Behavioural and Cognitive Psychotherapy, 2020, **48**, 672–687
doi:10.1017/S1352465820000181

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Exploring emotions and cognitions in hoarding: a Q-methodology analysis

Adam Postlethwaite[1], Stephen Kellett[2,*] and Nathan Simmonds-Buckley[3]

[1]Sheffield Health and Social Care NHS Foundation Trust, Sheffield, UK, [2]University of Sheffield and Sheffield Health and Social Care NHS Foundation Trust, Sheffield, UK and [3]Barnet, Enfield and Haringey Mental Health Foundation NHS Trust, UK
*Corresponding author. Email: s.kellett@sheffield.ac.uk

(Received 16 April 2019; revised 22 January 2020; accepted 12 February 2020; first published online 07 May 2020)

Abstract

Background: The cognitions and emotions of people prone to hoarding are key components of the dominant cognitive behavioural model of hoarding disorder.
Aims: This study sought to use Q-methodology to explore the thoughts and feelings of people that are prone to hoarding, to identify whether distinct clusters of participants could be found.
Method: A 49-statement Q-set was generated following thematic analysis of initial interviews ($n = 2$) and a review of relevant measures and literature. Forty-one participants with problematic hoarding met various study inclusion criteria and completed the Q-sort (either online or offline). A by-person factor analysis was conducted and subsequent participant clusters compared on psychometric measures of mood, anxiety, hoarding and time taken on the online task as proxy for impulsivity.
Results: Four distinct participant clusters were found constituting 34/41 (82.92%) of the participants, as the Q-sorts of $n = 7$ participants failed to cluster. The four clusters found were '*overwhelmed*' ($n = 11$ participants); '*aware of consequences*' ($n = 13$ participants); '*object complexity*' ($n = 6$ participants) and '*object–affect fusion*' ($n = 4$ participants). The clusters did not markedly differ with regard to hoarding severity, anxiety, depression or impulsivity.
Conclusions: Whilst the participant clusters reflect extant research evidence, they also reveal significant heterogeneity and so prompt the need for further research investigating emotional and cognitive differences between people prone to hoarding.

Keywords: cognitions; emotions; hoarding; Q-methodology

Introduction

The cognitive behavioural model of hoarding disorder (HD) (Steketee and Frost, 2003) describes how information-processing deficits, problematic beliefs about and emotional attachments to possessions and both cognitive and behavioural avoidance of discarding interact to create and then maintain the observable and overwhelming levels of clutter evident in problematic hoarding. However, a review of the role that emotions play in hoarding found that this component of the cognitive behavioural model was the least researched and therefore understood (Kellett and Holden, 2014). The emotions experienced towards the often vast and undifferentiated arrays and piles of objects in hoarding can be both positive and negative (Mogan *et al.*, 2012). In terms of negative feelings, when people prone to hoarding are requested to sort personal possessions in laboratory tasks, then strong feelings of anxiety and sadness become apparent (Grisham *et al.*, 2010). Clearly, emotions do not occur in a vacuum

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https://doi.org/10.1017/S1352465820000181 Published online by Cambridge University Press

and so cognitions (e.g. high need for control over possessions, responsibility assumptions and beliefs that objects function as memory aids) can also drive hoarding behaviour (Frost *et al.*, 2018).

Yap and Grisham (2019) recently reviewed and ordered the evidence for the emotional attachment to objects in hoarding into five main areas: (a) object attachment (Kyrios *et al.*, 2018), (b) objects functioning as symbols of comfort and safety (Przeworski *et al.*, 2014), (c) anthropomorphism of objects (Timpano and Shaw, 2013), (d) possessions functioning as extensions of self (Dozier *et al.*, 2017) and (e) reliance on possessions to trigger assumed lost autobiographical memories (Cherrier and Ponnor, 2010). This high emotional attachment to possessions has been linked to the elevated levels of anxiety and depression found amongst people with problematic hoarding (Coles *et al.*, 2003; Frost *et al.*, 2011). The evidence overall therefore suggests that hoarding-specific cognitions and deficits in emotion regulation (i.e. the ability to manage emotions via use of adaptive strategies) may play a role in problematic hoarding. Fernandez de la Cruz *et al.* (2013) have found that individuals with problematic hoarding (with and without comorbid obsessive compulsive disorder) reported greater difficulties forming goals and also finding strategies for managing emotions compared with controls. Tolin *et al.* (2018) reported that even after controlling for baseline depression, anxiety and stress, people prone to hoarding had greater general emotion regulation difficulties compared with controls. Taylor *et al.* (2019) used qualitative methods to suggest that difficulties with emotion regulation were associated with both the onset and maintenance of hoarding, with the acquisition and possession of objects having a role in the management of emotion.

