD (OCD occurring exclusively in the context of depression) were excluded.

Materials

The OCGS Assessment Package (Samuels et al., 2006) was developed to evaluate psychiatric disorders and symptoms for this study. The *Structured Clinical Interview for DSM-IV (SCID)* (Spitzer, Williams, Gibbon, & First, 1992) was used for assessing most diagnoses other than OCD, and a semi-structured assessment protocol was used for additional diagnoses of interest. For evaluation of OCD, the OCD section from the *Schedule for Affective Disorders and Schizophrenia-Lifetime Anxiety version (SADS-LAR)* (Mannuzza, Fyer, Klein, & Endicott, 1986) was adapted and included detailed screening questions; the *Yale-Brown Obsessive Compulsive Scale (YBOCS)* for the individual's worst period of OCD, and the *YBOCS Symptom Checklist (YBOCS-SC)* for obsessions and/or compulsions experienced at any point in the individual's lifetime (Goodman et al., 1989). A similar section was developed for assessing tics, Tourette disorder, and other tic disorders. Pathological nail biting and pathological skin picking were operationalized as described previously (Bienvenu et al., 2000; Cullen et al., 2000).

As part of the Y-BOCS-SC, for each obsession and compulsion endorsed by an individual, the examiner asked the individual to rate, for the period during which OCD symptoms were the worst, the time occupied by the symptom, from 0 (none), 1 (mild, less than 1 hour per day or occasional intrusion), 2 (moderate, 1–3 hours per day or frequent intrusion, 3 (severe, 3–8 hours per day), and 4 (extreme, more than 8 hours per day or near constant intrusion). The examiner also rated the level of distress of the individual when experiencing symptoms, from 0 (no distress), 1 (mild, infrequent, not too disturbing, and still manageable distress), 2 (moderate, frequent, and disturbing, but still manageable), 3 (severe, frequent, and very disturbing distress), and 4 (extreme, near constant, and disabling distress).

As with other obsessive-compulsive symptoms, hoarding obsessions and compulsions were assessed using the YBOCS-SC. If the checklist established the presence of hoarding during the participant's lifetime, then the participant was asked his/her age at symptom onset, as well as the amount of time occupied by the symptom and the level of distress caused by the symptom during the worst period. To be assigned, these symptoms had to be clinically significant; i.e., the clinician determined that the individual recognized that his/her symptoms were excessive or unreasonable, and the symptoms caused marked distress, were time consuming, or significantly interfered with normal routine, occupational functioning, or social activities and relationships (American Psychiatric Association, 1994).

The examiner also asked the participant, for the worst period of symptoms, "Do you think your concerns or behaviors were reasonable? What did you think would happen if you did not perform the compulsions? Were you convinced something would really happen?" Based on the responses, the examiner rated the participant's insight into his/her obsessions and compulsions, using a 5-point scale: 0 (excellent insight, fully rational); 1 (good insight; readily acknowledged absurdity or excessiveness of thought or behaviors but did not seem to be completely convinced that there was something to be concerned about); 2 (fair insight; reluctantly admitted that thoughts or behaviors seemed unreasonable or excessive); 3 (poor insight; maintained that thoughts and behaviors were not unreasonable or excessive, but acknowledged validity of contrary evidence); and 4 (lacked insight; definitely convinced that concerns and behavior were reasonable, and was unresponsive to contrary evidence). In the current analyses, subjects rated 3 or 4 were considered to have "poor insight."

The examiner also asked the participant, for the worst period of symptoms, "Did you have difficulty starting or finishing tasks? Did many routine activities take longer than they should?" The examiner rated this item on a 5-point scale, from 0 (no difficulty initiating or completing tasks); 1 (mild, occasional delay in starting and finishing); 2 (moderate, frequent prolongation of activities but tasks usually completed); 3 (severe, pervasive, and marked difficulty initiating and completing routine tasks); or 4 (extreme; unable to start or complete routine tasks without full assistance). In the current analyses, subjects rated 3 or 4 were considered to have "difficulty starting or completing tasks."

