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Recent Advances in Research on Hoarding

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Abstract

Purpose of Review—The purpose of the following paper is to review recent literature trends and findings in hoarding disorder (HD). Our goal is to highlight recent research on etiology, associated features, and empirically based treatments.

Recent Findings—Recent literature has added support for cognitive differences as a risk factor for HD; however, there is evidence that individuals with HD may overestimate their level of cognitive impairment. Several associated features have been highlighted in recent studies, including emotion regulation, intolerance of uncertainty and distress intolerance, and attachment. Finally, several psychotherapeutic treatments for hoarding have been recently validated, including group-based therapy and treatments using the cognitive-behavioral model.

Summary—Although recent research demonstrates that hoarding can be effectively treated with available psychotherapeutic modalities, the effectiveness of current treatments is not as robust as that for other psychiatric disorders and more work is needed in treatment precision.

Keywords

Hoarding disorder; Cognitive functioning; Distress intolerance; Attachment

Introduction

Hoarding disorder (HD) is characterized by persistent difficulty discarding items regardless of value, urges to save items and distress associated with discarding, and the accumulation of possessions which compromise use of the home [1]. In the six years since hoarding disorder was formally separated from obsessive-compulsive disorder (OCD) [1], research on HD has increased exponentially. The purpose of the following paper is to review recent literature trends and findings in HD. In particular, our goal is to highlight the recent research on cultural considerations of hoarding and hoarding across the lifespan, etiology, associated clinical features, and empirically based treatments. Finally, we conclude with a discussion of recent research themes.

Overview of Hoarding Disorder

The core features of HD include difficulties discarding possessions, intense urges to save items, and subsequent hazardous clutter [1]. Individuals with HD vary in their level of excessive acquisition of items as well as their level of insight into their symptoms [1]. Hoarding behaviors are theorized to stem from unusual beliefs about and strong emotional attachment to items, executive functioning deficits, behavioral avoidance, and early developmental factors [2, 3]. The overall prevalence of HD is estimated at around 2% and increases by 20% with each 5 years of age [4•]. Among adults over 70, the prevalence of HD is estimated at 6% [4•]. Hoarding onsets in early adulthood has a chronic and progressive course, and is associated with numerous adverse outcomes, including increased mortality [5-7]. Older adults with HD commonly suffer from self-neglect and are at risk for food contamination, malnutrition, medication mismanagement, falls, and eviction from their homes [8]. Homes of individuals with HD also pose problems for community members due to infestations, health code violations, fire risk, and expenses incurred by local support programs and cleanouts [9]. Approximately two-thirds of individuals with HD meet criteria for a comorbid mood or anxiety disorder, most commonly major depressive disorder, generalized anxiety disorder, and social anxiety disorder [10].

Special Populations

Cultural Considerations

Growing evidence suggests mental health disorders vary in prevalence, phenomenology, sensitivity to assessment, and treatment responsiveness across ethnicities and cultures [11, 12]. Inopportunely, in the field of HD, most studies have used samples from the USA and Western Europe, resulting in predominantly Caucasian populations [13]. These studies demonstrate an over-reliance on samples including individuals with OCD given the traditional conceptualization of compulsive hoarding [13]. Overall, recent findings support the DSM-5 conceptualization of HD as distinct from other disorders across culture and ethnicity [12, 14]. The importance of this distinction is illustrated by the Yale Brown Obsessive Compulsive Scale (Y-BOCS), which contains only two items regarding hoarding behavior, as it has consistently returned higher prevalence rates of hoarding than hoarding specific measures [13]. Varying assessment measures for HD symptoms show inconsistent validity and confound the generalization of findings [13]. These shortcomings are regularly

identified in the literature and recent studies have sought to address HD assessment as it presents across diverse populations.

Subramaniam and colleagues [15] administered a single hoarding-related item to an adult Asian population and found a lifetime prevalence of 2% and prevalence of 22.6% in individuals with OCD. This is within the range of prevalence rates for HD in Western populations, which has been estimated to be between 1.5%, based on a British sample assessed via diagnostic interview [16], and 6% based on an Italian sample assessed with the Savings Inventory–Revised (SI-R) [17]. Ong and colleagues [18] found over 30% of a sample of 500 outpatient psychiatric subjects from Singapore endorsed significant hoarding behaviors on the SI-R and 13.8% met DSM-5 criteria for the disorder; the high rate is likely due to the clinical sample. The SI-R has been successfully translated to Spanish [19], Brazilian Portuguese [20], and Turkish [21]. Its psychometric properties have also been studied in Italian [22] and Mandarin [12] versions of the measure. Further research on HD across cultures is needed to draw conclusions based on prevalence.