A research method well suited to the investigation of cognitions and emotions of people prone to hoarding would be that of Q-methodology (Stephenson, 1935), which is a 'qualiquantological' method (Stenner and Stainton-Rogers, 2004). The methodology accesses the individual opinions of participants on a particular, focused topic and uses a 'by-person' factor analytic approach to then identify clusters of individuals sharing common viewpoints (Watts and Stenner, 2005). This study is the first attempt to apply Q-methodology to people prone to hoarding, in the attempt to better understand the manner in which they think and feel about their possessions.

Method

Phase 1: Q-set generation

Ethical approval for this research study was obtained from the University of Sheffield ethics committee (reference no. 012409). The research instrument in Q-methodology is called a *Q-set*: emblematic, distinct and representative statements of the area under investigation drawn from academic literature, initial interviews and pilot studies (Watts and Stenner, 2005). 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 with a clinician and a patient with HD diagnosis and from a review of relevant research and also HD assessment measures. A panel of $n = 3$ trainee clinical psychologists then coded the interview transcripts and reviewed the relevant HD assessment measures (Coogan and Herrington, 2011). A panel meeting agreed on statements that had blanket consensus. A total of 166 statements were prospected (156 from interviews and 10 from HD measures). Statements were then reduced to the 49 most relevant statements (i.e. 46 interview statements and three measure items). Statements were reduced to 49 due to the choice of pre-arranged frequency distribution for the subsequent Q-sort (Watts and Stenner, 2012). These items were reviewed by two clinicians with research and clinical experience with HD. The two domain experts (Valenta and Wigger, 1997) rated each of the potential Q-set items in terms of relevance (i.e. 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant). Scores were then reduced to a dichotomy (Davis, 1992) of either relevant (and received a score of 3 or 4) or not relevant (and received a score of 1 or 2). Acceptable levels of inter-rater agreement range from 0.70 to 0.80

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(Selby-Harrington *et al.*, 1994) and the level of inter-rater agreement was 0.76. The content validity index (CVI) was then used to calculate the proportion of statements rated as either 'quite relevant' or 'highly relevant' (Polit and Beck, 2006). The CVI was 0.71, with a level of 0.80 proposed as being desirable (Polit and Beck, 2006).

Phase 2: Q-sorting

The Q-sort task was completed by a participant sample (either online via Qualtrics or offline) and involved sorting the 49-item Q-set. The answer sheet used forced the Q-sort into a quasi-normal distribution shape (Watts and Stenner, 2012). Participants sorted the randomly shuffled statements along a 7-point scale. Each point could only house a specific number of statements: strongly disagree (3); disagree (5); slightly disagree (9); neither agree nor disagree (15); slightly agree (9); agree (5); and strongly agree (3).

Phase 3: by-person factor analysis

PQMethod was used for the analysis (Watts and Stenner, 2005) and 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 *et al.*, 2013). Factors were only chosen if the eigenvalue was >1.00 and had at least two Q-statements loading on it alone; these were seen as factor exemplars (Brown, 1996; Watts and Stenner, 2005).

Participants

The inclusion and exclusion criteria for the study were: (1) for a participant to self-identify as having problems with hoarding and (2) that Q-sorts would be excluded from the factor analysis if the participant was beneath the clinical cut-off score on both hoarding measures (see 'Measures' section below). As Q-methodology is not designed for hypothesis testing, the study was therefore not subject to sample size estimation, but there is some guidance as to the size of sample required. Webler *et al.* (2009) and also Cairns (2012) recommended sample sizes of between 12 and 40, whilst samples of 30–60 participants have also been recommended (McKeown and Thomas, 2013; Stainton-Rogers, 1995). In practice, Q-method samples rarely exceed $n = 50$ (Brown, 1993). The number of participants is typically smaller than the Q-set (Brouwer, 1999). The initial sample size for the current study was $n = 44$. Offline participants were recruited via hoarding support groups ($n = 10$). The online version was distributed via national charities, on social media websites and through hoarding support forums. A total of $n = 79$ participants began the online version, with $n = 34$ (43%) completing.

