The University Of Sheffield.

The Emotional Experience of Hoarding Disorder:

An Exploration Using Q Methodology.

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Declaration

I declare that this work has not been submitted for any other degree at the University of Sheffield or any other institution. This thesis is my own original work and all other sources have been referenced accordingly.

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Literature Review

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Abstract

The current thesis consists of a literature review and meta-analysis, and a research study. The literature review aimed to synthesise and summarise the hoarding disorder (HD) prevalence evidence base. A systematic search was conducted to identify all relevant studies. A random effects meta-analysis was then conducted, with subgroup moderator analysis and meta-regression. Eleven studies, comprising of twelve samples met criteria (n = 53,378). The pooled estimated prevalence for HD was 2.5% (1.7% to 3.6%). There was significant heterogeneity between studies, and subgroup analyses were inconclusive. Studies were predominantly from developed countries and were at low risk of bias. The pooled estimate of HD indicates that HD is an infrequently occurring diagnosis. Guidance on the manner in which HD is assessed in future prevalence studies is provided and the clinical implications of the results discussed.

The research study aimed to explore emotions in participants prone to hoarding using Q-methodology. Forty-nine statements related to emotions in hoarding were generated following thematic analysis of two initial interviews. Forty-four participants (34 online, 10 offline) completed Q-sorts of the statements alongside a battery of psychometric measures. A by-person factor analysis was conducted and the clusters compared on the psychometric measures. Three participants failed to meet caseness for HD, a further seven failed to cluster. Four distinct participant clusters consisting a total n = 34 participants were identified: “emotionally overwhelmed” (n = 11); “social emotions” (n = 13); “object complexity” (n = 6); “object-affect fusion” (n = 4). The clusters identified did not differ significantly on measures of hoarding severity, anxiety, depression, and impulsivity. Complex emotions appear to be a significant component of HD. The four participant clusters elicited appeared to accurately reflect current research. This demonstrates significant emotional heterogeneity amongst people that hoard and so highlights the need for further research.

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Part One: Literature Review

Prevalence of Hoarding Disorder: A Systematic Review and Meta-Analysis

Abstract

Objectives

There is uncertainty concerning the prevalence of Hoarding Disorder (HD) due to methodological issues in the evidence base. This systematic review and meta-analysis aimed to synthesise and summarise the HD prevalence evidence base in well conducted studies with sufficiently large samples.

Methods

A systematic literature search was conducted to identify all relevant studies. Inclusion criteria were studies that reported adult HD prevalence and had sample sizes of at least 1,009 participants. A random effects meta-analysis was then conducted, with subgroup moderator analysis and meta-regression.

Results

Eleven studies, comprising of twelve samples met criteria (n = 53,378). The pooled estimated prevalence for HD was 2.5% (1.7% to 3.6%). There was significant heterogeneity between studies, and subgroup analyses were inconclusive. Studies were predominantly from developed countries and were at low risk of bias.

Conclusions

The pooled estimate of HD in the population studies was low at 2.5% indicating that HD is an infrequently occurring diagnosis. Guidance on the manner in which HD is assessed in future prevalence studies is provided and the clinical implications of the results discussed.

Practitioner points

- Approximately 2 in every 100 people in the general population meet HD criteria.
- Prevalence rates appear consistent across developed countries.
- Prevalence of HD may well increase with age, however further research is needed to confirm this.

Introduction

Hoarding disorder (HD) is defined as a persistent difficulty discarding possessions, resulting in an accumulation of belongings causing severe obstruction/congestion of living areas and significant distress and impairment in functioning for the individual (American Psychiatric Association, 2013). Levels of clutter in the home can range from non-clinical to extreme levels which create associated increasing levels of impairment (Timpano et al., 2013). When severe hoarding behaviour creates a significant build-up of clutter in the home, this often presents serious physical risks to personal safety. Severe clutter increases the risk of falls, contamination from decaying food, disease from contamination, fire if flammable materials are amassed, and impeded escape routes should a fire occur (Steketee & Frost, 2014). These threats to personal safety are particularly significant within the older adult HD population (Kim, Steketee, & Frost, 2001).

In terms of physical co-morbidity and HD, individuals with HD have been shown to be significantly more likely than their peers to be obese and to report chronic and severe medical issues (Tolin, Frost, Steketee, Gray, & Fitch, 2008). Amongst the most common conditions reported are diabetes, seizures, arthritis, and lung conditions, with hoarding severity predicting the total number of medical conditions (Ayers, Iqbal, & Stricklanda, 2014). Whilst the direction of the relationship between HD and these medical conditions is not currently clear, it is suggested that that HD and the consequential living conditions may be a precursor to poor physical health (Ayers et al., 2014). In terms of psychiatric comorbidity, the majority of studies find high rates of depression (Frost, Steketee, & Tolin, 2011). For example Frost, Steketee, Williams, and Warren (2000) found that people with HD experienced more anxiety and depression than both non-hoarding obsessive compulsive disorder participants and control participants. HD has also been found to be correlated with compulsive buying (Hayward

& Coles, 2009) and that this creates the flow of possessions into the home that HD then prevents discard of possessions. Frost et al. (2011) reported that 61% of participants with HD experienced problems with compulsive buying, and Mueller et al. (2009) similarly found that 61% of participants with HD also presented with clinically significant compulsive buying.

HD not only has a detrimental effect on the individual, but can also impact on others. For example, in a sample of thirty-two hoarders, twenty (62.5%) reported that their hoarding was a problem for their family members (Frost & Gross, 1993). In severe cases hoarding behaviour can threaten the health of others, with neighbours being most likely to raise concerns. Complaints are typically addressed by multiple community services at significant cost to the local community (Frost, Steketee, & Williams, 2000) and also relationships between neighbours. The cost may be even further reaching, with research suggesting that HD presents a burden in terms of increased occupational impairment, poorer physical health, and higher levels of social service involvement (Neave et al., 2017; Tolin et al., 2008).

Therefore, research to date suggests that hoarding is a significant problem in that it impacts on the physical health and safety of the individual, is associated with poorer mental and physical health, and can be a burden on family and the wider community. The mean age of onset of hoarding symptoms has been estimated to be 13.4 years, with 60% of hoarders reporting that the onset of symptoms occurred by age 12, increasing to 80% by age 18 (Grisham, Frost, Steketee, Kim, & Hood, 2006). However, assessing the prevalence of hoarding in children is difficult due to the restrictions placed upon them (e.g. their inability to acquire possessions due to lack of income, and lack of personal space to store items; Storch et al., 2011) . Childhood prevalence rates are unlikely to be as reliable as adult prevalence rates, as not all adults with HD report onset of hoarding symptoms in childhood, and childhood circumstances restrict the use of validated adult

measures of hoarding. Additionally, although hoarding onset typically occurs in adolescence, symptoms often do not become clinically significant until adulthood (Grisham et al., 2006).

Prevalence (as distinct from incidence) in epidemiological mental health is the proportion of a particular population (often expressed as a percentage) found to be affected by a particular mental health problem (Carneiro & Natasha, 2011). Point prevalence concerns the percentage with the mental health condition at a specific point in time, period prevalence refers to the percentage that have the mental health condition over a set period of time (typically 12 months), and lifetime prevalence refers to the percentage that have at some point experienced the mental health problem (National Institute of Mental Health, n.d.; Webb & Bain, 2011). Estimating the prevalence of any mental health problem has several useful purposes across policy, research and service delivery contexts. Having precise estimates of the prevalence of mental health problems can inform service delivery, governmental policy and insurers (Andrews, Henderson, & Hall, 2001). For example, awareness of the estimated number of cases in a given geographical population can help services to determine how much funding to allocate to address a specific disorder. Furthermore, with accurate prevalence estimates, services can assess whether they have detected the number of cases that would be expected given the size and demographics of the local population, and also audit the effectiveness of their detection methods (e.g. accessibility of services, public awareness).

It is worth noting that prevalence (in terms of fulfilment of diagnostic criteria and resulting diagnosis) does not necessarily imply the associated need for intervention and treatment (Spitzer, 1998). Indeed, due to the often low levels of insight in people meeting criteria for HD (Kim et al., 2001) their motivation to seek treatment is low. This may in part be due to hoarding symptoms often being ego-syntonic (Worden, DiLoreto, & Tolin, 2014). Even in treatment seeking HD patients, a meta-analysis of

cognitive behavioural treatment for HD illustrated that reliable clinically significant change rates were low (24-43%) and that final scores tended to remain in the clinical range (Tolin, Frost, Steketee, & Muroff, 2015).

Systematic reviews are often undertaken with the aim of synthesising data, such as summarising the prevalence rates from and across the original sources (Fox, 2005). The methodological design of any individual prevalence study can result in systematic error or bias, leading to overestimation or underestimation of the true prevalence of a disease or disorder (Higgins & Green, 2011). Factors that can introduce bias across prevalence studies include sampling methods, response rates, unreliable methods of data collection, and the prevalence period studied (Hoy et al., 2012). Consequently, it is important to assess the methodological quality of studies included in any prevalence review (Hoy et al., 2012). This can be achieved by assessing risk of bias, with more rigorous and well controlled studies being more likely to reveal trustworthy base rates (Higgins & Green, 2011).

Several frequently cited studies have previously attempted to estimate the point prevalence of HD in adults, with estimates varying from 1.5% to 6% of the general population (Iervolino et al., 2009; Mueller et al., 2009; Nordsletten, Reichenberg, et al., 2013; Samuels et al., 2008). Samuels et al. (2008) reported a hoarding point prevalence of 3.7% in their sample, with a weighted prevalence of 5.3%. In this study, 735 participants were recruited through the Baltimore Epidemiologic Catchment Area (ECA) follow-up survey. Assessments included International Personality Disorder Examination (Loranger et al., 1994), and hoarding was assessed as part of the obsessive-compulsive criterion of the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV; American Psychiatric Association, 2000) . Iervolino et al. (2009) reported a hoarding point prevalence of 2.3% in a sample of 5,022 monozygotic and dizygotic twins taken from the Twins UK adult twins registry.

Mueller et al. (2009) reported a hoarding point prevalence of 4.6% in a sample of 2,307 participants using an adapted version of the Saving Inventory – Revised (Frost, Steketee, & Grisham, 2004).

The commonly cited studies of HD prevalence all possess significant limitations, such as the hoarding criteria used no longer being representative of the current DSM-V definition, samples not being representative of the general population due to self-selection, small sample sizes, low response rates, and an over reliance on self-report measures. It is also inappropriate to denote any one study as being most accurate or representative of the general population. Therefore, it is currently unclear as to the lifetime and point prevalence rates of HD in the general population. A quantitative synthesis of the current prevalence data would usefully serve to reduce the impact of the methodological weaknesses of any one individual study and yield a balanced and weighted summary of the prevalence evidence base, providing a more reliable indication as to the base rate of HD in the global population. Despite an array of studies (with questionable methodological quality) reporting prevalence data, to our knowledge a prevalence meta-analysis has not been undertaken. Meta-analyses are widely used to summarise results across empirical studies and are increasingly used to inform scientific and policy decisions (Hedges & Pigott, 2004). Maraz, Griffiths, and Demetrovics (2016) conducted a meta-analysis of the prevalence rate of compulsive buying in adults. The compulsive buying pooled prevalence from representative adult studies was 4.9%, 95% confidence interval: [3.4% - 6.9%], based on eight estimates, with a total of 10,102 participants). Estimates of compulsive buying prevalence were higher among other subsamples (i.e. university students, adult non-representative samples and shopping-specific samples).

The main objective of this current review is therefore to conduct a systematic literature search to identify all relevant studies that report prevalence data for HD in the

general population, and to conduct a meta-analytic review of the data, replicating the analytic methods used in the Maraz et al. (2016) compulsive buying study. By assessing the methodological quality of the HD prevalence evidence base and statistically summarising the base rates found to date, this review will provide a more precise estimate of the pooled prevalence of HD than was currently possible. It is hoped that results can be used to inform best practice in the design of future prevalence studies of HD, clinical HD assessment methods, and inform any associated service provision.

Method

Sources and search terms

This review follows the recommendations regarding the reporting of meta-analyses of observational studies as outlined by Stroup et al. (2000). The review protocol was registered with the PROSPERO international prospective register of systematic reviews (http://www.crd.york.ac.uk/prospero), registration ID: CRD42018093809. An electronic search of three academic databases (PsycINFO, Medline, and Web of Science) was conducted in March 2018. The search specified that within the title, abstract, or topic the article must contain the term "hoard*" (using the asterisk wildcard function to ensure that all variations were included e.g. "hoarding", "hoarder"). In addition, the search specified that the article must contain either the term "prevalence" or "incidence". Where possible search results were limited to human studies, adult populations (18+ years of age), and journal articles. Only English language articles were included in the review. Within the Web of Science search "Medline" and "Zoological Records" were excluded, to avoid duplication (as Medline was searched independently) and to avoid returning animal studies. Further limitations were placed on the Web of Science search by excluding irrelevant areas such as toxicology, architecture, energy fields, optics etc (Appendix A). Searches of the three

databases returned 267, 73, and 16 results respectively. After the removal of duplicates, 288 papers remained for further evaluation. References quoted in the identified papers were hand-searched for any further eligible papers, with one additional paper being identified.

Inclusion and exclusion criteria

Papers were considered relevant if they reported prevalence data regarding hoarding. The minimum required sample size was calculated using the conventional formula (Daniel, 1999; Lwanga & Lemeshow, 1991; Naing, Winn, & Rusli, 2006).

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Where n = sample size,
Z = Z statistic for level of confidence,
P = expected prevalence,
d = precision

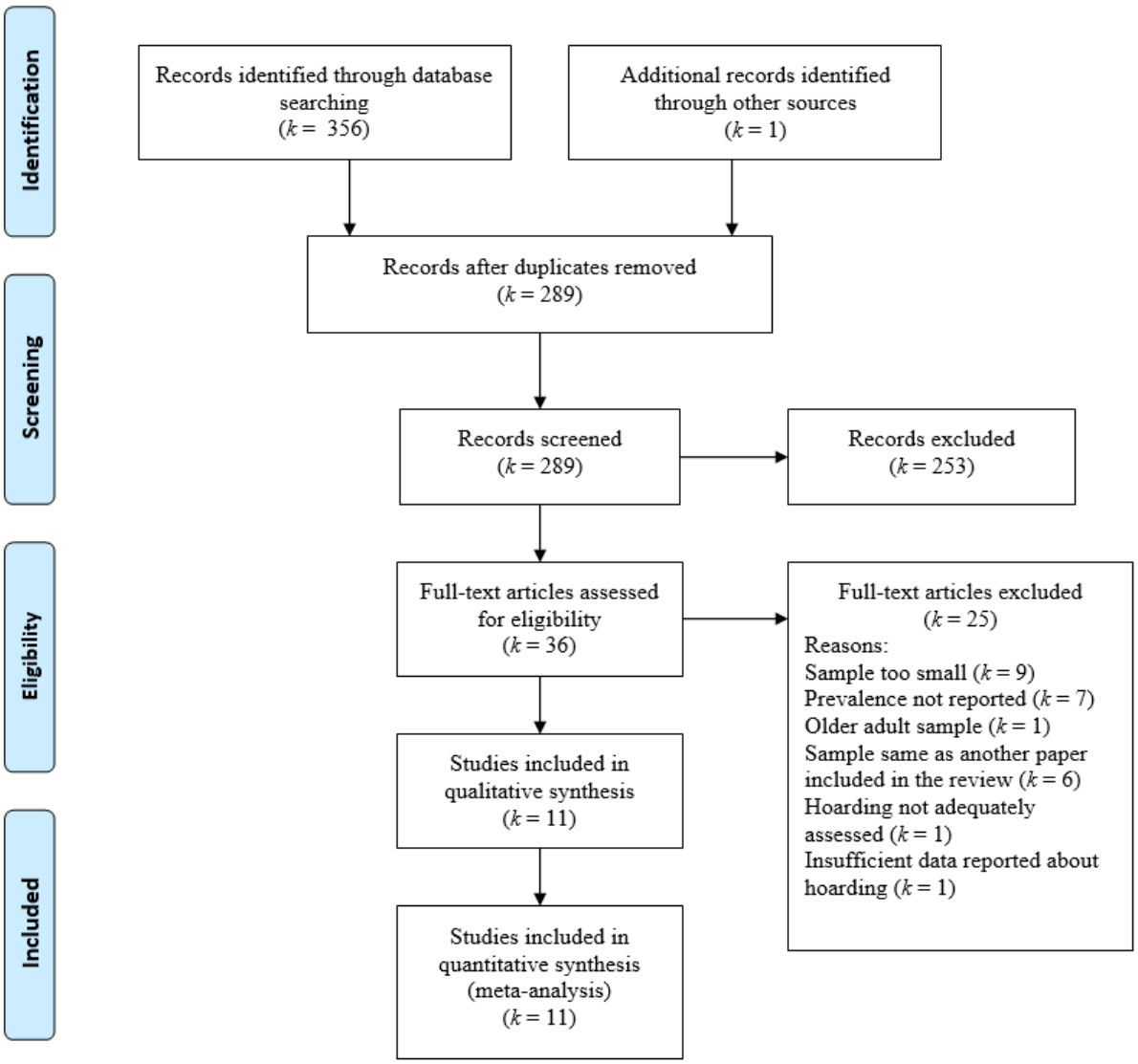
The expected prevalence was set to 1.5% (P = 0.015), a value gained from a recent and commonly cited prevalence estimate (Nordsletten, Reichenberg, et al., 2013). As the expected prevalence was less than 10%, the precision was set to half of P, or 0.0075, as per recommendations (Naing et al., 2006). The confidence interval value was set to 95% (Z = 1.96). Consequently, it was calculated (Appendix B) that only studies with a community sample of 1,009 participants were eligible for inclusion and this was therefore an appropriately conservative sampling method.

Only articles available in English were included. Articles were excluded if they did not relate to hoarding, did not report original study data (e.g. reviews, book chapters), considered clinical samples only, were comparative studies (e.g. comparing a clinical group with a control group), focused solely on relatives of hoarders or clinicians, reported qualitative data only, evaluated child/adolescent populations only, or did not report sufficient data. The process of paper selection is presented as a PRISMA diagram (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009) in

Figure 1. Initially titles of all 289 non-duplicate papers were scrutinised and 224 articles were excluded based on their title or abstract. Full texts of the remaining 36 papers were examined and 25 were excluded. A total of 11 papers were deemed eligible and were included in the review.

Figure 1

PRISMA diagram



Data extraction

The following data was extracted from the studies: country, sample size, sample age range, sample mean age, response rate, percentage females in sample, hoarding assessment tool, method of collection/assessment, type of prevalence assessed, and reported HD prevalence.

Assessing risk of bias

Risk of bias was assessed using a validated tool developed to assess the methodological quality of prevalence studies (Appendix C; Hoy et al., 2012). The tool consists of 10 items that assess both internal validity (measurement bias) and external validity (selection and non-response bias). Papers are categorised as being at either low, moderate, or high risk of bias. Having excluded one item from the tool, Thomas, Sanders, Doust, Beller, and Glasziou (2015) considered studies to be at high risk of bias if they met the criteria for low risk of bias on 3 items or less. Studies that met criteria for 4 or 5 items were classified as being at moderate risk of bias, and those that met criteria for 6 or more were considered to be at low risk of bias. Taylor, Goode, George, and Cook (2014) defined risk of bias using the following values: low (0-3 high-risk items), moderate (4-5 high-risk items), high (6 or more high-risk items). The current study adopted the categories as reported by Taylor et al. (2014). If the information related to an item was unclear in the original study, high risk of bias was recorded for that item.