Hoarding in Children

Problematic hoarding behavior has been evident in children as young as six years old [23] and identified as a marker of poor prognosis [24]. Limited research in HD and youth suggest prevalence rates fall between 2 and 3.7% [25], though Woerner et al. [26] found a prevalence rate of 7.3% for hoarding behavior in US college students. Comorbidity is a confounding factor in the phenomenology of hoarding behavior in children [23, 24, 26-28]. Morris and colleagues [23] found support for HD as a distinct diagnosis in youth, which indicates the need for further development of comprehensive assessment addressing hoarding behavior in this group.

Hoarding in Older Adults

Hoarding disorder increases in prevalence and severity with age [4•, 29, 30]. Specifically, prevalence rates in older adult samples vary between 6.2 and 7%, indicating increased levels as compared to younger adults [4•, 30]. In a sample of 82 older adults Dozier et al. [29] found the highest level of symptom severity in the 50–60-year age range utilizing a retrospective self-report study design. In a sample of 15,194 individuals from the Netherlands, self-reported severity peaked between age 60 and over 70 [4•]. Both studies demonstrate a linear increase in prevalence over age and replicate earlier findings [4•, 29]. Physical health decline and cognitive impairment in older adults coincide with increased HD severity [30]. Indeed, some evidence suggests that both cognitive deficits and experiences of loss over the lifespan may exacerbate difficulties with discarding [4•].

Etiology

Cognitive Functioning

Recent evidence suggests that those with HD utilize different strategies when completing procedural learning and memory recall tasks [31], and that differences in strategy may also be linked with risk evaluation [32••]. During a gambling task, hoarding participants have been observed to use a deliberative, rule-bound strategy to maximize potential value,

irrespective of risk [32••]. Compared to nonclinical individuals, HD participants have a tendency to neglect to alter their strategy even when receiving feedback throughout the task. Comparatively, nonclinical participants are more likely to experiment with different strategies until they develop a sense for the best decision based on relative risk/reward ratios.

Patients with HD also exhibit a significant reduction in error-related negativity (ERN), an electrophysiological reaction to performance errors, in comparison with OCD and nonclinical participants [33]. In contrast, error-related negativity is elevated among OCD patients, underscoring neurobiological differences between OCD and HD [33, 34]. Building on these findings, a subsequent investigation found that HD participants had significantly lower skin conductance during error trials on a Stop-Change task than did nonclinical participants [35••]. HD individuals also made more errors than comparison subjects and were less accurate in estimating how many errors were committed [35••]. Before and after the task, HD participants reported heightened negative and self-conscious emotions and throughout they reported feeling significantly more emotions when committing an error [35••]. However, contrary to self-reported emotional experience, facial response data demonstrated that HD participants expressed fewer self-conscious emotions than comparison participants during error trials [35••]. Taken together, these findings support error-processing deficits exist in HD. Discord between reported and expressed emotional states may explain why hoarding patients recount intense emotions that are not always born out during experimental tasks [35••, 36].

Clinically, those with HD perceive themselves to be significantly impaired with respect to their ability to attend to and remember information and inhibit prepotent responses. Interestingly, these perceived deficits do not always manifest during neuropsychological testing [37]. To clarify if this discrepancy is unique to those with hoarding symptoms, Moshier and colleagues [38] compared individuals diagnosed with HD to individuals diagnosed with OCD with and without elevated hoarding symptoms on self-reported and neuropsychological measures of attention, memory, and inhibition. Results evidenced impairment among the OCD-hoarding group with respect to delayed verbal memory, though performance on other tasks was intact [38]. Relative to the OCD group, those in the HD and OCD-hoarding groups had significantly greater discord between self-reported and actual memory performance, though groups did not differ significantly in regard to discord between reported and actual performance on attention and inhibition tasks [38].

Perceived memory deficits have important implications for saving in HD, as demonstrated by a mediation model put forth by Hallion et al. [39]. Specifically, the association between inattention and increased saving of possessions was mediated by poor memory confidence, which then predicted greater clutter. Thus, despite potentially intact capabilities, poor confidence in memory appears to fuel greater saving and subsequent functional impairment [39]. Tolin and colleagues [40] found that hoarding participants reported significantly greater impairment in measures of memory and attention and degree of perceived impairment was significantly and positively associated with saving items to avoid forgetting. Overall, recent research suggests that challenging perceptions of impaired memory functioning among patients with HD may reduce saving tendencies and burdensome clutter.