Measures

Clutter Image Rating (CIR)

This pictorial measure indexes the extent of clutter within the home. 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). A mean score is calculated across the three rooms, with a mean score of 4 or more being indicative of significant clutter requiring clinical attention (Muroff *et al.*, 2014). The CIR has been shown to demonstrate good psychometric properties (Frost *et al.*, 2008).

Saving Inventory-Revised (SI-R)

This is a 23-item self-report measure of three primary components of hoarding: difficulty discarding (7 items), compulsive acquisition (7 items) and clutter (9 items). A total score of 41 or more is indicative of caseness (Muroff *et al.*, 2014) and the SI-R has been psychometrically validated (Frost *et al.*, 2004).

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Hospital Anxiety and Depression Scale (HADS)

This is a 14-item self-report measure that detects anxiety and depression in clinical and non-clinical populations consisting of two subscales: anxiety (7 items) and depression (7 items). Total scores range from 0 to 21 and are categorised as normal (0–7), mild (8–10), moderate (11–14) and severe (15–21). Caseness is defined by a score of 8 or above on each of the anxiety and depression subscales (Bjelland *et al.*, 2002). The HADS has been shown to possess good psychometric properties (Mykletun *et al.*, 2001). All the items for each of the measures used were retyped to enable delivery by Qualtrics.

Decision-making

Time taken to complete the online Q-sort task and number of clicks were used as proxy measures for decision-making. Grisham *et al.* (2007) have previously illustrated that (compared with community controls) people prone to hoarding have slower/more variable reaction time, increased impulsivity, and worse spatial attention.

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. For the online version, 45 participants (50.56%) discontinued the study during the online task. No offline participants dropped out during the task (see Fig. 1). The majority of participants were female (86%; $n = 38/44$). Duration of hoarding ranged from 4 to 50 years (mean = 23 years) with 86% ($n = 38/44$) having received a psychological intervention for their hoarding. Duration of hoarding for completers (mean = 209.21 months, median = 180) did not differ from non-completers (mean = 276.46 months, median = 240), $U = 460.5$, $z = 1.894$, $p = 0.058$. Completers and non-completers did not differ in terms of gender; χ^2 (1) = 3.084, $p = 0.079$, HADS scores ($U = 361.0$, $z = -0.209$, $p = 0.834$), SI-R total score ($U = 478.0$, $z = 0.899$, $p = 0.368$) and CIR scores ($U = 473.0$, $z = 1.200$, $p = 0.230$).

For the 44 participants that fully completed the study, HADS scores for the anxiety subscale ranged from 3 to 19 (mean = 11.62, $SD = 4.14$) with 36 participants (81.8%) meeting caseness for anxiety. Depression subscale scores ranged from 1 to 19 (mean = 10.78, $SD = 4.23$) with 35 participants (79.5%) meeting caseness for depression. Mean scores for the CIR ranged from 1.67 to 7.00 (mean = 3.97, $SD = 1.49$) with 32 participants (72.7%) meeting clutter caseness. Total SI-R scores ranged from 32 to 76 (mean = 57.52, $SD = 12.28$), with 40/44 participants (90.9%) meeting hoarding caseness on the SI-R. Three online participants did not meet caseness for hoarding on either of the hoarding measures and so were removed from the dataset for the subsequent Q-sort analysis. This meant that 41 Q-sorts were included in the factor analysis.

Analysis of Q-sort data

Analysis of the unrotated factors indicated 12 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 explained 49% of the variance and Q-sort loadings for each of the factors are presented in Table 1. Thirty-four of the 41 Q-sorts (82.93%) were found to load significantly onto any single factor and were therefore classified as factor exemplars. This translated into four participant clusters consisting of $n = 11$ participants (factor 1), $n = 13$ (factor 2), $n = 6$ (factor 3) and $n = 4$ (factor 4). Correlations between factors were low and ranged between 0.0093 and 0.3665. Seven participants were