All of the studies were rated by a second rater. Three of the studies were selected at random and rated by rater 2, a trainee clinical psychologist and the remaining nine studies were second rated by rater 3, a consultant clinical psychologist. To evaluate inter-rater reliability, the intraclass correlation co-efficient (ICC) estimates were calculated using a two-way mixed effects model. Results indicated a moderate degree of reliability between both rater 1 and rater 2: ICC = 0.704, 95% CI: [0.386, 0.858], and good agreement between rater 1 and rater 3 ICC = 0.761, 95% CI: [0.611, 0.836] (Koo & Li, 2016). Disagreements between the raters were discussed until consensus was reached.

Meta-analysis

The statistical software package Comprehensive Meta-Analysis version 3 (Borenstein, Hedges, Higgins, & Rothstein, 2018) was used for the prevalence meta-analysis. The unit of data analysed was the estimated prevalence of HD. A random-effects model was used, as it could not be assumed that the studies were functionally identical. Studies were weighted by the inverse of their variance. Therefore, studies with larger samples yielded more precise estimates of the population effect size and so had greater weight towards the estimated mean (Borenstein, Hedges, Higgins, & Rothstein, 2010).

Publication bias was assessed by examining a funnel plot depicting the estimates of each of the studies, following guidelines by Sterne et al. (2011). It is expected that 95% of studies will fall within the funnel plot lines that represent 1.96 standard errors, if no bias is present. Reliance on visual inspection of funnel plots has been criticised as being unreliable (Terrin, Schmid, & Lau, 2005) and lacking in statistical power (Sterne et al., 2011). As such, publication bias was also evaluated statistically using Egger's regression intercept, whereby *P* values of less than 0.1 indicate statistically significant asymmetry (Egger, Smith, Schneider, & Minder, 1997). Heterogeneity was calculated using Cochran's *Q* statistic, where a significant *P* value ($P < 0.05$) indicates statistically significant differences between the studies, and Higgins' I^2, where it has been suggested that a value of 0.25 indicates low heterogeneity, 0.50 indicates medium heterogeneity, and 0.75 equals high heterogeneity (Higgins, Thompson, Deeks, & Altman, 2003).

Moderator analysis was used to assess the association between prevalence and the categorical variables "prevalence type", "method of data collection", and "study quality" (i.e. overall risk of bias rating). Large variation in where studies were conducted made the categorical variable of location inappropriate for moderator

analysis. As heterogeneity was detected, meta-regression was used to assess the association between prevalence and continuous variables: year of publication, proportion of females (gender) and response rate (Thompson & Higgins, 2002). Sample mean age was not analysed as only $k = 5$ studies reported this information.

Results

A total of k = 11 studies, with n = 53,378 participants were included in the meta-analysis. One of these studies, (Ivanov et al., 2017), reported two different samples based on age, therefore these were treated as separate samples for the analysis. An overview of the study characteristics is presented in Table 1.

Study characteristics

The majority of the samples included in the analysis were sourced from Europe. Two samples originated in Sweden (as part of the same study), two were from the Netherlands, two from Germany, and two from the United Kingdom. The remaining samples were sourced from Italy, Australia, Singapore, with a final sample consisting of participants across six countries (Belgium, France, Germany, Italy, Netherlands and Spain). No single research group has completed more than one prevalence study. Seven of the samples assessed presence of HD using self-report measures, whilst a further two had participants complete self-report measures in the presence of a researcher. The self-report measure used most often was the Hoarding Rating Scale (Tolin, Frost, & Steketee, 2010) and this was used in 6/12 samples. Three studies assessed participants by interview: Fullana et al. (2010) and Subramaniam et al. (2014) reported using the Composite International Diagnostic interview (Wittchen, 1994),whereas Nordsletten et al. (2013) used the Structured Interview for Hoarding Disorder (Nordsletten, Fernández de la Cruz, et al., 2013). Response rates ranged from 35.9% to 75.9%. The proportion of females ranged from 54.9% to 89.3%. Publication dates of the studies ranged from 2009 to 2017.

HD prevalence

Ten point prevalence estimates (N = 43,958) and two lifetime HD prevalence estimates (N = 9420) were identified and included in the meta-analysis, with a collective

total of *N* = 53,387 participants. Point prevalence estimates ranged from 0.8% to 6.03%, and the two lifetime prevalence estimates were 0.8% and 3.5%. The pooled point prevalence estimate for the studies was 2.6%, 95% confidence interval: [1.7 - 3.7%], and the pooled lifetime prevalence estimate was 1.7%, 95% confidence interval: [0.4-6.8%]. There was no significant difference between the pooled lifetime and pooled point prevalence estimates (see covariate analysis). Under the random effects model the overall pooled prevalence estimate for the studies was 2.5%, with a 95% confidence interval of 1.7% to 3.6% (Table 2). Visual inspection of the funnel plot (Figure 2) suggests an asymmetrical distribution. Egger's regression intercept did not indicate statistically significant asymmetry ($p = 0.114$). However, there was high heterogeneity between the studies ($Q = 466.521$, $df = 11$, $p < 0.01$, $I^2 = 97.642$).

Figure 2

Funnel plot distribution of standard error

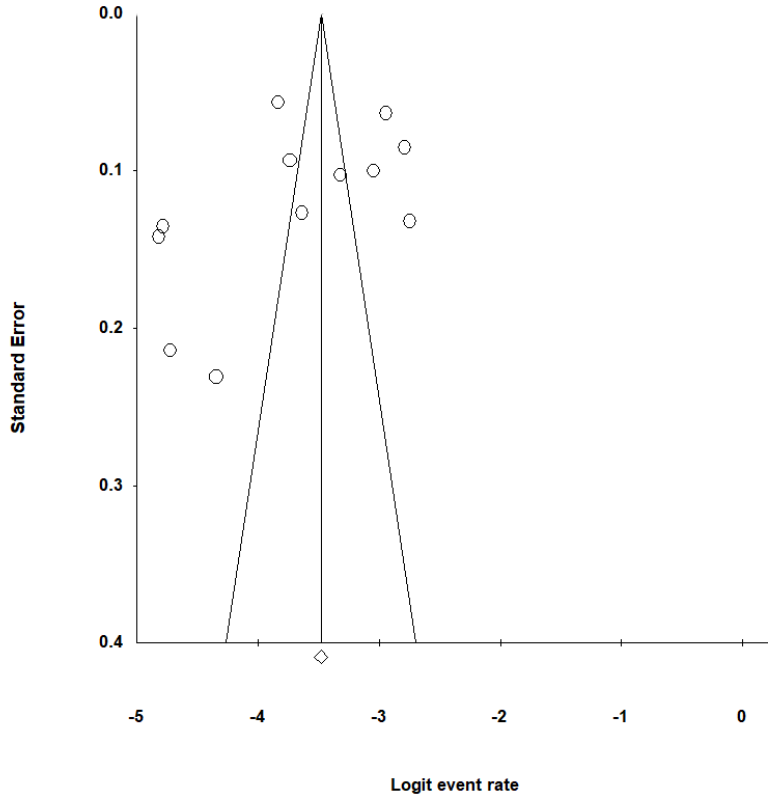


Table 1

Study characteristics

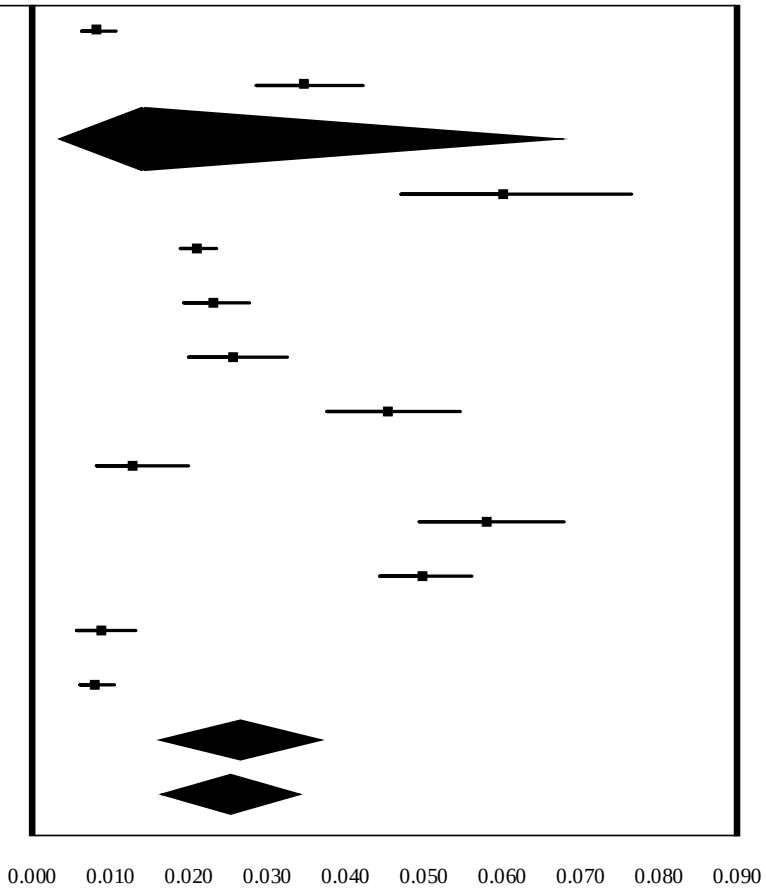
Reference	Authors (Year)	Country	Data collection method	N	Response rate (%)	Sample mean age (range)	Female (%)	Instrument	Prevalence Type	Hoarding prevalence (%)
1	Bulli, Melli, Carraresi, & Stopani (2014)	Italy	Self report survey	1012	NR	36.6 (18-84)	62.7	SI-R	Point	6.03
2	Cath, Nizar, Boomsma, & Mathews (2017)	Netherlands	Self report survey	15194	45	NR	64	HRS-SR	Point	2.12
3	Iervolino et al. (2009)	UK	Self report survey	5022	60.41	55.5 (17-86)	89.3	HRS-SR	Point	2.3
4	López-Solà et al. (2014)	Australia	Self report survey	2495	35.9	NR	58.8	HRS-SR	Point	2.57
5	Mueller et al. (2009)	Germany	Self report with assistance	2307	61.9	NR	54.9	German Compulsive Hoarding Inventory (adapted SI-R)	Point	4.55
6	Nordsletten et al. (2013)	UK	Interview	1482	51.9	NR	56.5	SIHD, MINI, HRS-SR	Point	1.3
7	Subramaniam et al. (2014)	Singapore	Interview	6616	75.9	NR	NR	CIDI	Lifetime	0.8
8	Timpano et al. (2011)	Germany	Self report with assistance	2512	54.25	48.8 (14-94)	55.8	German Hoarding Rating Scale and DSM criteria	Point	5.8
9	Zilhão, Smit, Boomsma, & Cath (2016)	Netherlands	Self report survey	5221	NR	33.61	NR	HRS-SR	Point	5
10	Fullana et al. (2010)	Belgium, France, Germany, Italy, Netherlands, Spain	Interview	2804	61.2	NR	58.9	Single question in the CIDI	Lifetime	3.5
11	Ivanov et al. (2017)a	Sweden	Self report survey	2495	48	18	58	HRS-SR	Point	0.9
12	Ivanov et al. (2017)b	Sweden	Self report survey	6218	38	23.8 (20-28)	61	HRS-SR	Point	0.8

CIDI = Composite International Diagnostic Interview; HRS-SR = Hoarding Rating Scale - Self Report; MINI = Mini International Neuropsychiatric Interview;
SIHD = Structured Interview for Hoarding Disorder; SI-R = Saving Inventory Revised. NR = Not reported.

Table 2

Forest plot of prevalence estimates

Study	Event rate	Lower Limit	Upper Limit
Subramaniam et al. (2014)	0.008	0.006	0.011
Fullana et al. (2010)	0.035	0.029	0.042
Lifetime	**0.017**	**0.004**	**0.068**
Bulli, Melli, Carraresi, & Stopani (2014)	0.060	0.047	0.077
Cath, Nizar, Boomsma, & Mathews (2017)	0.021	0.019	0.024
Iervolino, et al. (2009)	0.023	0.019	0.028
López-Solà et al. (2014)	0.026	0.020	0.033
Mueller et al. (2009)	0.046	0.038	0.055
Nordsletten et al. (2013)	0.013	0.008	0.020
Timpano et al. (2011)	0.058	0.050	0.068
Zilhão, Smit, Boomsma, & Cath (2016)	0.050	0.044	0.056
Ivanov et al. (2017)a	0.009	0.006	0.013
Ivanov et al. (2017)b	0.008	0.006	0.011
Point	**0.026**	**0.017**	**0.037**
Overall	**0.025**	**0.017**	**0.036**



Risk of Bias

Overall the risk of bias across the studies was low (Table 3). Of the 12 samples, across 11 studies, 11 were deemed to be at low risk of bias and 1 (López-Solà et al., 2014) was rated as being at moderate risk of bias. None of the prevalence studies were rated as being at high risk of bias. All bar one of the studies used acceptable definitions of HD and all bar two employed valid case detection methods. Both Fullana et al. (2010) and Subramaniam et al.(2014) used the Composite International Diagnostic Interview which is limited in its assessment of HD, with Fullana et al. (2010) reporting that hoarding caseness was determined with a single question. All numerators and denominators were appropriate and no errors in reporting were detected. The largest possible source of bias across the studies related to response rates (Figure 3). Hoy et al. (2012) stipulate that a study is at high risk of bias if the response rate is less than 75%, with risk of bias increasing when researchers fail to carry out or report statistical comparisons of responders and non-responders. Of the 12 samples, only two were deemed to be at low risk of response related bias: one study (Subramaniam et al., 2014) achieved a response rate of over 75%, and the other (Cath et al., 2017) reported comparison of responders and non-responders showing no differences. Two studies (Bulli et al., 2014; Zilhão et al., 2016) did not report response rates, and did not report sufficient detail for the response rate to be calculated. The mean response rate was 53.25%. Another significant potential source of bias was how representative the study population was of the national population. Half of the studies included in the review were deemed at high risk of bias on this item. For example, the percentage of female participants in the sample ranged from 54.9% to 89.3% suggesting a bias towards majority female samples.

Table 3

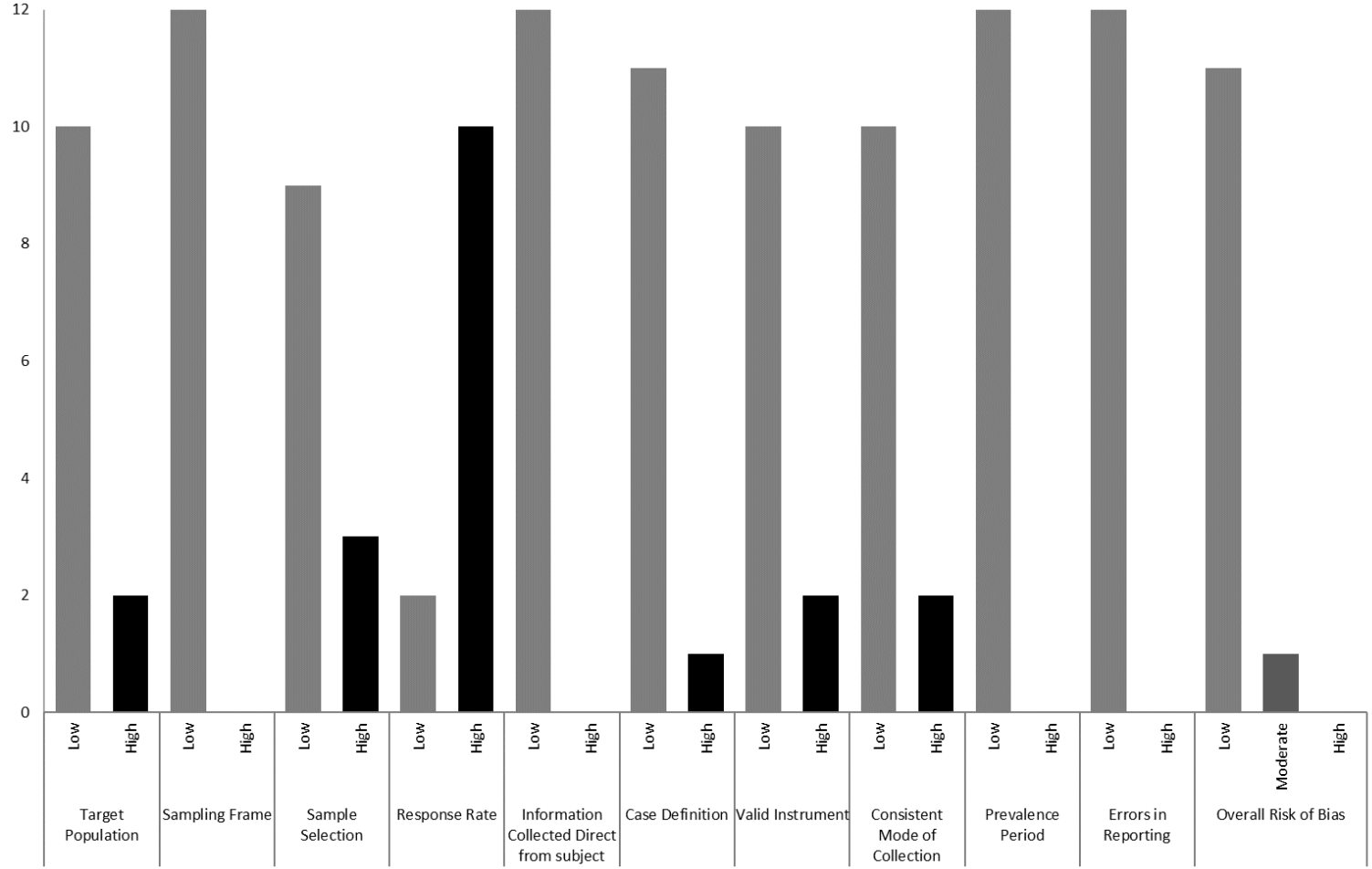
Risk of bias ratings for each study

Study	Target Population	Sampling Frame	Sample Selection	Response Rate	Information Collected Direct from subject	Case Definition	Valid Instrument	Consistent Mode of Collection	Prevalence Period	Errors in Reporting	Overall Rating
Bulli, Melli, Carraresi & Stopani (2014)	✓	✓	✗	✗	✓	✓	✓	✗	✓	✓	Low
Cath, Nizar, Boomsma & Mathews (2017)	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	Low
Iervolino, et al. (2009)	✗	✓	✓	✗	✓	✓	✓	✓	✓	✓	Low
López-Solà et al. (2014)	✗	✓	✗	✗	✓	✓	✓	✗	✓	✓	Moderate
Mueller et al. (2009)	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	Low
Nordsletten et al. (2013)	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	Low
Subramaniam et al. (2014)	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	Low
Timpano et al. (2011)	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	Low
Zilhão, Smit, Boomsma & Cath (2016)	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	Low
Fullana et al. (2010)	✓	✓	✓	✗	✓	✗	✗	✓	✓	✓	Low
Ivanov et al. (2017)a	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	Low
Ivanov et al. (2017)b	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	Low

Tick indicates risk of bias criteria met therefore low risk of bias; cross indicates risk of bias criteria not met therefore high risk of bias

Figure 3

Summary of risk of bias across all included study samples



Covariate analysis

Moderator analysis indicated no effect for prevalence type (lifetime, point), $Q_{between}$ = 0.285, *df* = 1, *p* = 0.593. Moderator analysis for study quality (overall risk of bias score, 2 levels: low, moderate) was also found to be non-significant, $Q_{between}$ = 0.113, *df* = 1, *p* = 0.736, as was the moderator analysis for "method of data collection" (3 levels: self-report survey, self-report with assistance and clinical interview), $Q_{between}$ = 4.524, *df* = 2, *p* = 0.104. Meta-regression indicated non-significant effects for response rate (Coefficient = 0.5973, *Q* = 0.10, *p* = 0.7516, Tau^2 = 0.4585), gender (Coefficient = -0.4805, *Q* = 0.05, *p* = 0.8179, Tau^2 = 0.3837) and year of publication (Coefficient = -0.1164, *Q* = 3.04, *p* = 0.0811, Tau^2 = 0.4440).

