Published in final edited form as:
Behav Res Ther. 2008 July ; 46(7): 836–844.

Prevalence and Correlates of Hoarding Behavior in a Community-Based Sample

Jack F. Samuels[a,*], **O. Joseph Bienvenu**[a], **Marco A. Grados**[a], **Bernadette Cullen**[a], **Mark A. Riddle**[a], **Kung-yee Liang**[b], **William W. Eaton**[c], and **Gerald Nestadt**[a]

a *Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine, 600 N. Wolfe Street, Meyer 109, Baltimore, Maryland 21287-7228, USA*

b *Department of Biostatistics, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, Maryland 21287, USA*

c *Department of Mental Health, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, Maryland 21287, USA*

Abstract

Little is known about the prevalence and correlates of hoarding behavior in the community. We estimated the prevalence and evaluated correlates of hoarding in 742 participants in the Hopkins Epidemiology of Personality Disorder Study. The prevalence of hoarding was nearly 4% (5.3%, weighted) and was greater in older than younger age groups, greater in men than women, and inversely related to household income. Hoarding was associated with alcohol dependence; paranoid, schizotypal, avoidant, and obsessive-compulsive personality disorder traits; insecurity from home break-ins and excessive physical discipline before 16 years of age; and parental psychopathology. These findings suggest that hoarding may be relatively prevalent and that alcohol dependence, personality disorder traits, and specific childhood adversities are associated with hoarding in the community.

Keywords

Hoarding; prevalence; risk factors; personality disorders; comorbidity

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, Frost, Steketee, & Fitch, 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 (Frost, Steketee, & Williams 2000; Steketee, Frost, & Kim, 2001).

*Corresponding author: Jack Samuels, Ph.D., Department of Psychiatry and Behavioral Sciences, Johns Hopkins, University School of Medicine, 600 N. Wolfe Street, Meyer 109, Baltimore, MD 21287-7228. Phone: 410-614-4942. Fax: 410-614-8137, E-mail address: jacks@jhmi.edu.

To date, hoarding behavior has been studied primarily in samples of individuals who were not selected from the community, such as respondents to advertisements for hoarding research studies, participants in hoarding self-help groups, individuals referred to clinics specializing in the treatment of obsessive-compulsive disorder, and individuals participating in family studies of obsessive-compulsive disorder. Results from these studies suggest that individuals with hoarding behavior have more symptoms of anxiety and depression, a greater prevalence of anxiety disorders, especially generalized anxiety disorder and social phobia, and poorer functioning (Frost, Steketee, Williams, & Warren 2000; Samuels et al., 2002). Moreover, individuals with hoarding behavior are more likely to exhibit obsessive-compulsive, dependent, avoidant, and schizotypal personality traits (Samuels et al., 2007).

However, little is known about the prevalence, and sociodemographic and clinical correlates, of hoarding behavior in community samples. Given that compulsive hoarding occurs in approximately 30% of individuals with obsessive-compulsive disorder (OCD) in clinical and family samples (Rasmussen & Eisen, 1992; Samuels et al., 2002), and that the population prevalence of OCD is estimated to be about 1–2% (Karno et al., 1988), based on population-based surveys, the population prevalence of compulsive hoarding behavior has been estimated to be approximately 0.4%; however, since hoarding behavior can occur in individuals without OCD, this may be an underestimate (Steketee & Frost, 2003). Furthermore, knowledge about the demographic and clinical characteristics of individuals with hoarding behavior is restricted to these particular samples of individuals, who may not reflect the wider range of hoarding behavior in the community.

A biological basis for the development of hoarding behavior has been suggested from case reports of hoarding emerging after traumatic brain lesions (Anderson et al., 2005), and from functional imaging studies identifying differential activation of specific brain regions in OCD patients with and without hoarding behavior (Saxena et al., 2004). A genetic etiology for hoarding behavior is supported by the occurrence of hoarding behavior in known genetic syndromes (e.g., Prader-Willi syndrome and velocardiofacial syndrome) (Dykens & Shah 2003; Gothelf et al., 2004), aggregation of hoarding behavior in OCD families (Samuels et al., 2007a), and genetic linkage of hoarding behavior to specific chromosomal regions in families with OCD (Samuels et al., 2007b). However, in most cases, precipitating factors for the development of hoarding behavior have not been identified.

Although early material deprivation has been hypothesized as a risk factor for hoarding behavior (Steketee & Frost, 2007), this was not supported by the only study to evaluate it empirically (Frost & Gross, 1993). More recently, two studies found that traumatic life events are associated with hoarding behavior. Hartl et al. (2005) found that, compared to controls, participants with hoarding reported having experienced greater frequency and greater number of different types of traumatic events, especially having had something taken by force, being physically handled roughly in childhood or adulthood, and being forced to engage in sexual activity in childhood or adulthood. Cromer et al (2007) reported that, in patients admitted to an adult OCD clinic, those with hoarding reported significantly more traumatic life events, and that the number of traumatic events experienced was significantly related to hoarding severity, even when controlling for current age, age at onset of OCD, and symptoms of depression and anxiety.

