TITLE

Hoarding behavior: special features and complications in real-world clinical practice.

AUTHORS:

David Córcoles[a,b,c] *(Corresponding author).*
[a] Institut de Neuropsiquiatria i Addiccions, Parc de Salut Mar.
Passeig Marítim de la Barceloneta 25-29, 08003 Barcelona, España.
[b] Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM),
Av. Monforte de Lemos, 3-5. Pabellón 11. Planta 0 28029 Madrid. España.
[c] Departmento de Psiquiatría y Medicina Forense, Universitat Autonoma de Barcelona. Campus de la UAB, Plaça Cívica, 08193 Bellaterra, Barcelona. España.
dcorcoles@psmar.cat
ORCID ID: 0000-0002-1193-260X.

Lucía Guerrero[d]
[d] Servei de Salut de l' Ajuntament de L'Hospitalet, Hospitalet de Llobregat. España.
lguerrero@l-h.cat

Angeles Malagon[a,c]
[a] Institut de Neuropsiquiatria i Addiccions, Parc de Salut Mar.
Passeig Marítim de la Barceloneta 25-29, 08003 Barcelona, España.
[c] Departmento de Psiquiatría y Medicina Forense, Universitat Autonoma de Barcelona. Campus de la UAB, Plaça Cívica, 08193 Bellaterra, Barcelona. España.
amalagon@psmar.cat
ORCID ID: 0000-0001-7572-2110

Magda Bellsolà[a],
[a] Institut de Neuropsiquiatria i Addiccions, Parc de Salut Mar.
Passeig Marítim de la Barceloneta 25-29, 08003 Barcelona, España.
mbellsola@psmar.cat

Ana Maria Gonzalez[a],
[a] Institut de Neuropsiquiatria i Addiccions, Parc de Salut Mar.
Passeig Marítim de la Barceloneta 25-29, 08003 Barcelona, España.
agonzalezf@psmar.cat

Jordi León[a,c],
[a] Institut de Neuropsiquiatria i Addiccions, Parc de Salut Mar.
Passeig Marítim de la Barceloneta 25-29, 08003 Barcelona, España.
[c] Departmento de Psiquiatría y Medicina Forense, Universitat Autonoma de Barcelona. Campus de la UAB, Plaça Cívica, 08193 Bellaterra, Barcelona. España.
jleon@psmar.cat
ORCID ID: 0000-0003-0138-7289.

Agnès Sabaté[a],
[a] Institut de Neuropsiquiatria i Addiccions, Parc de Salut Mar.
Passeig Marítim de la Barceloneta 25-29, 08003 Barcelona, España.
asabate@psmar.cat

ORCID ID: 0000-0001-7246-7070.

Victor Pérez[a,b,],
[a] Institut de Neuropsiquiatria i Addiccions, Parc de Salut Mar.
Passeig Marítim de la Barceloneta 25-29, 08003 Barcelona, España.
[b] Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM),
Av. Monforte de Lemos, 3-5. Pabellón 11. Planta 0 28029 Madrid. España.
vperezsola@psmar.cat
ORCID ID: 0000-0002-5825-2337

Antoni Bulbena[a,c]
[a] Institut de Neuropsiquiatria i Addiccions, Parc de Salut Mar.
Passeig Marítim de la Barceloneta 25-29, 08003 Barcelona, España.
[c] Departmento de Psiquiatría y Medicina Forense, Universitat Autonoma de Barcelona. Campus de la UAB, Plaça Cívica, 08193 Bellaterra, Barcelona. España.
abulbena@psmar.cat
ORCID ID: 0000-0003-2404-2478

Luis Miguel Martín[a,b,c],
[a] Institut de Neuropsiquiatria i Addiccions, Parc de Salut Mar.
Passeig Marítim de la Barceloneta 25-29, 08003 Barcelona, España.
[b] Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM),
Av. Monforte de Lemos, 3-5. Pabellón 11. Planta 0 28029 Madrid. España.
lmmartin@psmar.cat

Anna Mane[a,b,e]
[a] Institut de Neuropsiquiatria i Addiccions, Parc de Salut Mar.
Passeig Marítim de la Barceloneta 25-29, 08003 Barcelona, España.
[b] Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM),
Av. Monforte de Lemos, 3-5. Pabellón 11. Planta 0 28029 Madrid. España.
[e] Fundació Hospital del Mar Medical Research Institute (IMIM), Carrer del Dr. Aiguader, 88,08003 Barcelona, Spain.
amane@psmar.cat
ORCID ID: 0000-0003-2127-349X

ABSTRACT

Objective

Hoarding behavior is a common but poorly characterized problem in real-world clinical practice. Although hoarding behavior is the key component of Hoarding Disorder (HD), there are people who exhibit hoarding behavior but do not suffer from HD. The aim of the present study was to characterize a clinical sample of patients with clinically relevant hoarding behavior and evaluate the differential characteristics between patients with and without HD.

Methods

This study included patients who received treatment at the home visitation program in Barcelona (Spain) from January 2013 through December 2020, and scored ≥ 4 on the Clutter Image Rating scale. Sociodemographic, DSM-5 diagnosis, clinical data and differences between patients with and without a HD diagnosis were assessed.

Results

A total of 243 subjects were included. Hoarding behavior had been unnoticed in its early stages and the median length in the sample was 10 years (IQR 15). 100% of the cases had hoarding-related complications. HD was the most common diagnosis in 117 patients (48.1%).

Conclusions

The study found several differential characteristics between patients with and without HD diagnosis. Alcohol use disorder could play an important role among those without HD diagnosis. Home visitation programs could improve earlier detection, preventing hoarding-related complications.

Keywords:

hoarding; hoarding disorder; clinical practice; home treatment; public health

1. INTRODUCTION

Hoarding behavior, was first described in the 1960s [1–3]. In the general population, the prevalence of hoarding behavior ranges from 4%-12% [4,5] and may be present in up to one-third of patients admitted to acute psychiatric units for other reasons [6].

Hoarding Disorder (HD) was recently added to the Diagnostic and Statistical Manual of Mental Disorders (DSM)-5. According to the DSM-5, the diagnostic criteria for HD are met when no other disease can explain the behavior and the patient demonstrates a perceived need to save possessions regardless of their actual value and exhibits such a high level of distress associated with discarding these possessions that it causes functional impairment [7]. The estimated prevalence of HD in the general population is 2.3%-4.6% [8–10], equally distributed between men and women [8] and inversely related to income [4]. Although symptom onset usually occurs before age 20 [11], the prevalence of hoarding behavior increases markedly with age [4] and worsens with the passage of time [12].

HD is associated with isolation, falls, and other medical problems that increase with age [13,14]. Unlike most disorders, HD affects not only the patient and their immediate environment, but also the community, increasing the risk of infestation by insects and rodents, fire and structural problems in buildings, and unpleasant odors, as well as impeding access to the home in cases in which medical teams or firefighters need to intervene [15].