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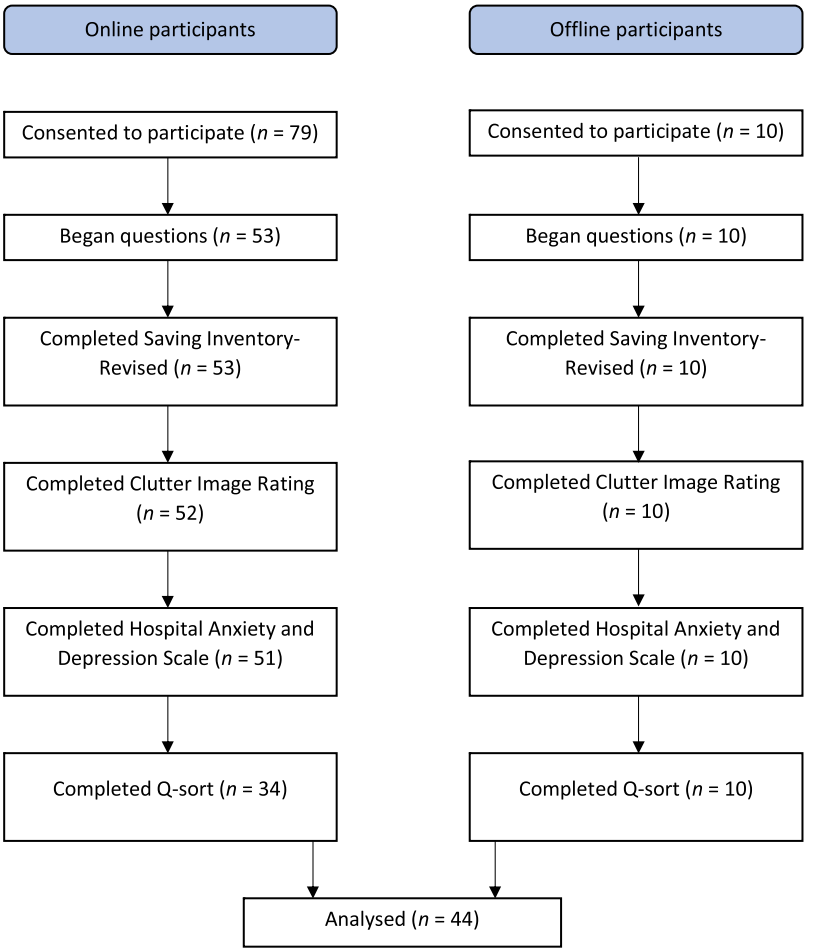


Figure 1. Flow chart depicting participant retention and drop-out.

excluded from analyses on the psychometric measures, as they failed to load onto any single factor, nor constitute a factor. Analysis indicated that 46 of the 49 (93.88%) statements in the Q-sort significantly discriminated between clusters. Statements 24 (cognition; '*objects are predictable and are not able to let you down like people might*'), 28 (cognition; '*other people get frustrated by my hoarding*') and 44 (emotion; '*I am often torn between needing to discard items and thinking they are still useful*') did not significantly distinguish between clusters. Factor arrays representing the viewpoints of each cluster are presented in Table 2, with *Z*-scores and Q-sort values demonstrating the levels of agreement between the participants within each factor.

Two statements were found to statistically distinguish each factor from all other factors ($p < .01$). Statement 21 (emotion) '*letting go of an item feels like letting a part of me go*' was rated differently by each cluster. 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 (cognition) '*my anxiety causes me to postpone addressing my hoarding*' was also rated consistently differently by each cluster. 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.

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Table 1. Q-sort loadings for each factor – asterisk denotes a participant

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

*Factor exemplars.

Factor 1: the 'overwhelmed' cluster (n = 11)

This cluster of participants was represented by 11 factor exemplars that explained 15% of the variance (see Table 2). The majority of the 11 participants (63.6%) completed the study online. All 11 participants met caseness for anxiety and seven (63.6%) met caseness for depression. All met hoarding caseness on the SI-R, with 8 (72.7%) also meeting clutter caseness on the CIR. 'Overwhelmed' participants strongly agreed (i.e. Q-sort value scores of +3) with statements that '*thinking about discarding my possessions causes me to feel distressed*' (S11; cognition), '*discarding my possessions makes me feel distressed*' (S12; emotion), and that '*I'm felt embarrassed about the state of my home*' (S41; emotion). There was also agreement (+2) that '*rediscovering items refreshes positive memories attached to them*' (S4; emotion), that '*anxiety causes me to postpone addressing my hoarding*' (S33; cognition) and that '*I avoid discarding possessions due to finding this process stressful*' (S49; emotion). This group of participants strongly disagreed (–3) that they got '*a sense of companionship from my possessions*' (S31).

