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The Role of Intrusive Imagery in Hoarding Disorder

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Abstract

Despite the incidence of trauma in the histories of people with Hoarding Disorder (HD), re-experiencing symptoms, namely intrusive images, have not been investigated in the condition. To address this, 27 individuals who met the DSM-5 criteria for HD and 28 community controls (CCs) were interviewed about (1) their everyday experiences of intrusive imagery, and (2) the unexpected images they experience when discarding high and low value possessions. Compared to CCs, everyday images described by the HD group were more frequent, had a greater negative valence, and were associated with greater interference in everyday life and attempts to avoid the imagery. With regard to discard-related imagery, a MANOVA followed up with mixed ANOVAs showed that HD participants reported more negative experiences of intrusive imagery in comparison with CCs during recent episodes of discarding objects of low subjective value. However, HD and CC participants both experienced positive imagery when discarding high value objects. CC participants reported greater avoidance of imagery in the high value object condition, but imagery did not change between conditions for HD participants. The findings are discussed, particularly in relation to the therapeutic implications the potential of imagery-based interventions for HD.

Keywords: Hoarding Disorder; Intrusive Thoughts; Imagery; Autobiographical Memory

Introduction

Hoarding Disorder (HD) is primarily characterised as a persistent difficulty in discarding possessions, with the accumulation of possessions resulting in clutter that impedes using living spaces for their intended purpose (American Psychiatric Association, 2013). Hoarding Disorder is a significant mental health problem that results in substantial distress for the individual, and can lead to impairments in social, occupational and other areas of functioning (Mataix-Cols, 2014). Negative consequences of HD include family conflict, eviction, and a level of work impairment equivalent to that reported by people with severe and enduring mental health problems (Tolin, Frost, Steketee, Gray, & Fitch, 2008). Risks such as fire, falling and death are associated with severe cases (Frost, Steketee, & Williams, 2000). It is estimated that HD affects up to 1.5% of the population at any time (Nordsletten et al, 2013).

In their model, Frost and Hartl (1996) described HD as a multifaceted problem that stems from: (1) information processing deficits; (2) problems in forming emotional attachments; (3) behavioural avoidance; and (4) erroneous beliefs about the nature of possessions. The emotions implicated in hoarding behaviour are driven by specific beliefs about objects (i.e., utility, beauty and sentimental value) and about the self (e.g., as vulnerable or responsible). Negative emotions such as grief, anxiety and shame (Chou, Tsoh, Vigil, et al., 2018) can lead to the avoidance of the potential negative outcomes such as emotional upset that might result from discarding items (i.e., negative reinforcement), although positive emotions have also been implicated in decisions not to discard items (Steketee & Frost, 2003). This can frequently lead to 'churning', i.e., moving objects from one pile to another because of difficulties making discarding decisions (Frost & Hartl, 1996).

Although psychological treatments have shown promise for HD, a recent meta-analysis of results from cognitive-behavioural therapy (CBT) interventions found that patients' post-treatment scores remained closer to the HD range than to the normal range (Tolin, Frost, Steketee, & Muroff, 2015). Thus, treatment for HD remains in its infancy compared to other anxiety disorders such as obsessive-compulsive disorder (OCD; Williams & Viscusi, 2016). A better understanding of the aetiology and maintaining factors involved in hoarding could highlight new therapeutic targets within the field of HD treatments, enabling the novel application of existing interventions.

One potential new target for treatment is intrusive imagery in relation to adverse life experiences. A recent meta-analysis of imagery rescripting (ImRs) interventions for adverse memories found that it was an effective treatment across a range of mental health disorders (Morina, Lancee, & Arntz, 2017). Adverse life experiences and their sequelae are highly relevant both to the aetiology of mental health problems and their maintenance (e.g., via intrusive memories; see Ehlers & Clark, 2000). Recurrent or intrusive mental imagery, often linked to past traumatic events or other life adversity, is a feature of a broad range of mental health disorders (Brewin, Gregory, Lipton, & Burgess, 2010) and intrusive images are included in the diagnostic criteria for a number of conditions (American Psychiatric Association, 2013). Traumatic histories are common in individuals with HD (e.g., Landau et al., 2011; Przeworski, Cain, & Dunbeck, 2014) and cumulative trauma has an apparent dose-response relationship with hoarding severity (Przeworski et al., 2014). Trauma has been found to be associated with emotional attachment to possessions in particular (Chou, Tsoh, Smith, et al., 2018). There is evidence that individuals with HD are more likely than those with OCD to have experienced trauma (Frost, Steketee, & Tolin, 2011). Given that vivid and distressing intrusive images have been found in OCD (Speckens, Hackmann, Ehlers, and Cuthbert (2007) and are more common in OCD compared to other anxiety disorders (Lipton, Brewin, Linke, and Halperin, 2010), people with HD might reasonably be expected to also experience similar intrusive images. However, it is currently unclear whether such imagery is common in individuals with HD, and also whether it might occur in relevant situations that are experienced as distressing in HD, such as attempts to discard objects.