Although hoarding behavior is the key component of hoarding disorder (HD), not all people who exhibit hoarding suffer from this disorder. Hoarding behavior has been associated with multiple diseases such as schizophrenia [16,17], alcohol dependence, genetic diseases, intellectual disability, personality disorder, and obsessive-compulsive disorder [4]. In older people, it increases the risk of medical complications and is associated with fronto-temporal dementia [13]. In most cases, hoarding involves objects, but it can also include animals, in which case it may be known as Animal Hoarding Disorder, which some authors suggest should be considered an independent entity [18].

To date, much of what we know about hoarding comes from volunteers in university-based research studies recruited through advertisements and diagnosed by non-objective measures. However, some studies have been conducted in clinical samples, with visual inspection of living conditions [4,19,20]. In these clinical samples, there is a tendency towards more severe hoarding behaviors (particularly of garbage) than in university-based research studies [21].

Unfortunately, treatment protocols are scarce at present, and the clinical management of hoarding behavior is quite complex and frequently inefficacious. Patients are frequently uncooperative and present a lack of awareness of the severity of their behavior [22]. This lack of awareness was demonstrated by Ayers et al. [23], who found that clinician-administered measures of hoarding were stronger predictors of disability than patient self-report measures. Frost et al. [14] suggested that many people with hoarding disorder were unlikely to seek help voluntarily. In that study, most participants either refused to co-operate or promised to comply but only made a few attempts to resolve the problem.

In short, hoarding behavior is highly prevalent in the general population and frequently associated with major personal and socioenvironmental consequences. At present, our understanding of the clinical and sociodemographic characteristics of these patients is limited, and no clinical guidelines are available to facilitate management of these patients.

In this context, there is a clear need to determine the clinical and sociodemographic characteristics of these patients in order to develop appropriate treatment protocols. The aim of this study was to objectively describe—by direct assessment through in-home visits—the clinical and sociodemographic characteristics of patients presenting hoarding behavior, and the characteristics of hoarding behavior in a clinical sample. We also sought to determine the characteristics that differentiate between patients who meet the clinical criteria for HD from those who do not fulfill these criteria. Finally, we assessed the association between hoarding severity and the participants' clinical characteristics.

2. MATERIAL AND METHODS

2.1. Participants

This study included people treated within the home visitation program (Multidisciplinary Specialized Support Team; EMSE) at the Parc de Salut Mar Hospital in Barcelona, Spain from January 1, 2013 to December 31, 2020. The EMSE home visitation program was developed to provide care for patients with mental disorders who are not included in the psychiatric health network, either because they had no prior diagnosis or had dropped out of usual care.

The main objective of the EMSE is to reconnect these patients to the health care network. Referrals to the service can come from any field of medicine or social work. Referral criteria are: 1) suspected mental illness and 2) refusal to participate in outpatient follow-up. The team is comprised of four health care professionals (two psychiatrists and two nurses) who are responsible for the entire population of Barcelona and two neighboring cities (Hospitalet del Llobregat and Cornellà de Llobregat). Before the first home visit, the team reviews clinical data from the patient's medical records, which are available online through the Catalan Health Service (CatSalut) database, and also conducts an interview with a family member or the primary caregiver. Home visits are performed to make the diagnosis and, if necessary, to establish a treatment plan in the mental health network. Hoarding is a common reason for consultation.

Study inclusion criteria were as follows: (1) enrollment in the home visitation program and (2) Clutter Image Rating (CIR) score ≥ 4 (which indicates the presence of significant clutter requiring clinical care [24]).

2.2. Assessment

Clinical and sociodemographic variables were collected through clinical interview performed by experienced psychiatrists (D.C, A.M, J.L, and A.S). Other data were collected through the patients' medical records.

The following sociodemographic data were registered: age, sex, work activity, family situation, and social network. The social network was evaluated and classified according to criteria developed by our team based on clinical experience, as follows: 1) null (immediate family only), 2) limited (up to two members outside the immediate family), and 3) normal (≥ three members outside the family). Clinical data included the following: referral source; psychiatric family history; history of previous hospitalizations; prior diagnosis; current DSM-5 diagnosis was assessed by the home visitation program using the Spanish version of the Structured

Clinical Interview for DSM-5, clinical version (SCID-CV)[25]; hoarding behavior; and functional and psychopathological characteristics. For the analysis, the following DSM-5 diagnoses were considered: HD; cognitive impairment; substance use disorder; psychotic disorder; affective disorder; adjustment disorder; anxiety disorder; personality disorder; autistic spectrum disorder; intellectual disability; and obsessive-compulsive disorder.

To assess hoarding behavior, we registered the following data: person who detected the problem; person who referred the case; main reason for consultation; date that hoarding behavior started; history of previous cleanout intervention; hoarding-related complications; animal hoarding (defined as 'unusual large number of animals with a lack of minimum standards of nutrition, hygiene and veterinary care'); insight as "No" (for poor or absent insight) and "Yes" (for good insight); and type of hoarding. Based on patient-reported information and that obtained through family member and/or neighbors, the type of hoarding behavior was classified as "with excessive acquisition" or "without excessive acquisition".

Various instruments are available to rate hoarding severity, including the Saving Inventory-revised (SI-R) [26], the Hoarding Rating Scale-Interview (HRS-I) [27], and the Clutter Image Rating (CIR) [24]. The SI-R is a self-report instrument and the HRS-I is a structured interview. An important advantage of these scales is that they can be administered without the need to directly assess the hoarding site. The main disadvantage is that the accuracy of these scales depends on the sincerity of the patient, who often has little awareness of the disease and is frequently uncooperative. HRS-I and SI-R have not been used in this study due to the lack of collaboration of the individuals. The CIR, by contrast, is based on nine objective photographs taken of each room (kitchen, living room, and dining room). Clutter severity in each room is scored on a scale from 1 (lowest) to 9 (highest), thus allowing for an objective, visual assessment of clutter severity. The final score is the average score obtained in the three rooms. This scale has demonstrated good test–retest reliability (r= 0.82) and good client/clinician correlation (r= 0.78) [24].

The Spanish versions of the following instruments were administered to assess functional and psychopathological characteristics of the study participants: Severity of Psychiatric Illness Scale (SPI) [28]; Global Assessment of Functioning scale (GAF) [29]; Clinical Global Impression-Severity Scale (CGI-S) [30]; Overt Aggression Scale (OAS)[31], and the 12-item, interviewer-administered World Health Organization Disability Scale 2.0 (WHODAS2.0) [32].

2.3. Ethics

The project was approved by the ethics committee at the Parc de Salut Mar Hospital (CEIC PSMAR; number: 2020/9414) accepting the exemption of informed consent form. The study adhered to national and international guidelines and the Declaration of Helsinki. Data confidentiality was ensured by following the legal provisions of the "Organic Law 3/2018, of December 5, on the Protection of Personal Data and guarantee of digital rights, and Regulation (EU) No. 2016/679 of the European Parliament and of the Council of April 27, 2016 on Data Protection (RGPD) ".