Neurobiology

Neurobiological functioning in HD represents a relatively new area of inquiry. Yamada and colleagues [41] examined structural differences in prefrontal grey matter between HD, OCD, and nonclinical participants. They found that HD individuals had significantly greater grey matter relative to both comparison groups in the right frontal pole—the most anterior location of the prefrontal cortex [41]. There was no association between grey matter volume and clinical variables, including age of HD onset and hoarding symptom severity [41]. No structural differences were found between OCD and nonclinical participants [41]. Neuroanatomical differences in HD may be related to its underlying pathophysiology; however, this cannot be established without additional research.

Hough and colleagues [42] compared regional brain activation during the administration of a Go/No-Go and Stroop task in participants with HD, OCD, and nonclinical comparison subjects using a whole brain analysis of fMRI data. During successful conflict processing (response inhibition on the Go/No-Go task), HD participants had significantly greater activity in the right dorsolateral prefrontal cortex (DLPFC) and anterior cingulate cortex (ACC) in comparison with nonclinical participants [42]. These brain regions are a part of the salience network which is involved in the valuation of rewards and task relevance [43]. Relative to OCD participants, significantly greater right DLPFC was observed for individuals with HD [42]. During error trials, HD participants evidenced increased activation in the DLPFC compared to the other groups, though this difference was not significant [42]. This finding is in contrast with Mathews et al. 's results [33], though the authors suggest that ERN may represent a more sensitive measure of error monitoring. Overall, unique activation patterns involved with deficits in valuation and in visual processing were observed for HD individuals [42].

Genetic Factors

Three recent studies have investigated genetic factors in the etiology of HD [44–46]. A heritability study in twins [44] indicated that genetic contributions to phenotypic presentation of hoarding symptoms and the influence of environmental context varies across adolescence [44]. In an adult sample, 6.7% of individuals met clinical criteria for HD and genetic factors accounted for 36% of the variance in hoarding [45]. Exploring heritability in genotypically similar psychiatric disorders (tic disorders, obsessive-compulsive disorder), Zilhão et al. [46] identified a genetic correlation of 41% between hoarding and obsessive-compulsive symptoms, and 35% between hoarding and tics [46]. This research supports previous work suggesting that hoarding symptoms are prevalent and heritable [47, 48] and may manifest differently depending on an individual's environmental and developmental context [44-46].

Associated Features

Emotion Regulation

The relationship between emotion regulation and hoarding has been examined both qualitatively [49] and quantitatively [50•, 51, 52] in the recent literature. Taylor and colleagues [49] interviewed 11 adults (aged 39–68) diagnosed with HD. Specifically, they

asked the participants about their understanding and experience of emotions, their regulation of emotions, and the relationship between their hoarding behaviors and emotion regulation [49]. The common themes that emerged suggested that individuals with HD may have difficulty identifying emotions, hoarding is a source of both positive and negative emotions, and avoidance and acquiring are often used to regulate emotions [49].

Emotion regulation may partially mediate the relationship between excessive acquisition and both alcohol use and binge eating [51, 52]. Two studies by Raines and colleagues [51, 52] demonstrated the shared associations among hoarding symptoms, alcohol use and binge eating, and emotion regulation at a given time point. Excessive acquisition, binge eating, and alcohol use may all be manifestations of difficulties in emotion regulation. Further longitudinal studies are needed to determine the causality of the associations among excessive acquisition and other maladaptive coping techniques.

Crone and Norberg [50•] examined the effect of environment (cluttered versus tidy) and emotion (induced fear versus neutral) on discarding in 143 individuals who reported at least a subclinical level of difficulty discarding. Fear was induced by showing participants a film clip. Following the film clip, while in either a cluttered or a tidy room, participants were asked to decide whether to keep or discard 15 items brought from home, ranging in personal value from mild to high value. Feeling fearful and being in a cluttered room were both associated with an increased number of discarded items. However, emotional sensitivity and emotional persistence were both significant moderators of the effect of a cluttered room on discarding behavior, such that for individuals with low emotional sensitivity or low emotional persistence, the tidy room was more likely to elicit higher levels of discarding than the cluttered room [50•]. For participants with high emotional sensitivity or high emotional persistence, level of clutter did not affect discarding behavior. There was also a three-way interaction between emotional intensity, induced emotional state, and clutter context, such that participants with low emotional intensity who had watched a clip of a horror movie discarded more items in the cluttered room and participants with high emotional intensity, regardless of whether they saw the horror clip, discarded fewer items in the cluttered room [50•]. In sum, where sorting takes place matters and the best context for sorting is not uniform. Although sorting in a cluttered room (such as a patient's home) may elicit more discarding behaviors in general, patients with low emotional sensitivity and persistence and/or high emotional intensity may benefit from doing the majority of the sorting at a clinician's (non-cluttered) office.