This study investigated whether people with HD experience intrusive imagery, and described the characteristics of these images in comparison with a community control (CC) sample. In line with previous research (see Brewin et al, 2010), intrusive imagery in everyday life was investigated and given that discarding difficulties are a cardinal feature of HD and an important focus of treatment, the present study also investigated the presence of intrusive imagery during discarding situations. It was hypothesised: (1) that HD participants would experience imagery more frequently than CC participants, with differences in how it is experienced (i.e., greater vividness, more negative emotional valence, stronger link to identity), and how it was responded to (i.e., greater interference with everyday life and

a greater tendency to avoid the imagery); and (2) that HD participants would report having had more negative experiences of intrusive imagery in comparison with CCs during recent episodes of discarding objects, and that this difference would be accentuated when the object had a relatively high subjective value, reflecting the strong emotional attachments to objects reported by people with HD, and their distress when parting with them.

Method

Participants

The study received approval from the University of XXX Psychology Ethics Committee (Reference Number: 17-123). Opportunity sampling was employed and fifty-seven individuals were recruited from the community using a range of traditional and digital methods (e.g., posters in community venues and social media). Potential participants were screened by telephone. The inclusion criteria were: (a) aged 18 or over; (b) absence of any organic brain injury or neurological disorder; (c) absence of current or past diagnosis of psychosis or bipolar disorder; (d) absence of current substance dependence. To be eligible for the HD group, participants had to meet DSM-5 criteria for HD (American Psychiatric Association, 2013), which was assessed using the Structured Interview for Hoarding Disorder (SIHD; Nordsletten et al., 2013). If a participant in the HD group reported mental health problem in addition to HD, it was stipulated that HD had to be the primary problem. To be eligible for the CC group, participants needed to report no current mental health difficulties (assessed using the SCID-5-CV; First, Williams, Karg, & Spitzer, 2015).

Two participants were excluded: one for not meeting the DSM-5 criteria for HD, and a potential CC participant because they were taking medication for depression. Therefore 55 participants (27 HD, 28 CC) completed the study.

Measures

Structured Interview for Hoarding Disorder (SIDH)

The SIHD (Nordsletten et al., 2013) is a semi-structured interview designed to assist with the diagnosis of HD. Open and closed questions are used to evaluate each of the six core features of HD, together with the two DSM-5 specifiers assessing excessive acquisition and level of insight (American Psychiatric Association, 2013). Excellent convergent and discriminant validity have been demonstrated for the SIHD (Nordsletten et al., 2013).

Structured Clinical Interview for DSM-5 Clinician Version (SCID-5-CV)

The SCID-5 (First et al., 2015) is a semi-structured interview guide to establish DSM-5 diagnoses. The instrument is considered to be suitable for use with both patients and community samples (First et al., 2015). All participants were initially screened for comorbidities using the SCID-I/P Screening Module for DSM-IV-TR (First, Spitzer, Gibbon, & Williams, 2002). Positive responses to the screening questions were followed up with the relevant SCID-5-CV interview and any comorbidities were recorded.

Savings Inventory Revised (SI-R)

The SI-R (Frost, Steketee, & Grisham, 2004) is a validated tool for measuring severity of hoarding symptoms. It consists of 23 statements (e.g., 'How much of your home is difficult to walk through because of clutter?') that an individual endorses on a 5-point Likert scale (e.g., 0 = *None* to 4 = *Almost all*) to indicate how closely the statement corresponds to their experience during the past week. Reliability, validity (convergent and divergent) and specificity have been established for the SI-R (Frost et al., 2004). The recommended cut-off for significant hoarding symptoms is a total SI-R score of 41 or above (Tolin, Meunier, Frost, & Steketee, 2011). In the present study, this scale was found to be internally consistent ($\alpha = .95$).

Generalised Anxiety Disorder Assessment-7 (GAD-7)

The GAD-7 (Spitzer, Kroenke, Williams, & Lowe, 2006) is a screening and severity measure for anxiety disorders. Respondents are asked to rate how much they have been bothered by each of seven problems (e.g., 'Not being able to stop or control worrying') over the last two weeks on a Likert scale (0 = *Not at all* to 3 = *Nearly every day*). The GAD-7 has been shown to be valid, reliable and efficient both for screening GAD and assessing its severity (Spitzer et al., 2006). Caseness (i.e., clinically significant symptoms of anxiety) has been defined as 8 and above (National IAPT Programme Team, 2011). In the present study, this scale was found to be internally consistent (α = .83).

Patient Health Questionnaire-9 (PHQ-9)

The PHQ-9 (Kroenke, Spitzer, & Williams, 2001) is a screening and severity measure for depression. Respondents are asked to rate how much they have been bothered by each of seven problems (e.g., 'Feeling down, depressed, or hopeless') over the last two weeks on a Likert scale (0 = *Not at all* to 3 = *Nearly every day*). The PHQ-9 has been shown to be a reliable and valid diagnostic measure (Kroenke et al., 2001). Caseness has been defined as 10 and above (National IAPT Programme Team, 2011). In the present study, this scale was found to be internally consistent (α = .92).