Little is known about gender-specific differences between individuals with and without hoarding behavior. Wheaton et al. (2008) reported that, among female patients in an OCD clinic, those with hoarding behavior had earlier age at onset of OCD, greater severity of OCD symptoms, and greater prevalence of bipolar disorder, panic disorder, binge-eating disorder, and alcohol and substance use disorders; in contrast, among men, the only difference was a greater prevalence of social phobia in those who hoard. To our knowledge, no studies have

evaluated correlates of hoarding behavior separately in men and women in a community sample.

In the current study, we investigated hoarding behavior in a community sample of adults who participated in an epidemiologic study of personality and personality disorders. The aims of the study were: 1) to estimate the prevalence of hoarding, overall and by sociodemographic characteristics, in this community sample; 2) to investigate the association between hoarding behavior and potential clinical correlates (personality disorder and personality dimensions; history of psychiatric disorders; and current functioning); 3) to investigate the association between hoarding behavior and specific self-reported childhood adversities, including parental psychopathology and specific childhood traumas; and 4) to determine if the relationships between hoarding and specific correlates are different in men and women.

Method

Participants

As described previously (Samuels et al., 2002), participants in the Hopkins Epidemiology of Personality Disorder Study were sampled from the Baltimore Epidemiologic Catchment Area (ECA) Follow-up survey (Eaton et al, 1997). In brief, 3481 adult household residents of east Baltimore were sampled probabilistically and were interviewed in 1981–1982, using the Diagnostic Interview Schedule (DIS); 810 of these individuals also were examined by psychiatrists as part of the Clinical Reappraisal (Anthony et al, 1985). Between 1993 and 1996, 1920 (73%) of the surviving participants were re-interviewed. From these 1920 individuals, all those who were examined by psychiatrists in 1981, as well as all those who were identified by the DIS as having a lifetime diagnosis of mania, depression, panic disorder, obsessive-compulsive disorder, alcohol use disorders, or drug use disorders at follow-up, were selected. In addition, a 25% random sample was selected from the remaining participants. Of the 1258 individuals selected with these criteria, 516 could not be interviewed because they could not be traced; refused participation; were deceased; or were too ill to participate. A total of 742 individuals completed the personality examinations between 1997 and 1999. The gender and ethnic distributions of these participants were similar to those of the 516 individuals who were not interviewed; however, the interviewed individuals were younger, on average, than the non-interviewed. The gender and ethnic distributions of the study participants also were similar to those of the 3481 individuals examined in 1981, although the study participants were younger (Samuels et al., 2002).

Materials

As described previously (Samuels et al., 2002), personality disorder criteria were assessed by psychologists using the International Personality Disorder Examination (IPDE) (Loranger et al, 1994), a semi-structured instrument designed to be administered by clinicians to detect all the relevant criteria for diagnosis of all DSM-IV personality disorders (American Psychiatric Association, 1994). The psychologists were directed to evaluate abnormal personality traits manifest over the subject's entire adult life. Each criterion was rated '0' (absent), '1' (accentuated or exaggerated), '2' (criterion level or pathological), or '9' (missing or unknown). A dimensional score was calculated for each of the 10 DSM-IV personality disorders by counting the number of traits of the specific disorder that were rated '2'.

The hoarding criterion for obsessive-compulsive personality disorder, as specified in DSM-IV, is "unable to discard worn-out or worthless objects even when they have no sentimental value" (American Psychiatric Association, 1994). To address this criterion, the interviewers were to ask participants the following questions: "Do you find it almost impossible to throw out worn-out or worthless things? If so, is that true even when they don't have any sentimental

value? Give me some examples. Is this a problem for you or for others? If so, tell me about it." The interviewers also were encouraged to cross-examine the participants in order to establish the presence of the behavior. As for other personality traits, the psychologists were directed to evaluate the hoarding criterion as manifest over the subject's entire adult life, and to rate the criterion as '0' (absent), '1' (accentuated or exaggerated), '2' (criterion level or pathological), or '9' (missing or unknown). For this paper, a rating of '2' was considered to indicate clinically significant hoarding behavior.

Potentially traumatic childhood experiences were assessed by the psychologists, with questions about parental death, parental separation or divorce, conflict between parents, not being raised by both parents, inappropriate sexual contact with a family member, and lack of security from break-ins, all before the age of 16 years. Information about the presence of depression, mania, and heavy drinking in natural mother and natural father was obtained by lay interviewers in the original ECA Study in 1982 and was used in the present analyses.

Psychiatric diagnoses were made by psychiatrists who examined participants using the Schedule for Clinical Assessment in Neuropsychiatry (SCAN, version 1.5) (Wing et al., 1990) for current and lifetime disorders according to DSM-IIIR criteria (American Psychiatric Association, 1987). The probes in the OCD section specifically included questions about checking compulsions, ordering compulsions, and cleaning compulsions, as well as a general probe for obsessions, but did not include questions about hoarding symptoms. The psychiatrists did not have access to the results of the psychologist's assessment of personality before conducting their examinations.

Global functioning was scored by the psychiatrists, using the Global Assessment of Functioning scale (GAF). Severity of stressors in nine domains (family; occupational; financial; legal; present living situation; marital; parental; social; and physical) also was rated by the psychiatrists; the scale for each domain ranged from 1 ("none") to 7 ("catastrophic") (American Psychological Association, 1994). A total stressor scale, which summed the scores across all stressor domains, was used in the current analyses.