Intolerance of Uncertainty and Distress Intolerance

Hoarding has been linked both with intolerance of uncertainty (IU) and with distress intolerance in psychiatric [53] and hoarding samples [54, 55]. Within individuals with HD, the association between IU and hoarding severity remains significant even when controlling for symptoms of anxiety and depression [55]. Individuals with HD demonstrate elevated levels of intolerance of uncertainty compared to nonclinical controls and similar levels of IU compared to patients with generalized anxiety disorder and obsessive-compulsive disorder [56]. Higher levels of intolerance of uncertainty have also been associated with decreased response to treatment for hoarding [55].

In a psychiatric (but mostly non-hoarding sample), the association between hoarding symptoms and distress tolerance was no longer significant when controlling for intolerance of uncertainty [53]; however, the opposite was true in a sample of individuals diagnosed with HD: intolerance of uncertainty was no longer a significant predictor of hoarding symptom severity when controlling for distress intolerance [54]. The effect of distress intolerance on hoarding symptoms may also be partially mediated by hoarding-related cognitions, and particularly by cognitions related to emotional attachment to objects [54].

Attachment

Recent research has emphasized the association between hoarding and attachment, both in nonclinical [57-59] and hoarding [60] samples. Danet and Secouet [59] found that hoarding symptoms were associated with increased anxious and fearful attachment and decreased secure attachment in an online sample of French women. However, Crone and colleagues [58] found no association between anxious attachment and hoarding symptoms in an American sample of individuals selected for increased difficulty discarding, despite finding significant correlations between anxious attachment and distress intolerance, emotional reactivity, and indecisiveness. A similar pattern was found in individuals with subclinical to clinical levels of excessive acquisition; anxious attachment was associated with distress intolerance and anthropomorphism (i.e., attributing human characteristics to inanimate objects), but not with hoarding symptoms [61]. However, anthropomorphism was significantly correlated with hoarding symptoms [61]. Further research in a nonclinical sample suggests that the association between anthropomorphism and attachment may be mediated by increases in instrumental and sentimental values attributed to objects [62].

Several measures have recently been constructed with the explicit purpose of investigating issues of attachment in HD [57, 60]. Burgess and colleagues [57] created a set of 15 questions which can be used to examine anthropomorphism of a target technology object, "comfort" object, and/or pet. The measure was validated in a majority female (96%) nonclinical undergraduate sample. Within this sample, anthropomorphism was significantly correlated with both hoarding symptoms and with loneliness [57]. Two significant and positive interactions were noted in the results: anthropomorphism of comfort objects had an increased effect on acquiring behaviors for individuals who were more likely to endorse saving items due to concerns about memory; and anthropomorphism of comfort objects had an increased effect on reported household clutter at higher rates of loneliness [57].

Dozier and colleagues [60] adapted a one-item visual measure of interpersonal connectedness to assess the degree to which individuals with HD feel interconnected with their possessions. Ratings of interconnectedness with items were significantly correlated with hoarding symptoms, but not with symptoms of anxiety and depression, in a sample of treatment-seeking adults with HD [60].

Treatment

Relative to other psychiatric disorders, treatment research for HD is in its early stages. This may be due to the fact that treatment seeking in those with HD is low [63]. Of 664 callers to the Boston University Hoarding Research Team between 2008 and 2011, 53.6% were calling

for general information and only 24.8% were seeking treatment [63]. An investigation by Rodriguez and colleagues [64] found that individuals with HD considered only individual cognitive-behavioral therapy (CBT), professional organizing, and self-help to be "acceptable" treatments for HD among the 11 HD treatments offered. Likewise, health/ social services professionals in primary mental health care reported a lack of HD clinical management and training as significant barriers to service delivery [65•]. These findings indicate that there is a significant need for research in treatment engagement and implementation across clinical settings.