2.4. Statistical analysis

The Kolmogorov-Smirnov test with Lilliefors correction was used to assess the distribution normality of the study variables. The internal consistency of the main scale (CIR) was assessed with Cronbach's α. A descriptive analysis of the sample was performed. Bivariate analyses were performed to compare patients who met criteria for HD to those who did not, with the

appropriate statistical test (Chi square test and Fisher's exact test for categorical variables and Student's T test for continuous variables). Due to the high prevalence of alcohol use disorder (AUD) in this sample, we performed a post hoc analysis to compare patients with and without AUD among those who did not meet criteria for HD, with the appropriate statistical test (Chi square test and Fisher's exact test for categorical variables and Student's T test for continuous variables). Bivariate analyses (Student's t test) were performed to compare clutter severity (CIR score) by sex, living situation, social network, family history of hoarding, and type of hoarding. Pearson correlation analysis was performed to determine the association between clutter severity (CIR score) and age, duration of hoarding, number of previous cleanouts, number of complications, and the other clinical scales. The SPSS v. 25.0 software package was used to perform the statistical analysis.

3. RESULTS

During the study period, 3468 patients participated in the home visitation program. In 265 individuals hoarding behavior was identified. Of these, 14 patients were subsequently excluded because the home assessment could not be performed because the patient was not at home during any of the attempted home visits (n=3), and 8 cases had a CIR score < 4 and were not included in the study. Consequently, the final sample comprised 243 patients, representing 7.4% of all patients visited at home during the study period. Table 1 shows the characteristics of the final sample.

3.1. Diagnosis

Table 2 shows the main diagnoses in the sample. HD was the most common diagnosis, present in 117 patients (48.1%), followed by cognitive impairment (16.0%), psychotic disorder (10.3%) and AUD (7.8%).

Twelve patients (4.9%) did not meet diagnostic criteria (DSM-5) for any disorder. The mean (SD) age in this subgroup was 58 years (10.6), which was comprised of three (25%) men and nine (75%) women. Most of these patients (n=8; 66.7%) lived alone while four (33.3%) lived with family. The social network was null or limited in six cases (50%) and normal in the other six patients (50%). In terms of employment, three (25%) were actively employed and nine (75%) unemployed. Three patients (25%) had previous psychiatric history (depressive disorder, anxiety disorder, and adjustment disorder, respectively). None of the patients had a previous hospital admission. The reason for the consultation was hoarding in all 12 cases (100%). None of them met the diagnostic criteria B for HD ('The difficulty discarding possessions is due to a perceived need to save the items and to distress associated with discarding them'). One patient (8.3%) had a previous cleanout, and 12 (100%) were without excessive acquisition. Mean (SD) CIR scores for the bedroom, kitchen, and living room were, respectively, 5.5 (1.31), 6.08 (1.51), and 5.25 (1,49). Median duration of hoarding was 10.0 (IQR: 14.0).

Slightly less than half (n=115: 47.3%) of the patients in the sample had a comorbid mental disorder in addition to the main diagnosis (table 3). AUD was the most common comorbid diagnosis (42 patients; 36.5%).

3.2. Hoarding behavior

The CIR scales had high internal consistency (Cronbach's α =.84). The mean (SD) CIR score was 5.65 (1.68). Table 4 shows the main characteristics of hoarding behavior. In most cases (n=148; 60.9%) the behavior was detected by people in the immediate environment (family or

neighbors), followed by social services (62 cases; 25.5%). In 21 patients (8.6%), hoarding behavior was not the reason for the consultation, but the presence of hoarding was subsequently detected at the home visit. The median duration of hoarding was 10 years, with a wide range (< 12 months up to 50 years). Most of the patients had never undergone a cleanout intervention (n=209; 86.0%). Twenty-five patients (10.3%) had undergone at least one cleaning, with one patient undergoing seven. In 18 cases (7.4%), another individual with hoarding behavior lived in the same home with the patient. In 13 patients (5.3%), animal hoarding was also present.

Table 5 shows the main complications derived directly from hoarding, most commonly problems with neighbors or family. All of the patients who received a home visit had at least one direct complication. Of the 243 patients in the sample, 102 (42.0%) had one complication, 90 (37.0%) had two complications, 47 (19.3%) had three complications, and four (1.6%) had four complications.

3.3. Comparison between patients diagnosed with HD vs those without HD.

Tables 1 and 3-5 show the differences between patients diagnosed with HD compared to those without HD. We observed several differences between the groups. In terms of previous diagnosis (Cramér's V= 0.33, p=0.004), most notably substance use disorder, which was more prevalent in the non-HD group to the HD group (19.0% vs. 5.1%).

3.4. Alcohol use disorder and hoarding behavior.

A total of 61 individuals (25.1%) had a diagnosis of AUD, with 46 (18.9%) in the non-HD group and 15 (6.2%) in the HD group (p<0.001). Most of the 46 non-HD patients with AUD were males (n=32, 69.6%) versus 36.2% (n=29) in the non-HD, non-AUD subgroup (p<0.001). Thirty-two patients (69.6%) without HD but with AUD lived alone while 41 patients (52.2%) without HD and without AUD lived alone (p=0.045). Among the patients with AUD in the non-HD group, 22 (47.8%) were without excessive acquisition and 24 (52.2%) with excessive acquisition. Among the non-AUD patients without HD, 56 (70.0%) were without excessive acquisition and 24 (30.0%) with excessive acquisition (p=0.009). The mean (SD) number of complications due to accumulations was greater (p=0.010) in those with AUD (2.1 [0.8]) compared to those without AUD (1.8 [0.8]) and the median duration of hoarding shorter (p=0.023) in those with AUD (5 years; IQR: 7) than in those without AUD (10 years; IQR: 10).

No differences were found between individuals with and without AUD in terms of social network, employment status, education, previous incomes, psychiatric history, age, CIR score (each room and total), SPI, OAS, WHODAS2.0, CGI-S, number of previous cleanouts and duration of hoarding.

3.5. Correlation between characteristics of patients and hoarding and severity of clutter

Significant differences were found in CIR scores between those with and without a family history of hoarding. Patients with a family history had a mean (SD) score of 6.2 (1.6) vs 5.3 (1.6) in those without (p=0.008). Similarly, differences were observed for CIR scores according to type of hoarding; Patients with excessive acquisition had a mean (SD) CIR of 6.2 (1.6) and 4.9 (1.4) without excessive acquisition (p<0.001).

There were no significant differences between CIR scores for any of the following variables: sex, living situation or social network. Mean scores among males were 5.6 (1.6) vs. 5.7 (1.7) among females (p=0.637). Mean scores in patients living alone were 5.7 (1.8) vs. 5.6 (1.6) in

those living “accompanied” (p=0.734). Mean scores (SD) according to the size of the social network were as follows: null (5.8 [1.8]) vs limited (5.5 [1.5]), p=0.195; null (5.8 [1.8]) vs. normal (5.8 [1.4]), p=0.910; and limited (5.5 [1.5]) vs. normal (5.8 [1.4]), p=0.494).