Discussion

The aim of this review was to systematically identify all relevant studies that have reported prevalence data for HD, to summarise these studies and to calculate a pooled estimate of the prevalence of HD using meta-analytic techniques. Through the systematic literature review, eleven studies were identified, reporting ten point prevalence estimates and two lifetime prevalence estimates. The pooled point prevalence estimate for HD was 2.6%, 95% confidence interval: [1.7-3.7%], and the pooled lifetime prevalence HD estimate was 1.7%, 95% confidence interval: [0.4-6.8%]. There was no significant difference between the pooled lifetime and pooled point prevalence estimates. The overall pooled prevalence estimate for the studies was therefore 2.5%, 95% confidence interval: [1.7-3.6%]. Potential for publication bias was identified via an asymmetrical funnel plot. As many of the studies were not reporting prevalence as a primary outcome, it is unlikely that this asymmetry was solely due to publication bias. There are several other causes of asymmetry other than publication bias such as study heterogeneity, chance and the selection of HD assessment measures

used (Tang & Liu, 2000). Significant heterogeneity was present in reported estimates, which may be a more likely explanation for the asymmetrical distribution. Heterogeneity occurs when results vary from study to study due to differences in the study design and methodology (Terrin et al., 2005).

In terms of the lack of difference between the lifetime prevalence and point prevalence estimates, existing research suggests that HD is a chronic condition and therefore there may be little difference between point and lifetime prevalence rates. For example, in an untreated sample of $N = 751$ adults with self-reported hoarding symptoms, Tolin, Meunier, Frost, and Steketee (2010) found that 73% followed a chronic course, with less than 1% indicating improvement. Individuals presenting with HD at a single point in time (point prevalence) are likely to continue to meet criteria. Research also suggests that the onset of HD typically occurs before adulthood (Grisham et al., 2006). Due to the typical age of onset and chronic nature of HD it is likely that the prevalence of HD is relatively stable across adult populations, therefore point prevalence and lifetime prevalence are likely to be analogous.

No statistically significant effects were found for the method of HD assessment, study quality, response rate, gender and year of publication. However, although Cochran's *Q* often has high power for detecting statistical tests of main effects, it is often underpowered when used for moderator analyses (Hedges & Pigott, 2004). Thompson and Higgins (2002) concluded that as the number of studies included in systematic reviews is often low, the potential for robust conclusions based on meta-regression analyses can be limited. Given the small number of prevalence studies in the current review, it is therefore difficult to determine whether there truly was no effect, or whether the non-significant findings were due to the meta-regression being underpowered.

Studies in the current review differed in terms of the assessment methods used to detect HD. Six of the twelve prevalence estimates were based on HD detected using the Hoarding Rating Scale-Self Report (Tolin, Frost, et al., 2010). A further study used a version of this tool adapted for use in Germany, whilst another used a different self-report measure (Saving Inventory-Revised; Frost et al., 2004). Only three studies used clinical interviews to assess HD (Fullana et al., 2010; Nordsletten, Reichenberg, et al., 2013; Subramaniam et al., 2014). Although these differences in how HD was assessed may have contributed to the heterogeneity detected, it is important to recognise the limitations imposed by studies of prevalence of HD that relied solely upon participant self-report. Self-criticism and shame have been shown to be positively associated with HD (Chou et al., 2018) and it has been suggested that this may be in response to feeling "personally defective" due to high levels of clutter (Weingarden & Renshaw, 2015). High levels of shame may discourage people with HD from self-reporting the presence and severity of their hoarding due to social desirability response bias (Huang, Liao, & Chang, 1998). And so prevalence estimates based on self-report indices might under estimate true prevalence. Additionally, insight can vary greatly amongst people with HD, with a large proportion judged to have poor insight (Kim et al., 2001; Tolin, Fitch, Frost, & Steketee, 2010). Individuals with less insight into their hoarding may therefore also be unreliable sources of self-report hoarding prevalence. Additionally, tools used to assess for HD such as the Composite International Diagnostic Interview and Saving Inventory-Revised may not have accurately detected HD, as they were devised prior to the implementation of the DSM-V definition. Recent research suggests that the Saving Inventory-Revised may be satisfactory for identifying HD (Ayers, Dozier, & Mayes, 2017), whilst the Hoarding Rating Scale-Self Report reflects the DSM-V criteria for HD (Cath et al., 2017).

The sample of studies in the current review were all conducted predominantly in developed Western countries. Therefore, this study has generated a pooled prevalence estimate of HD which is specific to developed nations. This review has wholly neglected the possible prevalence of HD in developing nations, due to absence of evidence. Studies using twin samples would imply that approximately 50% of HD could be explained by the contribution of genetic factors (Iervolino et al. 2009). This evidence would imply that if a prevalence study were to be conducted in the developing nations, then HD would be present, albeit possibly at slightly lower rates. Nine studies did not meet criteria for inclusion in the review, because sample sizes were inadequate. The quality of the studies included in the current review was relatively high, with one (López-Solà et al., 2014) scoring moderate overall risk of bias, and the remaining studies scoring low overall risk of bias. The inclusion criteria demanded a large minimal sample size based on an expected HD prevalence of 1.5%. However, response rates across studies were an issue. It is recommended that in prevalence studies the response rate should be at least 75% (Hoy et al., 2012). Inspection of the individual risk of bias items revealed that a large proportion (11/12) of the samples did not meet this recommended response rate criteria of 75%. The studies were generally methodologically rigorous in their use of appropriate sampling frames, collecting data directly from participants, and using appropriate prevalence periods and case definitions.

Limitations

The current review has several limitations. Only twelve samples taken from eleven studies were identified and included in the analysis which is a relatively small sample for a meta-analysis. A considerable risk of this is that the estimate of error may be unreliable and inaccurate, therefore the summary and confidence interval may be

erroneous and should be considered with an understanding of this potential confound (Borenstein, Hedges, Higgins, & Rothstein, 2009). The sample did not include any studies conducted in developing countries therefore it would be inappropriate to attempt to generalise to these countries, or to conclude that HD is a global clinical phenomenon. This bias in sampling may be a result of the methodology, in that only papers available in English were eligible for inclusion in the review. However, it is possible that less research is conducted and published in developing nations. Research into HD in non-Western countries has begun, with results indicating that the core features of HD may be stable across cultures (Nordsletten et al., 2018). Clearly, further research into the epidemiology and etiology of HD in non-Western cultures is needed. In terms of the reliability and validity of the measures used to assess for HD, then any small error applied over the large datasets used in the current study may have produced a relevant and non-negligible number of cases that were falsely classified in the original studies. Therefore, the overall prevalence rate produced may have been affected by a number of "false positives" in terms of meeting the full clinical syndrome of HD. The current meta-analysis identified a low prevalence base rate for HD. Any mental health disorder with a relatively low base rate is also prone to yielding a high "false positive" rate that can often exceed the false negative rate (Baldessarini, Finklestein, & Arana, 1983).

The current review focused on the adult prevalence and did not consider the impact of age on HD prevalence. Research strongly suggests that hoarding symptoms may begin in childhood and adolescence (Grisham et al., 2006), with severity of symptoms potentially increasing with age (Ayers, Saxena, Golshan, & Wetherell, 2010). Cath et al. (2017) found that in a sample of 15,194 participants, hoarding severity increased reliably with age, beginning at around age 30-35, with the highest prevalence rates being amongst individuals aged over 65. Given this evidence, it could be argued

that the results of the current review are an oversimplified estimation of HD prevalence. However, the limited volume of HD prevalence data currently published makes it impractical to complete a meta-analysis of specific age bands. It is recommended that future prevalence studies collate and analyse HD prevalence data by participant age bands, and again this would demand planning to collect large samples. Then, a future meta-analysis could assess for changes in HD prevalence that occur with age.

Research implications

The findings of this review carry implications for the design of future HD prevalence studies. Often the type of prevalence being assessed (i.e. point, period, or lifetime) was not explicitly stated in the published article. Future studies should explicitly state the type of prevalence assessed. Participant response rates were mostly below the level recommended by Hoy et al. (2012) therefore further attempts should be made to maximise response rates. Strategies that have been shown to be effective in improving survey response rates include providing monetary incentive, personalising questionnaires and letters, using colour ink, and sending surveys by recorded delivery (Edwards et al., 2002). It is also recommended that studies conduct comparisons of responders and non-responders (Hoy et al., 2012) and consistently report the findings of these analyses. If no significant difference is found between the groups in terms of relevant demographic characteristics (e.g. age, gender, socio-economic status) then it can be argued that a sample is demonstrably at low risk of bias.

Future prevalence studies should seek to recruit a sufficient number of participants based on a priori calculations, such as the one conducted in this review. Given the pooled HD prevalence estimate of 2.5% (95% confidence interval: [1.7-3.6%]) reported in this study, studies should seek to recruit at least $N = 599$ participants. Ideally studies should ideally seek to recruit $N = 889$ participants (calculation based on

the lower limit of the 95% confidence interval, i.e. 1.7% prevalence). Had this minimal sample size been used as the inclusion criteria for this review, an additional paper would have been eligible. Samuels et al. (2008) reported an unweighted prevalence of 3.7% in a sample of $N = 735$ participants. This study was methodologically limited in similar way to the studies included in the review, as a response rate of only 59% was achieved, and the sample was biased towards females (63.3%).

In terms of assessment of HD in future prevalence studies, then a far more robust assessment method would be to triangulate self-report, clinical interview and also an environmental assessment of the home, in a method similar to that used by Nordsletten et al. (2013). It is proposed that the Hoarding Rating Scale-Self Report (Tolin, Frost, et al., 2010) and the Savings Inventory-Revised (Frost et al., 2004) are appropriately validated self-report hoarding measures, the Hoarding Rating Scale-Interview (Tolin, Frost, et al., 2010) and the Structured Interview for Hoarding Disorder (Nordsletten, de la Cruz, et al., 2013) are valid clinical interview formats, and the Clutter Image Rating Scale (Frost, Steketee, Tolin, & Renaud, 2008) is a valid measure of environmental clutter. Triangulation would lower the risk of both false positives and false negatives in future HD prevalence studies.

Conclusion

The results of this review indicate that the prevalence of HD appears relatively low and consistent across a range of Western/developed countries. Due to the pre-adulthood onset and subsequent chronicity of HD, point and lifetime prevalence are likely to be analogous. The pooled prevalence estimate of HD in the populations studied was 2.5%. There was however significant variation between studies in terms of response rates, location, gender proportions and assessment tools used. The analysis of the influence of these differences was also potentially underpowered due to the small

number of published studies. Although this review suggests more than 2 in 100 people in the community might meet diagnostic criteria for HD, people with HD may not seek help from services due shame and also may not participate in epidemiological research due to lack of insight. Future HD prevalence studies need to plan for large samples ($N >$ 889), clearly define the type of prevalence being assessed, triangulate assessment methods and report comparison of responders with non-responders. The aggregation of studies and calculation of an estimated prevalence provided by this review should enable services to better evaluate their detection of HD cases. The need for further research into the prevalence of HD in developing countries and across different age groups is indicated.

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Appendix A

Search terms

PsycInfo

(Hoard*) in abstract

and (prevalence or incidence) all fields.

Limits:

Empirical human populations: adulthood 18+

Age groups: Adulthood (18+)

Document types: journal article

Population groups: Human

Publication types: peer reviewed journal

English language

Results: 267

Medline

Hoard* (abstract)

Prevalence or incidence (all fields)

Limits:

Age Groups: adult 19+ years

Languages: English

Checktags: Humans

Publication types: Journal article

Results: 73

Web of science

Title or topic = hoard* (5868)

And title or topic = (prevalence or incidence) (2140378)

Limits:

Language: English

Exclude: medline and zoological records

Exclude areas: e.g. geography, architecture, toxicology

Results: 16

Appendix B

Sample calculations

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Z = 1.96 (95% confidence)

P = 0.015 (1.5% prevalence taken from Nordsletten et al., 2013)

d = 0.0075 (half of prevalence)

$$= \frac{3.8416 \times 0.015(1-0.015)}{0.0075^2}$$

$$= \frac{3.8416 \times 0.014775}{0.00005625}$$

$$= \frac{0.05675964}{0.00005625}$$

= 1009.060

Calculation of sample size given pooled estimate of 2.5%

Z = 1.96
P = 0.025
d = 0.0125

$$= \frac{3.8416 \times 0.025\ (1-0.025)}{0.0125 \times 0.0125}$$

$$= \frac{3.8416 \times 0.024375}{0.00015625}$$

= 599.3

Calculation based on lower limit of 95% confidence interval of 1.7%

Z = 1.96
P = 0.017
d = 0.0085

$$= \frac{3.8416 \times 0.017(1-0.017)}{0.0085*0.0085}$$

$$= \frac{3.8416 \times 0.016711}{0.00007225}$$

= 888.5

Appendix C
Hoy et al. (2012) Risk of Bias Tool

Appendix 1: Risk of Bias Tool
Name of author(s):_____ Year of publication:_____

Name of paper/study:-

_____

This tool is designed to assess the risk of bias in population-based prevalence studies. Please read the additional notes for each item when initially using the tool. Note: If there is insufficient information in the article to permit a judgement for a particular item, please answer **No (HIGH RISK)** for that particular item.

Risk of bias item	Criteria for answers (please circle one option)	Additional notes and examples
External Validity		
1. Was the study's target population **a close representation** of the national population in relation to relevant variables, e.g. age, sex, occupation?	• **Yes (LOW RISK):** The study's target population was a close representation of the national population. • **No (HIGH RISK)**: The study's target population was clearly NOT representative of the national population.	The **target population** refers to the group of people or entities to which the results of the study will be generalised. Examples: • The study was a national health survey of people 15 years and over and the sample was drawn from a list that included all individuals in the population aged 15 years and over. The answer is: **Yes (LOW RISK).** • The study was conducted in one province only, and it is not clear if this was representative of the national population. The answer is: **No (HIGH RISK).** • The study was undertaken in one village only and it is clear this was not representative of the national population. The answer is: **No (HIGH RISK).**
2. Was the sampling frame a **true or close representation** of the target population?	• **Yes (LOW RISK):** The sampling frame was a **true or close** representation of the target population. • **No (HIGH RISK)**: The sampling frame was NOT a **true or close** representation of the target population.	The **sampling frame** is a list of the sampling units in the target population and the study sample is drawn from this list. Examples: • The sampling frame was a list of almost every individual within the target population. The answer is: **Yes (LOW RISK)**. • The cluster sampling method was used and the sample of clusters/villages was drawn from a list of all villages in the target population. The answer is: **Yes (LOW RISK)**. • The sampling frame was a list of just one particular ethnic group within the overall target population, which comprised many groups. The answer is: **No (HIGH RISK).**
3. Was some form of **random selection** used to select the sample, OR, was a census undertaken?	• **Yes (LOW RISK):** A census was undertaken, OR, some form of random selection was used to select the sample (e.g. simple random sampling, stratified random sampling, cluster sampling, systematic sampling). • **No (HIGH RISK)**: A census was NOT undertaken, AND some form of random selection was NOT used to select the sample.	A census collects information from every unit in the sampling frame. In a survey, only part of the sampling frame is sampled. In these instances, random selection of the sample helps minimise study bias. Examples: • The sample was selected using simple random sampling. The answer is: **Yes (LOW RISK)**. • The target population was the village and every person in the village was sampled. The answer is: **Yes (LOW RISK)**. • The nearest villages to the capital city were selected in order to save on the cost of fuel. The answer is: **No (HIGH RISK).**
4. Was the likelihood of **non-response bias minimal?**	• **Yes (LOW RISK):** The response rate for the study was >/=75%, OR, an analysis was performed that showed no significant difference in relevant demographic characteristics between responders and non-responders • **No (HIGH RISK)**: The response rate was <75%, and if any analysis comparing responders and non-responders was done, it showed a significant difference in relevant demographic characteristics between responders and non-responders.	Examples: • The response rate was 68%; however, the researchers did an analysis and found no significant difference between responders and non-responders in terms of age, sex, occupation and socio-economic status. The answer is: **Yes (LOW RISK)**. • The response rate was 65% and the researchers did NOT carry out an analysis to compare relevant demographic characteristics between responders and non-responders. The answer is: **No (HIGH RISK)**. • The response rate was 69% and the researchers did an analysis and found a significant difference in age, sex and socio-economic status between responders and non-responders. The answer is: **No (HIGH RISK)**.

Internal Validity		
5. Were data collected **directly from the subjects** (as opposed to a proxy)?	• **Yes (LOW RISK):** All data were collected directly from the subjects. • **No (HIGH RISK)**: In some instances, data were collected from a proxy.	A proxy is a representative of the subject. Examples: • All eligible subjects in the household were interviewed separately. The answer is: **Yes (LOW RISK)**. • A representative of the household was interviewed and questioned about the presence of low back pain in each household member. The answer is: **No (HIGH RISK)**.
6. Was an acceptable case definition used in the study?	• **Yes (LOW RISK):** An acceptable case definition was used. • **No (HIGH RISK)**: An acceptable case definition was NOT used.	• For a study on low back pain, the following case definition was used: "Low back pain is defined as activity-limiting pain lasting more than one day in the area on the posterior aspect of the body from the bottom of the 12th rib to the lower gluteal folds." The answer is: **Yes (LOW RISK)**. • For a study on back pain, there was no description of the specific anatomical location 'back' referred to. The answer is: **No (HIGH RISK)**. • For a study on osteoarthritis, the following case definition was used: "Symptomatic osteoarthritis of the hip or knee, radiologically confirmed as Kellgren-Lawrence grade 2-4". The answer is: LOW RISK.
7. Was the study instrument that measured the parameter of interest (e.g. prevalence of low back pain) shown to have **reliability and validity (if necessary)**?	• **Yes (LOW RISK):** The study instrument had been shown to have reliability and validity (if this was necessary), e.g. test-re-test, piloting, validation in a previous study, etc. • **No (HIGH RISK)**: The study instrument had NOT been shown to have reliability or validity (if this was necessary).	• The authors used the COPCORD questionnaire, which had previously been validated. They also tested the inter-rater reliability of the questionnaire. The answer is: **Yes (LOW RISK)**. • The authors developed their own questionnaire and did not test this for validity or reliability. The answer is: **No (HIGH RISK)**.
8. Was the **same mode of data collection** used for all subjects?	• **Yes (LOW RISK):** The same mode of data collection was used for all subjects. • **No (HIGH RISK)**: The same mode of data collection was NOT used for all subjects.	The mode of data collection is the method used for collecting information from the subjects. The most common modes are face-to-face interviews, telephone interviews and self-administered questionnaires. Examples: • All eligible subjects had a face-to-face interview. The answer is: **Yes (LOW RISK)**. • Some subjects were interviewed over the telephone and some filled in postal questionnaires. The answer is: **No (HIGH RISK)**.
9. Was the **length of the shortest prevalence period** for the parameter of interest appropriate?	• **Yes (LOW RISK):** The shortest prevalence period for the parameter of interest was appropriate (e.g. point prevalence, one-week prevalence, one-year prevalence). • **No (HIGH RISK)**: The shortest prevalence period for the parameter of interest was not appropriate (e.g. lifetime prevalence)	The prevalence period is the period that the subject is asked about e.g. "Have you experienced low back pain over the previous year?" In this example, the prevalence period is one year. The longer the prevalence period, the greater the likelihood of the subject forgetting if they experienced the symptom of interest (e.g. low back pain). Examples: • Subjects were asked about pain over the past week. The answer is: **Yes (LOW RISK)**. • Subjects were only asked about pain over the past three years. The answer is: **No (HIGH RISK)**.
10. Were the **numerator(s) and denominator(s)** for the parameter of interest appropriate?	• **Yes (LOW RISK):** The paper presented appropriate numerator(s) AND denominator(s) for the parameter of interest (e.g. the prevalence of low back pain). • **No (HIGH RISK)**: The paper did present numerator(s) AND denominator(s) for the parameter of interest but one or more of these were inappropriate.	There may be errors in the calculation and/or reporting of the numerator and/or denominator. Examples: • There were no errors in the reporting of the numerator(s) AND denominator(s) for the prevalence of low back pain. The answer is: **Yes (LOW RISK)**. • In reporting the overall prevalence of low back pain (in both men and women), the authors accidentally used the population of women as the denominator rather than the combined population. The answer is: **No (HIGH RISK).**
11. Summary item on the overall risk of study bias		
• **LOW RISK OF BIAS:** Further research is very unlikely to change our confidence in the estimate. • **MODERATE RISK OF BIAS:** Further research is likely to have an important impact on our confidence in the estimate and may change the estimate.		
• **HIGH RISK OF BIAS:** Further research is very likely to have an important impact on our confidence in the estimate and is likely to change the estimate. •		

Part Two: Research Report

The Emotional Experience of Hoarding Disorder:

An Exploration Using Q Methodology.