Procedure

The study protocol was approved by the Institutional Review Board of the Johns Hopkins Medical Institutions. The assessment of personality disorder criteria and childhood experiences was conducted in person by four masters-level clinical psychologists, who obtained informed consent from participants prior to beginning the interview. Following each participant interview, the psychologist interviewed an informant about the participant, using questions from the IPDE and scored as above; formulated a final rating for each criterion based on her clinical judgment of both participant and informant reports; and completed a case summary describing the personality of each participant. On a separate visit, the psychiatric examinations were conducted in person by one of five Johns Hopkins School of Medicine psychiatrists trained in use of the SCAN.

Data analysis

The unweighted prevalence of hoarding across sociodemographic characteristics was compared using the χ^2 test. The odds ratio (*OR*) and 95% confidence interval (*CI*) of the association between each potential correlate and hoarding were estimated using logistic regression. Logistic regression also was used to evaluate the association between hoarding and potential correlates, controlling for other correlates in the model. We used separate models to evaluate the magnitude of these relationships in men and women, respectively. We also evaluated the interactions between the clinical correlates and gender; in each of these models, hoarding was the dependent variable; one independent variable was the specific clinical

characteristic, and the other independent variable was sex; and a term for the interaction between sex and the clinical characteristic was included.

To estimate the weighted prevalence of the hoarding in the eastern Baltimore population, we used weights to account for the unequal selection probabilities. The weights are the product of the two selection probabilities from the baseline study and the subsequent screening at follow-up, as described above (Samuels et al., 2002). Weighted results better represent the population, whereas unweighted results better represent the sample.

Results

Prevalence and description of hoarding behavior

Of 735 participants with information on the hoarding trait, 27 (3.7%) were rated as having "pathological" hoarding. The weighted prevalence of hoarding was 5.3%.

The individuals with hoarding described substantial difficulties due to this behavior. For example, one participant, a 49 year-old man, said that "My room is like a bomb hit it. I've got books and papers, stuff in the corner there. I don't want to throw nothing away. Old suits in my closet, I know I'll never wear again in my life. Old beat up tennis shoes, think I'll find a use for them. I never throw a book away. I like to keep articles, the whole paper; it starts building up on me in a hurry. Newspapers knee-high. I keep a whole drawer full of rubber bands; don't know why, but I do. Lots of junk." Another participant, a 41 year-old woman, noted that she has saved "old clothes from the 1970's, piled up clocks, iron, tiny television, picture frame, fans. My house sometimes looks like a junk shop. I argue with my fiancé over throwing things away; he wants to get rid of all my good stuff; to me it's good stuff, to him it's junk. Stuff I've had for years, reminds me of my mother….you know I'm not going to throw that away."

As shown in Table 1, the prevalence of hoarding increased with age, from 2.3% in the youngest, to 6.2% in the oldest, age groups; the odds of hoarding was nearly three times as great in the oldest compared to the youngest age group. In addition, the prevalence of hoarding was over two times as great in men (5.6%) compared to women (2.6%). The prevalence of hoarding was about two times as great in those who were widowed compared to those who were currently married, and two times as great in the currently unemployed compared to the employed, although the differences were not statistically significant at $p<0.05$. The prevalence of hoarding was not substantially different by education, living arrangement (i.e., lives alone or with others), or race/ethnicity.

The prevalence of hoarding was inversely related to household income; the odds of hoarding was over 4 times as great in the poorest, compared to the wealthiest, households ($p = 0.052$). Household income was strongly related to age, sex, race, marital status, living arrangement, education, and employment status (a greater proportion of participants in lower income households were older, female, nonwhites, not currently married, living alone, unemployed, and of lower educational attainment). However, controlling for these variables, one by one, in logistic regression models did not appreciably change the magnitude of the association between hoarding and household income (results not shown).

Association of hoarding with clinical characteristics

The current total psychosocial stressor score was similar in participants with ($M = 13.6$, $SD = 3.8$) and without ($M = 13.9$, $SD = 4.1$) hoarding; $t(567) = 0.31$, $p = 0.76$. However, the current GAF score was significantly lower in those with hoarding ($M = 67.9$, $SD = 15.3$) than in those without ($M = 76.1$, $SD = 10.0$); $t(700) = 4.2$, $p < 0.001$).

The prevalence of almost all lifetime, as well as current, Axis I disorders was not significantly different in participants with and without hoarding (results not shown). However, the lifetime prevalence of alcohol dependence was significantly greater in individuals with (52.2%), compared to those without (19.5%), hoarding behavior (*OR* = 4.5, 95% *CI* = 1.9–10.4, $p < 0.001$). Current alcohol dependence was more prevalent in individuals with hoarding (11.1%) than in those without hoarding (4.8%), although the difference was not significant (OR = 2.5, 95% CI=0.7–8.7, $p = 0.20$). None of the individuals with hoarding behavior was diagnosed with OCD; however, some participants with hoarding might have been diagnosed with OCD had the SCAN probe questions included an assessment of compulsive hoarding.

The odds of hoarding increased with the number of personality disorder traits, including paranoid (*OR* = 1.60, per unit increase in number of paranoid traits), schizotypal (*OR* = 1.49), antisocial (*OR* = 1.2), avoidant (*OR* = 1.66), and obsessive-compulsive traits (excluding the hoarding trait) (*OR* = 1.76) (Table 2). Adjusting for lifetime alcohol dependence substantially reduced the magnitude of the association between hoarding and antisocial personality disorder (*OR* = 1.07, 95% *CI* = 0.8–1.4), but not the other personality disorder dimensions.