Correlations (Pearson's) between the CIR score and the different variables were significant for the following: duration of hoarding (0.178; p=0.009); number of previous cleanouts (0.144; p=0.028), and number of complications (0.135; p=0.038). CIR scores were not significantly correlated with age (0.117; p=0.074). The correlation between the various psychopathological scales and the CIR scale was significant for the GAF (-0.172; p=0.010) and CGI-S (0.235; p < 0.001). No significant correlations were observed between the CIR and any of the other scales: WHO/DAS2.0 (-0.025; p=0.708), SPI (0.083; p = 0.216), or OAS (-0,048; p = 0.470).

4. DISCUSSION

To our knowledge, the present study includes the largest clinical sample of individuals with hoarding behavior evaluated at home to date.

4.1. Sociodemographic characteristics and psychopathology

The mean age of our sample (≈ 63 years) was similar to that described in other clinical samples, confirming the absence of early detection [13,21,33]. The prevalence rate between men and women was similar, a finding that contrasts with data from some studies in non-clinical samples, but in line with a recent metanalysis that included only non-clinical samples [8]. Consistent with previous research [34–36], we found that more than half of the patients (54.3%) lived alone, a situation that has been associated with higher levels of clutter than living with one or more people [19,36]. Interestingly, among the patients in our sample who lived with another person, 7.4% lived with another individual with hoarding behavior.

In terms of psychosocial functioning, more than 80% of our sample had a limited social network (none or “few”), and moderate psychosocial dysfunction, a finding that is consistent with previous reports [4,13,37].

4.2. Hoarding behavior

In most cases, the hoarding behavior was detected by individuals (family, neighbors) in the direct environment (≈ 60%), followed by social services (≈ 25%). Nevertheless, most referrals came from social services. In other studies, the most common source of referrals were service providers and family members [33] or property managers and inspectors [20]. These findings suggest that greater availability of communication channels to report this behavior could improve early detection.

Notably, only 3.7% of the cases were detected by psychiatric services. This finding, coupled with the long duration of hoarding behavior observed in this study, suggest that a high proportion of cases are not detected by the mental health system and thus undiagnosed and untreated. Consequently, there is a clear need to develop protocols to ensure early detection and management of this disorder. These protocols should consider the role of home intervention teams given that such teams can more easily and objectively detect hoarding. In our study, nearly 9% of cases were detected by the team, even though this was not the initial reason for consultation and the hoarding behavior had not been previously detected by other health or social care services.

The mean CIR score in our sample was higher than reported in several other studies involving clinical samples. For instance, Pittman et al. [38] and Luu et al. [33] reported mean CIR scores of 3.89 and 4.16, respectively. The higher scores in our sample are likely due to our inclusion criteria, which required a minimum CIR score (≥ 4) which could also have influenced our results given that clutter severity has been associated with more severe psychopathologic conditions such as hostility, dysfunction, and lack of collaboration [23,39,40]. However, we decided this minimum CIR score (≥ 4) because it indicates the presence of significant clutter that requires clinical care [24].

In most cases, hoarding behavior affected the individual's social environment, prompting neighbors or family to move elsewhere in more than a quarter of cases, pest infestation in the building in ≈ 10% of cases, and even a fire in 1% of cases. These findings are consistent with prior studies in clinical samples [13,14,41]. In terms of personal problems, other studies have found that hoarding is a common cause of problems in family relationships, and is also a relatively common cause of moving, usually due to eviction [42]. Medical complications directly related to unsanitary living conditions, which can lead to sudden or unnatural death [43], were found in more than 5% of our sample. The incidence of problems caused by collapse of stacked objects or fires was lower in our sample than in other studies, even though such issues can cause serious harm [34,44]. Only 1.7% of the individuals in our sample reported any discomfort related to the hoarding, a finding that is consistent with the scant awareness of the disorder and the lack of motivation to change in these patients, both of which are major impediments to treatment.

4.3. Diagnosis

HD was the main diagnosis, present in nearly half (48.1%) of the sample. However, this behavior was also present in patients with other pathologies [45]. After HD, the two most common primary diagnoses in our sample were cognitive impairment and psychotic disorders. Numerous studies have reported an association between hoarding behavior and cognitive impairment [13,37,46–48]. A few studies have found that hoarding behavior is associated with schizophrenia and other types of psychosis, and—at least in some patients—improvement in psychotic symptoms could also improve (lessen) the hoarding behavior [19,49,50].

In our sample, close to one out of every 10 participants (9.5%, Tables 2 and 3) had a personality disorder (particularly schizotypal disorder), which has been associated with hoarding [51]. Interestingly, the schizotypal subtype has been specifically associated with hoarding in women [4].

An unexpected finding in our study was that the mean CIR score in the 12 individuals who did not meet DSM-5 diagnostic criteria for any disorder was similar to the scores in the rest of the sample. Nevertheless, the home visitation team observed that these 12 individuals shared several common characteristics: extreme tolerance to dirt, hoarding of dirt and garbage, use of the floor as a garbage container, reluctance to clean due to lethargy, and no emotional attachment to objects. Although cognitive screening tests were not administered in these patients because they were all under 65 years old, it does not seem likely that these cases are due to early stages of dementia given that accumulation onset occurs in this subgroup around the age of 50. Alcohol consumption was also not suspected as no alcohol containers were observed among the accumulated objects. Although these patients failed to meet criteria for any currently known disorder (and we were unable to find a similar description in the

literature), we tentatively defined this unique condition as “extreme tolerance to squalor disorder”.

4.4. AUD and hoarding behavior.

The role of comorbid alcohol misuse in hoarding behavior in our sample was extremely important, especially in individuals with diagnoses other than HD. Previous studies have reported an association between alcohol misuse and hoarding, especially when the hoarding is accompanied by dirtiness, suggesting executive deficits related to frontal lobe dysfunction [48,52]. Interestingly, alcohol abstinence has been associated with a partial remission of cognitive deficits, suggesting that reduced alcohol consumption could reduce hoarding and dirtiness [53].

We found that the individuals in our sample without HD but with AUD tended to be males, living alone, with a shorter duration of hoarding, but with some complications (Table 5) due to accumulation. Gleason et alt. [52] suggest that alcohol misuse may be a risk factor for squalor via a failure to maintain an orderly environment rather than through intentional accumulation of objects. It is worth noting that, in this clinical sample, more than half of the patients presented excessive acquisition.

4.5. Comparison between patients diagnosed with HD vs those who did not.

To our knowledge, no previous clinical studies have directly compared hoarding behavior between individuals with a diagnosis of HD and those without HD. However, Mataix et al. conducted a review of case series [54], finding that the available data suggest apparent phenomenological differences between different types of hoarding. Similarly, we found differences between these two groups in the duration of hoarding behavior and family history of hoarding, both of which were higher in patients with confirmed HD. Our study shows that high clutter severity may be present in both groups (HD and non-HD), although clutter severity is higher in individuals with HD. Consistent with our findings, Snowdon [55] described more severe hoarding in patients with HD than in patients without HD. While both studies suggest that social impairment is greater in individuals with HD, we did not observe any significant differences between the two groups in terms of demographic data (age, sex), social network, living situation, or number of complications due to hoarding behavior. However, individuals without HD had greater disability and lower functionality than those with HD in our sample.