Spontaneous Use of Imagery Scale (SUIS)

The SUIS (Reisberg, Pearson, & Kosslyn, 2003) is a tool used to evaluate a participant's general use of imagery in everyday life. Participants are asked to read 12 statements (e.g., 'When I think about visiting a relative, I almost always have a clear mental picture of him or her') and indicate the degree to which each is appropriate for them on a 5-point Likert scale (5 = *Always completely appropriate*, 1 = *Never appropriate*). The instrument has acceptable reliability and convergent validity (Nelis, Holmes, Griffith, & Raes, 2014). In the present study, this scale was found to be internally consistent (α = .83).

Imagery interview

Based upon previous research (e.g., Gregory, Brewin, Mansell, & Donaldson, 2010; Speckens et al., 2007) a semi-structured interview was developed to investigate the presence and characteristics of

intrusive images in everyday and discard situations[1]. The interview was developed using items taken from interviews used in similar research studies. The interview has two parts:

(1) *Everyday imagery*. Participants were asked to report on everyday intrusive memories and images from the previous week, and to estimate their frequency. They were told that the images could relate to events that had actually happened (i.e., memories), or they could relate to things they had imagined (i.e., images). Prompts were used to aid discussion about intrusive images. Participants were then asked to focus on a particular image that had reoccurred during the week (or, if no image reoccurred, the image that gave the strongest emotion or felt most important). After describing the image and reporting its frequency, participants rated the emotional valence of each image (-50 = *Extremely negative* to +50 = *Extremely positive*) and indicated the extent to which it elicited several common emotions (i.e., anger, sadness, guilt, happiness, grief, fear, excitement, disgust; from 0 = *Not at all* to 100 = *Extremely*). Participants also rated the image for vividness (0 = *Not at all vivid (hazy)* to 100 = *Extremely, almost as if happening right now)*, to what extent they felt the image reflected their identity (based on Berntsen & Rubin, 2006; 0 = *Not at all* to 100 = *Extremely*), to what extent they tried to avoid the image (0 = *Never* to 100 = *Always*), how much the image interfered with their everyday life (0 = *Not at all* to 100 = *All of the time*).

(2) *Discard scenarios*. Participants were asked to recall the two most recent events in their lives where: they discarded (or tried to discard) an object (1) that had low value to them ('perhaps even thrown away without a second thought'), and (2) that had high value to them and was very difficult to throw away ('it may not have been expensive or worth a lot of money—just something that was important to you'). The order in which the scenarios were presented was counterbalanced. Participants were asked to describe the object and to rate its subjective value

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[1] Please contact the corresponding author for a copy of the interview schedule.

(monetary, memories, usefulness; 0 = *Not at all valuable* to 100 = *Extremely valuable*), enabling the researcher to check whether the item was appropriate to the object-value condition (i.e., low or high) and whether HD and CC participants were selecting items of similar value. Participants were then asked if any images or memories popped into their head while they were trying to discard the object and whether or not they had actually discarded it. If an image was identified it was rated in the same way as for everyday imagery and participants were asked whether they thought there was any connection between the image or memory they described and their hoarding problem (yes or no) and the reason why.

Procedure

After providing informed consent, HD participants completed the SIHD and all participants completed the SCID-5-CV, either by telephone or face-to-face. The Imagery Interview was then administered, after which participants were asked to complete an online questionnaire containing the psychometric measures. Participants received a voucher to compensate them for their time. All screening telephone calls and interviews were carried out by the lead author.

Statistics

A mixed cross-sectional and experimental design was employed. Outliers were found in the data for frequency of images, therefore data points more than 3 SDs from the mean were assigned a raw score one unit larger than the next most extreme score (following Tabachnick & Fidell, 2013). Group differences in everyday imagery (Hypothesis 1) were examined using t-tests, or Mann-Whitney tests where variables were non-normally distributed. Group differences in discard imagery across the two groups for the low and high value object scenarios (Hypothesis 2) were compared using MANOVA followed up by a series of 2-way (Group: HD, CC) x 2 (Condition: low value, high value) mixed ANOVAs. In cases of non-normal data, ANOVAs were run again using ranks in place of raw scores (i.e., a non-parametric analysis of variance; Conover & Iman, 1981) as an extra check. All tests were two-tailed, setting α at 0.05.

Narrative descriptions of everyday and discard images were coded independently by two research assistants to classify the descriptions into themes. The coders agreed on themes in 90% of cases. Where there was disagreement, a final decision was made by Author 1 in consultation with Author 3.