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Table 2. Factor arrays showing both Q-sort values (Q-SV) and *Z*-scores (*Z*)

		Factor 1		Factor 2		Factor 3		Factor 4	
Q-statement	Q-statement	Q-SV	*Z*	Q-SV	*Z*	Q-SV	*Z*	Q-SV	*Z*
2	*It's exciting when I find bargains*	0	−0.055*	2	1.593	1	0.942	2	1.284
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
10	*My hoarding is destructive to my relationships*	0	0.375*	3	2.352*	−2	−1.279	−2	−1.150
11	*Thinking about discarding my possessions causes me to feel distressed*	3	1.754*	0	−0.271	0	0.058	−1	−1.002*
17	*I am able to see the unique features in items*	−1	−0.698*	1	0.291	0	0.260	1	0.512
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*
33	*My anxiety causes me to postpone addressing my hoarding*	2	1.335*	1	0.313*	−1	−0.826*	−3	−1.678*
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
49	*I avoid discarding possessions because it is too stressful*	2	1.307*	−1	−0.512	−1	−1.025	−1	−0.277
3	*I get a buzz from acquiring things*	0	−0.004	2	1.196*	0	0.378	3	2.264*
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*
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
16	*I worry that others think I am disgusting*	−1	−0.609	2	1.505*	−1	−0.855	0	0.069
18	*I fear what will happen if someone comes to my house*	1	0.520	3	1.824*	0	−0.245	0	0.226
20	*I feel guilty about throwing items away*	1	0.809	−1	−0.576*	3	1.674*	0	0.219
22	*I think my hoarding behaviour is illogical*	−1	−0.627	1	0.998*	−1	−0.771	0	0.040
25	*My possessions remind of events in the past*	2	1.371	0	−0.390*	2	1.295	2	1.665
31	*I get a sense of companionship from my possessions*	−3	−1.675	−1	−0.781*	−2	−1.507	2	1.199*
39	*I feel safe when I am with my possessions*	−2	−1.422	0	−0.267*	−3	−1.550	1	0.468*
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*
7	*I think of the potential that objects have*	0	0.152	1	0.878	3	1.719*	0	0.180
30	*I like being around my possessions*	−2	−1.380	−1	−0.892	1	0.417*	2	1.250*
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
41	*I'm embarrassed at the state of my home*	3	1.793	2	1.372	−1	−0.937*	1	0.956
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*
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
12	*Discarding my possessions causes me to feel distressed*	3	1.595	0	−0.103	2	1.087	0	−0.259
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
19	*I acquire objects and end up forgetting about them*	0	−0.472	1	0.886	0	0.277	0	−0.078
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
26	*Other people don't understand why I hoard things*	0	−0.157	1	0.360	1	0.508	0	0.326

(*Continued*)

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Table 2. (*Continued*)

		Factor 1		Factor 2		Factor 3		Factor 4	
Q-statement	Q-statement	Q-SV	*Z*	Q-SV	*Z*	Q-SV	*Z*	Q-SV	*Z*
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
32	*I find tidying and organising is tedious*	−1	−0.722	0	0.194	0	0.231	0	−0.273
34	*I anticipate regretting throwing things away*	1	1.158	−1	−0.534	0	−0.130	1	0.583
38	*It feels rude to throw objects away*	−2	−1.448	−2	−1.416	1	0.528	0	0.171
40	*I value my possessions over any potential risks to my safety*	−3	−2.114	−2	−1.444	−3	−1.627	−2	−1.434
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
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 $p < .0186$. ‡ denotes the three Q-statements that did not significantly distinguish between the clusters.

Of the statements mentioned, statements 11 (cognition) '*thinking about discarding my possessions causes me to feel distressed*', 33 (emotion) '*my anxiety causes me to postpone addressing my hoarding*' and 49 (emotion) '*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 cognitive 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 the 'overwhelmed' cluster did not. Participants in the 'overwhelmed' cluster neither agreed nor disagreed with S10 (emotion) '*my hoarding is destructive to my relationships*' whereas those in other clusters expressed stronger opinions. 'Overwhelmed' participants also neither agreed nor disagreed with S6 (cognition) '*I think about how I could use an object in the future*' and S2 (emotion) '*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 'aware of consequences' cluster (n = 13)