In adults, the *Structured Interview for the Diagnosis of DSM-IV Personality Disorders (SIDP)* (Pfohl, Blum, Zimmerman, & Stangl, 1995) was used to assess the presence of criteria for schizotypal, obsessive-compulsive, avoidant, and dependent personality disorders, since results from previous research (Torres et al., 2006), as well as the experience of the clinicians contributing to the design of the study, suggested that features of these four personality disorders most distinguish individuals with OCD. For each of these four disorders, a dimension was created by counting the number of criteria rated present. The criterion "inability to discard worn-out or worthless objects even when they have no sentimental value" was excluded in constructing the obsessive-compulsive personality disorder dimension for this study

The *Family Informant Schedule and Criteria (FISC)* (Mannuzza, Fyer, Endicott, & Klein, 1985) was used to obtain additional information about each participant from a knowledgeable informant. For participants who had received psychiatric treatment, consent was obtained to review relevant medical records and to contact treatment providers, if such information was deemed useful for making diagnoses. Examiners completed a narrative formulation for each case.

The *Revised NEO Personality Inventory (NEO PI-R)* paper-and-pencil form was used for the assessment of the five domains of general personality as construed by the Five-Factor Model: neuroticism, extraversion, openness, agreeableness, and conscientiousness (Costa & McCrae, 1992). Each domain is represented by six specific scales that measure facets of the domain.

The *t*-scores for the domain and facet scales were calculated according to the method of Costa & McCrae (1992), which uses different reference means and standard deviations for men and women. Each distribution has a mean of 50 and standard deviation of 10. The *t*-scores are considered "average" in the range 45–54. Scores in the range 35–44 are considered to be "low", and those less than 35, "very low". Scores in the range 55–64 are considered to be "high"; and those greater than 64, "very high" (Costa & McCrae, 1992).

Procedure

Written, informed consent to study procedures was obtained prior to the clinical interview. The protocol was approved by the institutional review board at each site. Diagnostic assessments were conducted by psychiatrists or PhD-level clinical psychologists experienced with clinical evaluations using the OCGS Assessment Package. The Johns Hopkins Diagnostic Assignment Checklist was used to collate all the clinical information from a variety of sources (the semi-structured direct interview, case formulation, informant interview, and medical records). The checklist presents logical algorithms with specified rules, allowing assignment of definite, probable, absent, or unknown for each disorder. All psychiatric diagnoses were made according to strict DSM-IV criteria (American Psychiatric Association, 1994). At each site, each case was reviewed independently by two expert diagnosticians who reviewed all case materials and assigned final best-estimate diagnoses. Final diagnoses were reviewed by diagnosticians at Johns Hopkins University.

Data analysis

Demographic features and clinical characteristics were compared between participants with and without hoarding behavior, separately in men and women. We used logistic or linear regression models to estimate the magnitude of the association between hoarding and each clinical correlate, separately in men and women. Because cases might be relatives in the same family, we used the method of Generalized Estimating Equations (GEE), which provides standard error estimates that account for within-family correlation among relatives (Liang & Pulver, 1996). The point estimates of the regression coefficients allow comparison of the relationships in men and women, even though there are more than twice as many women as men in the study. We also determined if the relationships were different in men and women by introducing interaction terms in the regression models. That is, in each model, the specific clinical characteristic was the dependent variable; hoarding and sex were the dependent variables; and a term for the interaction between sex and the clinical characteristic was included. A significant interaction coefficient, as evaluated by the Wald chi-square test, indicates that the magnitude of the relationship between the clinical characteristic and hoarding is different in men and women.

Results

Sample description

There were 509 adult participants (age > 17 years) with definite OCD in the OCGS sample. The mean age at interview was 41 years (range, 18–95). Ninety-seven per cent of the participants were white. A total of 49% of the participants were college graduates, and another 29% had attended college; 42% were employed as higher executives, business managers, or administrative personnel. The current household income was $50,000 – $100,000 for 33% of the participants, and greater than $100,000 for 20%.

The mean age at onset of obsessive-compulsive symptoms was 10 years (range, 5–54). The mean YBOCS score during the most severe period of symptoms was 25 (range, 5–40), and 53% of the participants were judged by the examiners to have had moderate to extremely severe symptoms that significantly limited functioning. Sixty-five per cent of the participants had ever

been treated for their obsessive-compulsive symptoms. Of these, 93% had been treated with medications; 55% had received behavioral therapy; and 26% had been hospitalized.