Association of Hoarding with Childhood Adversities

As shown in Table 3, several childhood adversities were reported significantly more often by participants with hoarding. The odds of hoarding were nearly 3 times as great in individuals reporting having a parent with psychiatric symptoms (depression, mania, or heavy drinking). Moreover, the odds of hoarding were nearly 4 times as great in participants reporting lack of security from home break-ins in childhood. In addition, the odds of hoarding were over 4 times as great in individuals who reported receiving excessive physical discipline in childhood.

We evaluated the relationships between these four child adversities and hoarding in a series of logistic regression models, controlling one by one for each of the sociodemographic characteristics (age, sex, household income), personality disorder dimensions (paranoid, schizotypal, avoidant, and obsessive-compulsive), and other clinical features (GAF score, lifetime alcohol dependence) that were associated with hoarding in previous analyses. We found that, in general, the magnitude of the relationships between the four child adversities and hoarding did not substantially change after these adjustments. Moreover, each child adversity remained independently associated with hoarding when each of the other three adversities was included one by one in the models (Table 4).

Gender Interactions

We examined the relationship between childhood adversities, personality disorder dimensions, and other clinical characteristics, on the one hand, and hoarding, on the other, separately in men and women. We found that the magnitude of the association of hoarding with paternal psychiatric symptoms was considerably stronger in women (*OR* = 6.97, 95% *CI* = 1.8–26.8, $p < 0.001$) than in men (*OR* = 1.23, 95% *CI* = 0.3–4.7); in a logistic model, the interaction term $\beta = 1.74$, *SE* = 0.97, $p = 0.07$). Moreover, the magnitude of the association of hoarding with maternal psychiatric symptoms was considerably stronger in women (*OR* = 4.68, 95% *CI* = 1.4–15.7, $p < 0.01$) than in men (*OR* = 1.91, 95% *CI* = 0.5–7.4); interaction term $\beta = 0.90$, *SE* = 0.93, $p = 0.33$). In addition, the relationship with avoidant personality disorder score was substantially stronger in women (*OR* = 2.45, 95% *CI* = 1.6–3.7; $p < 0.001$) than in men (*OR* = 1.09, 95% *CI* = 0.6–1.9); interaction term $\beta = 0.81$, *SE* = 0.36, $p = 0.03$). The magnitude of the association between hoarding and lifetime alcohol dependence was similar in women (*OR* = 3.91, 95% *CI* = 0.91–16.8) and men (*OR* = 3.37, 95% *CI* = 1.2–9.8). The magnitude of associations between hoarding and other correlates also were similar in women and men (results not shown).

Discussion

There are four major findings from this study of hoarding behavior. First, the prevalence of hoarding behavior in this community sample was nearly 4% (5%, weighted to the population). This is considerably higher than estimates of about 0.4% in the community, based on the known population prevalence of OCD and the proportion of OCD cases with compulsive hoarding (Steketee & Frost, 2003). This estimate is based on the notion that most, if not all, individuals with hoarding behavior have OCD. However, currently there is debate about the classification of hoarding, and whether the behavior characterizes a subtype of OCD, or a unique syndrome, is an unresolved clinical issue (Steketee & Frost, 2003). On the one hand, it has been reported that approximately one-third of individuals with OCD have hoarding symptoms (Rasmussen & Eisen, 1992; Samuels et al., 2002), and hoarding obsessions and compulsions are considered as symptoms of OCD in the Yale Brown Obsessive-Compulsive Scale-Symptom Checklist (Goodman et al. 1989). On the other hand, it has been reported that hoarding correlates poorly with other symptoms of OCD (Wu & Watson, 2005), and that patients with compulsive hoarding have different clinical profiles, response to treatment, and functional neuroimaging findings compared to other OCD patients (Saxena, 2007). The results of the current study would suggest that, in this community sample, hoarding behavior can occur without OCD; indeed, none of the hoarding individuals was diagnosed with OCD by examining psychiatrists. However, some of these individuals probably would have been diagnosed with OCD, if the SCAN probes had included a question about compulsive hoarding. Based on the phenomena recorded during the IPDE interviews, we consider it likely that at least some of the participants with hoarding would meet criteria for OCD (with compulsive hoarding). Moreover, although none of the 13 participants with psychiatrist-diagnosed OCD received a rating of “pathological” on the hoarding item, 4 (31%) were rated as “accentuated or exaggerated”, indicating evidence for sub-threshold hoarding behavior in these individuals.

Second, the prevalence of hoarding differed by demographic characteristics. Consistent with impressions from prior studies of individuals with hoarding, we found that the prevalence of hoarding behavior increased markedly with age (Steketee & Frost, 2003), and was nearly three times as prevalent in the oldest compared to the youngest age group. We do not know if this reflects an actual increase in the incidence of hoarding, or its severity, because we did not assess the age at onset of the behavior. It may be that the consequences of a hoarding tendency become more problematic as individuals age, due to accretion of objects over time, or because of increases in physical and mental infirmities that interfere with discarding and organizing possessions. Consistent with Wheaton et al. (2008), we also found that the prevalence of hoarding in this community sample was inversely related to household income, even when age, sex, living arrangement, and current employment were controlled statistically. Longitudinal studies are required to determine if hoarding is a response to financial insecurity; or, alternatively, whether financial insecurity is a consequence of hoarding behavior or other characteristics of individuals with this behavior.