4.6. Correlation between psychopathology and severity of clutter

We found a significant association between clutter severity and both family history of hoarding and complications due to accumulation. By contrast, there was no significant association between age and clutter severity, similar to previous studies [13,36]. However, in contrast to the study by Ayers et al., we did not find significant association between sex and living alone. In our sample, severity of clutter was associated with excessive acquisition and with greater duration of hoarding behavior.

In non-clinical samples, hoarding severity has been associated with obsessive-compulsive disorder [56], certain personality traits [51,57], and depressive symptoms [58]. In our clinical cohort, psychosocial dysfunction was associated with clutter severity on the GAF scale but not on the WHODAS2.0. Ayers et al. also found an association between general psychosocial dysfunction and severity of hoarding behavior [23]. Although some studies have found that

hoarding severity is associated with increased feelings of hostility in response to social exclusion [39], we did not find any correlation between the CIR and OAS scales.

We believe that the differences between our findings and those of previous studies can be explained by two main factors. First, the mean CIR score in our sample was higher than most other studies. Second, we used clinician-administered measures to assess clutter severity, whereas most other studies have used patient self-report measures. This is relevant given that clinician-administered measures of hoarding are stronger predictors of disability [23].

4.7. Limitations and strengths

The main limitation of this study is related to the strict inclusion criteria for the home visitation program, which was open only to patients who had refused standard care and scored ≥ 4 on the CIR scale, which probably biased the sample towards more severe patients. This limits our ability to generalize these findings. Another limitation is that, due to lack of collaboration from many of the participants, we were unable to administer some instruments (e.g., HRS-I and SI-R), and the diagnosis was made according to DSM-5 criteria while clutter severity was based on CIR scores. However, it is important to keep in mind that lack of awareness of their condition and collaboration is a common characteristic of patients with hoarding behavior, suggesting that these findings are probably applicable to other populations. Despite these limitations, the study has several important strengths, including the large clinical sample comprehensively assessed by means of an objective, *in situ* evaluation of hoarding behavior by experienced psychiatrists.

5. **CONCLUSIONS**

Hoarding behavior is a common but complex problem that may have major personal and socioenvironmental consequences. This condition often goes completely unnoticed in its early stages. In this study, approximately half of the individuals who exhibited hoarding behavior met the diagnostic criteria for HD. A better understanding of hoarding behavior and associated problems in a real-world context could help further the development of protocols to improve detection and management, which may differ according to the underlying disorder, in order to avoid the potentially devastating consequences of this disorder.

Keypoints

- Hoarding behavior often goes unnoticed in mental health and in early stages.
- Complications due to accumulation are very common.
- All subjects included in this study had severe hoarding and multiple complications from hoarding, even those who did not meet diagnostic criteria for HD.
- Alcohol use disorder is often linked to non-HD patients
- Home visitation programs could improve earlier detection of hoarding behavior.

Funding information

This research did not receive any grants from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of Competing Interest

None

REFERENCES

[1] Clark ANG, Mankikar GD. A CLINICAL STUDY OF GROSS NEGLECT These revealed the presence of anaemia and multiple. Lancet 1975:366–8.

[2] Macmillan D, Shaw P. Senile breakdown in standards of personal and environmental cleanliness. BMJ 1966;2:1032–7. https://doi.org/10.1136/bmj.2.5521.1032.

[3] Stevens RS. Self-neglect in the elderly. British Journal of Geriatric Practice 1963;2:88–91.

[4] Samuels JF, Bienvenu OJ, Grados MA, Cullen B, Riddle MA, Liang K-Y, et al. Prevalence and correlates of hoarding behavior in a community-based sample. Behaviour Research and Therapy 2008;46:836–44. https://doi.org/10.1016/j.brat.2008.04.004.

[5] Turna J, Patterson B, Simpson W, Pullia K, Khalesi Z, Grosman Kaplan K, et al. Prevalence of hoarding behaviours and excessive acquisition in users of online classified advertisements. Psychiatry Res 2018;270:194–7. https://doi.org/10.1016/j.psychres.2018.09.022.

[6] Basu A, Goel N, Puvvada S, Jacob T. Prevalence of Hoarding in an Adult Inpatient Population and Its Association With Axis I Diagnoses. American Journal of Geriatric Psychiatry 2019;27:564–8. https://doi.org/10.1016/j.jagp.2018.12.029.

[7] American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. American Psychiatric Association; 2013. https://doi.org/10.1176/appi.books.9780890425596.

[8] Postlethwaite A, Kellett S, Mataix-Cols D. Prevalence of Hoarding Disorder: A systematic review and meta-analysis. J Affect Disord 2019;256:309–16. https://doi.org/10.1016/j.jad.2019.06.004.

[9] Mueller A, Mitchell JE, Crosby RD, Glaesmer H, de Zwaan M. The prevalence of compulsive hoarding and its association with compulsive buying in a German population-based sample. Behaviour Research and Therapy 2009;47:705–9. https://doi.org/10.1016/j.brat.2009.04.005.

[10] Iervolino AC, Ph D, Perroud N, Fullana MA, Guipponi M, Cherkas L, et al. Prevalence and Heritability of Compulsive Hoarding : A Twin Study. American Journal of Psychiatry 2009;166:1156–61.

[11] Zaboski BA, Merritt OA, Schrack AP, Gayle C, Gonzalez M, Guerrero LA, et al. Hoarding: A meta-analysis of age of onset. Depress Anxiety 2019;36:552–64. https://doi.org/10.1002/da.22896.

[12] Dozier ME, Porter B, Ayers CR. Age of onset and progression of hoarding symptoms in older adults with hoarding disorder. Aging Ment Health 2016;20:736–42. https://doi.org/10.1080/13607863.2015.1033684.

[13] Diefenbach GJ, DiMauro J, Frost R, Steketee G, Tolin DF. Characteristics of hoarding in older adults. American Journal of Geriatric Psychiatry 2013;21:1043–7. https://doi.org/10.1016/j.jagp.2013.01.028.

[14] Frost RO, Steketee G, Williams L. Hoarding: A community health problem. Health Soc Care Community 2000;8:229–34. https://doi.org/10.1046/j.1365-2524.2000.00245.x.

[15] Bratiotis C. Community hoarding task forces: a comparative case study of five task forces in the United States. Health Soc Care Community 2013;21:245–53. https://doi.org/10.1111/hsc.12010.

[16] Schou ML, Urfer-Parnas A, Parnas J. The Hoarding Phenomenon in Schizophrenia Spectrum Disorders. Psychopathology 2020;53:111–8. https://doi.org/10.1159/000508453.

[17] Chiu SN, Chong HC, Lau SPF. Exploratory study of hoarding behaviour in Hong Kong. Hong Kong Journal of Psychiatry 2003;13:23-30+34.