Of the 151 men with OCD, 61 (40.4%) had hoarding behavior, whereas 90 did not. Of the 358 women with OCD, 138 (38.5%) had hoarding, whereas 220 did not. The mean age at interview was similar in men with and without hoarding (39 vs. 40 years), and in women with and without hoarding (42 vs. 41 years). The NEO PI-R was completed by 80 men and 238 women with OCD in the sample. The mean age at interview, mean age at onset of obsessive-compulsive symptoms, and mean YBOCS severity score were similar in those completing and not completing the NEO form.

OCD clinical features

Among men, several categories of obsessions and compulsions were significantly more prevalent among individuals with vs. those without hoarding, including aggressive obsessions [odds ratio (*OR*) (95% confidence interval)] = 2.1 (1.04–4.3)], sexual obsessions [2.1 (1.1–4.1)], religious obsessions [2.1 (1.1–4.2)], symmetry obsessions [2.8 (1.4–5.7)], checking compulsions [2.5 (1.1–5.6)], and ordering compulsions [3.3 (1.7–6.6)]. In contrast, among women, only symmetry obsessions [1.8 (1.1–2.7)] and ordering compulsions [1.6 (1.03–2.5)] were more prevalent among individuals with hoarding behavior. The magnitude of the association with hoarding was substantially stronger in men than women for all these categories of symptoms except symmetry obsessions. In the GEE models, the significance of the sex*hoarding interaction terms were: for aggressive obsessions ($\chi^2_1 = 3.9$, p=0.049); religious obsessions ($\chi^2_1 = 5.0$, *p = 0.03*), sexual obsessions ($\chi^2_1 = 3.6$, p=0.06), checking compulsions ($\chi^2_1 = 3.8$, p=0.05), and ordering compulsions ($\chi^2_1 = 3.0$, p=0.08) (Table 1).

The proportion of individuals ever treated for obsessive-compulsive symptoms was similar in participants with and without hoarding behavior, in men (66% vs. 72%) and women (69% vs. 66%). The mean YBOCS total severity score during the worst episode was not different between groups with and without hoarding, respectively, in either men (*M* = 26 vs. *M* = 24) or women (*M* = 27 vs. *M* = 25). The proportion of participants judged by the interviewers to be markedly or extremely impaired was similar in groups with and without hoarding, in men (44% vs. 42%) and women (31 vs. 35%). In addition, the proportion of individuals judged to have poor insight their thoughts or behaviors was similar in those with and without hoarding, in men (14% vs. 12%) and women (20% vs. 16%). However, in men, those with hoarding reported an earlier age at onset of obsessive-compulsive symptoms than those without hoarding (8 vs. 11 years) [t (147) = 3.8, *p<0.001*]; in women, the age at onset was similar in groups with and without hoarding (10 vs. 11 years) [*t* (352) = 0.4) [sex*hoarding interaction, $\chi^2_1 = 5.4$, *p = 0.02*]. In women, a substantially greater proportion of those with hoarding than those without hoarding reported severe or extreme difficulty starting or finishing tasks (43% vs. 16%; [OR=4.0 (2.4–6.7); p<0.001]; this was not found in men (36% vs. 27%) [sex*hoarding interaction, $\chi^2_1 = 4.3$, *p = 0.04*] (Table 2).

Axis I Disorders

In men, the prevalence of almost all of the disorders evaluated was similar in those with and without hoarding behavior, except for generalized anxiety disorder [*OR* = 3.0 (1.4–6.2)] and tics [*OR* = 2.1 (1.04–4.3)], which were more prevalent in those with hoarding. In contrast, in women, several disorders were more prevalent in those with hoarding behavior, including social phobia [*OR* = 2.0 (1.3–3.1)], post-traumatic stress disorder [*OR* = 2.4 (1.1–5.1), body dysmorphic disorder [*OR* = 2.4 (1.1–5.4)], nail biting [*OR* = 2.0 (1.1–3.6)], and skin picking [*OR* = 1.8 (1.1–3.0)]. However, the magnitude of these relationships was similar in men and women, except for generalized anxiety disorder (sex*hoarding interaction, $\chi^2_1 = 3.5$, *p = 0.06*) (Table 3).