Results

Participant characteristics

Participant characteristics are summarised in Table 1. The groups did not differ significantly from each other in respect of gender, X^2 (1, N=55) =0.34, p=0.56, but HD participants were older than CC participants, t(53) =2.55, p=0.014. Age did not correlate significantly with any of the outcome variables so was not considered in the analysis thereafter.

HD participants scored higher for hoarding symptoms (SI-R) than CC participants, t(52) =13.84, p<0.001. HD participants were more depressed (PHQ-9) than CC participants, t(30.40) =6.05, p<0.001), and more anxious (GAD-7) than CC participants, t(35.65) =5.53, p<0.001). Participants did not differ significantly from each other in tendency to use visual mental imagery in daily life (SUIS), t(52) =0.65, p=0.52.

In the HD group, 10 participants (37%) had no comorbidities and 17 (63%) had at least one comorbidity. The following comorbidities were recorded: generalised anxiety disorder (GAD; n=12), social anxiety disorder (n=7), major depressive disorder (MDD; n=6), Attention Deficit Hyperactivity Disorder (ADHD; n=5), panic disorder (n=4), binge-eating disorder (n=3), agoraphobia (n=2), specific phobia (n=2), OCD (n=2) and anorexia nervosa (n=1). These comorbidities are consistent with previous HD research (e.g., Frost et al., 2011). On the SIHD (Nordsletten et al., 2013) one HD participant demonstrated 'poor' insight into their condition; the remainder (n=26) showed 'good/fair' insight.

[Insert Table 1 about here]

Everyday imagery (Hypothesis 1)

Ninety-six per cent of HD participants and 86% of CC participants reported that they experienced everyday intrusive images. Scores for each of the variables describing the qualities of the images are summarised in Table 2. The overall frequency of everyday intrusive images was higher in the hoarding group compared with the control group, but this difference did not reach statistical significance. However, when the *specific* examples of everyday images described by HD participants were examined, these were more frequent and also more negative compared with those experienced by the CC group. HD participants were more likely to report that their everyday images interfered with their lives compared to CC participants and were also more likely to report that they tried to avoid their everyday intrusive images. No significant group differences were observed for image vividness or the extent to which participants felt that images reflected their identity.

[Insert Table 2 about here]

Themes.

The everyday images reported by HD participants reflected themes of illness or death to other (n=8; e.g., '*Suffering in an abattoir. Lambs, or any creature, taken for slaughter… being forcibly taken and frightened.*'), reminiscence, i.e., recalling a positive past experience (n=7; e.g., '*I can see my eldest daughter's features from when she was a small child. It made me think of the fun we had doing things together*'), danger/illness/death to participant (n=4; e.g., '*I'm getting swept towards [the bow of a huge ship]. It's almost kinaesthetic – a sense of being swept and the fear associated with it.*'), clutter (n=2; e.g., '*I see my pile of papers that I need to look at… I see the junk around the papers.*'), neutral everyday memories (n=2; '*A stack of champagne glasses in a pyramid… mainly visual, but perhaps a sense of warmth and hope from it also.*'), waste/harm to environment (n=1; '*A still image of plastic islands in the sea… it's a bunch of plastic that's found its way together in the ocean.*') and negative interpersonal memories (n=1; '*I'm in the dining area of my friend's kitchen… things got emotional… we had an*

argument. The image is of the whole scene in detail.'). The everyday images reported by CC participants reflected themes of reminiscence (n=16), neutral everyday memories (n=5), illness or death to other (n=2) and danger to participant (n=1).

Imagery in response to discard scenarios (Hypothesis 2)

Participants selected objects of significantly higher subjective value in the High Value condition compared with the Low Value condition, in both the HD (Low = 11.62 (14.77), High = 51.37 (16.93), t(26)= -9.99, p<0.001) and CC groups (Low = 10.07 (10.26), High = 45.06 (20.68), t(27)=-8.28, p<0.001). The items selected by HD and CC participants were similar in value to each other in both the Low Value condition (HD= 11.62 (14.77), CC=10.07 (10.26), t(46.18)= 0.45, p=0.654) and the High Value condition (HD= 51.37 (16.93), CC= 45.06 (20.68), t(53)= 1.24, p=0.222).

A MANOVA was conducted to test whether participants in the two groups differed overall on the set of variables investigated (i.e., image frequency, image vividness, image valence, link to identity, interference of image and avoidance of image) across the two conditions. MANOVA revealed a significant multivariate effect of group on the variables, V= 0.60, F(12, 19)= 2.41, p= 0.042. Follow-up univariate two-way mixed ANOVAs were then conducted on each variable.