Abstract

Objectives

The role that emotions play in Hoarding Disorder (HD) has been under researched. The aim of this study was to explore emotions in participants prone to hoarding using Q-methodology.

Methods

Forty-nine statements related to emotions in hoarding were generated following thematic analysis of two initial interviews. Forty-four participants (34 online, 10 offline) completed Q-sorts of the statements alongside a battery of psychometric measures. A by-person factor analysis was conducted and the clusters compared on the psychometric measures.

Results

Three participants failed to meet caseness for HD, a further seven participants failed to cluster. Four distinct participant clusters consisting a total $N = 34$ participants were identified: "emotionally overwhelmed" ($n = 11$); "social emotions" ($n = 13$); "object complexity" ($n = 6$); "object-affect fusion" ($n = 4$). The four clusters identified did not differ significantly on measures of hoarding severity, anxiety, depression, and impulsivity.

Conclusions

Complex emotions appear to be a significant component of HD. The four participant clusters elicited appeared to accurately reflect current research. This demonstrates significant emotional heterogeneity amongst people that hoard and so highlights the need for further research.

Practitioner points

- Emotions vary widely across people that hoard; some feel emotionally overwhelmed, some have complex relationships with their possessions, some are

concerned about the social impact of their hoarding, and some have strong emotional attachments to their possessions.

- The heterogeneity discovered suggests that treatments are likely to be most effective when they are matched to the individual rather than the diagnosis.
- Q-method is a valuable way of exploring emotions in HD and could be used as an outcome methodology.

Introduction

The 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association [APA], 2013) identified Hoarding Disorder (HD) as a discrete diagnosis. The DSM-5 specifies that the essential features of HD are persistent difficulties discarding possessions, regardless of their actual value, and that these difficulties result in the build-up of clutter that impedes the function of living areas. Therefore, living areas can become grossly cluttered and congested, causing clinically significant distress and impacting on the individual's wellbeing (Frost & Hartl, 1996). HD is only diagnosed if the behaviours and difficulties are persistent and not better explained by a medical condition or as being symptomatic of another mental disorder (APA, 2013). The prevalence rate of HD has been estimated at 2% to 5% (Pertusa et al., 2010) although a recent UK study estimated a lower-bound prevalence rate of 1.5% (Nordsletten et al., 2013). HD is also associated with increased physical health conditions and co-morbid mental disorders (Ayers, Iqbal, & Stricklanda, 2014; Frost, Steketee, & Tolin, 2011).

Early definitions assumed that hoarders kept items solely due to their intrinsic value (i.e. monetary value or potential future usage; APA, 2000) and hoarding was regarded as part of the diagnostic criteria for obsessive-compulsive personality disorder (OCPD) or obsessive-compulsive disorder (Mataix-Cols et al., 2010). The OCPD definition suggested that objects were of no sentimental value, however subsequent inquiry of people with HD suggested that this was not the case (Steketee, Frost, & Kyrios, 2003). The definition of HD as a subset of OCPD was challenged and it was subsequently proposed that a key attribute of hoarding was that individuals felt a strong emotional attachment to their possessions (Frost, Hartl, Christian, & Williams, 1995). This was not a new idea; the development of emotional attachment and positive affect

towards objects as a motivator for saving had been proposed almost two decades earlier (Furby, 1978). Emotional attachment to possessions is also common amongst the general population however the severity and intensity of attachment in individuals with HD is maladaptive (Kellett & Knight, 2003). Research has provided evidence supporting the role of emotional attachment in HD, and the distinction of HD from OCD. For example, Pertusa et al. (2008) found that people with HD cited emotional attachment to objects as well as their intrinsic value as prime reasons for retaining them. Steketee, Frost, and Kyrios (2003) investigated cognitive and emotional aspects of hoarding and identified four factors including excessive emotional attachment to possessions (i.e. that possessions provided emotional comfort and fears regarding potential loss of identity associated with discard).

Frost and Hartl (1996) outlined a component of emotional attachment to possessions in their cognitive-behavioural model of hoarding. The model proposes that several factors contribute to hoarding: information processing deficits, behavioural avoidance, erroneous beliefs about the nature of possessions, and problems forming emotional attachments. The emotional aspect of the model has received the least research attention (Kellett & Holden, 2014). The emotions component of the model suggested two types of emotional attachment to possessions; sentimental attachment to objects (i.e. possessions are seen as being part of oneself, so that discard feels traumatic and that possessions function as reminders of past events) and objects functioning as "safety signals" (i.e. possessions become associated with safety therefore individuals retain them to avoid the anxiety associated with discarding them (Kellett, 2007). Cherrier and Ponnor (2010) supported these concepts, finding that participants reported that their reluctance to discard possessions was due to a perceived threat to their sense of security and memory of past experiences.

The cognitive-behavioural model of hoarding was developed further by Steketee and Frost (2003) following a review of the research, suggesting that emotional attachment to possessions was associated with positive as well as negative emotions. Kellett and Holden (2014) built on this, proposing that emotional attachment in hoarding is shaped by aspects of both positive and negative affect and subsequent positive and negative reinforcement of these feelings. These mechanisms of reinforcement have also been proposed as being active during compulsive acquisition episodes (Kyrios, Frost, & Steketee, 2004). Acquisition and retention provides short term relief from negative emotions (negative reinforcement), but then incurs long term negative consequences (e.g. financial and social problems; Tolin, Frost, Steketee, Gray, & Fitch, 2008). Acquisition can also be reinforced through the positive experiences it provides such as joy, excitement, and pride (Steketee & Frost, 2013). It has been suggested that impulsivity and response inhibition may play a role in the acquisition process, however this remains poorly understood and requires further research (Rasmussen, Brown, Steketee, & Barlow, 2013).

Kellet and Holden (2014) also hypothesised that the development of positive affect towards an object could also be explained by the mere-repeated-exposure-effect (Zajonc, 1968). Positive affect has been shown to form through repeated contact with an item, regardless of whether any reinforcement is offered or whether the object is in the individual's conscious awareness. This is a robust effect that has been observed across cultures, species, and diverse stimuli (Zajonc, 2001). They argue that once a person with HD has a positive affective relationship with one possession, there is an increased likelihood that the affect becomes associated with other possessions, so that large collections of objects can be formed and then maintained.

Cognitive models of OCD have proposed that for individuals with OCD, a cognitive distortion known as "thought-action fusion" occurs. Unwanted thoughts become fused with feared actions, such that the presence of an unacceptable thought is considered to be equivalent to carrying out the action (Shafran, Thordarson, & Rachman, 1996). Kellett and Knight (2003) proposed a similar process of object-affect fusion in HD, whereby there is the merging of the emotions associated with an object and the object itself. Though not labelled as object-affect fusion, this concept is discernible within items embedded in the emotional attachment scale of the Saving Cognitions Inventory (Steketee et al. 2003) e.g. "Throwing away this possession is like throwing away a part of me", "I see my belongings as extensions of myself; they are part of who I am", and "This possession is equivalent to the feelings I associate with it". The concept of object-affect fusion is notably absent from some established hoarding measures, such as the Saving Inventory Revised (Frost, Steketee, & Grisham, 2004). Emotional attachment to possessions has been linked to elevated levels of anxiety and depression amongst people with HD (Coles, Frost, Heimberg, & Steketee, 2003; Frost et al., 2011).

In summary, a recent review suggested that people who hoard display heightened levels of emotional attachment to objects through deriving comfort from possessions, anthropomorphising objects, identity attachment, and magnified responsibility; and a call was made for more research and theory in the area (Kellett & Holden, 2014). To date only a limited number of studies have contributed to an increasing understanding of the features and characteristics of the phenomena of emotional attachment to objects in HD (Grisham et al., 2009). This is in spite of treatment resistance and poor outcome in hoarding behaviour having been linked to emotional attachment to possessions (Frost & Steketee, 1999).

A research method well suited to the investigation of the emotions in HD is that of Q methodology (Stephenson, 1935). Q methodology combines the strengths of both qualitative and quantitative methodologies and has been referred to as a "qualiquantological" method (Stenner & Stainton-Rogers, 2004). The methodology acquires the individual opinions of participants on a particular topic and uses a "by-person" factor approach to identify clusters of individuals sharing similar opinions or viewpoints on the topic (Watts & Stenner, 2005). The method enables subjective phenomena to emerge from the data, as in many qualitative approaches, and the systematic examination of differences between and amongst experiences can aid the understanding of how individuals relate to the emergent phenomena, as often addressed using qualitative methods. The product of Q methodology is the formation of a theory developed through the experiences of individuals, rather than the results from the testing of pre-determined hypotheses (Simons, 2013). Q methodology has a rich heritage and has been used in a multitude of areas: patients conceptions about what causes psychosis (Dudley, Siitarinen, James, & Dodgson, 2009), understandings of Down's syndrome (Bryant, Green, & Hewison, 2006), service user and staff opinions about an intervention (Morera, Bucci, Randal, Barrett, & Pratt, 2017), and how compulsive buyers make sense of their behaviour (Thornhill, Kellett, & Davies, 2012).

Aims

Due to the study being exploratory in nature and the first attempt to conduct a Q method investigation of emotions in HD, it was deemed premature to present specific hypotheses. The aims of this study were therefore to: (1) explore the nature of emotions in adults who hoard by enabling a Q-set to be developed from HD participants' affective experience of hoarding, (2) investigate whether there are different clusters of HD participants with differential emotional profiles, (3) investigate the association between

demographic differences and the participant clusters, (4) investigate the association between HD severity and the participant clusters, (5) investigate the association between mental health (anxiety and/or depression) and the participant clusters, and finally (6) investigate the association between impulsivity (as indexed by number of clicks and time taken to complete the Q-sort online) and the participant clusters.

Method

Ethics and Design

Ethical approval for this research study was granted by the University of Sheffield Research Ethics Committee (Appendix A). This study utilised a Q methodology design as devised by Stephenson (1935). Q methodology involves three distinct phases: 1) Q-set generation, 2) Q-sort, and 3) by-person factor analysis (Watts & Stenner, 2005). The method replicates the analytic methods used in an extant Q-sort investigating compulsive acquisition (Thornhill et al., 2012) due to this being a related topic.

Phase 1: Generation of the Q-set

The Q-set is a collection of distinct statements that participants sort in the second stage of Q methodology. The Q-set for this study consisted of a set of statements representing HD specific emotions. Q-sets can be generated using many different sources such as academic literature, informal discussions, interviews and pilot studies (Watts & Stenner, 2005) and a typical Q-set consists of between 40 and 80 statements (Stainton-Rogers, 1995). For the current study the Q-set was generated from interviews and from review of relevant research and HD assessment measures.

Interviews.

Two participants were interviewed about the possible role of emotions in HD. The first was a clinical psychologist with a special interest in HD not otherwise

associated with the current research, and the second was an individual with lived experience of HD. These participants were chosen to enable the formation of a Q-set based on the subjective experience of an individual with hoarding difficulties supplemented by clinical expertise and the vicariously articulated experience a range of other hoarders. Each participant was provided with an information sheet (Appendix B) and informed consent was taken prior to the interview (Appendix C). The interviews were one hour in length, followed a semi-structured interview schedule (Appendix D) and focused on understanding of the role played by emotions in HD. Interviews were audio recorded and transcribed. Transcribers were paid for their time and were required to sign a Transcriber Confidentiality Agreement (Appendix E) prior to receiving the audio files.

Generation of statements.

A panel consisting of $N = 3$ trainee clinical psychologists coded the interview transcripts. Panel members were instructed to highlight any quotes believed to be related to any emotional aspects of hoarding. A panel meeting was convened that recorded the statements on which there was complete consensus. Contentious items were discussed amongst the panel until consensus was reached. A total of 166 statements were prospected, 156 from the interview transcripts, with a further 10 statements from a review of commonly used hoarding assessment measures (Appendix F). These were reduced to 49 statements that were judged to directly reflect distinct concepts. Therefore, 49 potential items were generated for the Q-set.

Inter-rater reliability and content validity.

An expert panel was convened consisting of $N = 2$ members of the British Association for Behavioural and Cognitive Psychotherapies with clinical and research expertise in HD. These clinicians were asked to rate each of the 49 potential Q-sort

items in terms of relevance (i.e. 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant). A four point scale was chosen to avoid the potential problem of neutral ratings arising from having a neutral midpoint on the scale (Lynn, 1986). Inter-rater agreement regarding the relevancy of each item to the topic was calculated following a method outlined initially by Martuza (1977) and subsequently summarised by (Davis, 1992). The method dictates that the 4-point scale is reduced to a dichotomy (i.e. "relevant" (a score of 3 or 4) or "not-relevant" (a score of 1 or 2). Inter-rater agreement is calculated by summing all items for which there is agreement in terms of relevant or not-relevant, then dividing by the total number of items. The level of inter-rater agreement regarding the statements for the Q-sort was 0.76 (see Appendix G for calculation). Proposed acceptable levels of inter-rater agreement range from 0.70 - 0.80 (Davis, 1992; Selby-Harrington, Mehta, Jutsum, Riportella-Muller, & Quade, 1994).

Content validity has been defined as "the extent to which an instrument adequately samples the research domain of interest" (Wynd, Schmidt, & Schaefer, 2003). The Content Validity Index (CVI) was used to calculate the proportion of items rated as either "quite relevant" or "highly relevant" (Polit & Beck, 2006). The CVI for the current study was 0.71 (see Appendix G for calculation) and a level of 0.80 has been proposed as being desirable when developing new scales (Polit & Beck, 2006). Considering the reasonable results obtained for the tests of inter-rater agreement and CVI all 49 items were retained and formed the Q-set consisting of 46 interview statements, plus 3 measure statements (Appendix H).

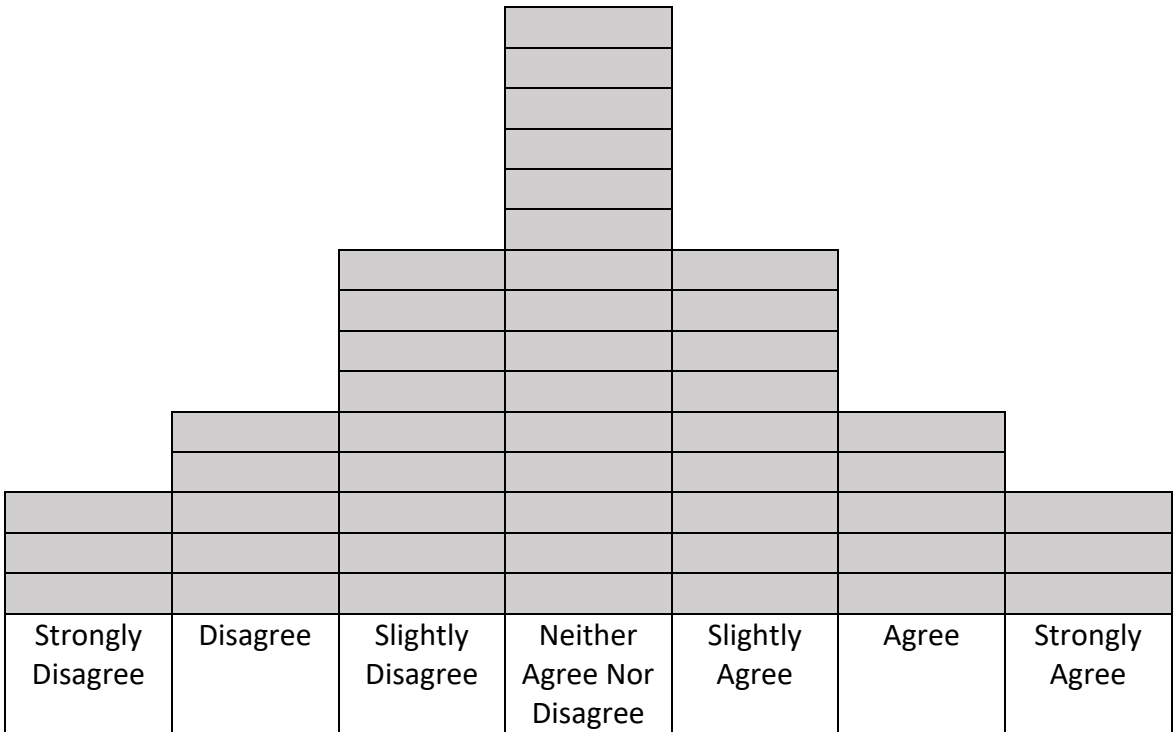
Phase 2: The Q-sort.

The Q-sort task was completed by a new participant sample either online or offline. This task involved participants ranking, or "sorting", the Q-set statements using

a scale. Q-sorts are typically arranged so that participants are forced to rank the majority of items in the central area, but are also forced to rank statements at both extremes. This "forced distribution" method is convenient for both the researcher and participant (Watts & Stenner, 2012). This study therefore used a forced quasi-normal distribution method Q-sort. The Q-sort required participants to sort the 49 statements along a scale with seven points, with each point housing a specific number of statements (see Figure 1): strongly disagree, 3 statements; disagree, 5 statements; slightly disagree, 9 statements; neither agree nor disagree, 15 statements; slightly agree, 9 statements; agree, 5 statements; and strongly agree, 3 statements.