Personality Disorder Dimensions

In men [*OR* = 1.24 (1.04–1.5)] and women [*OR* = 1.16 (1.03–1.3)], the odds of hoarding increased with the number of obsessive-compulsive personality disorder traits (which excluded the trait, "inability to discard worn-out or worthless objects."). In men, none of the other personality disorder dimensions was related to hoarding. In contrast, in women, the odds of hoarding increased with the number of schizotypal traits (*OR* = 1.4 (1.1–1.7)] and dependent traits [*OR* =1.2 (1.1–1.4). The interaction terms indicated that the relationships between hoarding and the schizotypal personality dimension (sex*hoarding interaction, $\chi^2_1 = 3.7$, *p=0.06*), and between hoarding and the dependent personality dimension (interaction, $\chi^2_1 = 3.1$, *p=0.08*), were stronger in women than men (Table 4).

In women, the schizotypal personality disorder item, "suspiciousness or paranoid ideation," was more prevalent in those with, compared to those without, hoarding (27% vs. 16%); [*OR* = 1.9(1.1–3.3); *p < 0.02*], but this was not found when comparing men with vs. without hoarding (13% vs. 24%); [*OR* = 0.5, (0.2–1.2)] (interaction $\chi^2_1 = 6.4$, *p = 0.01*). In addition, the dependent personality disorder trait, "difficulty making everyday decisions without an excessive amount of advice and reassurance from others," was more prevalent in women with vs. women without hoarding (31% vs. 9%); [*OR* = 4.6 (2.5–8.7); *p < 0.001*] but not in men (13% vs. 13%; *OR* = 0.96 (0.3–2.7) (interaction $\chi^2_1 = 6.5$, *p = 0.01*).

NEO Personality Dimensions

In men, NEO domain scores were not significantly different between those with and without hoarding behavior. In women, those with hoarding had higher scores than those without hoarding on the openness domain (*M* = 54.6 vs. *M* = 50.1) [*t (236)* = 2.85, *p < 0.01*], although the scores were similar to those in men. However, in women, those with hoarding had considerably lower scores than those without hoarding on the conscientiousness domain (*M* = 41.1 vs. *M*= 47.7) [*t (236)* = 3.65, *p < 0.001*], and on the conscientiousness facets, order (*M* = 42.8 vs. *M* = 50.4) [*t (236)* = 3.99, *p < 0.001*] and self-discipline (*M* = 33.8 vs. *M* = 44.4) [*t (236)* = 5.82, *p < 0.001*], in those with and without hoarding, respectively. In men, those with hoarding scored higher than those without hoarding on achievement striving (*M* = 52.5 vs. *M* = 44.3) [*t (236)* = 2.77, *p < 0.01*] and non-significantly higher on other conscientiousness facets, except for a slightly lower score on self-discipline. There were significant sex*hoarding interactions for conscientiousness [$\chi^2_1 = 8.4$, *p= 0.004*], order [$\chi 2_1 = 9.8$, *p = 0.002*], achievement-striving [, $\chi^2_1 = 10.1$, *p = 0.002*], and self-discipline [$\chi^2_1 = 4.1$, *p = 0.04*] (Table 5 and Table 6).