Third, consistent with prior reports (Frost, Steketee, Williams, & Warren 2000; Samuels et al., 2002; Samuels et al., 2007a), we found evidence of more impairment in individuals with hoarding behavior. A measured by the GAF, these individuals had poorer psychosocial functioning than individuals who did not hoard. Moreover, we found that the odds of hoarding increased with the number of traits of specific personality disorders, including paranoid, schizotypal, avoidant, and obsessive-compulsive. Consistent with Wheaton et al. (2008), we also found a strong relationship between alcohol dependence and hoarding. We speculate that heavy alcohol use might interfere with discarding and organizing possessions; alternatively, both alcohol dependence and hoarding behavior might be independent outcomes of psychopathology, personality disorders, or adverse life events.

Fourth, several self-reported childhood adversities were associated with hoarding in this sample, specifically, lack of security from home break-ins and excessive physical discipline. Interestingly, patients with hoarding sometimes identify break-ins (not necessarily in childhood) as instigating their hoarding behavior (Steketee & Frost, 2007). Hartl et al. (2005) found that excessive physical discipline was strongly correlated with hoarding. We also found that parental psychiatric symptoms (mania, depression, and heavy alcohol use) were associated with hoarding. Parental psychopathology might contribute to childhood adversities, such as material deprivation or excessive physical discipline, that influence the development of hoarding behavior; alternatively, there may be a direct genetic relationship between psychopathology in parents and offspring, such as alcohol dependence, that contribute to hoarding (Nurnberger et al., 2004). The results of the regression analyses in the current study suggest that these four childhood adversities are each independently related to hoarding. We propose that these adversities, and perhaps others not measured in the current study, may be different features of a more general chaotic upbringing, and that some individuals with this history may seek security in collecting and saving a large number of possessions. Alternatively, it has been hypothesized that strong emotional attachment to possessions may be a response to poor attachment to parents during childhood (Steketee, Frost, & Kyrios, 2003).

In most previous studies of hoarding, the majority of participants have been women. However, we found a twofold higher prevalence of hoarding in men than women in this community sample. We also found that the magnitude of the relationship between certain correlates and hoarding was different in men and women in this sample. Specifically, parental psychiatric symptoms, and avoidant personality disorder dimensions, were more strongly associated with hoarding in women than men. This may suggest that the development of hoarding may be different in men than women. Wheaton et al. (2008) recently reported that, among women with OCD, those with hoarding had an earlier age at onset of OCD, more severe OCD, and greater prevalence of several Axis I disorders, compared to those without hoarding; whereas the only difference in men with OCD was increased prevalence of social phobia in those who hoarded. In contrast to Wheaton et al (2008), we found that the magnitude of the association between alcohol dependence and hoarding was similarly strong in men and women in this community sample.

Strengths and Limitations

Strengths of the current study include its investigation of hoarding in a community sample; assessment of personality disorder features and specific childhood adversities by psychologists; and evaluation of Axis I disorders, social functioning, and psychosocial stressors by psychiatrists.

However, several potential limitations of the study must be acknowledged. First, whereas the 1981 ECA study involved a probabilistic sample of household residents of the eastern Baltimore community, the sample for the current study had undergone multiple sources of attrition by 1997; nevertheless, the gender and ethnic distributions of the participants were similar to those who could not be interviewed (Samuels et al., 2002). Moreover, given the relatively low prevalence of hoarding and many of the childhood adversities, a larger sample is required to evaluate the relationships between them with adequate statistical power, as well as to control for multiple correlates simultaneously in regression models. Thus, the findings of this study must be considered preliminary and contingent on replication in larger, representative samples in other communities.

Second, we do not know what proportion of individuals with hoarding behavior, as identified in this study, meet criteria for compulsive hoarding as defined by Frost & Hartl (1996), which include acquisition and failure to discard possessions that seem useless or of limited value;

clutter that interferes with normal use of living spaces; and significant distress and impairment. In particular, the OCPD hoarding trait used to assess hoarding in this study does not evaluate the extent of clutter, and it focuses on "worn-out or worthless objects", so that it might not identify some individuals with low insight into their behavior. However, all of the individuals with hoarding either acknowledged, or were judged by the interviewers, to have experienced difficulties because of their hoarding behavior; in addition, in the opinion of several psychiatrists who reviewed transcripts of the cases, the individuals with hoarding behavior in this study were consistent with cases of hoarding that they had seen in clinical and research settings.

Third, childhood adversities in this study were evaluated retrospectively. Since the age at onset of hoarding behavior and childhood adversities were not established, it is unknown if specific adversities preceded the onset of hoarding behavior, or vice versa. Moreover, the perception and attribution of certain childhood experiences, as well as the willingness to report them to an interviewer, might be influenced by current psychopathology or personality disorder features (Brewin, Andrews, Gotlib, 1993). However, the magnitude of the relationships between childhood adversities and hoarding in this study did not appreciably change after controlling for these potential confounders or mediators. Nevertheless, there may be other unmeasured factors that could influence self-report of childhood adversities. Given these difficulties, longitudinal studies are needed that use more valid, reliable methods to evaluate childhood experiences prior to the onset of hoarding behavior, as have been conducted for other mental health outcomes (Jaffee et al., 2002; Fergusson, Boden, & Horwood, 2007).