[18] Ferreira EA, Paloski LH, Costa DB, Fiametti VS, De Oliveira CR, de Lima Argimon II, et al. Animal Hoarding Disorder: A new psychopathology? Psychiatry Res 2017;258:221–5. https://doi.org/10.1016/j.psychres.2017.08.030.

[19] Snowdon J, Halliday G. A study of severe domestic squalor: 173 cases referred to an old age psychiatry service. Int Psychogeriatr 2011;23:308–14. https://doi.org/10.1017/S1041610210000906.

[20] Davis T, Edsell-Vetter J. Rethinking hoarding intervention MBHPs analysis of the hoarding intervention and tenancy preservation project. Metropolitan Boston Housing Partnership 2016;12:28.

[21] Woody SR, Lenkic P, Bratiotis C, Kysow K, Luu M, Edsell-Vetter J, et al. How well do hoarding research samples represent cases that rise to community attention? Behaviour Research and Therapy 2020;126:103555. https://doi.org/10.1016/j.brat.2020.103555.

[22] Tolin DF, Fitch KE, Frost RO, Steketee G. Family informants' perceptions of insight in compulsive hoarding. Cognit Ther Res 2010;34:69–81. https://doi.org/10.1007/s10608-008-9217-7.

[23] Ayers CR, Ly P, Howard I, Mayes T, Porter B, Iqbal Y. Hoarding severity predicts functional disability in late-life hoarding disorder patients. Int J Geriatr Psychiatry 2014;29:741–6. https://doi.org/10.1002/gps.4057.

[24] Frost RO, Steketee G, Tolin DF, Renaud S. Development and validation of the clutter image rating. J Psychopathol Behav Assess 2008;30:193–203. https://doi.org/10.1007/s10862-007-9068-7.

[25] First MB, Williams J, Karg R, Spitzer R. Structured Clinical Interview for DSM-5, Clinician Version. Arlington, VA: American Psychiatric Association; 2016.

[26] Frost RO, Steketee G, Grisham J. Measurement of compulsive hoarding: Saving inventory-revised. Behaviour Research and Therapy 2004;42:1163–82. https://doi.org/10.1016/j.brat.2003.07.006.

[27] Tolin DF, Frost RO, Steketee G. A brief interview for assessing compulsive hoarding : The Hoarding Rating Scale-Interview. Psychiatry Res 2010;178:147–52. https://doi.org/10.1016/j.psychres.2009.05.001.

[28] Bulbena, A., Pompei, S., Olle, L., Coletas J. Assessment of Severity of Psychiatric Illness. Arch Neurobiol (Madr) 1997;60:69–79.

[29] American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR). vol. 1. Arlington, VA: American Psychiatric Association; 2000. https://doi.org/10.1176/appi.books.9780890423349.

[30] Guy W. ECDEU Assessment Manual for Psychopharmacology. U.S. Dept. Rockville, Md: 1976.

[31] Yudofsky SC, Silver JM, Jackson W, Endicott J, Williams D. The Overt Aggression Scale for the objective rating of verbal and physical aggression. American Journal of Psychiatry 1986;143:35–9. https://doi.org/10.1176/ajp.143.1.35.

[32] Organización Mundial de la Salud. Medición de la Salud y la Discapacidad. 2015.

[33] Luu M, Lauster N, Bratiotis C, Edsell-Vetter J, Woody SR. Squalor in community-referred hoarded homes. J Obsessive Compuls Relat Disord 2018;19:66–71. https://doi.org/10.1016/j.jocrd.2018.08.005.

[34] Ayers CR, Saxena S, Golshan S, Wetherell JL. Age at onset and clinical features of late life compulsive hoarding. Int J Geriatr Psychiatry 2010;25:142–9. https://doi.org/10.1002/gps.2310.

[35] Landau D, Iervolino AC, Pertusa A, Santo S, Singh S, Mataix-Cols D. Stressful life events and material deprivation in hoarding disorder. J Anxiety Disord 2011;25:192–202. https://doi.org/10.1016/j.janxdis.2010.09.002.

[36] Ayers CR, Dozier ME. Predictors of hoarding severity in older adults with hoarding disorder. Int Psychogeriatr 2015;27:1147–56. https://doi.org/10.1017/S1041610214001677.

[37] Roane DM, Landers A, Sherratt J, Wilson GS. Hoarding in the elderly: A critical review of the recent literature. Int Psychogeriatr 2017;29:1077–84. https://doi.org/10.1017/S1041610216002465.

[38] Pittman JOE, Davidson EJ, Dozier ME, Blanco BH, Baer KA, Twamley EW, et al. Implementation and evaluation of a community-based treatment for late-life hoarding. Int Psychogeriatr 2020:1–10. https://doi.org/10.1017/S1041610220000241.

[39] Mathes BM, Kennedy GA, Cougle JR, Schmidt NB. An examination of the relationship between hoarding symptoms and hostility. J Psychiatr Res 2019;111:121–7. https://doi.org/10.1016/j.jpsychires.2019.01.025.

[40] Ayers CR, Wetherell JL, Golshan S, Saxena S. Cognitive-behavioral therapy for geriatric compulsive hoarding. Behaviour Research and Therapy 2011;49:689–94. https://doi.org/10.1016/j.brat.2011.07.002.

[41] Steketee G, Schmalisch CS, Dierberger A, DeNobel D, Frost RO. Symptoms and history of hoarding in older adults. J Obsessive Compuls Relat Disord 2012;1:1–7. https://doi.org/10.1016/j.jocrd.2011.10.001.

[42] Rodriguez CI, Herman D, Alcon J, Chen S, Tannen A, Essock S, et al. Prevalence of hoarding disorder in individuals at potential risk of eviction in New York City: A pilot study. Journal of Nervous and Mental Disease 2012;200:91–4. https://doi.org/10.1097/NMD.0b013e31823f678b.

[43] Darke S, Duflou J. Characteristics, circumstances and pathology of sudden or unnatural deaths of cases with evidence of pathological hoarding. J Forensic Leg Med 2017;45:36–40. https://doi.org/10.1016/j.jflm.2016.11.004.

[44] Snowdon J, Shah A, Halliday G. Severe domestic squalor: A review. Int Psychogeriatr 2007;19:37–51. https://doi.org/10.1017/S1041610206004236.

[45] Pertusa A, Frost RO, Fullana MA, Samuels J, Steketee G, Tolin D, et al. Refining the diagnostic boundaries of compulsive hoarding: A critical review. Clin Psychol Rev 2010;30:371–86. https://doi.org/10.1016/j.cpr.2010.01.007.

[46] Cipriani G, Lucetti C, Vedovello M, Nuti A. Diogenes syndrome in patients suffering from dementia. Dialogues Clin Neurosci 2012;14:455–60.

[47] Davidson EJ, Dozier ME, Pittman JOE, Mayes TL, Blanco BH, Gault JD, et al. Recent Advances in Research on Hoarding. Curr Psychiatry Rep 2019;21. https://doi.org/10.1007/s11920-019-1078-0.