Clinical differences between men and women with hoarding

Among the participants with hoarding behavior, men reported an earlier age at onset of OCD (8 vs. 10 years, $t_{194} = 2.01$, *p=0.046*) and earlier age at onset of hoarding symptoms than women (13 vs. 17 years; $t_{182} = 2.30$, *p=0.02*), and they were less likely than the women to have ever married (53% vs. 70%, $\chi^2_1 = 5.8$, *p=0.02*). Men with hoarding were more likely than women with hoarding to report sexual obsessions (46% vs. 20%; $\chi^2_1 = 12.5$, *p<0.001*) and religious obsessions (46% vs. 26%, $\chi^2_1 = 7.2$, *p<0.01*) (Table 1). The lifetime prevalence of panic disorder (27% vs. 10%, $\chi^2_1 = 7.7$, *p<0.01*), agoraphobia (22% vs. 8%, $\chi^2_1 = 6.0$, *p=0.01*), eating disorders (12% vs. 2%, $\chi^2_1 = 7.4$, *p<0.01*), and skin picking (31% vs. 14%, $\chi^2_1 = 6.6$, *p=0.01*) were greater in the women with hoarding, whereas tics were more prevalent in men (42% vs. 20%, $\chi^2_1 = 9.3$, *p<0.01*) (Table 3). These differences were, in general, not specific for hoarding but reflect differences between men and women with OCD, as reported previously (Samuels et al., 2006).

Discussion

In this study of 509 adults with OCD, we found that several clinical correlates were differentially associated with hoarding behavior in men and women. First, hoarding was associated with symmetry obsessions and ordering compulsions in both men and women. However, hoarding was associated with aggressive, sexual, and religious obsessions and with checking compulsions in men but not women.

Second, generalized anxiety disorder and tics were associated with hoarding in men but not women, whereas social phobia, post-traumatic stress disorder, body dysmorphic disorder, nail biting, and skin picking were associated with hoarding in women but not men. However, in general, the magnitude of the relationships between hoarding and Axis I disorders were not markedly different between men and women.

Third, the obsessive-compulsive disorder personality disorder dimension was related to hoarding behavior in both men and women, suggesting that rigidity and perfectionism may have a role in initiating and maintaining hoarding behavior in both sexes (Rhéaume et al, 1995; Eisen et al., 2006). In contrast, schizotypal and dependent dimensions were related to hoarding only in women. Moreover, whereas scores on general personality domains were similar in men with and without hoarding, women with hoarding behavior scored substantially lower on conscientiousness, judging themselves less able to get organized and to initiate and complete tasks, and less driven to achievement, than their counterparts who did not hoard. This is in accordance with the findings from the interview, in which a greater proportion of women with hoarding reported themselves having more difficulty starting or finishing tasks, and more difficulty making decisions, compared to women without hoarding. Thus, these features of personality appear to distinguish individuals with and without hoarding in women, but not in men.

These results are not consistent with those of the only previous study to investigate clinical features of hoarding behavior separately in men and women. Wheaton et al. (2008) found that most YBOCS-SC obsession categories (sexual, religious, symmetry, contamination, and somatic), as well as ordering and repeating compulsions, were significantly more prevalent in hoarding than non-hoarding women in their OCD clinical sample, whereas only symmetry obsessions were associated with hoarding in men. In addition, in the Wheaton et al. study (2008), bipolar I disorder, alcohol and substance abuse disorders, panic disorder, and binge eating disorder were significantly more prevalent in hoarding than non-hoarding women, whereas only social phobia was associated with hoarding in men. Moreover, Wheaton et al. (2008) found that among women but not men, hoarding patients had, on average, an earlier age at onset of OCD and a higher YBOCS severity score.

The reasons for these differences in findings from the two studies are unclear, but they may reflect differences in the study samples and methods. In the current study, the sample consisted of adult participants in an OCD family/genetics study, who were required to have a sibling with OCD, and therefore may have a more “familial” form of the disorder. In contrast, the Wheaton et al (2008) sample consisted primarily of individual OCD probands, with a likely lower “familial loading” for OCD. Moreover, the prevalences of several disorders, including panic disorder, bipolar disorder, and substance abuse disorder, were substantially greater in that study compared to the current study. In addition, whereas the present study used the clinician-administered YBOCS-SC to assess hoarding, Wheaton et al. (2008) used a composite measure combining interviewer and self-report data that may have lead to a stricter definition of hoarding, as only 24% of participants in that study, compared to 40% in the present study, were classified as having hoarding behavior.