Figure 1

A visual depiction of the Q-sort scale and 49 statement placings



In the offline version a Q-sort board displaying the required distribution was presented to participants, along with the statements from the Q-set that were randomly shuffled. Offline Q-sorts were completed at a neutral location where participants attended a regular support group. The online Q-sort consisted of the same distribution and statements but was presented to participants via the internet via Qualtrics software (Qualtrics, 2015). Statements were presented to participants in a random order. Qualtrics also enabled the collection of data about the time taken for each participant to complete the Q-sort.

Participants

Participants were recruited using a self-selection sampling method. Offline participants were recruited via hoarding charities and support groups (n = 10). An access link to the online version of the study was distributed via national charities, on social media websites, and through hoarding support forums, with the expressed approval of the relevant gatekeepers and administrators. Participants were provided with an information sheet (Appendix I; online and offline) before consenting to the study (Appendix C; offline and online). Following completion of the study participants were provided with details of charities and support services (Appendix J). A total of n = 79 participants consented to begin the online version of the study, with n = 34 (43%) reaching completion. Ten participants were recruited to the offline version of the study and all reached completion. Therefore, a total of 44 Q-sorts were collected and available for analysis. A sample size or power calculation is not conducted as part of the Q methodology process as it is an exploratory form of analysis and not designed for hypothesis testing (Shabila, Al-Tawil, Al-Hadithi, & Sondorp, 2014). Samples sizes considered appropriate are those of between 40 and 60 participants (Stainton-Rogers, 1995) or between 30 and 50 participants (McKeown & Thomas, 2013). Sample sizes

rarely exceed 50 participants (Brown, 1993) and are usually smaller than the number of items in the Q-set (Brouwer, 1999).

Measures

Clutter Image Rating (CIR).

This pictorial measure aims to index the extent of clutter within the participant's home (Appendix K). It includes nine photographs for each of three rooms (kitchen, living room, and bedroom) varying in the amount of clutter from a rating of 1 (no clutter) to 9 (severe clutter). Participants select the photograph that most closely resembles the clutter in their home. A mean score for the individual is calculated across the three rooms, with a mean score of 3 or more being indicative of caseness (Muroff, Underwood, & Steketee, 2014). The CIR has been shown to demonstrate good psychometric properties (Frost, Steketee, Tolin, & Renaud, 2008). The internal consistency of the composite score has been shown to be good (α = 0.84) and highly correlated with other measures of clutter, therefore demonstrating good convergent validity: the Saving Inventory – Revised clutter subscale (r = 0.72), and the Hoarding Rating Scale (Tolin, Frost, & Steketee, 2010) clutter ratings (r = 0.82). Test re-test reliability of the composite score has been found to be very high (r = 0.82).

Saving Inventory – Revised (SI-R).

This is a 23-item self-report questionnaire that measures three primary components of hoarding: difficulty discarding (7 items), compulsive acquisition (7 items), and clutter (9 items) (Appendix L). Items are rated on a scale of 0 to 4 and are scored for the three subscales and a total overall score. A total score of 41 or more is indicative of caseness (Muroff et al., 2014). The scale was validated with a sample of hoarding participants (Frost et al., 2004). The SI-R was found to have high internal consistency (α = 0.92), as did the three subscales: difficulty discarding (α = 0.88),

compulsive acquisition (α = 0.87), and clutter (α = 0.91). Test re-test reliability was good for the overall scale (r = 0.86) and each subscale: difficulty discarding (r = 0.89), compulsive acquisition (r = 0.78), and clutter (r = 0.90). The SI-R total score and subscales of difficulty discarding and clutter correlated strongly (rs = 0.54 to 0.75) with the Saving Cognitions Inventory (Steketee & Frost, 2003), a measure of hoarding beliefs and attitudes, indicating good convergent validity.

Hospital Anxiety and Depression Scale (HADS).

This is a 14-item self-report questionnaire detects anxiety and depression in clinical and non-clinical populations (Appendix M). It consists of two subscales: anxiety (7 items) and depression (7 items). Items are scored on a scale of 0-3. Total sub-scale scores range from 0 to 21 with higher scores indicating increased symptom frequency. Scores on each subscale are normal (0-7), mild (8-10), moderate (11-14), and severe (15-21). Caseness is defined by a score of 8 or above for each of the anxiety and depression subscales (Bjelland, Dahl, Haug, & Neckelmann, 2002). A composite score of both subscales can be taken as being indicative of emotional distress. The HADS has been shown to possess good psychometric properties (Mykletun, Stordal, & Dahl, 2001) with the depression subscale having an acceptable internal consistency (α = 0.76) and the anxiety subscale having good internal consistency (α = 0.80). The HADS has good factorial validity (Herrmann, 1997). The concurrent validity has been determined to be "good to very good" following medium to strong correlations with several other questionnaires for anxiety and depression (Bjelland et al., 2002)

Phase 3: By-person Factor Analysis

Data Analysis Strategy.

A specialised software program, PQMethod, dedicated to Q methodology was used for the analysis, as recommended by Watts and Stenner (2005). The analysis

consisted of an initial pairwise intercorrelation of individual Q-sorts to generate a by-person correlation matrix. A factor analysis was then undertaken to identify an optimal model of factors (Preacher, Zhang, Kim, & Mels, 2013). The objective of this analysis was to identify the model with the highest relative verisimilitude (i.e. closest appearance to having truthful meaning and interpretability). Other important considerations were to select only factors with eigenvalues of 1.00 or above, and that each of the factors should have at least two Q-sorts that load significantly on them alone, these are referred to as "factor exemplars" (Brown, 1996; Watts & Stenner, 2005). Once the factor analysis had been completed, the factors identified (i.e. the clusters of participants) were then compared with regards to the scores on the hoarding measures (Clutter Image Rating, and Saving Inventory – Revised), and the scores on the Hospital Anxiety and Depression Scale.

Results

Sample Characteristics

A total of 89 participants consented to take part in the Q-sort phase of the study; 79 online and 10 offline. Forty-four participants completed the study with attrition of 45 online and 0 offline participants (Figure 2). Of the 45 participants who consented but did not complete the study, 26 dropped out before answering any questions; a further participant dropped out after completing the demographic questions and SI-R; another participant dropped out after completing up to the HADS; and 17 participants completed all questions apart from the Q-sort. The majority of participants who completed the study were female (86%; $N = 43$), self-estimated duration of hoarding ranged from 4 to 50 years with a mean of 23 years ($N = 37$) and 42% ($N = 38$) reported having received a psychological intervention for their HD. Comparisons were carried out between participants who completed the study and those who did not. Duration of hoarding for completers (mean = 209.21, median = 180, $N = 37$) did not differ significantly from non-completers (mean = 276.46, median = 240, $N = 19$), $U = 460.5$, $z = 1.894$, $p = 0.058$. Similarly, the two groups did not differ significantly in terms of gender; $\chi^2 (1) = 3.084$, $p = 0.079$ and the groups did not differ on any of the psychometric measures: HADS total score ($U = 361.0$, $z = -0.209$, $p = 0.834$), SI-R total score ($U = 478.0$, $z = 0.899$, $p = 0.368$), CIR mean score ($U = 473.0$, $z = 1.200$, $p = 0.230$).

For the 44 participants who completed the study, HADS scores for the anxiety subscale ranged from 3-19 (M = 11.62, SD = 4.14) with 36 participants (81.8%, $n = 44$) meeting caseness for anxiety. Depression subscale scores ranged from 1-19 (M = 10.78, SD = 4.23) with 35 participants (79.5%, $n = 44$) meeting caseness for depression. Mean scores for the CIR ranged from 1.67 to 7.00 (M = 3.97, SD = 1.49) with 32 participants

(72.7%, *N* = 44) meeting clutter caseness. Total SI-R scores ranged from 32-76 (M = 57.52, SD = 12.28), with 40 participants (90.9%, *N* = 44) meeting hoarding caseness. Three online participants did not meet caseness for hoarding on either of the hoarding measures and were removed from the dataset for the subsequent Q-sort analysis.

Figure 2

Flow chart depicting participant flow and drop-out

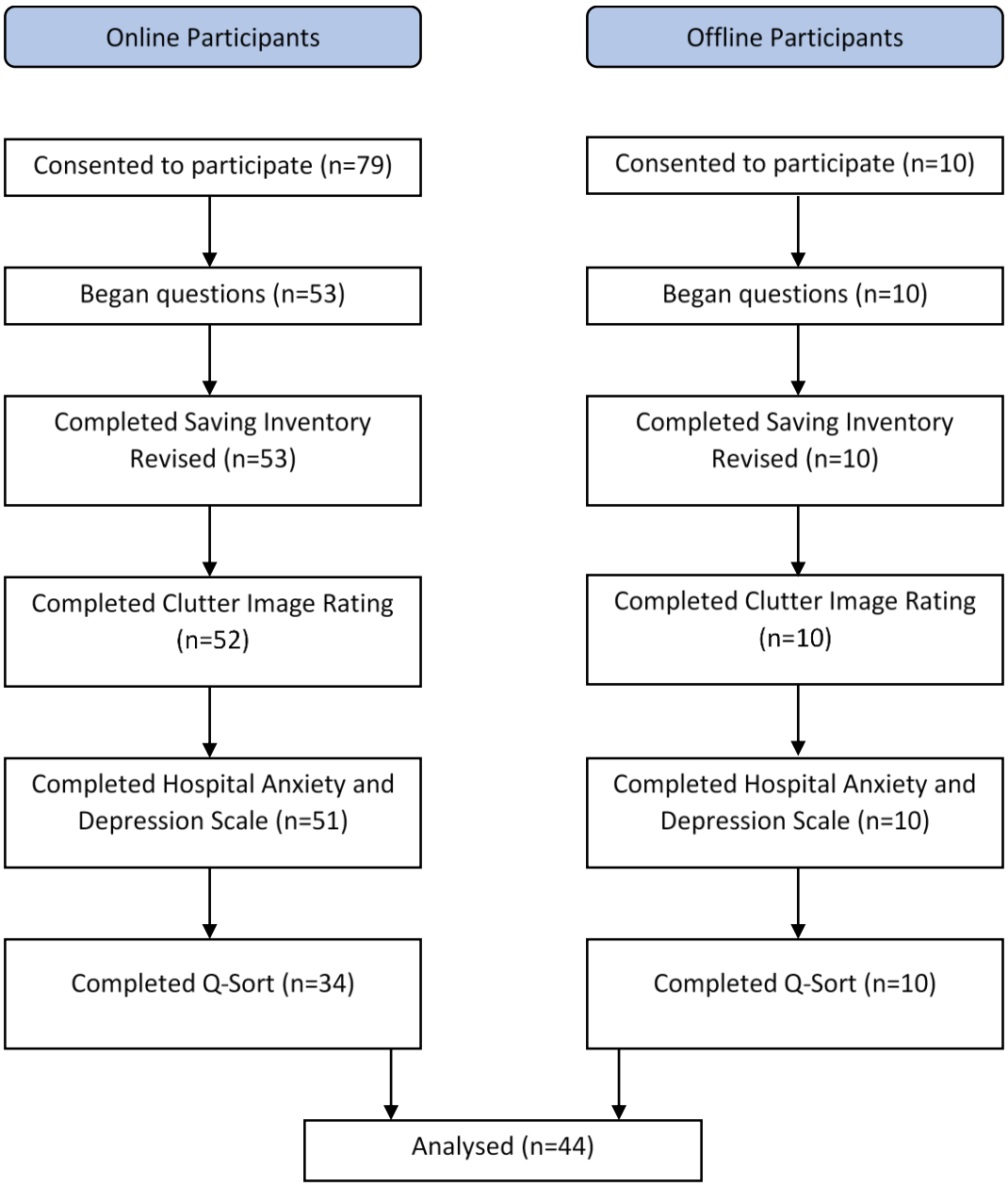


Table 1
Q-sort loadings for each factor

Q-Sort	Factor 1	Factor 2	Factor 3	Factor 4
1	0.1473	- 0.0959	0.4524 *	0.3437
2	0.0183	0.6443 *	- 0.3863	- 0.1137
3	0.3169	- 0.1317	- 0.1072	0.6653 *
4	0.0423	0.0621	0.6870 *	- 0.3054
5	- 0.1008	0.5878 *	0.2422	0.4227
6	0.2143	0.5067 *	0.3616	- 0.0275
7	0.5797	0.5978 *	- 0.1285	0.0084
8	0.7600 *	0.0129	0.0250	- 0.0336
9	- 0.1483	0.3188	0.1331	0.5404 *
10	0.2319	0.6297 *	0.2738	- 0.2297
11	0.1742	0.0275	0.5617 *	0.3037
12	0.5762 *	0.2675	0.2979	0.3699
13	0.6295 *	- 0.1557	0.2885	- 0.1956
14	0.5924 *	0.3372	0.2501	- 0.1319
15	0.3002	0.4534 *	0.1358	0.0860
16	0.4837	0.3917	0.3873	- 0.1172
17	0.3365	0.4018	- 0.0672	0.5002
18	0.4029	0.5590 *	0.1709	0.0658
19	- 0.0031	0.4961 *	0.1239	0.4474
20	0.3856	0.3571	0.0269	0.3183
21	0.5386 *	0.2323	0.4536	0.0925
22	0.1367	0.2437	0.5041 *	0.4035
23	0.1787	0.4714	0.2074	0.3861
24	0.6039 *	0.4257	0.3007	- 0.0097
25	0.5449 *	0.2340	0.0181	- 0.0979
26	0.4789	0.3058	0.4717	- 0.1468
27	- 0.0325	- 0.0557	0.0597	0.5557 *
28	0.0240	0.5841 *	0.1843	0.0997
29	0.1544	0.7223 *	- 0.2424	- 0.0098
30	0.4186	0.2536	0.3707	0.0309
31	0.0290	0.1061	0.7693 *	- 0.1632
32	0.4703 *	- 0.0739	0.0238	0.0705
33	0.5033	0.3297	- 0.4627	- 0.1612
34	0.4385 *	0.1631	- 0.0225	0.2033
35	0.0415	0.7119 *	- 0.1644	0.1712
36	0.3969	- 0.5099 *	- 0.0110	0.0641
37	0.3641	0.0313	0.1347	- 0.5914 *
38	0.5708 *	0.3447	0.0426	0.0100
39	0.2104	0.6016 *	0.0009	0.0265
40	0.0400	- 0.1689	0.6235 *	0.1662
41	0.5832 *	- 0.3349	0.0294	0.2346
% Expl.Var.	15	16	10	8

*Factor exemplars

Analysis of Q-sort data

Analysis of the unrotated factors indicated twelve factors with eigenvalues of greater than 1, which explained 79% of the variance. Exploration of the first eight factors revealed that only two factors had two or more factor exemplars. A varimax rotation was conducted and a four-factor model was chosen as having the highest verisimilitude. The four factors collectively explained 49% of the variance. Q-sort loadings for each of the factors are presented in Table 1. Correlations between factors were low, ranging between r = 0.0093 and r = 0.3665. Thirty-four of the 41 Q-sorts (82.93%) were found to load significantly onto one factor alone and were therefore classified as factor exemplars. The remaining seven cases were excluded from subsequent analyses. Analysis indicated that 46 of the 49 (93.88%) statements in the Q-sort significantly discriminated between clusters. Statements 24 ("*objects are predictable and are not able to let you down like people might*"), 28 ("*other people get frustrated by my hoarding*"), and 44 ("*I am often torn between needing to discard items and thinking they are still useful*") were found to not significantly distinguish between clusters. Factor arrays (i.e. Q-sort arrangements configured to represent the viewpoints of each cluster are presented in Table 2). The Z-scores and Q-sort values demonstrate agreement between individuals within each factor.

Divisive statements

Two statements were found to statistically distinguish each factor from all other factors ($p < .01$). Statement 21, "*letting go of an item feels like letting a part of me go*" was rated differently by each cluster of participants. Factor 2 participants strongly disagreed with this statement whereas Factor 4 participants strongly agreed with the statement. Factor 1 participants slightly agreed whereas Factor 3 participants slightly disagreed. Statement 33, "*my anxiety causes me to postpone addressing my hoarding*"

was also rated consistently differently by each of the participant clusters. Factor 4 participants strongly disagreed with this statement whereas Factor 3 participants only slightly disagreed, Factor 2 participants slightly agreed, and Factor 1 participants agreed.

Table 2

Factor arrays showing both Q-Sort Values (Q-SV) and Z-scores (Z)

Number	Statement	Factor 1		Factor 2		Factor 3		Factor 4	
		Q-SV	Z	Q-SV	Z	Q-SV	Z	Q-SV	Z
1	If an object looks abandoned, I will feel compelled to rescue it	0	-0.594	-1	-0.878	1	1.064 *	-3	-1.780 *
2	It's exciting when I find bargains	0	-0.055 *	2	1.593	1	0.942	2	1.284
3	I get a buzz from acquiring new things	0	-0.004	2	1.196 *	0	0.378	3	2.264 *
4	Rediscovering items refreshes the positive memories attached to them	2	1.278	0	0.092	0	0.241	1	0.563
5	I care for my possessions in the same way I would like to be cared for	-2	-1.053	0	-0.467	0	-0.592	-1	-1.080
6	I think about how I could use an object in the future	0	-0.339 *	1	1.022	3	2.073	3	1.716
7	I think of the potential that objects have	0	0.152	1	0.878	3	1.719 *	0	0.180
8	I find it difficult to make decisions	1	1.246	0	0.178 *	2	1.237	-3	-1.707 *
9	I sometimes question why I have so much stuff	1	0.667	3	1.780 *	1	0.795	-1	-0.284 *
10	My hoarding is destructive to my relationships	0	0.375 *	3	2.352 *	-2	-1.279	-2	-1.510
11	Thinking about discarding my possessions causes me to feel distressed	3	1.754 *	0	-0.271	0	0.058	-1	-1.002 *
12	Discarding my possessions causes me to feel distressed	3	1.595	0	-0.103	2	1.087	0	-0.259
13	I find it difficult to get rid of items when others tell me that I should	1	0.816	0	-0.236 *	1	0.762	1	0.685
14	I sometimes feel I'm being made to discard things	-2	-0.954	0	-0.121 *	1	0.589 *	-2	-1.496
15	When I'm getting rid of something, I wonder if I am doing the right thing	1	0.987	0	0.024	2	1.629	-1	-0.574
16	I worry that others think I am disgusting	-1	-0.609	2	1.505 *	-1	-0.855	0	0.069
17	I am able to see the unique features in items	-1	-0.698 *	1	0.291	0	0.260	1	0.512
18	I fear what will happen if someone comes to my home	1	0.520	3	1.824 *	0	-0.245	0	0.226
19	I acquire objects and end up forgetting about them	0	-0.472	1	0.886	0	0.277	0	-0.078
20	I feel guilty about throwing items away	1	0.809	-1	-0.576 *	3	1.674 *	0	0.219
21	Letting go of an item feels like letting a part of me go	1	0.455 *	-3	-1.613 *	-1	-0.898 *	3	1.745 *
22	I think my hoarding behaviour is illogical	-1	-0.627	1	0.998 *	-1	-0.771	0	0.040
23	My possessions aren't capable of hurting me	0	-0.185	-2	-0.948	-2	-1.082	0	-0.066
24	Objects are predictable and are not able to let you down like people might #	-1	-0.620	-1	-0.685	-1	-0.706	-1	-0.681
25	My possessions remind me of events in the past	2	1.371	0	-0.390 *	2	1.295	2	1.665
26	Other people don't understand why I hoard things	0	-0.157	1	0.360	1	0.508	0	0.326
27	Others despair about my hoarding	0	-0.066	0	0.126	-1	-0.729	0	-0.135
28	Other people get frustrated by my hoarding #	1	0.427	1	0.681	0	0.297	0	0.020
29	I feel overwhelmed by my hoarding, I don't know where to start	2	1.554	2	1.167	0	-0.135	-1	-0.636
30	I like being around my possessions	-2	-1.380	-1	-0.892	1	0.417 *	2	1.250 *
31	I get a sense of companionship from my possessions	-3	-1.675	-1	-0.781 *	-2	-1.507	2	1.199 *
32	I find tidying and organising is tedious	-1	-0.722	0	0.194	0	0.231	0	-0.273
33	My anxiety causes me to postpone addressing my hoarding	2	1.335 *	1	0.313 *	-1	-0.826 *	-3	-1.678 *
34	I anticipate regretting throwing things away	1	1.158	-1	-0.534	0	-0.130	1	0.583
35	I sometimes feel like I'm rescuing objects	-1	-0.767	-2	-1.227	2	1.159 *	-2	-1.363
36	If an object looks sad I will feel compelled to rescue it	-1	-0.947	-3	-1.784	0	0.317 *	-2	-1.558
37	I feel responsibility towards objects, if they can be used then they should	0	0.094 *	-1	-0.838	1	0.993 *	-1	-0.860
38	It feels rude to throw objects away	-2	-1.448	-2	-1.416	1	0.528	0	0.171
39	I feel safe when I am with my possessions	-2	-1.422	0	-0.267 *	-3	-1.550	1	0.468 *
40	I value my possessions over any potential risks to my safety	-3	-2.114	-2	-1.444	-3	-1.627	-2	-1.434
41	I'm embarrassed at the state of my home	3	1.793	2	1.372	-1	-0.937 *	1	0.956
42	I see beauty in items	0	-0.206	-1	-0.672	0	0.252	0	0.208
43	I feel stuck with my hoarding	0	0.262	0	0.149	-1	-0.834	-1	-0.457
44	I am often torn between needing to discard items and thinking they are still useful #	0	0.158	0	-0.002	0	-0.291	0	0.326
45	Negative moods cause me to hoard	-1	-0.855	0	0.118	-2	-1.225	0	0.326
46	Others might think that my hoarding is a bit odd	0	0.051	1	0.424	0	-0.508	0	0.208
47	My possessions provide me with emotional comfort	-1	-0.716	-2	-1.155	-2	-1.241	1	0.991 *
48	I love some of my belongings the way I love some people	-3	-1.478	-3	-1.711	-3	-1.788	1	0.991 *
49	I avoid discarding possessions because it is too stressful	2	1.307 *	-1	-0.512	-1	-1.025	-1	-0.277