[48] Dyer CB, Goodwin JS, Pickens-Pace S, Burnett J, Kelly PA. Self-neglect among the elderly: A model based on more than 500 patients seen by a geriatric medicine team. Am J Public Health 2007;97:1671–6. https://doi.org/10.2105/AJPH.2006.097113.

[49] Stein DJ, J EM, Potocnik F. Hoarding symptoms in patients on a geriatric psychiatry inpatient unit. South African Medical Journal 1997;87:1138–40.

[50] Wustmann T, Brieger P. [A study of persons living in neglect, filth and squalor or who have a tendency to hoard]. Das Gesundheitswesen 2005;67:361–8. https://doi.org/10.1055/s-2005-858223.

[51] Dozier ME, Davidson EJ, Pittman JOE, Ayers CR. Personality traits in adults with hoarding disorder. J Affect Disord 2020;276:191–6. https://doi.org/10.1016/j.jad.2020.07.033.

[52] Gleason A, Lewis M, Lee SM, Macfarlane S. A preliminary investigation of domestic squalor in people with a history of alcohol misuse: Neuropsychological profile and hoarding behavior - An opportunistic observational study. Int Psychogeriatr 2015;27:1913–8. https://doi.org/10.1017/S1041610215000897.

[53] Ridley NJ, Draper B, Withall A. Alcohol-related dementia: An update of the evidence. Alzheimers Res Ther 2013;5:1–8. https://doi.org/10.1186/alzrt157.

[54] Mataix-Cols D, Pertusa A, Snowdon J. Neuropsychological and neural correlates of hoarding: a practice-friendly review. J Clin Psychol 2011;67:467–76. https://doi.org/10.1002/jclp.20791.

[55] Snowdon J. Accumulating too much stuff: what is hoarding and what is not? Australasian Psychiatry 2015;23:354–7. https://doi.org/10.1177/1039856215588228.

[56] Grisham JR, Frost RO, Steketee G, Kim H-J, Tarkoff A, Hood S. Formation of attachment to possessions in compulsive hoarding. J Anxiety Disord 2009;23:357–61. https://doi.org/10.1016/j.janxdis.2008.12.006.

[57] Ayers CR, Castriotta N, Dozier ME, Espejo EP, Porter B. Behavioral and experiential avoidance in patients with hoarding disorder. J Behav Ther Exp Psychiatry 2014;45:408–14. https://doi.org/10.1016/j.jbtep.2014.04.005.

[58] Raines AM, Short NA, Fuller KL, Allan NP, Oglesby ME, Schmidt NB. Hoarding and depression: The mediating role of perceived burdensomeness. J Psychiatr Res 2016;83:24–8. https://doi.org/10.1016/j.jpsychires.2016.08.003.

Table 1. General characteristics of the sample overall and according to diagnosis: hoarding disorder vs non-hoarding disorder

	Non-HD (N=126)		HD (N=117)		Total (N=243)		p	Effect Size**
Sociodemographic variables	**N**	**%***	**N**	**%**	**N**	**%**		
Sex								
Male	61	48.4	51	43.6	112	46.1	0.451	0.05
Female	65	51.6	66	56.4	131	53.9		
Age *(mean - SD)*	62.32	14.40	64.32	13.39	63.30	14.0	0.265	0.14
Living situation								
Alone	73	57.9	59	50.4	132	54.3	0.240	0.08
Accompanied	53	42.1	58	49.6	107	45.7		
Social network								
Null	54	47.8	45	42.5	99	40.7	0.711	0.08
Limited	48	42.5	53	50.0	101	41.6		
Normal	11	9.7	8	7.5	19	7.8		
Unknown	13	10.3	11	9.4	24	9.9		
Education*								
None	3	2.4	2	1.8	5	2.1	0.809	0.09
Primary	58	47.6	54	48.2	113	46.5		
Secondary	49	39.5	43	38.4	92	37.9		
University	13	10.5	13	11.6	26	10.7		
Unknown	2	1.6	5	4.3	7	2.9		
Employment status*								
Not working (any reason)	40	31.7	35	29.9	75	30.9	0.656	0.14
Student	1	0.8	0	0.0	1	0.4		
Actively employed	5	4.0	9	7.7	14	5.8		
Sick leave	3	2.4	1	0.9	4	1.7		
Unemployed	6	4.8	3	2.6	9	3.7		
Retired	42	33.3	44	37.6	86	35.4		
Pensioner	29	23.0	25	21.4	54	22.2		
Psychiatric History								
No	46	36.5	58	49.6	104	42.8	0.051	0.13
Yes	80	63.5	59	50.4	139	57.2		
Previous Diagnosis*								
Cognitive disorder	3	2.3	1	0.9	4	1.7	0.004	0.33
Substance use disorder	24	19.0	6	5.1	30	12.4		
Psychotic disorder	13	10.3	10	8.5	23	9.5		
Affective disorder	10	7.9	8	6.8	18	7.4		

Anxiety disorder	10	7.9	4	3.4	14	5.8		
Adaptive disorder	3	2.4	7	6.0	10	4.1		
Personality disorder	8	6.3	6	5.1	14	5.8		
Obsessive compulsive disorder	4	3.2	2	1.7	6	2.5		
HD	0	0.0	6	5.1	6	2.5		
Others	5	4.0	9	7.7	14	5.8		
None	46	36.5	58	49.6	104	42.8		
Previous hospital admission								
No	106	87.6	102	91.9	208	85.6	0.513	0.07
Yes	15	12.4	9	8.1	24	9.9		
Unknown	5	4.0	6	5.1	11	4.5		
Family psychiatric history								
No	62	49.2	54	46.2	116	47.7	0.697	0.06
Yes	42	33.3	45	38.5	87	35.8		
Unknown	22	17.5	18	15.4	40	16.5		
GAF *(mean - SD)*	38.36	13.65	42.79	15.30	40.53	14.62	0.021	0.30
SPI *(mean - SD)*	15.14	4.61	13.68	4.73	14.43	4.71	0.018	-0.31
CGI-S *(mean - SD)*	4.89	1.08	4.68	1.25	4.79	1.16	0.182	-0.18
OAS *(mean - SD)*	5.18	1.73	5.03	1.40	5.10	1.58	0.467	-0.10
WHODAS2.0 *(mean - SD)*	37.37	7.33	32.90	8.85	35.19	8.39	<0.001	-0.53

Abbreviations: HD (Hoarding disorder), GAF (Global Assessment of Functioning scale), SPI (Severity of Psychiatric Illness scale), CGI-S (Clinical Global Impression - Severity Scale), OAS (Overt Aggression Scale), WHODAS2.0 (World Health Organization Disability Assessment Schedule 2.0).

** Fisher's exact test, ** Cohen's d for continuous variables and Cramér's V for categorical variables*

Table 2. Main diagnoses (N=243).