This cluster of participants was best represented by 13 factor exemplars that explained 16% of the variance (see Table 2). 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. This cluster had the highest mean score on both the SI-R clutter and excessive acquisition subscales. The 'aware of consequences' cluster participants strongly agreed (+3) '*fearing what will happen if someone comes to my home?*' (S18; emotion), with '*hoarding is destructive to my relationships*' (S10; emotion) and questioned '*why I have so much stuff*' (S9; cognition). This cluster also agreed (+2) that '*I worry that others think I'm disgusting*' (S16; cognition), that '*it's exciting when I find bargains*' (S2; emotion) and that '*I get a buzz from acquiring new things*' (S3; emotion). 'Consequences' participants strongly disagreed (–3) with statement 21 (cognition) '*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 the 'consequences' cluster participants from the other clusters ($p < .01$). This cluster contained the only participants to agree with statements 10 (cognition) '*my hoarding is destructive to my relationships*' and 16 (cognition) '*I worry that others think I am disgusting*'. Factor 2 participants also rated stronger disagreement with statement 21 (emotion) '*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 six exemplars that explained 10% of the variance (see Table 2). 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. 'Object complexity' cluster participants strongly agreed (+3) that '*I feel guilty about throwing items away*' (S20; emotion). They also strongly agreed with the cognition statement '*I think about the potential that objects have*' (S7) and about '*how I could use an object in the future*' (S6; cognition). This cluster agreed with the cognitive statement (+2) '*I sometimes feel I am rescuing objects*' (S35), but not because '*when an object feels sad, I feel compelled to rescue it*' (S36; emotion). This cluster strongly disagreed (–3) with emotion statement 39 '*I feel safe when I am with my possessions*', and disagreed with cognitive statement 31 '*I get a sense of companionship from my possessions*'. They slightly agreed (+1) with the statement that '*I feel responsibility towards objects and that if they can be used then they should*' (S37; cognitive) and that '*I sometimes feel I am being made to discard things*' (S14; emotion). They were the only cluster that expressed any degree of

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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 four factor exemplars that explained 8% of the variance (see Table 2). 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. This cluster had the highest mean score on SI-R clutter scale. 'Object–affect fusion' cluster participants strongly agreed with the statement (+3) that '*letting go of an item felt like letting a part of me go*' (S21; emotion), that they experienced '*a buzz from acquiring new things*' (3; emotion), and that '*I think about how I could use an object in the future*' (S6; cognition). This cluster shared agreement (+2) with the statements that '*I like being around my possessions*' (S30; emotion), '*I get a sense of companionship from my possessions*' (S31; emotion), and these participants consisted the only cluster to express any degree of agreement with the later statement. Similarly, the 'object–affect' cluster shared slight agreement (+1) with statements 47 (emotion) '*my possessions provide me with emotional comfort*' and 48 (emotion) '*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 (cognition) '*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

Table 3 contains the scores on the psychometric measures and time taken on the online version. Twenty-five participants were included in the time-taken analysis, as click data were only collected for online participants ($n = 34$); three of these did not meet caseness for hoarding and six were not factor exemplars. Two data points were removed from the time-taken data as they were deemed to be outliers. There were no significant between-group differences found for number of clicks or time taken. Similarly, no significant between-group differences were found between the clusters in terms of hoarding severity, anxiety, depression or impulsivity. Table 4 contains the results for the caseness and cluster analyses. The relationship between cluster and depression caseness (HADS-D) was significant [χ^2 (3, $n = 34$) = 8.017, $p = 0.046$]. *Post-hoc* examination of the adjusted standardised residuals was then conducted (García-Pérez and Vicente, 2003). Residual scores indicated that the 'aware of consequences' cluster was more likely to meet caseness for depression than participants from the other clusters. However, after conducting a Bonferroni correction for multiple comparisons ($\alpha = 0.00625$), the effect became non-significant. No other significant associations were found between clusters and caseness: 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, $p = 0.250$].

Discussion

This has been the first attempt to explore cognitions and emotions in people prone to hoarding using Q-methodology. Analysis identified four distinct participant clusters with differing profiles of quite distinct thoughts and feelings. Within each of the clusters, participants held common and shared perspectives. The implication of this is that the personal experience of hoarding is possibly

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Table 3. Differences between the four participant clusters in terms of psychometric measures, time taken and clicks used

	Mean (standard deviation)					Kruskal–Wallis test		
Outcome measure	Factor 1 ($n = 11$)	Factor 2 ($n = 13$)	Factor 3 ($n = 6$)	Factor 4 ($n = 4$)	*N*	d.f.	*H*	*p*
HADS – anxiety subscale	12.18 (2.79)	11.23 (4.57)	12.33 (5.20)	11.75 (4.79)	34	3	0.291	0.962
HADS – depression subscale	10.00 (4.41)	12.66 (3.26)	10.67 (6.62)	9.75 (2.63)	34	3	3.387	0.336
HADS – full scale	22.18 (6.15)	23.89 (7.49)	23.00 (11.45)	21.50 (7.14)	34	3	0.368	0.947
Clutter Image Rating Scale	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 subscale	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 subscale	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 subscale	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 score	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). HADS, Hospital Anxiety and Depression Scale; SI-R, Saving Inventory-Revised.