Limitations

Several potential limitations of the current study must be acknowledged. Although we included over 500 OCD-affected individuals in these analyses, the number of men in our sample was less than half that of women, so the power to detect differences between men with and without hoarding was considerably less than in women. Future studies that include a larger number of men are warranted. In addition, we relied primarily on the YBOCS-SC to evaluate hoarding symptoms; in future studies, it would be useful to include self-report hoarding behavior inventories, such as the Savings Inventory-Revised (Frost, Steketee, and Grisham, 2004) and the Saving Cognition Inventory (Steketee, Frost, & Kyrios, 2003), as well as direct observation of individuals' homes (Frost, Steketee, Tolin, Renaud, in press). Third, in order to limit the length of the interview and to reduce the burden on participants and examiners, we restricted the assessment of personality disorders to four disorders; in future studies, it would be interesting to investigate the sex-specific relationships between hoarding and other personality disorder dimensions.

Implications

The findings of this study suggest that several clinical correlates of hoarding behavior may be different in men and women with OCD. Most noteworthy are the much stronger relationships between hoarding and specific personality disorder and personality dimensions in women than in men. It remains to be determined whether the clinical differences identified in this study reflect sex-specific differences in the course and expression of an underlying hoarding vulnerability, or in etiology and pathogenesis. Interestingly, the sib-sib correlation of hoarding dimension scores has been found to be stronger for hoarding than for other OCD symptom dimensions, and stronger in female-female than male-male sibling pairs, in the OCGS (Hasler et al., 2007) and other studies (Chacon et al., 2007). Moreover, there is evidence for linkage of OCD to several chromosomal regions, including the X chromosome, in families with multiple hoarding relatives (Samuels et al., 2007b).

Several studies have found different neurocognitive deficits in OCD-affected individuals with and without hoarding behavior (Hartl et al., 2004; Lawrence et al., 2006; Luchian., 2007), and functional imaging studies have identified differential activation of specific brain regions in OCD patients with and without hoarding (Saxena et al., 2004; Mataix-Cols et al., 2004; An et al., in press). Whether these characteristics of hoarding behavior are sex-specific, and how they relate to sex-specific clinical and genetic differences, are important questions for future research.

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Table 1

Categories of obsessions and compulsions in OCD participants with and without hoarding behavior, by sex

	MEN (N=151)			WOMEN (N=358)		
	Hoarding (N=61) N (%)	**Non-hoarding (N=90) N (%)**	**Odds Ratio (95% CI)**	**Hoarding (N=138) N (%)**	**Non-hoarding (N=220) N (%)**	**Odds Ratio (95% CI)**
OBSESSIONS						
Aggressive	44 (73)	51 (57)	**2.1 (1.04–4.3)** *,‡	85 (63)	138 (65)	0.91 (0.6–1.4)
Sexual	27 (46)	26 (29)	**2.1 (1.1–4.1)** *	28 (20)	47 (22)	0.90 (0.5–1.5)
Religious	27 (46)	25 (28)	**2.1 (1.1–4.2)** *,‡	35 (26)	64 (30)	0.82 (0.5–1.3)
Contamination	37 (64)	52 (58)	1.3 (0.7–2.5)	83 (61)	123 (58)	1.1 (0.7–1.8)
Symmetry	35 (60)	30 (35)	**2.8 (1.4–5.7)** **	75 (55)	85 (41)	**1.8 (1.1–2.7)** *
Somatic	28 (48)	29 (33)	1.8 (0.9–3.6)	51 (38)	74 (36)	1.1 (0.7–1.7)
COMPULSIONS						
Cleaning	38 (66)	47 (53)	1.7 (0.9–3.4)	80 (59)	126 (59)	1.03 (0.7–1.6)
Checking	49 (83)	59 (66)	**2.5 (1.1–5.6)** *	97 (71)	155 (72)	0.98 (0.6–1.6)
Repeating	35 (60)	42 (47)	1.7 (0.9–3.3)	73 (54)	97 (45)	1.4 (0.94–2.2)
Counting	25 (43)	25 (28)	2.0 (0.98–3.9)	53 (39)	62 (29)	1.5 (0.97–2.4)
Ordering	37 (64)	31 (35)	**3.3 (1.7–6.6)** **	79 (58)	99 (47)	**1.6 (1.03–2.5)** *