* Distinguishing statements at $p < .01$

Consensus statements that do not distinguish between any pair of factors

Factor 1: the emotionally overwhelmed cluster (*n* = 11)

This cluster of participants was represented by 11 factor exemplars that explained 15% of the variance. The majority of the 11 participants (63.6%) completed the study online. All 11 participants in this factor met caseness for anxiety and 7 (63.6 %) also met caseness for depression. All met hoarding caseness on the SI-R, with 8 (72.7%) also meeting clutter caseness on the CIR. In summary, this cluster of participants was characterised by high emotional distress associated with their hoarding and associated difficulties with discard owing to stress and anxiety. They do not appear to place special value on objects, or experience positive affect upon acquiring items, but felt overwhelmed by the extent of their hoarding and due to this feeling feel unable to subsequently initiate discard.

Emotionally over-whelmed participants strongly agreed (Q-sort value scores of +3) that thinking about discarding their possessions caused them to feel distressed (statement 11 [S11]) as did discarding their possessions (S12), and that they felt embarrassed about the state of their home (S41). There was also agreement (+2) that rediscovering items refreshed positive memories attached to them (S4), that their anxiety caused them to postpone addressing their hoarding (S33) and that they avoided discarding possessions due to finding this process stressful (S49). This group of participants strongly disagreed (-3) that they got a sense of companionship from their possessions (S31).

Of the statements mentioned, statements 11 *"thinking about discarding my possessions causes me to feel distressed"*, 33 *"my anxiety causes me to postpone addressing my hoarding"*, and 49 *"I avoid discarding possessions because it is too stressful"* were found to statistically distinguish the emotionally overwhelmed cluster from the other three clusters ($p < .01$). Participants in other clusters tended to neither agree nor disagree with statement 11, and whereas participants in this cluster agreed

with statement 49, participants in the other three clusters slightly disagreed. Further distinguishing statements included a slight disagreement with statement 17 "*I am able to see unique features in items*", whereas participants in other clusters tended towards agreement with this statement. Participants in other clusters held shared opinions on several statements which "emotionally overwhelmed" participants did not. Participants in this cluster neither agreed nor disagreed with S10 "*my hoarding is destructive to my relationships*" whereas those in other clusters expressed stronger opinions. Emotionally overwhelmed participants also neither agreed nor disagreed with S6 "*I think about how I could use an object in the future*" and S2 "*it's exciting when I find bargains*" suggesting that these items were not significant in their hoarding, whereas the other clusters all showed agreement across these items.

Factor 2: the social emotions cluster (*n* = 13)

This cluster of participants was best represented by 13 factor exemplars that explained of 16% of the variance. The majority (76.9%) completed the study online. Eleven participants (84.6%) met caseness for anxiety and all met caseness for depression. All met SI-R caseness for hoarding and 12 (92.3%) met clutter caseness on the CIR. In summary, "social emotion" cluster participants were characterised by a strong concern about the impact of hoarding on their social relationships. They worry that others view them negatively, fear others visiting their home and strongly believe that hoarding was destructive to their relationships. Participants in this cluster experience positive affect when acquiring new items, do not find it difficult to discard when others direct them to and do not appear to find discard particularly challenging. They denied feeling that they were strongly connected to their possessions, but sometimes question why they have so many belongings.

"Social emotions" cluster participants strongly agreed (+3) fearing what would happen if someone came to their home (S18), that hoarding was destructive to their relationships (S10), and that they questioned why they have so many belongings (S9). They also agreed (+2) that they worried that others thought them to be disgusting (S16), that finding bargains was exciting (S2) and that they get a buzz from acquiring items (S3). Social emotion participants strongly disagreed (-3) with statement 21 "*letting go of an item feels like letting a part of me go*". Of the statements mentioned, statements 3, 9, 10, 16, 18, and 21 were found to statistically distinguish social emotion cluster participants from the other clusters ($p < .01$). This cluster contained the only participants to agree with statements 10 "*my hoarding is destructive to my relationships*" and 16 "*I worry that others think I am disgusting*". Factor 2 participants also rated stronger disagreement with statement 21 "*letting go of an item feels like letting a part of me go*" than did participants of the other three clusters.

Factor 3: the object complexity cluster (*n* = 6)

This cluster of participants was best represented by 6 exemplars that explained 10% of the variance. The majority (83.3%) completed the study online. Four (66.7%) met caseness for anxiety, and four (66.7%) met caseness for depression. Five (83.3%) met SI-R caseness for hoarding and four (66.7%) met CIR clutter caseness. In summary, "object complexity" participants shared agreement that they think about the potential that objects have and how they could be used in future, and as such feel responsible to use them. This cluster often feel that they are rescuing objects and feel guilty for discarding objects. They do not feel that they gain a sense of safety or companionship from their possessions.

"Object complexity" cluster participants strongly agreed (+3) about feeling guilty about throwing items away (S20). They also strongly agreed that they think about

the potential that objects have (S7) and about how they could use them in the future (S6). This cluster agreed (+2) that they sometimes feel they are rescuing objects (S35) but not because they felt the object looked sad (S36). They strongly disagreed (-3) with statement 39 "*I feel safe when I am with my possessions*", and disagreed with statement 31 "*I get a sense of companionship from my possessions*". They slightly agreed (+1) that they felt responsibility towards objects and that if they can be used then they should (S37) and that they sometimes feel they are being made to discard things (S14). They were the only cluster that expressed any degree of agreement towards these two statements. Of the statements mentioned, statements 7, 14, 35, 36, and 37 significantly distinguished "object complexity" participants from the other clusters ($p < .01$).

Factor 4: the object-affect fusion cluster (*n* = 4)

This cluster of participants was best represented by 4 factor exemplars that explained 8% of the variance. The majority (75%) completed the study online. Three (75%) met caseness for anxiety, and three (75%) met caseness for depression. All four met SI-R caseness for hoarding and clutter caseness on the CIR. In summary, the "object-affect" cluster of participants felt strongly that letting go of a possession felt like letting a part of themselves go. They also drew a sense of companionship and emotional comfort from their possessions, an experience not shared with any of the other three clusters. Unlike participants in the other clusters they also feel that they are decisive and do not tend to question why they have so many possessions.

"Object-affect fusion" cluster participants strongly agreed (+3) that letting go of an item felt like letting a part of themselves go (S21), that they experienced a buzz from acquiring new things (3), and that they thought about how an object could be used in the future (S6). They shared agreement (+2) that they like being around their possessions (S30), drawing a sense of companionship from them (S31), and they were the only

cluster to express any degree of agreement with the later statement. Similarly, they shared slight agreement (+1) with statements 47 "*my possessions provide me with emotional comfort*" and 48 "*I love some of my belongings the way I love some people*", whereas the other three clusters expressed varying degrees of disagreement with these statements. Participants in this cluster expressed strong disagreement (-3) with statements 1 "*if an object looks abandoned, I will feel compelled to rescue it* ", 8 "*I find it difficult to make decisions*", and 33 "*my anxiety causes me to postpone addressing my hoarding*". Of the statements mentioned, only statement 6 "*I think about how I could use an object in the future*" did not significantly distinguish "object-affect" participants from those in the other clusters ($p < .01$).

Factor comparisons

The Kruskal-Wallis test (Kruskal & Wallis, 1952) assessed for any differences between the four clusters (factors) on each of the measures (HADS, CIR, SI-R). No significant between group differences were found between the clusters (see Table 3). The Kruskal-Wallis test was also used to assess for differences between each of the four clusters for "time taken" and "number of clicks used" to complete the online Q-sort. Twenty-five participants were included in this analysis, as click data was only collected for online participants (n=34), 3 of which did not meet caseness for hoarding and 6 of which were not factor exemplars. Two data points were removed from the time taken data as they were deemed to be outliers (Appendix N). No significant between group differences were found for number of clicks or time taken.

A Chi-square test of independence was performed comparing the four clusters and clinical caseness for the psychometric measures (HADS anxiety scale, HADS depression scale, SI-R, CIR; see Table 4). The relationship between factor and depression caseness (as assessed by the HADS) was significant χ^2 (3, N = 34) = 8.017, p

= 0.046. Post-hoc examination of the adjusted standardised residuals was conducted following the method outlined by García-Pérez & Vicente (2003). Residual scores indicated that factor 2 participants were more likely to meet caseness for depression than participants from the other factors. After Bonferroni correction (α = 0.00625) for multiple comparisons the effect was found to be non-significant p = 0.02. No significant associations were found between factor and caseness on the other measures: HADS anxiety (χ^2 (3, N = 34) = 5.096, p = 0.165), SI-R (χ^2 (3, N = 34) = 3.616, p = 0.306), and CIR (χ^2 (3, N = 34) = 4.108, p = 0.250).

Table 3

Differences between the four participant clusters in terms of psychometric measures, time taken, and clicks used

Outcome Measure	Mean (standard deviation)				Kruskal-Wallis Test			
	Factor 1 (*n* =11)	Factor 2 (*n* =13)	Factor 3 (*n* =6)	Factor 4 (*n* =4)	*N*	*df*	*H*	*p*
HADS Anxiety Scale	12.18 (2.79)	11.23 (4.57)	12.33 (5.20)	11.75 (4.79)	34	3	0.291	0.962
HADS Depression Scale	10.00 (4.41)	12.66 (3.26)	10.67 (6.62)	9.75 (2.63)	34	3	3.387	0.336
HADS Overall Distress	22.18 (6.15)	23.89 (7.49)	23.00 (11.45)	21.50 (7.14)	34	3	0.368	0.947
CIR	3.73 (1.33)	4.67 (1.38)	3.56 (1.47)	4.50 (1.00)	34	3	5.497	0.139
SI-R Clutter Scale	24.64 (5.43)	28.46 (4.60)	22.17 (5.49)	25.75 (3.40)	34	3	7.099	0.069
SI-R Difficulty Discarding Scale	20.91 (4.66)	16.69 (5.65)	18.83 (2.71)	21.00 (4.97)	34	3	3.853	0.278
SI-R Excessive Acquisition Scale	14.36 (4.97)	15.00 (4.93)	13.33 (7.37)	14.25 (4.11)	34	3	0.218	0.975
SI-R Total	59.91 (11.89)	60.15 (10.89)	54.33 (13.78)	61.00 (10.55)	34	3	1.271	0.736
Time taken (seconds)	1323.82 (140.90)*	874.24 (332.40)*	1227.99 (352.39)*	1134.02 (701.78)*	23	3	6.193	0.103
Number of clicks used	318.86 (334.71)*	214.10 (236.86)*	270.20 (163.68)*	104.33 (69.04)*	25	3	4.833	0.184

*cases missing (not collected in offline version) or removed from analysis (outliers)

Table 4

Differences between the four participant clusters in terms of caseness of each of the psychometric measures

	Participants reaching clinical caseness (%)				Chi-Square Test			
Psychometric Measure	Factor 1 (n =11)	Factor 2 (n =13)	Factor 3 (n =6)	Factor 4 (n =4)	*N*	*df*	χ^2	*p*
HADS Anxiety	100	85	67	75	34	3	5.096	0.165
HADS Depression	64	100	33	75	34	3	8.017	0.046*
SI-R	100	100	83	100	34	3	3.616	0.306
CIR	73	92	67	100	34	3	4.108	0.250

CIR = Clutter Image Rating; HADS = Hospital Anxiety and Depression Scale; SI-R = Saving Inventory-Revised.

* significant at $p<0.05$

Discussion

The current study sought to investigate emotional phenomena in HD using Q methodology. This has been the first attempt to explore emotions in HD using this innovative method. Analysis identified four distinct participant clusters, within each of which the participants held common and shared experiences related to their hoarding-related emotions. The overlap of the clusters with the extant hoarding literature will now be examined.

The "*emotionally overwhelmed*" cluster appears to exemplify the attentional deficits and organisational problems that have been suggested to contribute to HD, such as indecision and categorization problems (Frost & Gross, 1993; Frost & Hartl, 1996). It has been shown that amongst hoarders, indecisiveness is correlated with the core features of hoarding (Frost, Tolin, Steketee, & Oh, 2011). It has been suggested that this difficulty with decision making and the resulting tendency to avoid or postpone making decisions arises from a fear of making mistakes (Warren & Ostrom, 1988). The "emotionally overwhelmed" cluster in the current study reported similar tendencies, for example, they reported that they often postpone addressing their hoarding and avoid discard as they find it too stressful. This is in line with findings indicating heightened emotional attachment may interact with concerns about making an incorrect decision, and the incorrect discard of valued objects being experienced as aversive by hoarders (Tolin, Kiehl, Worhunsky, Book, & Maltby, 2009).

The "*social emotions*" cluster seems to reflect that these individuals were not ego-dystonically distressed by their hoarding behaviour itself, but rather by the negative social consequences generated (Mataix-Cols et al., 2010). For example, social services may express concerns about the health hazards of their cluttered environment, and

family members might be distressed about the clutter. Frost and Gross (1993) reported social emotions in a hoarding sample with most reporting that their hoarding created embarrassment and led to avoidance of social contact in their homes. Participants in this cluster similarly reported fearing what would happen if someone came to their home and worrying that others would find them socially unacceptable. Research has demonstrated that loneliness is associated with increased depressive symptoms (Cacioppo & Hughes, 2006) which may explain why all the individuals in this cluster met caseness for depression.

The *"object-complexity"* cluster was characterised by beliefs that objects were currently inherently useful or could be in the future. This cluster of hoarders feel some sense of responsibility towards objects causing them to feel guilt upon discarding them, and aggrieved if forced to discard. At the same time, they do not derive emotional comfort from their possessions. Steketee et al. (2003) found that responsibility towards objects appears to be a significant dimension of HD. Individuals with HD often report difficulties aligned with those of the object complexity cluster such as not wanting to "waste" an object that could still be useful and feelings of guilt associated with discarding objects (Mataix-Cols & Fernández de la Cruz, 2014). Furby (1978) separated this concept as being a specific potential contributor to possession behaviour suggesting that this feature of HD has consistently been a fundamental identifier of problematic hoarding.

Participants within the final "*object-affect fusion*" cluster derived emotional comfort from their possessions, enjoyed being with their possessions, and felt that that letting go of a possession was like letting go of a part of them. This is highly similar to the concept of object-affect fusion proposed by Kellett and Knight (2003), by which a person's emotions associated with an object become merged with the object itself such

that the objects become symbolic tabernacles of affective information. Frost and Hartl's (1996) cognitive behavioural model of hoarding suggests that intense emotional attachment to possessions is a key component of HD. For example, Frost and Gross (1993) found that hoarders reported higher levels of emotional attachment to their possessions than non-hoarding controls. A small but distinct proportion of the sample in the current study endorsed this experience suggesting that it may be an important but non-essential feature of HD. It is unclear from current research whether this might be an aspect of HD that fluctuates or evolves, perhaps dependent on environmental factors. The current study provides further qualitative information about the experience of emotional attachment in HD. This insight suggests that these individuals do not only feel emotionally attached to objects but experience the objects as an extension of the self. This provides further evidence to support Kellett and Knight's (2003) proposal that this feature of HD may be similar to the thought-affect fusion cognitive distortion that is often a feature of OCD.

It was found that the four participant clusters did not differ significantly on scale scores for measures of hoarding severity, anxiety, depression, and indices of impulsivity. The failure to find statistical differences may have been due to the overall sample size, and thus the small size of each participant cluster. Any differences may have also been difficult to discern due to mood disorders being highly prevalent in HD (Frost et al., 2011). Prevalence of clinically significant anxiety and depression was high across the sample in the current study. From inspection of the caseness descriptive statistics, it appears that "*emotionally overwhelmed"* participants were most likely to be clinically anxious, as every member of the cluster met caseness for anxiety. Similarly, "*social emotion"* participants appear to be at increased risk of being depressed, as every member of that cluster met caseness for depression. A significant relationship between

cluster and depression caseness was found. Post-hoc exploration indicated that "*social emotion*" participants were more likely to be depressed, although this effect was non-significant following correction for multiple comparisons. Social problems such as loneliness have been shown to be predictive of depressive symptomatology (Cacioppo, Hawkley, & Thisted, 2010), and may explain this potential association between social emotions and depression for people with HD.

Clinical implications

The four clusters found in this study appear to reflect a number of extant concepts which explain the role played by emotions in HD. It is unlikely that one individual's profile will be limited to a single cluster; instead it appears that clusters are likely to be dimensions of their emotional experience of hoarding, such that an individual could experience each dimension to varying degrees. Certain profiles may represent "emotional hoarding" typologies. It may be the case that individuals may transition through the dimensions over time, starting with feeling emotionally overwhelmed. Assessing the dimensions of an individual's emotional relationship with their possessions may prove useful to clinicians as it may help to provide a more detailed and nuanced understanding of the problem.