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*	d.f.	χ^2	*p*
HADS – anxiety subscale	100	85	67	75	34	3	5.096	0.165
HADS – depression subscale	64	100	33	75	34	3	8.017	0.046*
Saving Inventory-Revised	100	100	83	100	34	3	3.616	0.306
Clutter Image Rating	73	92	67	100	34	3	4.108	0.250

*Significant at $p < 0.05$. HADS, Hospital Anxiety and Depression Scale.

more cognitively and emotionally heterogeneous than previously considered, and that people prone to problematic hoarding can vary considerably in terms of their thoughts and feelings.

The '*overwhelmed*' cluster appeared to exemplify the attentional deficits and organisational problems suggested to contribute to hoarding, such as indecision and categorization problems (Frost and Gross, 1993; Frost and Hartl, 1996). It has been shown that amongst people that hoard, indecisiveness is correlated with the core features of hoarding (Frost *et al.*, 2011). It has been suggested that this difficulty with decision-making and the resulting tendency to avoid or postpone making decisions is based in a pronounced fear of making mistakes (Warren and Ostrom, 1988). The 'overwhelmed' cluster reported similar tendencies; for example, they reported that they often postponed addressing their hoarding and procrastinated regarding discarding possessions, as they found this behaviour too stressful. This is in line with findings that heightened emotional attachment to a possession interacts with concerns about making an incorrect decision concerning discarding that possession, with any mistaken discarding of valued objects being experienced as a particularly aversive and traumatic event by people that hoard (Tolin *et al.*, 2009).

The '*aware of consequences*' 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 cluttered home environments, and family members might become distressed and agitated concerning the clutter (Wilbram *et al.*, 2008). The mean scores on the SI-R acquisition scale may indicate that this cluster had more of a problem with acquiring than discarding. The consequences cluster was particularly concerned about how others perceived and felt about their hoarding. Frost and Gross (1993) reported similar themes related to embarrassment that led to avoidance of any social contact in the homes of people prone to hoarding. Participants in the consequences cluster similarly reported fearing what would happen if someone visited their home, worrying that people would judge them as socially unacceptable. Given the prominent role of domiciliary visits in hoarding treatment (Koenig et al., 2014), this is a particularly useful finding.

The '*object-complexity*' cluster was characterised by beliefs that objects were uniquely and inherently useful. This cluster felt some sense of responsibility towards objects causing them to feel guilty upon discarding them, and also feeling aggrieved if and when they are forced into discarding an object. At the same time, these participants did not derive emotional comfort from their possessions, creating a complex emotional dilemma. Steketee *et al.* (2003) found that the responsibility felt towards objects was a significant component of problematic hoarding. Individuals that hoard have previously reported difficulties aligned with those of the object complexity cluster, such as not wanting to 'waste' an object, it as will be useful in the future and feelings of marked guilt associated with discarding objects (Frost *et al.*, 2015). Furby (1978) highlighted object complexity as a specific contributor to possession behaviour, suggesting that this feature was central to problematic hoarding.

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Participants within the final '*object–affect fusion*' cluster derived emotional comfort from their possessions, enjoyed being with their possessions, and felt 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 Gross (1993) found that hoarders reported higher levels of emotional attachment to their possessions than non-hoarding controls. This insight suggests that these individuals not only feel emotionally attached to objects, but experience the objects as extensions of themselves, creating a sense of 'it–me' confusion. Yap and Grisham (2019) found that possessions functioned as a store for autobiographical memories, anthropomorphism, and insecure object attachment predicted hoarding even after accounting for depression, anxiety, and other non-sentimental hoarding beliefs.