* p<0.05,

** p<0.01.

‡ Sex*Hoarding interaction, p<0.05

Table 2

Other clinical features in OCD participants with and without hoarding symptoms, by sex

	MEN (N=151)			WOMEN (N=358)		
	Hoarding (N=61) N (%)	**Non-hoarding (N=90) N (%)**	**Odds Ratio (95% CI)**	**Hoarding (N=138) N (%)**	**Non-hoarding (N=220) N (%)**	**Odds Ratio (95% CI)**
Ever treated for OC	40 (66)	63 (72)	0.8 (0.4–1.5)	90 (69)	140 (66)	1.1 (0.7–1.8)
Poor insight	8 (14)	10 (12)	1.2 (0.4–3.3)	26 (20)	32 (16)	1.4 (0.8–2.4)
Marked or extreme impairment	25 (44)	35 (42)	1.1 (0.6–2.2)	39 (31)	71 (35)	0.9 (0.5–1.4)
Difficulty starting or finishing tasks[a]	21 (36)	22 (27)	1.6 (0.8–3.2)	55 (43)	33 (16)	**4.0 (2.4–6.7)** ***, ≠

[a] Severe or extreme difficulty starting or finishing tasks.

*** p<0.001.

≠ Sex*Hoarding interaction, p<0.05

Table 3

Lifetime DSM-IV Axis I disorders in OCD participants with and without hoarding behavior, by sex

	MEN (N=151)			WOMEN (N=358)		
	Hoarding (N=61) N (%)	**Non-hoarding (N=90) N (%)**	**Odds Ratio (95% CI)**	**Hoarding (N=138) N (%))**	**Non- hoarding (N=220) N (%)**	**Odds Ratio (95% CI)**
Panic disorder	6 (10)	10 (11)	0.90 (0.3–2.6)	37 (27)	47 (22)	1.3 (0.8–2.2)
Agoraphobia	5 (8)	9 (10)	0.8 (0.3–2.5)	30 (22)	43 (20)	1.1 (0.7–1.9)
Social phobia	27 (44)	29 (34)	1.5 (0.8–3.0)	64 (47)	64 (31)	**2.0 (1.3–3.1)** **
Specific phobia	22 (36)	19 (22)	2.0 (0.96–4.1)	51 (38)	83 (39)	0.97 (0.6–1.5)
Generalized anxiety disorder	26 (44)	18 (21)	**3.0 (1.4–6.2)** **	63 (47)	84 (40)	1.3 (0.9–2.1)
Separation anxiety disorder	7 (13)	12 (15)	0.8 (0.3–2.2)	28 (22)	33 (16)	1.5 (0.9–2.6)
Posttraumatic stress disorder	3 (7)	3 (5)	1.4 (0.3–7.2)	19 (16)	12 (8)	**2.4 (1.1–5.1)** *
Major depression	40 (68)	56 (63)	1.2 (0.6–2.5)	101 (74)	149 (69)	1.3 (0.8–2.1)
Major depression, recurrent	27 (48)	29 (35)	1.7 (0.9–3.4)	60 (50)	97 (48)	1.1 (0.7–1.7)
Mania or Hypomania	2 (3)	1 (1)	3.0 (0.3–33.9)	4 (10)	11 (5)	2.2 (0.98–5.0)
Dysthymia	5 (8)	6 (7)	1.2 (0.4–4.2)	18 (13)	28 (13)	1.04 (0.5–2.0)
Alcohol dependence	13 (22)	26 (29)	0.7 (0.3–1.5)	20 (15)	30 (14)	1.04 (0.6–1.9)
Substance dependence	7 (12)	11 (13)	0.93 (0.3–2.5)	14 (10)	19 (9)	1.2 (0.6–2.4)
Alcohol or substance dependence	16 (27)	28 (32)	0.8 (0.4–1.6)	25 (18)	38 (18)	1.03 (0.6–1.8)
Anorexia or bulimia	1 (2)	1 (1)	1.4 (0.1–23.1)	17 (12)	26 (12)	1.02 (0.5–2.0)
Hypochondriasis	3 (5)	1 (1)	4.6 (0.5–45.1)	7 (5)	14 (7)	0.8 (0.3–2.0)
Body dysmorphic disorder	12 (20)	9 (11)	2.2 (0.8–5.5)	16 (12)	11 (5)	**2.4 (1.1–5.4)** *
Trichotillomania	4 (7)	3 (3)	2.0 (0.4–9.2)	6 (5)	14 (7)	0.7 (0.3–1.8)
Nail biting	8 (13)	8 (9)	1.5 (0.5–4.2)	26 (20)	24 (11)	**2.0 (1.1–3.6)** *
Skin picking	8 (14)	10 (12)	1.2 (0.4–3.2)	39 (31)	40 (19)	**1.8 (1.1–3.0)** *
Tics	25 (42)	22 (25)	**2.1 (1.04–4.3)** *	25 (20)	40 (19)	1.1 (0.6–1.8)