Implications

This study provides evidence that hoarding behavior is more prevalent in the community than previously thought. The prevalence is greater in older individuals, and those with limited household income, and these demographic characteristics should be considered in focusing community interventions. Clinicians and social welfare professionals also should be aware that alcohol dependence and paranoid, avoidant, and obsessive-compulsive personality disorder features may complicate the treatment of, and intervention against, hoarding in the community. Moreover, adversities experienced in childhood may independently contribute to the development of hoarding behavior. Further research on the impact of these adversities on behavior may provide insights for developing programs for treating and preventing severe hoarding in the community.

Acknowledgements

This research was supported by National Institute of Mental Health grants R01- MH47447, R01-MH50616, and K23-MH64543. The authors thank the many individuals participating in the study; Ms. Gail Bendit, Ms. Stacie Johnson, Ms. Carolyn Newcomb, and Ms. Valerie Wadja-Johnson for conducting personality assessments; Dr. Leigh Ellison, Dr. David Gotlib, and Dr. William Howard for conducting clinical evaluations; Dr. Armand Loranger and Dr. Alan Romanoski for consultation on the study; and Ms. Margaret Dees, Ms. Sandra Hensley, Ms. April Ravert, and Ms. Krista Vermillion for their efforts in coordinating the study.

References

American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 3. Washington, DC: APA; 1987.

American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4. Washington, DC: APA; 1994.

Anderson SW, Damasio H, Damasio AR. A neural basis for collecting behavior in humans. Brain 2005;128:201–212. [PubMed: 15548551]

Anthony JC, Folstein M, Romanoski A, Von Korff MR, Nestadt G, Chahal R, et al. Comparison of the lay Diagnostic Interview Schedule and a standardized psychiatric diagnosis. Archives of General Psychiatry 1985;42:667–675. [PubMed: 4015308]

Brewin CR, Andrews B, Gotlib IH. Psychopathology and early experience: a reappraisal of retrospective reports. Psychological Bulletin 1993;113:82–98. [PubMed: 8426875]

Cromer KR, Schmidt NB, Murphy DL. Do traumatic events influence the clinical expression of compulsive hoarding? Behaviour Research and Therapy 2007;45:2581–2592. [PubMed: 17673166]

Dykens E, Shah B. Psychiatric disorders in Prader-Willi syndrome. CNS Drugs 2003;17:167–178. [PubMed: 12617696]

Eaton WW, Anthony JC, Gallo J, Cai G, Tien A, Romanoski A, et al. Natural history of Diagnostic Interview Schedule/DSM-IV major depression: The Baltimore Epidemiologic Catchment Area follow-up. Archives of General Psychiatry 1997;54:993–999. [PubMed: 9366655]

Efron B, Tibshirani R. Bootstrap measures for standard errors, confidence intervals, and other measures of statistical accuracy. Statistical Science 1986;1:54–77.

Fergusson DM, Boden JM, Horwood LJ. Exposure to single parenthood in childhood and later mental health, educational, economic, and criminal behavior outcomes. Archives of General Psychiatry 2007;64:1089–1095. [PubMed: 17768274]

Frost R, Gross R. The hoarding of possessions. Behaviour Research and Therapy 1993;31:367–382. [PubMed: 8512538]

Frost R, Hartl T. A cognitive-behavioral model of compulsive hoarding. Behaviour Research and Therapy 1996;34:341–350. [PubMed: 8871366]

Frost RO, Steketee G, Williams L. Hoarding: A community health problem. Health and Social Care in the Community 2000;8:229–234. [PubMed: 11560692]

Frost RO, Steketee G, Williams L, Warren R. Mood, disability, and personality disorder symptoms in hoarding, obsessive compulsive disorder, and control subjects. Behaviour Research and Therapy 2000;38:1071–1082. [PubMed: 11060936]

Goodman WK, Price LH, Rasmussen SA, Mazure C, Fleischmann RL, Hill CL, et al. The Yale-Brown Obsessive Compulsive Scale: I. Development, use, and reliability. Archives of General Psychiatry 1989;46:1006–1011. [PubMed: 2684084]

Gothelf D, Presburger G, Zohar AH, Burg M, Nahmani A, Frydman M, et al. Obsessive-compulsive disorder in patients with velocardiofacial (22q11 deletion) syndrome. American Journal of Medical Genetics, Part B (Neuropsychiatric Genetics) 2004;126:99–105. [PubMed: 15048657]

Greenberg D, Witzum E, Levy A. Hoarding as a psychiatric symptom. Journal of Clinical Psychiatry 1990;51:417–421. [PubMed: 2211540]

Hartl TL, Duggany SR, Allen GJ, Steketee G, Frost RO. Relationships among compulsive hoarding, trauma, and attention-deficit/hyperactivity disorder. Behaviour Research and Therapy 2005;43:269–276. [PubMed: 15629755]

Jaffee SR, Moffitt TE, Caspi A, Fombonne E, Poulton R, Martin J. Differences in early childhood risk factors for juvenile-onset and adult-onset depression. Archives of General Psychiatry 2002;59:215–222. [PubMed: 11879158]

Karno M, Golding JM, Sorenson SB, Burnam MA. The epidemiology of obsessive-compulsive disorder in five US communities. Archives of General Psychiatry 1988;45:1094–1099. [PubMed: 3264144]