[Insert Table 3 about here]

As shown in Table 3, there were significant main effects of object value such that in the High Value condition compared with the Low Value condition imagery was more frequent, more vivid, and more strongly linked to identity. There was a significant effect of Group such that the HD group experienced more interference from their images than the CC group. A significant crossover interaction indicated that differences in valence scores in the High Value condition compared with the Low Value condition

were different for HD and CC participants[2]. Simple main effects analysis showed that valence scores for HD participants were higher (i.e., more positive) in the High Value condition compared with the Low Value condition (p= 0.017), but scores did not differ between the conditions for CC participants (p=0.36). A second significant crossover interaction indicated that differences in avoidance scores in the High Value condition compared with the Low Value condition were different for HD and CC participants. Simple main effects analysis showed that avoidance scores for CC participants were higher in the High Value condition compared with the Low Value condition (p= 0.023), but scores did not differ between the conditions for HD participants (p= 0.284). All other main effects and interactions were non-significant.

Imagery themes.

Low value condition.

The images reported by HD participants in the Low Value condition reflected themes of neutral image/memory relating to object (n=7), positive memories relating to object (n=4), negative image/memory relating to object (n=3), acquisition of object (n=2), possible future use of object (n=2), waste/harm to the environment (n=1) and clutter (n=1). The images reported by CC participants in the Low Value condition reflected themes of neutral image/memory relating to object (n=6), positive memories relating to object (n=5), possible future use of object (n=2), negative image/memory relating to object (n=2), acquisition of object (n=1).

High value condition.

Examples of images reported by HD and CC participants in the High Value condition are provided in Table 4. The images reported by HD participants in the High Value condition reflected themes of

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[2] These interactions remained significant when non-parametric tests were run.

positive memories relating to the object (n=15), memory of acquisition of object (n=2), waste/harm to the environment (n=2), negative image/memory relating to the object (n=2), neutral image/memory relating to the object (n=1), nostalgic memory relating to object (n=1) and clutter (n=1). The images reported by CC participants in the High Value condition reflected themes of positive memories relating to the object (n=18), nostalgic memory relating to object (n=3), neutral image/memory relating to the object (n=3), possible future use of object (n=1) and acquisition of object (n=1).

Relevance of images to discarding difficulties

Among the HD participants, 52% (n=14) in the Low Value condition and 67% (n=18) in the High Value condition identified a possible connection between the image/memory they reported (or the event it was linked to) and their hoarding problem. In the Low Value condition, some participants reported that the images impeded (n=8) discard and others reported that they encouraged (n=6) discard. In the High Value condition, all participants reported that the images impeded discard, for one of the following reasons: the object is connected to important memories (n=15; e.g., *'It's hanging onto the past… it can feel disrespectful to get rid of the objects. Keeping them is like honouring [my grandmother's] memory.'*), the image shows how the object might still be useful or would otherwise go to waste (n=2; e.g., *'If I think that [the items] would go to an unloved pile of things, that stops me from throwing my things out.'*) or the object serves an important function as a memory aid (n=1; e.g., *'I forgot things. I need external cues to jog my memory'*).

[Insert Table 4 about here]

Discussion

This study is the first to ask whether people with HD experience intrusive imagery. It described the phenomenology of intrusive images in people who hoard, compared with a healthy sample (Hypothesis 1). It also asked how experiences of discarding objects might be associated with intrusive imagery

(Hypothesis 2). Consistent with our expectations for Hypothesis 1, HD participants experienced more frequent everyday images that had negative emotional valence in comparison with CC participants. Furthermore, they were comparatively more likely to report that the imagery interfered with their everyday lives and that they tried to avoid the imagery. Contrary to expectations, the images did not differ between the groups in their vividness or reported link to identity. Hypothesis 2 was partly confirmed; HD participants reported experiences of intrusive imagery that were more negative than those of CCs during recent episodes of discarding objects of low subjective value. However, there was also an unexpected finding: HD participants experienced positive imagery when discarding, or trying to discard, high value objects. Taken together, these findings show for the first time that images are important mental events that could play an important role in the maintenance of HD.

The findings in relation to Hypothesis 1 are consistent with research on intrusive imagery in the context of other mental health problems (Brewin et al., 2010; Hackmann, Ehlers, Speckens, & Clark, 2004), and add to growing evidence that images are important cognitions that can be highly relevant to the aetiology and maintenance of psychopathology. In common with individuals with other mental health problems (see Brewin et al., 2010), the content of images and memories experienced by HD participants tended to be more distressing than those in the CC group, and was often associated with specific adverse past events. Also, some of the themes of everyday images reported by HD participants (e.g., reminiscence) appeared to reflect, to an extent, themes of verbal thoughts reported by people who hoard (e.g., beliefs about the sentimental value of objects). However, these links are arguably subtler than in certain other conditions such as social anxiety and agoraphobia, in which observer perspective images of anxiety-provoking social situations are common (Wells & Papageorgiou, 1999).