	N	%
Hoarding disorder	117	48.1
Cognitive impairment	39	16.0
Substance use disorder	19	7.8
Alcohol use disorder	19	7.8
Psychotic disorder	25	10.3
Affective disorder	5	2.1
Anxiety disorder	2	0.8
Personality disorder	8	3.3
Schizotypal	4	1.6
Paranoid	1	0.4
Narcissistic	1	0.4
Obsessive	1	0.4
Others	1	0.4
Autistic spectrum disorder	1	0.4
Intellectual disability	6	2.5
Obsessive compulsive disorder	9	3.7
None	12	4.9

Table 3. Prevalence of comorbid mental disorders associated with the main diagnosis (N=115).

	Non-HD (N=44)		HD (N=71)		Total	
	N	**%**	**N**	**%**	**N**	**%**
Cognitive impairment	3	6.8	10	14.1	13	11.3
Substance use disorder	29	65.9	19	26.8	48	41.7
Alcohol	27	61.4	15	21.1	42	36.5
Cannabis	1	2.3	4	5.6	5	4.3
Cocaine	1	2.3	0	0.0	1	0.9
Psychotic disorder	0	0.0	14	20.9	14	12.2
Affective disorder	1	2.3	3	4.5	4	3.5
Personality disorder	10	22.7	15	22.4	25	21.7
Schizotypal	10	22.7	6	5.1	16	13.9
Paranoid	0	0.0	3	2.6	3	2.6
Schizoid	0	0.0	2	1.7	2	1.7
Borderline	0	0.0	1	0.9	1	0.9
Obsessive	0	0.0	3	2.6	3	2.6
Autistic spectrum disorder	1	2.3	3	4.5	4	3.5
Intellectual disability	0	0.0	2	3.0	2	1.7
Obsessive compulsive disorder	0	0.0	2	3.0	2	1.7
Other diagnosis	0	0.0	4	5.6	4	3.4

Note: N = 115 represents 47.3% of the sample that had a co-morbid mental disorder in addition to the main diagnosis.

Abbreviations: HD (Hoarding disorder).

Table 4. Hoarding characteristics overall and according to diagnosis: hoarding disorder vs non-hoarding disorder (N=243)

	Non-HD (N=126)		HD (N=117)		Total (N=243)		p	Effect Size*
	N	%	N	%	N	%		
Person/entity detecting the hoarding[a]								
Family	42	33.3	47	40.2	89	36.6	0.252	0.17
Neighbors	26	20.6	33	28.2	59	24.3		
Social services	37	29.4	25	21.4	62	25.5		
Primary care	9	7.1	6	5.1	15	6.2		
Mental health center	7	5.6	2	1.7	9	3.7		
Others	5	4.0	4	3.4	9	3.7		
Referring person/entity[a]								
Social services	69	54.8	63	53.8	132	54.3	0.553	0.19
Police	1	0.8	1	0,9	2	0.8		
Courts	1	0.8	1	0.9	2	0.8		
Outpatient treatment center	11	8.7	8	6.8	19	7.8		
Outpatient addiction treatment center	1	0.8	1	0.9	2	0.8		
Psychiatric emergencies	4	3.2	2	1.7	6	2.5		
Primary care	23	18.3	24	20.5	47	19.3		
Other	8	6.3	4	3.4	12	4.9		
Home treatment	2	1.6	1	0.9	3	1.2		
Psychiatric hospitalization	2	1.6	0	0.0	2	0.8		
Family	4	3.2	12	10.3	16	6.6		
Reason for consultation[a]								
Hoarding behavior	111	88.1	111	94.9	222	91.4	0.484	0.14
Aggressiveness	3	2.4	1	0.9	4	1.7		
Psychotic symptoms	7	5.6	3	2.6	10	4.1		
Depression	1	0.8	0	0.0	1	0.4		
Isolation	3	2.4	2	1.7	5	2.1		
Alcohol consumption	1	0.8	0	0.0	1	0.4		
Family history of hoarding[b]								
No	66	52.4	33	28.2	99	40.7	<0.001	0.31
Yes	6	4.8	25	21.4	31	12.8		
Unknown	54	42.9	59	50.4	113	46.5		
Excessive acquisition[b]								
No	78	61.9	28	23.9	106	43.6	<0.001	0.38

Yes	48	38.1	89	76.1	137	56.4		
Insight[b]								
No	67	53.2	48	41.0	115	47.3	0.058	0.12
Yes	59	46.8	69	59.0	128	52.7		
Duration of hoarding, years *(median – IQR)*[c]	10	6.75	15	15	10.00	15	<0.001	0.82
Previous cleanout[b]								
No	113	89.7	96	82.1	209	86.0	0.087	0.11
Yes	13	10.3	21	17.9	34	14.0		
Number of Previous Cleanout *(mean – SD)*[c]	0.12	0.37	0.35	1.06	0.23	0.78	0.023	0.29
Number of complications *(mean –SD)*[c]	1.90	0.78	1.71	0.821	1.81	0.80	0.069	-0.23
CIR Kitchen *(mean – SD)*[c]	4.59	1.64	5.59	2.07	5.07	1.92	<0.001	0.52
CIR Bedroom *(mean – SD)*[c]	5.46	1.84	7.10	1.79	6.25	1.99	<0.001	0.82
CIR Living room *(mean – SD)*[c]	5.06	1.69	6.19	1.90	5.60	1.88	<0.001	0.61
CIR Total *(mean – SD)*[c]	5.04	1.47	6.30	1.65	5.65	1.68	<0.001	0.76

Abbreviations: HD (Hoarding disorder), CIR (Clutter Image Rating Scale), SD (Standard Deviation), IQR (Inter-quartile Range)

[a] Fisher's exact test, [b] Chi-square test, [c] Student's t-test.

** Cohen's d for continuous variables and Cramér's V for categorical variables.*

Table 5. Complications due to accumulation overall and by diagnosis (N=243)

	Non-HD (N=126)		HD (N=117)		Total (N=243)		
	N	**%**	**N**	**%**	**N**	**%**	**p**
Problems with neighbors[a]	95	75.4	87	74.4	182	74.9	0.852
Family[a]	43	34.1	39	33.3	82	33.7	0.896
Home transfer[a]	35	27.8	23	19.7	58	23.9	0.080
Fall[a]	23	18.3	20	17.1	43	17.7	0.813
Pests in building[a]	16	12.7	7	6.0	23	9.5	0.074
Medical complications[a]	6	4.8	10	8.5	16	6.6	0.235
Family member leaves home[b]	5	4.0	5	4.3	10	4.1	>.999
Total disability[b]	4	3.2	1	0.9	5	2.1	0.372
Fire[b]	3	2.4	1	0.9	4	1.6	0.623
Personal uneasiness[b]	2	1.6	2	1.7	4	1.6	>.999
Firefighter intervention[b]	2	1.6	2	1.7	4	1.6	>.999
Risk of collapse[b]	2	1.6	1	0.9	3	1.2	>.999
Other[b]	1	0.8	2	1.7	3	1.2	0.610

Abbreviations: HD (Hoarding disorder)
[a]Chi-square test, [b]Fisher's exact test