Loranger AW, Sartorius N, Andreoli A, Berger P, Buchheim P, Channabasavanna SM, et al. The International Personality Disorder Examination. Archives of General Psychiatry 1994;51:215–224. [PubMed: 8122958]

Nurnberger JI Jr, Wiegand R, Bucholz K, O'Connor S, Meyer ET, Reich T, et al. A family study of alcohol dependence: coaggregation of multiple disorders in relatives of alcohol-dependent probands. Archives of General Psychiatry 2004;61:1246–56. [PubMed: 15583116]

Rasmussen SA, Eisen JL. The epidemiology and differential diagnosis of obsessive compulsive disorder. Journal of Clinical Psychiatry 1992;53(suppl):4–10. [PubMed: 1564054]

Samuels JF, Bienvenu OJ, Pinto A, Fyer AJ, McCracken JT, Rauch SL, et al. Hoarding in obsessive-compulsive disorder: results from the OCD Collaborative Genetics Study. Behaviour Research and Therapy 2007;43:673–686. [PubMed: 16824483]

Samuels J, Shugart YY, Grados MA, Willour VL, Bienvenu OJ, Greenberg BD, et al. Significant linkage to compulsive hoarding on chromosome 14 in families with obsessive compulsive disorder. American Journal of Psychiatry 2007;164:493–499. [PubMed: 17329475]

Samuels J, Eaton WW, Bienvenu OJ 3rd, Brown CH, Costa PT Jr, Nestadt G. Prevalence and correlates of personality disorders in a community sample. British Journal of Psychiatry 2002;180:536–542. [PubMed: 12042233]

Samuels J, Bienvenu OJ III, Riddle MA, Cullen BAM, Grados MA, Liang KY, et al. Hoarding in obsessive compulsive disorder: Results from a case-control study. Behaviour Research and Therapy 2002;40:517–528. [PubMed: 12043707]

Saxena S, Brody AL, Maidment KM, Smith EC, Zohrabi N, Katz E, et al. Cerebral glucose metabolism in obsessive-compulsive hoarding. American Journal of Psychiatry 2004;161:1038–1048. [PubMed: 15169692]

Saxena S. Is compulsive hoarding a genetically and neurobiologically discrete syndrome? Implications for diagnostic classification. American Journal of Psychiatry 2007;164:380–384. [PubMed: 17329459]

Steketee G, Frost RO. Compulsive hoarding: current status of the research. Clinical Psychology Review 2003;23:905–927. [PubMed: 14624821]

Steketee G, Frost RO, Kim HJ. Hoarding by elderly people. Health & Social Work 2001;26:176–184.

Steketee, G.; Frost, RO. Compulsive Hoarding and Acquiring: Therapist Guide. New York: Oxford University Press; 2007.

Steketee G, Frost RO, Kyrios M. Cognitive aspects of compulsive hoarding. Cognitive Therapy and Research 2003;27:463–479.

Tolin DF, Frost RO, Steketee G, Fitch KE. Family burden of compulsive hoarding: results of an internet survey. Behaviour Research and Therapy 2008;46:334–344. [PubMed: 18275935]

Wheaton M, Cromer K, LaSalle-Ricci VH, Murphy D. Characterizing the hoarding phenotype in individuals with OCD: associations with comorbidity, severity and gender. Journal of Anxiety Disorders 2008;22:243–152. [PubMed: 17339096]

Wing JK, Babor T, Brugha T, Burke J, Cooper JE, Giel R, et al. SCAN: Schedules for Clinical Assessment in Neuropsychiatry. Archives of General Psychiatry 1990;47:589–593. [PubMed: 2190539]

Wu K, Watson D. Hoarding and its relation to obsessive-compulsive disorder. Behaviour Research and Therapy 2005;43:897–121. [PubMed: 15896286]

TABLE 1

Relationship between hoarding and sociodemographic characteristics Eastern Baltimore, 1997–1999

	PREVALENCE N (%)	Odds Ratio (95% CI)
Age (in years)		
34–44 (N=266)	6 (2.3)	1.00
45–54 (N=244)	7 (2.9)	1.28 (0.4–3.9)
55–94 (N=225)	14 (6.2)	**2.88 (1.1–7.6)**[a]
Sex		
Women (N=465)	12 (2.6)	1.0
Men (N=270)	15 (5.6)	**2.22 (1.02–4.8)**[a]
Race/Ethnicity		
White (N=442)	14 (3.2)	1.0
Other (N=293)	13 (4.4)	1.42 (0.7–3.1)
Current marital status		
Married/cohab (N=374)	11 (2.9)	1.00
Sep/Divorced (N=180)	6 (3.3)	1.14 (0.4–3.1)
Never married (N=99)	5 (5.1)	1.76 (0.6–5.2)
Widowed (N=82)	5 (6.1)	2.14 (0.7–6.3)
Lives alone		
No (N=594)	20 (3.4)	1.00
Yes (N=141)	7 (5.0)	1.50 (0.6–3.6)
Highest grade completed		
Post-HS (N=270)	10 (3.7)	1.00
HS graduate (N=213)	7 (3.3)	0.88 (0.3–2.4)
Not HS graduate (N=247)	10 (4.0)	1.10 (0.4–2.7)
Currently employed		
Yes (N=470)	13 (2.8)	1.00
No (N=262)	14 (5.3)	1.98 (0.92–4.3)
Household income, annual $		
>49,999 (N=174)	2 (1.1)	1.00
20,000 – 49,999 N=246)	8 (3.3)	2.89 (0.6–13.8)
<20,000 (N=221)	11 (5.0)	**4.51 (0.99–20.6)**[b]

[a] $p<0.05$,

[b] $p=0.052$.