The findings in relation to Hypothesis 2 (discard scenarios) suggest that autobiographical memories may play an important role in saving and discarding in hoarding. The only instance during this study when HD participants tended to report positive imagery was when they reported on a recent experience of trying to discard an object of high subjective value. In around two-thirds of HD participants this imagery reflected positive memories associated with the object. It had been hypothesised that HD participants would experience negative imagery in the High Value Object condition, perhaps reflecting

reactivated memories relating to past losses and traumatic events. However, when this finding is viewed in the context of research that has shown the high degree of comfort and security that people with HD derive from their possessions (e.g., Frost, Hartl, Christian, & Williams, 1995), it is perhaps unsurprising that someone who hoards should be flooded with positive imagery when handling a valued object. This finding may add important detail to the cognitive-behavioural model of hoarding (Frost & Hartl, 1996; Steketee & Frost, 2003), by highlighting a role for positive mental imagery in maintaining saving behaviour, either through positive reinforcement (i.e., repeated indulgence in positive memories relating to objects, leading to saving objects), and/or negative reinforcement (i.e., acting on these positive memories to avoid the distress of discarding an object). The participants themselves reported that positive images made it more difficult for them to discard items; thus these findings may be helpful for understanding the cognitive barriers to discarding observed in people who hoard. Frost et al. (1998) observed that people with HD can more easily provide reasons to save an item than reasons to discard it; perhaps positive mental imagery helps to elaborate these 'reasons to save' when individuals are handling an object.

These findings have implications for understanding how individuals without HD manage to declutter. No interactions were observed for image frequency, vividness nor their link to identity, highlighting important commonalities in how discarding tasks elicit memories in all individuals. However, in the High Value condition, CC participants experienced imagery that was more frequent, more fused with identity and more likely to interfere with everyday life compared with the Low Value condition. They also reported attempts to avoid this imagery, so one might surmise that avoiding images in this way serves a function by easing the task of discarding objects whose subjective value might otherwise prove a barrier. Hoarding Disorder participants reported more frequent, vivid and positive imagery in the High Value condition compared with the Low Value condition, but the observed interaction indicated that, unlike CCs, their avoidance behaviour did not change between conditions. Images have been linked to goals (Conway, Meares, & Standart, 2004), and individuals are more likely to act on events they have simulated in the imagination than thought about verbally (Libby, Shaeffer, Eibach, & Slemmer, 2007). Therefore positive imagery relating to objects in the absence of increased avoidance may increase the

likelihood that people who hoard will save those objects in favour of discarding them, leading them to 'churn' objects.

Strengths of this study include the use of a clinical sample and a well-matched CC group. However, the findings should be viewed in the context of several limitations. The experimental part of the interview asked participants to recall a time when they discarded, or tried to discard, an item; thus, some of the differences in dependent variables observed may reflect differences in the outcomes of specific discarding scenarios (i.e., the decisions made), rather than group differences *per se*. However, it could equally be argued that the scenarios reflected appropriately the reality of discarding situations for individuals with and without hoarding. No standardised interview for intrusive imagery is currently available, which resulted in a reliance on idiographic scales to test hypotheses. As with all similar measures, the nature of respondents' subjective experience could not be independently validated. This limitation also makes it difficult to compare these findings directly with those of studies on intrusive imagery in other disorders, each of which has used a different interview schedule.

Nearly all of the HD participants had at least fair insight into their difficulties; thus it is not known whether the imagery experienced by individuals with poor insight might differ from the imagery reported in this study. However, there is no indication in the literature on imagery and psychopathology that insight should be a relevant factor in this regard. The study design relied on retrospective self-report, which may have been subject to difficulties and biases in recall, although there is no reason to believe that this limitation would affect comparisons between groups or across conditions. Longitudinal research would be the obvious antidote to this problem, and future studies should seek to ask participants to monitor and record intrusive images and memories in real time. Comparisons between experimental conditions were only possible if a participant reported intrusive images in both conditions; this limited the sample size for this part of the study. Finally, the inclusion of an additional clinical group would have enabled stronger conclusions regarding the specificity of the findings reported to HD rather than general psychopathology. However, the discard-specific scenarios used were highly relevant to hoarding behaviour; there is no reason to expect that these scenarios would elicit similar memories in the context of other disorders.

Clinical implications

The present findings on intrusive imagery have interesting implications for the novel application of imagery rescripting interventions within the field of HD treatment, drawing on the imagery-based treatments that have led to advances in the treatment of other mental health disorders (see, Morina et al, 2017). The imagery findings from the high value discarding scenario can be used to illustrate the clinical potential of these results particularly as all of the participants reporting intrusive imagery indicated that it impeded discarding. Firstly, it would be important for clinicians to assess for the presence and type of imagery triggered by a discarding scenario. If positive images are acting as barriers to discard when people with HD are making difficult decisions about valued objects (which may describe many or most possessions in HD; Frost et al., 1995) it be may be helpful to collaboratively develop an alternative multi-sensory image to 'compete' (see Brewin, 2006) with the image impeding discard. Thus, individuals could be helped to develop a multi-sensory image that encapsulates either the negative consequences of keeping objects (e.g. the sad faces of self and loved ones not being able to eat at the dinner table) or capturing the positive consequences of discarding (e.g. seeing self and loved ones at the dinner table enjoying each other's company). Alternatively, if the triggered imagery is more negatively valenced, the focus of the imagery intervention can be adapted accordingly. For example, in our clinic a patient reported a specific image that was activated whenever discarding personally relevant clothing. This image encapsulated an experience that occurred during a difficult life period where similar objects had been regrettably discarded. Therefore, each discarding scenario in the present was a reminder of this traumatic event from the past. Rescripting this image in line with protocols developed for other mental health problems, for example, post-traumatic stress disorder (Ehlers & Clark, 2000), social anxiety (Wild, Hackmann, & Clark, 2008) and depression (Brewin et al., 2009) was followed by an improvement in being able to let go of the objects that had become associated with this adverse memory. Future experimental research is required to test the proposition that imagery rescripting techniques for imagery associated with difficulty discarding will enable people with HD to let go of at least some categories of possessions more easily.