* p<0.05,

** p<0.01.

Table 4

Relationship between personality disorder dimensions and hoarding behavior, by sex

	MEN	WOMEN
	Odds Ratio (95% CI)	**Odds Ratio (95% CI)**
Schizotypal	0.90 (0.6 – 1.3)	**1.35 (1.1 – 1.7)** *
Avoidant	1.04 (0.9 – 1.2)	1.05 (0.9 – 1.2)
Dependent	0.94 (0.7 – 1.2)	**1.23 (1.1 – 1.4)** **
Obsessive-compulsive [a]	**1.24 (1.04 – 1.5)** *	**1.16 (1.03 – 1.3)** *

[a] Excludes the trait "inability to discard worn-out or worthless objects".

* $p<0.05$,

** $p<0.01$.

Table 5

NEO personality scores in OCD participants with and without hoarding behavior, by sex

	MEN (N=80)			WOMEN (N=238)		
	Hoarding (N=34) *M (SD)*	**Non-hoarding (N=46) *M (SD)***	**t (78)**	**Hoarding (N=88) *M (SD)***	**Non-hoarding (N=150) *M (SD)***	**t (236)**
Neuroticism	68.5 (12.4)	65.9 (12.8)	0.94	63.5 (13.2)	60.7 (12.1)	1.65
Extraversion	47.2 (12.6)	45.5 (13.3)	0.57	44.5 (13.1)	47.0 (13.1)	1.46
Openness	55.0 (12.8)	49.9 (12.1)	1.87	54.6 (11.6)	50.1 (12.5)	**2.86** **
Agreeableness	45.1 (15.7)	49.8 (11.5)	1.52	46.1 (15.2)	49.4 (12.2)	1.77
Conscientiousness	47.1 (12.9)	43.6 (14.0)	1.19	41.1 (14.0)	47.7 (12.4)	**3.65** ***, ≠

** p<0.01,

*** p<0.001.

≠ Sex*Hoarding interaction, p<0.05.

Table 6

NEO conscientiousness facet scores in OCD participants with and without hoarding behavior, by sex

	MEN (N=80)			WOMEN (N=238)		
	Hoarding (N=34) *M (SD)*	**Non-hoarding (N=46) *M (SD)***	**t (78)**	**Hoarding (N=88) *M (SD)***	**Non-hoarding (N=150) *M (SD)***	**t (236)**
Competence	46.0 (14.3)	43.2 (15.0)	0.88	45.2 (13.7)	48.2 (12.6)	1.71
Order	49.1 (12.8)	46.2 (12.5)	1.05	42.8 (15.3)	50.4 (13.2)	**3.99** ***, ≠
Dutifulness	49.2 (10.0)	47.3 (11.7)	0.82	45.8 (13.6)	48.1 (12.4)	1.32
Achievement Striving	52.5 (13.5)	44.3 (13.8)	**2.77** **,≠	43.7 (13.1)	46.6 (13.5)	1.69
Self-Discipline	38.6 (16.0)	41.6 (13.6)	0.91	33.8 (14.2)	44.4 (13.2)	**5.82** ***,≠
Deliberation	52.2 (11.1)	49.7 (10.9)	1.05	50.4 (13.2)	51.7 (11.6)	0.81

* p<0.05,

** p<0.01,

*** p<0.001.

≠ Sex*Hoarding interaction, p<0.05.