In terms of future research, this paper implies that emotion regulation difficulties may be a shared and common problem across people that hoard (Fernandez de la Cruz *et al.*, 2013; Tolin *et al.*, 2018). Emotion regulation is the process of changing the experience (or the expression of) feelings via situation selection/modification, attentional focus, cognitive change and response modification and therefore has obvious potential influence on hoarding behaviour. A recent qualitative study conducted by Taylor *et al.* (2019) has added to the hoarding and emotion regulation evidence by highlighting that people prone to hoarding have problems with naming feelings, harbour unhelpful attitudes towards feelings, avoid feelings and carry a personal sense of being deficient in their emotion regulation strategies. Further use of the Difficulties in Emotion Regulation Scale (Gratz and Roemer, 2004) is indicated to explore the manner in which individual Q-statements may correlate with the five scales (acceptance, goals, impulsivity, strategy and clarity). For example, individuals with low distress tolerance could also be in the object complexity cluster and have an exemplar Q-statement (Q11) of '*thinking about discarding my possessions causes me to feel distressed*' or score highly on the impulsivity subscale, be in the object–affect cluster and have a factor exemplar of (Q3) '*I get a buzz from acquainting new things*'. Greater use of qualitative and qualiquantological methods (Stenner and Stainton-Rogers, 2004) for exploring emotion regulation difficulties in HD is also called for, as is the evaluation of whether CBT for hoarding can improve and broaden emotion regulation. Q-methods can be used longitudinally and therefore it would be useful to follow up treated and untreated samples over time. Future Q-methods research should also integrate a measure of compulsive acquisition into their methods, such as the Compulsive Acquisition Scale (Faraci *et al.*, 2018). Future research also needs to control for the manner in which co-occurring mental health conditions may influence Q-item endorsement. Innovations in using bootstrapping methods offer much potential in advancing Q-method analysis (Zabala and Pascual, 2016).

In terms of study limitations, despite opinion being divided (Weingarden and Renshaw, 2015), some research has suggested that hoarding can carry significant shame and stigma (Schmalisch et al., 2010), and this may have impacted on willingness to participate. Participants were recruited primarily through hoarding support groups which may have introduced bias. Whilst the clusters identified differentiated the aspects of the hoarding that were distinct for that cluster, this does not imply that these were the only concern of that cluster. The size of the clusters in the third (object complexity) and fourth (object–affect fusion) clusters were small, bringing the reliability of these clusters into doubt. However, as Q-methods often recruit samples less than $n = 50$ and some participants do not load onto factors, then clusters of this size should be expected (Dennis, 1988). Q-methodology requires participants to be self-aware and previous research has suggested that people that hoard often lack insight (Kim *et al.*, 2001; Tolin *et al.*, 2010). It is acknowledged that the content validity index (CVI) score for the Q-items could have been higher (Lynn, 1986).

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Half of the online participants dropped out during the Q-sort task and this was in comparison with zero in the offline group. Q-sorting is a complex task that is more demanding than completing a questionnaire, as attention needs to be given to sorting and resorting the Q-statements. It may be the case that this felt a more attentionally demanding task (Grisham *et al*., 2007) when completed online and therefore participants withdrew. Whilst there is evidence that online and paper versions of Q-methods are analogous (Nazariadli *et al*., 2019), this may not be the case in clinical samples. It is acknowledged, nevertheless, that the high drop-out rate limits the generalisability of the current findings. It is also worth noting that offline participants tended to be over-represented in the 'object–complexity' and 'object–affect' clusters and this calls into question whether the method of study completion affected Q-sorting.

In conclusion, the results of this study provide evidence of cognitive and emotional heterogeneity within HD. The methods were capable of categorising the experiences of a sample of people prone to hoarding into four clusters and these clusters were reflective of current hoarding theory and research. This grounding of the elicited clusters in extant theoretical concepts has helped to develop a more nuanced understanding of cognition and emotions in HD. The heterogeneity evidenced suggests that HD treatment with CBT is more likely to be effective when is it matched to both the individual and the diagnosis.

Acknowledgements. The authors thank the participants and charities that helped with the project.

Conflicts of interest. Stephen Kellett, Adam Postlethwaite and Nathan Simmonds-Buckley have no conflicts of interest with respect to this publication.

Ethical statements. This project adhered to the APA ethical principles and code of practice. Ethical approval for this research study was granted by the University of Sheffield ethics committee (reference no. 012409).

Financial support. None.

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Cite this article: Postlethwaite A, Kellett S, and Simmonds-Buckley N (2020). Exploring emotions and cognitions in hoarding: a Q-methodology analysis. *Behavioural and Cognitive Psychotherapy* **48**, 672–687. https://doi.org/10.1017/S1352465820000181

https://doi.org/10.1017/S1352465820000181 Published online by Cambridge University Press