In conclusion, this study has demonstrated that intrusive images are present in HD. The nature of the images described, and how individuals report responding to those images, are consistent with several phenomena described in the cognitive-behavioural model of hoarding. Further research may add to our understanding of the interplay of intrusive imagery and positive and negative reinforcement in creating and maintaining hoarding behaviour.

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Table 1 - *Participant characteristics*

Variable	Hoarding Disorder (n = 27) Mean (SD) or %	Community Control n = 28 Mean (SD) or %
Males	18.5%	25.0%
Age (years)	57.19 (10.89)	48.59 (13.9)
Married	40.7%	35.7%
Educated to degree level	48.1%	75.0%
Living alone	40.7%	39.3%
Number of medications taken	2.41 (2.85)	0.64 (1.03)
PHQ-9	9.88 (6.62)	1.61 (2.27)
GAD-7	8.27 (5.53)	1.64 (2.70)
SUIS	37.31 (9.69)	35.57 (10.07)
SI-R	53.58 (10.50)	18.04 (8.32)
Five or more comorbidities	11%	-
Hoarding with excessive acquisition[1]	89%	-

Note. [1] DSM-5 specifier, assessed as part of the SIHD.

Table 2 - *Qualities of everyday intrusive imagery experienced by HD and CC participants.*

Variable	Hoarding Disorder n = 27 Median (IQR), unless otherwise specified	Community Control n = 28 Median (IQR), unless otherwise specified	HD – CC comparison
Everyday intrusive imagery			
Frequency (per week)	28.00 (4.88–50.63)	10.25 (1.63–30.63)	U= 261.00, z= -1.79, p= 0.074
Specific recent example			
Frequency (per week)	2.5 (1.00–7.50)	1.00 (1.00–3.00)	U= 243.50, z= -2.12, p= 0.034, r= 0.29
Emotional valence	-20.00 (-45.00–30.00)	30.00 (4.25–43.75)	U= 435.00, z= 2.710, p=0.007, r=0.39
Most strongly endorsed emotions	Grief (M=40.20, SD=36.73) Sadness (M=30.20, SD=34.66)	Happiness (M=58.33, SD=38.41) Grief (M=32.50,	

Vividness	75.00 (55.00-90.00)	70.00 (61.25-83.75)	U= 276.00, z= -0.482, p=0.630
Link to identity	55.00 (27.50-75.00)	62.50 (40.00-87.50)	U= 350.00, z= 1.003, p=0.316
Interference in everyday life	10.00 (0.00-45.00)	0.00 (0.00-1.13)	U= 150.00, z= -3.29, p=0.001, r= -0.47
Avoidance of image	30.00 (0.00-72.50)	0.00 (0.00-0.00)	U= 155.00, z= -3.357, p=0.001, r= -0.48

Table 3 – *Summary of results from mixed ANOVAs*

Variable Group	Condition		Main effect of condition	Main effect of group	Interaction (group x condition)
	Low Value Object	High Value Object			
Image frequency					
HD	1.69 (2.14)	4.52 (5.85)	$F(1, 53)= 16.74$***	$F(1, 53)= 0.73$	$F(1, 53)= 0.082$
CC	0.72 (0.86)	3.98 (5.75)	$\eta^2=.24$		
Image vividness					
HD	53.33 (26.01)	74.03 (20.92)	$F(1,32)= 12.21$**	$F(1, 32)= 0.059$	$F(1, 32)= 0.44$
CC	54.94 (26.09)	69.06 (25.96)	$\eta^2=.28$		

Image valence

HD	-4.67 (24.81)	20.59 (29.94)	F (1,31)= 2.83	F (1,31)= 1.07	F(1,31)= 7.36*
CC	18.13 (21.73)	12.19 (23.87)			η²=.192

Image link to identity

HD	45.41 (36.99)	59.71 (30.13)	F(1, 31)= 16.77***	F(1, 31)= 0.71	F(1, 31)= 2.38
CC	28.75 (28.67)	60.31 (30.41)	η²=.351		

Interference of image

HD	9.00 (18.39)	16.11 (16.14)	F(1,32)= 2.95	F(1,32)= 10.87**	F(1,32)= 0.827
CC	0.00 (0.00)	2.19 (4.82)		η²=.254	

Avoidance of image

HD	22.78 (34.78)	13.89 (29.53)	F(1, 32)= 0.39	F(1,32)= 1.816	F(1, 32)= 5.56*
CC	0.63 (2.50)	15.94 (24.44)			η²=.148

*p < .05; **p < 0.01; ***p < .001.