Strengths and limitations

This study gathers the current research and theoretical understanding regarding the role of emotions in HD and is the first study to instigate a targeted exploration this concept. The study methodology ensured that the exploration was based in the experience of HD whilst ensuring an adequate breadth through review of the literature. This study used the accepted Western psychiatric criteria for HD as a basis for participant selection. As the aetiology of HD is currently unclear it is possible that there may be a range of different experiences that manifest as HD symptoms. Medical

conditions often have clear markers such as measurable physical abnormalities which can be used to classify specific diseases. This is not true of psychiatric disorders and often symptom checklist definitions are used to classify symptoms into arbitrary categories (Hirschtritt & Mathews, 2014). Consequently, individuals are given a best-estimate diagnosis based on symptoms and may not share the same underlying pathology. Despite this problem the psychiatric criteria for HD was used in this study as at this time it is the most efficient means of identifying a group of individuals with shared symptomatology and experiences.

Existing measures of emotion tend to simply list emotions and ask participants to rate frequency or intensity (e.g. the Discrete Emotions Questionnaire; Harmon-Jones, Bastian, & Harmon-Jones, 2016). Such an approach would not have illuminated the clusters found in the current research. The basis of the clusters in extant evidence also provides vindication for the research to date regarding emotions in HD. Recent maturation of web-based interfaces means that this was the first study to use Q methodology in an online survey. This proved to be a success and paves the way for future studies to utilise this methodology which has several advantages such as easy access to larger, more diverse samples and increased anonymity. Additionally, the current study found no significant differences between the online and offline samples, suggesting that online samples are suitable for study. The use of Q methodology in an online form also enabled the collection of additional data such as the number of clicks and time taken to complete the Q-sort. These were used as indices of impulsivity for the current study. It has been suggested that HD may be an impulse-control disorder (Preston, Muroff, & Wengrovitz, 2009). The ability to record data such as time-taken and number of clicks used in online surveys offers a potentially useful means of investigating impulsivity for future HD research.

The sample for this study was self-selecting therefore possibly biased towards individuals willing to engage in research. Despite opinion being divided (Weingarden & Renshaw, 2015) some research has suggested that hoarding can carry significant shame and stigma (Schmalisch, Bratiotis, & Muroff, 2010) which may have impacted on participants' willingness to participate. Attempts were made to reduce the impact of this by recruiting participants online as well as offline. Participants were recruited primarily through hoarding charities, forums, and groups therefore the sample may be biased towards individuals who have accepted the label of "hoarder" and have sought treatment or advice. The size of the sample recruited for this study is considered an appropriate sample size for Q methodology (McKeown & Thomas, 2013). Although appropriate for Q methodology, the sample size may have limited the power in detecting significant differences between the participant clusters, and between online and offline participants.

There are some limitations in the survey methodology employed for this study. Q methodology itself requires participants to be self-aware and able to reflect on their hoarding. The study is reliant on this self-report as independent assessments of hoarding, depression, and anxiety were not made. However, research has suggested that hoarders may tend to lack insight into their hoarding (Kim, Steketee, & Frost, 2001). The length of the survey was limited to reduce attrition however this limited the range of assessments. Significant between group differences were not found on the measures of distress and hoarding used, and inclusion of further assessments may have provided information on between group differences (e.g. measures of personality traits such as perfectionism and indecision).

This study demonstrated that online recruitment of people with HD can be effective and that Q methodology can be conducted via the internet. Unfortunately, there was a high rate of attrition in the online arm of the study which, although not

unusual for online surveys, can introduce systematic bias (Frankel & Hillygus, 2014). Due to the limited demographic details collected it is unclear whether the attrition in the current study introduced significant bias. It is possible that individuals less familiar with completing forms online might have been more likely to discontinue. It has been suggested that sociodemographic characteristics may only contribute marginally to the explanation of online attrition and further research has been recommended (Rübsamen, Akmatov, Castell, Karch, & Mikolajczyk, 2017). Strategies such as sending reminders to finish started surveys and offering incentives to complete the survey were not used in this study but may serve to reduce attrition rates.

Experience sampling could be considered as an alternative methodology suitable for assessing the experience of emotions in hoarding. An added advantage of this method is that it can provide information about the frequency and pattern of emotional experiences (Csikszentmihalyi & Larson, 2014). Experience sampling has been used to explore the experience of worry and rumination in psychosis (Hartley, Haddock, Vasconcelos E Sa, Emsley, & Barrowclough, 2014) and emotion regulation strategies of adolescents (Silva, Freire, & Faria, 2018).

Directions for future research

This study is the first to explore emotional attachment in HD using a method grounded in the experience of hoarding. The emergent factors reflect the literature of emotional attachment in HD however the sample size for the study was limited so it is unclear how robust these factors are, and whether they are an artefact of this specific sample. Further research should seek to address whether these factors are robust and observable in all clinical HD samples. Future research should also pursue longitudinal methodologies to assess cluster stability both in response to intervention and without intervention. If the factors are found to be robust, it may be pragmatic to consider how

treatment modalities can be adapted to maximise the likelihood of success given an individual's emotional attachment profile. A larger sample size and selection of more comprehensive outcome measures may be necessary to detect any clinical differences between groups, due to the high overall prevalence of distress amongst individuals with HD. It may be useful to explore other potential between group differences. Personality traits, alcohol dependence, and childhood adversities have been associated with hoarding (Samuels et al., 2008), and these may distinguish between the emotional attachment dimensions.

Conclusion

The results of this study provide evidence that complex emotions are prevalent for individuals with HD. The results divided the emotional experiences of hoarding into four dimensions that appeared reflective of current theory and research in the field. The characteristics of clusters identified appeared to demarcate clusters of individuals sharing similar and distinct emotional profiles. The grounding of the elicited clusters in extant theoretical concepts helps develop a more nuanced understanding of emotions in HD. This research has demonstrated the heterogeneity and complexity with regards to emotions in the HD population and serves to highlight the need for further research. The heterogeneity of HD suggests that treatments are likely to be most effective when they are matched to the individual rather than the diagnosis.

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Appendix A
Ethical Approval Letter

Downloaded: 16/02/2017
Approved: 08/02/2017

Adam Postlethwaite
Registration number: 150123691
Psychology
Programme: Clinical Psychology

Dear Adam

PROJECT TITLE: Emotions and Cognitions in Hoarding Disorder. An exploration using Q Methodology.
APPLICATION: Reference Number 012409

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 08/02/2017 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 012409 (dated 31/01/2017).
- Participant information sheet 1026292 version 2 (23/01/2017).
- Participant information sheet 1026291 version 2 (23/01/2017).
- Participant consent form 1026293 version 1 (29/12/2016).

If during the course of the project you need to deviate significantly from the above-approved documentation please inform me since written approval will be required.

Yours sincerely

Thomas Webb
Ethics Administrator
Psychology

Appendix B
Participant Information Sheet (Initial Interviews)

The University Of Sheffield.

Clinical Psychology Unit
Department of Psychology
University of Sheffield
Western Bank
Sheffield S10 2TN

Telephone: 0114 2226650

Participant Information Sheet

Exploring Emotions and Cognitions in Hoarding

Invitation
You are being invited to take part in a research study which is being carried out by the University of Sheffield. It is important that you understand why this research is being done and what is involved. Please take time to read the following information. Please ask us if there is anything that is unclear or if you would like more information.

What is the purpose of the project?
We are hoping to find out more about the experience of hoarding by exploring what thoughts and emotions people have in relation to their hoarding.

Why have I been chosen?
We are looking for at least 40 people who experience difficulties with hoarding. You have been asked to participate because you have been identified as someone who possibly has an experience of hoarding.

Do I have to take part?
It is up to you to decide whether you take part in this research. If you do decide to take part you will be given this information sheet to keep and will be asked to sign a consent form. You are free to withdraw from the study at any time without giving a reason.

What will happen to me if I take part?
You will be interviewed by the researcher (Adam Postlethwaite) about your experience of hoarding. The interview will focus on emotions and thoughts linked to your hoarding. At this stage of the study we will be interviewing three people about their experiences of hoarding. The interviews will help us to form a set of statements about experiences of hoarding that will be used with further participants. The interview will be audio recorded and we anticipate it will last around 60 minutes.

What are the potential disadvantages and risks of taking part?
There are no known risks for you in taking part in this study.

What are the potential benefits of taking part?
We do not anticipate that there will be any immediate benefits for those participating in this study.

Will my taking part in this study be kept confidential?
All information that you provide will be strictly confidential and no individuals will be identifiable in any reports or publications. No information collected will be shown to anyone apart from the University of Sheffield research team. All information and data from the study will be stored securely for at least 5 years for regulatory purposes then destroyed as confidential waste.

What if something goes wrong?

If you have any questions about the study, please do not hesitate to contact the researcher Adam Postlethwaite using the email address: apostlethwaite1@sheffield.ac.uk

If there is a problem with our research, please contact the study supervisor Dr Steve Kellett using the email address: s.kellett@sheffield.ac.uk

Following this, if you feel your complaint has not been handled to your satisfaction then you can contact the research support officer Amrit Sinha at the University of Sheffield Clinical Psychology Unit using the email address: a.sinha@sheffield.ac.uk

What will happen to the results of the research project?
The results of the study may be published in academic journals and presented at conferences. Participants will not be identifiable in any reports. A brief summary of the results will be sent to participants who provide contact details and specify that they would like this.

Who has reviewed the study?
The study has been reviewed and approved by the University of Sheffield Department of Psychology Ethics Committee.

Contact for further information
If you would like any further information about this study or you would like to take part please do not hesitate using the details below.

If you would like to discuss any aspect of the project with the project supervisor, please contact Dr Steve Kellett, Clinical Psychology Unit, University of Sheffield S10 2TN, 0114 2226610.

Thank you for taking the time to read this!

Adam Postlethwaite
Trainee Psychologist

Clinical Psychology Unit
Department of Psychology
University of Sheffield
Western Bank
Sheffield
S10 2TN

Tel: 0114 2226610
Email: apostlethwaite1@sheffield.ac.uk

Appendix C
Consent Forms (offline and online)

Participant Consent Form

The University Of Sheffield.

Department Of Psychology.
Clinical Psychology Unit.

Doctor of Clinical Psychology (DClin Psy) Programme
Clinical supervision training and NHS research training & consultancy.

Clinical Psychology Unit
Department of Psychology
University of Sheffield
Western Bank
Sheffield S10 2TN

Telephone: **0114 2226650**
Fax: **0114 2226610**
Email: **dclinpsy@sheffield.ac.uk**

Consent form for study:

Emotions and Cognitions in Hoarding Disorder. An exploration using Q methodology.

Participant name.....

Address: .....

I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected.	
I understand that relevant sections of my data collected during the study may be looked at by individuals from University of Sheffield, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.	
I agree to take part in the above study.	
I would like to receive a copy of the study results, once available. I would like to receive this by: ☐ Email: _____ ☐ Post: _____	

Name of Participant	Date	Signature
Name of Person taking consent	Date	Signature

2 copies: 1 for participant, 1 for the project notes

If you are willing to participate in the study, please read the statements below and click on the "yes" button in order to proceed:

I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected.

I understand that relevant sections of my data collected during the study may be looked at by individuals from University of Sheffield, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.

I agree with the above statements and I consent to take part in this study:

- ○ Yes
- ○ No

>>

Survey Powered By Qualtrics

Appendix D

Semi-Structured Interview Schedules (expert by experience and clinician)

SEMI-STRUCTURED INTERVIEW SCHEDULE V.3

Interview schedule for interviews with self-identified hoarders. The aim of these interviews is to elicit information about their experience of hoarding, specifically focusing on the emotions and cognitions.

Introducing self. Hi, my name is XXX. I am a trainee clinical psychologist and as part of my training I am conducting a research project about hoarding disorder.

Purpose. I would like to ask you some questions about your experience of hoarding. The focus of the interview will be on your thoughts and feelings related to your hoarding. If we deviate from this I might need to bring us back to talking about what thoughts and feelings you have.

Motivation. I hope to use this information to develop a better understanding of the experience of hoarding which may help clinicians to provide better services for people with similar problems.

Time. The interview should take approximately 60 minutes.

1) **What are your thoughts and feelings about being a person that hoards?**
2) **What thoughts and feelings are generated in others by your hoarding?**
3) **What thoughts and feelings make you want to acquire and object?**
4) **What thoughts and feelings do you typically have when you acquire a new object**
5) **What thoughts and feelings are associated with holding onto objects?**
6) **What does it feel like to throw something out?**
7) **Tell me you most common feelings when you are in your home with your possessions.**

Interview schedule for interviews with clinicians. The aim of these interviews is to elicit information about their experience of hoarding from clinicians who have worked with people who hoard, specifically focusing on the emotions and cognitions.

Introducing self. Hi, my name is XXX. I am a trainee clinical psychologist and as part of my training I am conducting a research project about hoarding disorder.

Purpose. I would like to ask you some questions about your experience of hoarding. The focus of the interview will be on your thoughts and feelings related to your hoarding. If we deviate from this I might need to bring us back to talking about what thoughts and feelings you have.

Motivation. I hope to use this information to develop a better understanding of the experience of hoarding which may help clinicians to provide better services for people with similar problems.

Time. The interview should take approximately 60 minutes.

1) **What are some thoughts and feelings that a person that hoards might have about being a hoarder?**

2) **What thoughts and feelings do you think are generated in others by a person's hoarding?**

3) **What thoughts and feelings do you think make hoarders want to acquire an object?**

4) **What thoughts and feelings do hoarders typically have when they acquire a new object?**

5) **What thoughts and feelings do you think are associated with holding onto objects?**

6) **What do you think it feels like for a hoarder to throw something out?**

7) **What do you believe are the most common feelings when a hoarder is in their home with their possessions?**

Appendix E
Transcriber Confidentiality Agreement

Doctorate in Clinical Psychology, University of Sheffield

Transcribing Confidentiality Form & Guidance Notes

Type of project: Clinical Skills Assessment / Research thesis

Project title: Emotions and Cognitions in Hoarding Disorder. An Exploration using Q Methodology.

Researcher's name: Adam Postlethwaite

The recording you are transcribing has been collected as part of a research project. Recordings may contain information of a very personal nature, which should be kept confidential and not disclosed to others. Maintaining this confidentiality is of utmost importance to the University.

We would like you to agree:

1. Not to disclose any information you may hear on the recording to others,

2. If transcribing digital recordings – only to accept files provided on an encrypted memory stick

3. To keep the tapes and/or encrypted memory stick in a secure locked place when not in use,

4. When transcribing a recording ensure it cannot be heard by other people,

5. To adhere to the Guidelines for Transcribers (appended to this document) in relation to the use of computers and encrypted digital recorders, and

6. To show your transcription only to the relevant individual who is involved in the research project.

7. If you find that anyone speaking on a recording is known to you, we would like you to stop transcription work on that recording immediately and inform the person who has commissioned the work.

Declaration

I have read the above information, as well as the Guidelines for Transcribers, and I understand that:

1. I will discuss the content of the recording only with the individual involved in the research project

2. If transcribing digital recordings – I will only accept files provided on an encrypted memory stick

3. I will keep the tapes and/or encrypted memory stick in a secure place when not in use

4. When transcribing a recording I will ensure it cannot be heard by others

5. I will treat the transcription of the recording as confidential information

6. I will adhere to the requirements detailed in the Guidelines for transcribers in relation to transcribing recordings onto a computer and transcribing digital audio files

7. If the person being interviewed on the recordings is known to me I will undertake no further transcription work on the recording

I agree to act according to the above constraints

Your name _____

Signature _____

Date _____

Occasionally, the conversations on recordings can be distressing to hear. If you should find it upsetting, please stop the transcription and raise this with the researcher as soon as possible.

Appendix F
All extracted statements

Number	Statement	Source
1	I avoid responsibilities in my life	Transcript 1
2	I avoid doing boring things	Transcript 1
3	I leave boring tasks to other people	Transcript 1
4	I often aquire items because I think they are a bargain	Transcript 1
5	I am more likely to buy something if I think it is a bargain	Transcript 1
6	Finding new items prevents me from feeling bored	Transcript 1
7	Acquiring an object gives me a buzz	Transcript 1
8	Acquiring something new gives me a buzz	Transcript 1
9	collecting new items gives me a buzz	Transcript 1
10	When I acquire an object I initially get a buzz	Transcript 1
11	I get a buzz from acquiring new items	Transcript 1
12	I have always tried to do things that give me a buzz	Transcript 1
13	I find it worrying that I can't control my hoarding behaviour	Transcript 1
14	I can't control my hoarding behaviour	Transcript 1
15	My possessions provide me with a sense of comfort	Transcript 1
16	I feel compelled to obtain new items	Transcript 1
17	Collecting things makes me feel in control	Transcript 1
18	Hoarding helps me to cope when I find life hard	Transcript 1
19	I am creative	Transcript 1
20	I can often think of many different uses for an object	Transcript 1
21	I can think of a use for an object when most people would throw it away	Transcript 1
22	I have ideas about future uses for items	Transcript 1
23	I have creative ideas about how to use items but never follow through on them	Transcript 1
24	I have great ideas about what I can use things for	Transcript 1
25	I have creative ideas which provide me with a way of avoiding real life	Transcript 1
26	My hoarding is related to depression	Transcript 1
27	If I'm feeling down getting a new object can help me feel better	Transcript 1
28	I acquire objects to feel happier	Transcript 1
29	Rediscovering items can make me feel depressed	Transcript 1
30	When I'm feeling down acquiring something new can make me feel better	Transcript 1
31	I sometimes question why I have so much stuff	Transcript 1
32	My hoarding is destructive in my relationships	Transcript 1
33	I don’t like to see anything thrown away	Transcript 1
34	Thinking about discarding my possessions causes me to feel distressed	Transcript 1
35	Discarding my possessions causes me to feel distressed	Transcript 1
36	Getting rid of an item makes me feel anxious	Transcript 1
37	I avoid throwing things out because to me they are still perfectly alright	Transcript 1
38	If I'm feeling down getting a new object can help me feel better	Transcript 1
39	I find it difficult to get rid of items when others tell me that I should	Transcript 1
40	I don’t like the culture of disposable items	Transcript 1
41	Collecting items provides an escape from reality	Transcript 1
42	I experience excitement from acquiring something for free	Transcript 1

Number	Statement	Source
43	It's exciting not knowing what you might find	Transcript 1
44	Obtaining an object for free is exciting	Transcript 1
45	I enjoy rediscovering items	Transcript 1
46	I live in a fantasy world	Transcript 1
47	I acquire objects and end up forgetting about them	Transcript 1
48	I often come across items fortuitously	Transcript 1
49	I think my hoarding behaviour is completely ridiculous	Transcript 1
50	I think my hoarding behaviour is illogical	Transcript 1
51	I think my hoarding behaviour is completely ridiculous	Transcript 1
52	Things don’t hurt you	Transcript 1
53	Others might think "Why is (s)he doing that?"	Transcript 1
54	Other people get angry because of my hoarding	Transcript 1
55	Others dispair about my hoarding	Transcript 1
56	Other people get distressed by my hoarding	Transcript 1
57	Other people get frustrated by my hoarding	Transcript 1
58	Other people think my hoarding behaviour is odd	Transcript 1
59	My collecting of objects gets out of hand	Transcript 1
60	I sometimes acquire objects when I am feeling good	Transcript 1
61	I do not care about my presentation	Transcript 1
62	I often think "I'll do that later"	Transcript 1
63	I find clearing my house out to be tedious	Transcript 1
64	I avoid household tasks because I find them tedious	Transcript 1
65	I do creative tasks instead of tasks that I should be doing	Transcript 1
66	Surrounding myself with objects protects me from the reality of life	Transcript 1
67	It's frightening to think of the impact of my hoarding behaviour	Transcript 1
68	I am sometimes disappointed when I find something new to collect	Transcript 1
69	A little while after acquiring a new item I feel a bit down	Transcript 1
70	Realising how many items I have can feel depressing	Transcript 1
71	I sometimes feel like I'm rescuing objects	Transcript 1
72	I find that perfectly good items are often trashed by others	Transcript 1
73	I sometimes think "Someone else could use this" when I find an object	Transcript 1
74	I try to resist collecting more items	Transcript 1
75	I find it worrying that I can't resist collecting more	Transcript 1
76	I am embarrassed by my hoarding	Transcript 1
77	I avoid using things because they might get spoilt	Transcript 1
78	I am often tempted to look for more objects	Transcript 1
79	I think that items discarded by others is often perfectly alright	Transcript 1
80	I believe there is often use left in items that others discard	Transcript 1
81	I am the only one that can control my hoarding behaviour	Transcript 1
82	I am often torn between needing to discard items and thinking they are still useful	Transcript 1
83	Other people throw away things that I think are useful	Transcript 1
84	I believe others think I am weird	Transcript 1