Psychotherapy

Cognitive-behavioral therapy (CBT) approaches target information processing difficulties, maladaptive beliefs, emotional attachment to objects, and related avoidance [56, 66]. In a recent systematic review of CBT for HD, Williams and Viscusi [67••] observed that across studies, participants did not achieve full remission of HD symptoms, had high attrition rates, and had low motivation for treatment. Early treatment trials of HD had several shared methodological issues, including enrolling racially and ethnically non-diverse OCD individuals, not utilizing a diagnostic measure of HD or consistent outcome measures, and lack of follow-up post-treatment [67••]. Importantly, individuals with HD do not respond as robustly to traditional CBT modalities in comparison with other clinical groups [67••]. These issues underscore the need for refinement of extant HD interventions and their evaluation in more methodologically rigorous treatment trials.

Group therapy is often employed as a cost-effective alternative to individual CBT for HD. A recent systematic review and meta-analysis evaluating group interventions for HD reported that clinically reliable change across group treatments ranged from 21 to 68% [68], suggesting that group treatment is efficacious, yet the rate of clinically significant improvement is low [68]. Examples of recent group treatments include peer-led group bibliotherapy [69], a community-based CBT group [70], a CBT group targeting self-identity [71], and groups utilizing contingency management [72] and between-session internet support [73]. Some recent treatments have also sought to ameliorate cognitive impairments in HD with compensatory skills [74] and attention retraining [75].

Pharmacotherapy

In addition to psychotherapeutic approaches, studies of pharmacotherapy for HD suggest that serotonin reuptake inhibitors (SSRIs) [76] and serotonin-norepinephrine reuptake inhibitors (SRNIs) [77] effectively reduce hoarding symptoms and are currently the most commonly used medications [78]. Preliminary preclinical and clinical trials also indicate the use of stimulant medications, typically employed in attention-deficit/hyperactivity disorder, for individuals with HD [78, 79].

Conclusions

Research on HD has grown in recent years. Much of the research has focused on the association between hoarding and cognitive functioning, particularly as it relates to cognitive *dysfunction* as a potential etiological factor in the development and maintenance of

hoarding. However, there continue to be many unanswered questions about the contribution of specific cognitive deficits on hoarding psychopathology. Clinically, indecisiveness is often evident among HD patients during sorting and discarding exercises and patients often cite memory problems as a reason to save items (e.g., to serve as informational cues). Clarifying categorization deficits can help clinicians and researchers understand why those with HD struggle to store qualitatively similar items together and to make sense of their cluttered, hectic living spaces. There appears to be findings in executive functioning; however, without replication in clinical samples, researchers struggle to pinpoint real-life implications for treatment. It may be that executive functioning deficits are heterogeneous, and that a more personalized approach may be required during intervention.

Another common theme throughout recent literature is the global lack of insight in many hoarding patients, including with regard to aspects of cognition, such as memory [39]. Hoarding patients may be less aware of their emotional experience than other individuals [35••]. Intense emotions reported by HD individuals during discarding may be more reflective of perceived distress intolerance than actual difficulties in regulating physiology [36]. Thus, their misperceptions of emotions may impact treatment response.

Over the past several years, the proliferation of research on evidence-based interventions for HD has allowed for the publication of several meta-analyses and systematic reviews on the subject [66, 67••, 68]. Unfortunately, the news is not uniformly positive; although hoarding can be effectively treated with available psychotherapeutic modalities, the effectiveness of current treatments is not as robust as that for other psychiatric disorders [66, 67••, 68]. Some researchers have started to augment traditional CBT treatments with skills training to address cognitive deficits which may be treatment-interfering [74, 75], but it is not enough. Unfortunately, the majority of current research on this topic has been done in nonclinical samples [57-59], which limits the generalizability of the findings. This body of research is further disadvantaged due methodological design issues such as lack of robust randomized controlled trials.

Ultimately, more work is needed in treatment precision. Recent research suggests that although the context of treatment (cluttered vs. not cluttered) may have a substantial impact on treatment efficacy, additional patient factors (e.g., emotional sensitivity, executive functioning, and persistence) need to be considered when determining the ideal treatment setting for an individual patient [58]. Hoarding may not be a one-treatment-fits-all kind of disorder and future research needs to focus on not only which treatments work but also on which treatments work *for whom*.

Finally, access to evidence-based treatment remains a major concern. Despite the relatively high prevalence rate of hoarding [16, 47], communities continue to struggle with managing HD from a non-mental health perspective. This highlights the need for evidence-based multidisciplinary approaches to the treatment of HD.

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