Note. Sample sizes for mixed ANOVAs were n=27 (HD group) and n=28 (CC group) for 'value of object' and 'image frequency' and n=18 (HD group) and n=16 (CC group) for all other variables.

Table 4

Themes and examples of objects and images described by HD and CC participants during recent experiences of discarding, or trying to discard, an object of high subjective value (i.e., High Value Object condition)

Theme	Example	
	Object, and description of experience of discard or attempted discard	Image
HD participants		
Positive memories relating to the object	*'A doll's wooden high chair. I gave it to my god-daughter.'*	*'My mum's face as it lit up at her achievement at having bought the doll's chair for me. She didn't have much money.'*
Memory of acquisition of object	*'Yarn and wool, for knitting and crochet. I was going through a box of stuff – getting rid of stuff… I went through the balls of wool one by one, thinking about what I had bought them for.'* [object not discarded]	*I remembered buying [the balls of wool and yarn], in a warehouse abroad, and how I had felt when I first saw, smelt and touched the wool.*

Waste/harm to the environment	*'A carved elephant's tusk… the tip is a carved crocodile and there are antelopes, lions and other animals on it. I have sent pictures of it to an auction house, but they don't think it's valuable enough.'* [object not discarded]	*'[An image of] someone having the tusk up on their wall, and a feeling of revulsion… about the way human and animal life was not respected in those colonial days.'*
Negative image/memory relating to the object	*'A lollypop, still in its wrapper. Something my girlfriend left behind [in my flat]. I considered the possibility of throwing the lollypop away. Then thought no I actually can't. Even though I don't eat lollypops.'* [object not discarded]	*An image of finding the lollypop in my flat. I was sweeping up and found it where it had dropped down. This was shortly after [my girlfriend] left, and I was in a state about the whole business.*
Neutral image/memory relating to the object	*'Books that I acquired while doing my degree. I found the books and thought 'they've been [here] ages and I've not looked for them'. I was going to the library to return some borrowed books anyway, so I donated them to the library.'*	*'[Me] sitting in my room in my flat, as a student. It's 3-4am. I'm trying to keep myself going with tea. I'm looking at the books, looking for information.'*
Nostalgic memory relating to object	*An owl doorstop. I thought I would give [the collection of owls] away to mum's friend from church. She had it in her bag, and was about to walk out the door and I said 'I can't, can I have it back please!' So I kept the big one.'* [object not discarded]	*'[I] saw my mother talking to me, I could actually see her saying 'don't give that away!' Thought of my mum and her joy at acquiring that particular owl.'*
Clutter	*'Plastic picnic bowls, bought so I would have something to eat out of at home [because of clutter affecting the kitchen]. I have lots of bowls, so I said I would throw these out… I put them from one place to another to another – then eventually sent them off in a charity bag.'*	*'An overflowing bowl of washing up that was still to be done. A mound of stuff, dirty dishes.'*

CC
Participants

Positive memories relating to the object	*'A grey cashmere hoodie. I gave it to a charity shop with another bag of things. I have a clear-out monthly.'*	*'I am in a clearing in a forest, with a view of redwood trees in the background [wearing the hoodie]. I have my arms outstretched.'*
Nostalgic memory relating to object	*'My mother's yellow suitcase. She brought it from Canada when she came to live in this country. I took it to the dump and threw out all of the contents, but couldn't get rid of the suitcase. Then one day I managed to give it away.'*	*'[A memory of] being with my mum in the airport, checking in for the flight. She had the suitcase and her pet budgie with her.'*
Neutral image/memory relating to the object	*'A throw. I wrap it around myself. It's ugly, grey and a bit miserable. I had a fleeting thought I might get rid of it. But it's not broken so I decided to keep it.'* [object not discarded]	*My ex-boyfriend's sister [who the throw belonged to previously]. An image of her. Her whole body. Almost on a white background.*
Possible future use of object	*'A campervan. It [had been] off the road and sat on the drive for three years.*	*'An image of what could have been if the campervan had been on the road… a live moving image. The campervan on the road, and next to the sea.'*
Acquisition of object	*'A copper etching of a cat's head that I had as a child. Wondered if I should take a picture of it… but I decided the picture in my mind was quite clear enough. Took it to charity shop.'*	*'The moment I bought the picture… in a cosy shop. I remember the picture on the wall. I can vaguely see someone behind the counter, but the picture itself is much clearer.'*