Number	Statement	Source
85	Others might think that my behaviour is a bit odd	Transcript 1
86	If an object looks abandoned I will feel compelled to rescue it	Transcript 2
87	I like to find bargains	Transcript 2
88	When I acquire an item I experience a buzz	Transcript 2
89	Rediscovering items refreshes the positive memories of them	Transcript 2
90	I care for my possessions in the same way I would like to be cared for	Transcript 2
91	I feel a sense of comfort when I am with my possessions	Transcript 2
92	When I'm with my possessions I feel in control	Transcript 2
93	I think of the potential that objects have	Transcript 2
94	I can think of many different ways of using an object	Transcript 2
95	I find it difficult to make decisions	Transcript 2
96	Throwing something out feels heart-wrenching	Transcript 2
97	Throwing something out makes me feel anxious	Transcript 2
98	Throwing something out makes me feel sad	Transcript 2
99	I feel a sense of achievement when I thow something out	Transcript 2
100	I sometimes feel I'm being made to discard things	Transcript 2
101	When I'm getting rid of something I wonder if I am doing the right thing	Transcript 2
102	I worry that others think I am disgusting	Transcript 2
103	I am able to see the unique features in items	Transcript 2
104	I fear what will happen if someone comes to my home	Transcript 2
105	I fear that others might make me get rid of my possessions	Transcript 2
106	I serendipitously come across new things	Transcript 2
107	I'm frustrated with my hoarding behaviour	Transcript 2
108	I feel guilty about throwing items away	Transcript 2
109	I feel guilty about spending money I don’t have	Transcript 2
110	Letting go of an item feels like letting a part of me go	Transcript 2
111	After aquiring an item I experience a come down	Transcript 2
112	Objects are predictable and are not able to let you down like people might	Transcript 2
113	My possessions remind me of events in the past	Transcript 2
114	Other people don’t understand why I hoard things	Transcript 2
115	Other people don’t understand why I can't get my hoarding under control	Transcript 2
116	Professionals don’t understand my hoarding	Transcript 2
117	My family/friends are supportive	Transcript 2
118	Other people worry about me	Transcript 2
119	Other people worry about me	Transcript 2
120	Other people get frustrated by my hoarding	Transcript 2
121	When I am with my possessions I feel overwhelmed	Transcript 2
122	I feel overwhelmed by my hoarding, I don’t know where to start	Transcript 2
123	I like being around my possessions	Transcript 2
124	I get a sense of companionship from my posessions	Transcript 2
125	I get a sense of achievement from finding a bargain	Transcript 2

Number	Statement	Source
126	I experience positive feelings in the lead up to acquiring an item	Transcript 2
127	I acquire items to capture positive moments in my life	Transcript 2
128	Acquiring an object can consolidate a positive experience	Transcript 2
129	I feel peaceful when I am with my possessions	Transcript 2
130	I put off doing things	Transcript 2
131	After aquiring an item I experience regret	Transcript 2
132	Rediscovering items can make me regret having acquired them	Transcript 2
133	I anticipate regretting throwing things away	Transcript 2
134	I acquire objects that I think I can fix	Transcript 2
135	If an object looks sad I will feel compelled to rescue it	Transcript 2
136	I feel responsibility toward objects, if they can be used then they should	Transcript 2
137	It feels rude to throw objects away	Transcript 2
138	If I was to get rid of some of my possessions I would have to make sure they went to a good home	Transcript 2
139	I feel responsible towards a person who gave me an object	Transcript 2
140	I feel safe when I am with my possessions	Transcript 2
141	I feel my possessions provide a physical barrier from others and keep me safe	Transcript 2
142	I value my possessions over the potential risks to my safety	Transcript 2
143	I am embarrassed at the state of my home	Transcript 2
144	I'm embarrassed at the severity of my hoarding	Transcript 2
145	When I am with my possessions I feel embarrassed	Transcript 2
146	I fear that people might be disapproving of my house	Transcript 2
147	I think I shouldn’t have let it get like this	Transcript 2
148	I'm embarrassed at the state of my house	Transcript 2
149	I see beauty in items	Transcript 2
150	I see the uniqueness in objects	Transcript 2
151	I feel stuck with my hoarding	Transcript 2
152	I often acquire an item because I might not be able to find another one	Transcript 2
153	Negative moods can cause me to hoard more	Transcript 2
154	Low mood triggers me to acquire items	Transcript 2
155	I often think items will come in handy	Transcript 2
156	I acquire items when I think they will come in handy	Transcript 2
157	Throwing away a possession is like thowing away a part of me	SCI
158	Thowing some things away would feel like abandoning a loved one	SCI
159	I am responsible for the well-being of my possessions	SCI
160	I'm ashamed when I don’t have something when I need it	SCI
161	My possessions provide me with emotional Comfort	SCI
162	I love some of my belongings the way I love some people	SCI
163	I feel uncomfortable if I can not acquire something I want	SIR
164	The clutter in my home causes me distress	SIR
165	My acquiring habits cause me distress	SIR
166	I avoid discarding possessions because it is too stressful	SIR

Appendix G

Inter-rater agreement and content validity index calculations

		Expert rater 1 (AK)		
		Items rated 1 or 2	Items rated 3 or 4	
Expert rater 2 (HD)	Items rated 1 or 2	2	6	8
	Items rated 3 or 4	6	35	41
		8	41	49

Inter-rater agreement: all items rated 1 or 2 by panel members plus all items rated 3 or 4 by panel members, divided by total number of items

35+2/49 = 0.755102041

Content Validity: proportion of items rated either 3 or 4 (“quite relevant” or “highly relevant”) by both panel members

35/49 = 0.714285714

Appendix H
Final 49 Q-sort statements

Number	Statement
1	If an object looks abandoned, I will feel compelled to rescue it
2	It's exciting when I find bargains
3	I get a buzz from acquiring new things
4	Rediscovering items refreshes the positive memories attached to them
5	I care for my possessions in the same way I would like to be cared for
6	I think about how I could use an object in the future
7	I think of the potential that objects have
8	I find it difficult to make decisions
9	I sometimes question why I have so much stuff
10	My hoarding is destructive to my relationships
11	Thinking about discarding my possessions causes me to feel distressed
12	Discarding my possessions causes me to feel distressed
13	I find it difficult to get rid of items when others tell me that I should
14	I sometimes feel I'm being made to discard things
15	When I'm getting rid of something, I wonder if I am doing the right thing
16	I worry that others think I am disgusting
17	I am able to see the unique features in items
18	I fear what will happen if someone comes to my home
19	I acquire objects and end up forgetting about them
20	I feel guilty about throwing items away
21	Letting go of an item feels like letting a part of me go
22	I think my hoarding behaviour is illogical
23	My possessions aren't capable of hurting me
24	Objects are predictable and are not able to let you down like people might
25	My possessions remind me of events in the past
26	Other people don't understand why I hoard things
27	Others despair about my hoarding
28	Other people get frustrated by my hoarding
29	I feel overwhelmed by my hoarding, I don't know where to start
30	I like being around my possessions
31	I get a sense of companionship from my possessions
32	I find tidying and organising is tedious
33	My anxiety causes me to postpone addressing my hoarding
34	I anticipate regretting throwing things away
35	I sometimes feel like I'm rescuing objects
36	If an object looks sad I will feel compelled to rescue it
37	I feel responsibility towards objects, if they can be used then they should
38	It feels rude to throw objects away
39	I feel safe when I am with my possessions
40	I value my possessions over any potential risks to my safety
41	I'm embarrassed at the state of my home
42	I see beauty in items
43	I feel stuck with my hoarding
44	I am often torn between needing to discard items and thinking they are still useful
45	Negative moods cause me to hoard
46	Others might think that my hoarding is a bit odd
47	My possessions provide me with emotional comfort
48	I love some of my belongings the way I love some people
49	I avoid discarding possessions because it is too stressful

Appendix I
Participant Information Sheets

The University Of Sheffield.

Clinical Psychology Unit
Department of Psychology
University of Sheffield
Western Bank
Sheffield S10 2TN

Telephone: 0114 2226650

Participant Information Sheet

Exploring Emotions and Cognitions in Hoarding

Invitation
You are being invited to take part in a research study which is being carried out by the University of Sheffield. It is important that you understand why this research is being done and what is involved. Please take time to read the following information. Please ask us if there is anything that is unclear or if you would like more information.

What is the purpose of the project?
We are hoping to find out more about the experience of hoarding by exploring what thoughts and emotions people have in relation to their hoarding.

Why have I been chosen?
We are looking for at least 40 people who experience difficulties with hoarding. You have been asked to participate because you have been identified as someone who possibly has an experience of hoarding.

Do I have to take part?
It is up to you to decide whether you take part in this research. If you do decide to take part you will be given this information sheet to keep and will be asked to sign a consent form. You are free to withdraw from the study at any time without giving a reason.

What will happen to me if I take part?
We will ask you to complete some questionnaires about your current hoarding and current mood, and we will ask you to provide some demographic information e.g. your age, sex, duration of hoarding. Following these we will ask you to complete a task which involves ranking how much you agree or disagree with certain statements. These statements will be thoughts and emotions related to hoarding that have been identified by other people that have experiences of hoarding. We anticipate that your involvement should last 30-45 minutes and a researcher will be present throughout the process to answer any questions that you may have.

What are the potential disadvantages and risks of taking part?
There are no known risks for you in taking part in this study.

What are the potential benefits of taking part?
We do not anticipate that there will be any immediate benefits for those participating in this study.

Will my taking part in this study be kept confidential?
All information that you provide will be strictly confidential and no individuals will be identifiable in any reports or publications. No information collected will be shown to anyone apart from the University of Sheffield research team. All information and data from the study will be stored securely for at least 5 years for regulatory purposes then destroyed as confidential waste.

What if something goes wrong?
If you have any questions about the study, please do not hesitate to contact the researcher Adam Postlethwaite using the email address: apostlethwaite1@sheffield.ac.uk

If there is a problem with our research, please contact the study supervisor Dr Steve Kellett using the email address: s.kellett@sheffield.ac.uk

Following this, if you feel your complaint has not been handled to your satisfaction then you can contact the research support officer Amrit Sinha at the University of Sheffield Clinical Psychology Unit using the email address: a.sinha@sheffield.ac.uk

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The results of the study may be published in academic journals and presented at conferences. Participants will not be identifiable in any reports. A brief summary of the results will be sent to participants who provide contact details and specify that they would like this.

Who has reviewed the study?
The study has been reviewed and approved by the University of Sheffield Department of Psychology Ethics Committee.

Contact for further information
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If you would like to discuss any aspect of the project with the project supervisor, please contact Dr Steve Kellett, Clinical Psychology Unit, University of Sheffield S10 2TN, 0114 2226610.

Thank you for taking the time to read this!

Adam Postlethwaite
Trainee Psychologist

Clinical Psychology Unit
Department of Psychology
University of Sheffield
Western Bank
Sheffield
S10 2TN

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The University Of Sheffield.

Clinical Psychology Unit
Department of Psychology
University of Sheffield
Western Bank
Sheffield S10 2TN

Telephone: 0114 2226650

Participant Information Sheet

Exploring Emotions and Cognitions in Hoarding

Invitation
You are being invited to take part in a research study which is being carried out by the University of Sheffield. It is important that you understand why this research is being done and what is involved. Please take time to read the following information. Please ask us if there is anything that is unclear or if you would like more information.

What is the purpose of the project?
We are hoping to find out more about the experience of hoarding by exploring what thoughts and emotions people have in relation to their hoarding.

Why have I been chosen?
We are looking for at least 40 people who experience difficulties with hoarding. You have been asked to participate because you have been identified as someone who possibly has an experience of hoarding.

Do I have to take part?
It is up to you to decide whether you take part in this research. If you do decide to take part you can click at the bottom of this page to continue to the study. You are free to withdraw from the study at any time without giving a reason.

What will happen to me if I take part?
We will ask you to complete some questionnaires about your current hoarding and current mood, and we will ask you to provide some demographic information e.g. your age, sex, duration of hoarding. Following these we will ask you to complete a task which involves ranking how much you agree or disagree with certain statements. These statements will be thoughts and emotions related to hoarding that have been identified by other people that have experiences of hoarding. We anticipate that your involvement should last 30-45 minutes.

What are the potential disadvantages and risks of taking part?
There are no known risks for you in taking part in this study.

What are the potential benefits of taking part?
We do not anticipate that there will be any immediate benefits for those participating in this study.

Will my taking part in this study be kept confidential?
All information that you provide will be strictly confidential and no individuals will be identifiable in any reports or publications. No information collected will be shown to anyone apart from the University of Sheffield research team. All information and data from the study will be stored securely for at least 5 years for regulatory purposes then destroyed as confidential waste.

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How do I take part?
To participate in this study please visit the following webpage:
[QUALTRICS ADDRESS AND HYPERLINK]

This page is accessible from many different devices such as mobile phones, tablets, desktop computers, and laptop computers. We recommend that you access the webpage from either a desktop or laptop computer for ease of use.

Thank you for taking the time to read this!

Adam Postlethwaite
Trainee Psychologist

Clinical Psychology Unit
Department of Psychology
University of Sheffield
Western Bank
Sheffield
S10 2TN

Tel: 0114 2226610
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The University Of Sheffield.

Department of Psychology

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Appendix J
National Helplines Handout

National Helplines

The Samaritans

Offering emotional support 24 hours a day

Telephone: 116 123

Email: jo@samaritans.org

Website: www.samaritans.org

Sane Line

Offering specialist mental health emotional support 6-11pm every day.

Telephone: 0300 304 7000

Email: Through website

Website: www.sane.org.uk

Mind

Infoline – weekdays 9am – 6pm. Providing information and advice on a wide range of topics including types of mental health problems, where to get help, medication and alternative treatments.

Telephone: 0300 123 3393 or text: 86463

Email: info@mind.org.uk

Website: www.mind.org.uk

Anxiety UK

Offering support, advice and information on a range of anxiety and anxiety based depression conditions. Available Monday to Friday, 9.30am – 5.30pm.

Telephone: 08444 775 774 or text: 07537416905

Email: support@anxietyuk.org.uk

Website: www.anxietyuk.org.uk

If you feel suicidal or feel like harming yourself or other people:

- **Call 999**
- **Go to your nearest Accident and Emergency department (A&E). You can search for your local department through the NHS Choices website (http://www.nhs.uk/)**

For non-emergency situations:

- **Visit your GP**
- **Visit NHS Choices via http://www.nhs.uk/**

Appendix K
Clutter Image Rating

Removed from electronic version of thesis due to copyright issues.

Removed from electronic version of thesis due to copyright issues.

Removed from electronic version of thesis due to copyright issues.

Removed from electronic version of thesis due to copyright issues.

Appendix L
Saving Inventory – Revised

Removed from electronic version of thesis due to copyright issues.

Removed from electronic version of thesis due to copyright issues.

Appendix M
Hospital Anxiety and Depression Scale

Removed from electronic version of thesis due to copyright issues.

Appendix N
Demographics Questions

The University Of Sheffield.

Emotions and Cognitions in Hoarding Disorder.
An exploration using Q methodology.

Please provide the following information about yourself. All data will be made anonymous for the analysis process and you will not be identifiable in any subsequent reports.

Name: _____

Date of birth: _____

Sex: ☐ Male

☐ Female

Are you prescribed any medication in relation to your hoarding difficulties, if so please record this below:

_____

_____

_____

_____

_____

_____

_____

_____

Estimated duration of hoarding difficulties: _____
(Please specify to nearest years and months)

Have you received any psychological interventions to help you with your hoarding problems? E.g. Cognitive Behaviour Therapy. Please record any such treatments below.
Please specify, as best you can, when you received the treatment (year and month) and how long you had it for (e.g. how many months or how many sessions).

_____

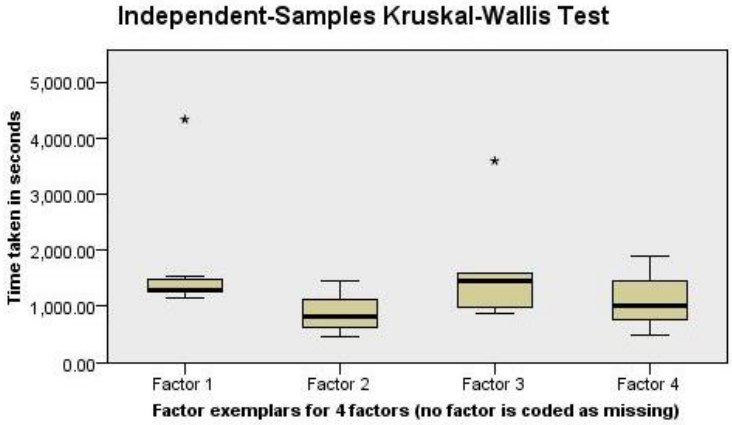
_____

_____

_____

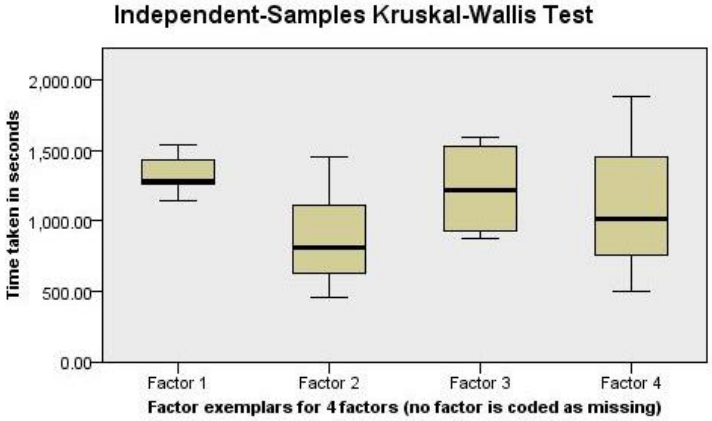
_____

Appendix O
Outliers removal



Total N	25
Test Statistic	8.146
Degrees of Freedom	3
Asymptotic Sig. (2-sided test)	.043

1. The test statistic is adjusted for ties.



Total N	23
Test Statistic	6.193
Degrees of Freedom	3
Asymptotic Sig. (2-sided test)	.103

1. The test statistic is adjusted for ties.
2. Multiple comparisons are not performed because the overall test does not show significant differences across samples.