TABLE 2

Relationship between hoarding and number of personality disorder traits Eastern Baltimore, 1997–1999

	Odds Ratio (95% CI)
Paranoid	**1.60 (1.1–2.2)**[b]
Schizoid	1.53 (1.0–2.3)
Schizotypal	**1.49 (1.2–1.9)**[c]
Antisocial	**1.24 (1.02–1.5)**[a]
Borderline	1.28 (0.98–1.7)
Histrionic	1.01 (0.6–1.8)
Narcisssistic	1.24 (0.8–1.9)
Avoidant	**1.66 (1.2–2.2)**[c]
Dependent	1.49 (0.9–2.3)
Obsessive-compulsive[d]	**1.76 (1.3–2.3)**[c]

[a] $p<0.05$,

[b] $p<0.01$,

[c] $p<0.001$.

[d] Excludes the trait “unable to discard worn-out or useless objects”.

TABLE 3

Relationship between hoarding and childhood adversities Eastern Baltimore, 1997–1999

	HOARDING N (%)	NONHOARDING N (%)	Odds Ratio (95% CI)
Conflict between parents	9 (36.0)	229 (33.1)	1.14 (0.5–2.6)
Family sexual contact	3 (11.1)	63 (8.9)	1.27 (0.4–4.3)
Raised by both parents	10 (41.7)	217 (31.7)	1.54 (0.7–3.5)
Death of mother	2 (7.7)	32 (4.6)	1.71 (0.4–7.6)
Parents separated or divorced	10 (38.5)	150 (23.0)	2.09 (0.9–4.7)
Death of father	5 (20.8)	10 (10.3)	2.28 (0.8–6.3)
Death of mother or father	7 (28.0)	95 (14.4)	2.31 (0.9–5.7)
Psychiatric symptoms, father [a]	11 (47.8)	151 (25.4)	**2.69 (1.2–6.2)** [b]
Psychiatric symptoms, mother [a]	9 (37.5)	111 (18.0)	**2.73 (1.2–6.4)** [b]
Lack of security from home break-ins	4 (14.8)	30 (4.3)	**3.90 (1.3–12.0)** [b]
Excessive physical discipline	14 (51.9)	144 (20.5)	**4.18 (1.9–9.1)** [c]

[a] Depression, mania, or heavy drinking.

[b] $p<0.05$,

[c] $p<0.001$

TABLE 4

Relationship between hoarding and childhood adversities, controlling individually for sociodemographic and clinical characteristics Eastern Baltimore, 1997–1999

	Psychiatric Symptoms, Father	Psychiatric Symptoms, Mother	Home breakins	Excessive physical discipline
Controlling for:	**Odds Ratio (95% CI)**			
----	2.7 (1.2–6.2)	2.7 (1.2–6.4)	3.9 (1.3–12.0)	4.2 (1.9–9.1)
Age	2.6 (1.1–6.1)	3.1 (1.3–7.3)	5.1 (1.6–16.2)	4.2 (1.9–9.1)
Sex	2.9 (1.3–6.8)	3.1 (1.3–7.3)	4.6 (1.4–14.3)	4.0 (1.8–8.8)
Household income	2.8 (1.1–7.4)	3.3 (1.3–8.4)	5.6 (1.7–18.7)	4.0 (1.7–9.8)
Number of paranoid traits	2.6 (1.1–6.2)	2.6 (1.1–6.3)	3.8 (1.2–11.9)	4.0 (1.8–9.1)
Number of schizotypal traits	2.7 (1.1–6.3)	2.4 (1.01–5.8)	3.3 (1.04–10.4)	3.5 (1.6–7.8)
Number of avoidant traits	3.0 (1.2–7.2)	2.5 (1.01–6.1)	3.3 (1.03–10.5)	4.1 (1.8–9.1)
Number of obsessive-compulsive traits [a]	2.4 (1.03–5.8)	2.8 (1.2–6.6)	3.1 (0.97–10.2)	4.1 (1.9–9.1)
GAF score	2.2 (0.9–5.6)	1.9 (0.7–5.1)	2.8 (0.8–9.1)	3.3 (1.4–7.6)
Alcohol dependence, lifetime	1.9 (0.7–4.8)	2.9 (1.1–7.6)	4.6 (1.4–14.8)	3.8 (1.6–8.8)
Psychiatric symptoms, father	----	2.2 (0.9–5.5)	2.6 (0.7–9.6)	4.2 (1.8–9.9)
Psychiatric symptoms, mother	2.5 (1.1–5.8)	----	4.1 (1.3–12.9)	4.6 (2.0–10.6)
Home break-ins	2.5 (1.1–5.9)	2.6 (1.1–6.2)	----	4.0 (1.8–8.8)
Excessive physical discipline	2.3 (0.99–5.5)	2.3 (0.97–5.5)	3.5 (1.1–11.2)	----

[a] Excludes the trait, “unable to discard worn-out or useless objects”.