**Effectiveness of Group Cognitive Behavioral Therapy for Hoarding Disorder: Evaluation of Outcomes**

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**Abstract**

Limited research suggests that Group Cognitive Behavioral Therapy (GCBT) is an effective treatment in relieving symptoms of Hoarding Disorder (HD), although interventions have often included more than 15 sessions with high attrition rates. This study presents findings from 24 patients with HD referred to a specialist mental health tertiary service in southwest London treated with GCBT in clinical practice. GCBT consisted of 11 or 12 x 2 hour closed sessions over a 6-month period for a maximum of 9 individuals per group. Twenty (83%) patients completed the GCBT treatment. Results demonstrated highly significant improvements in hoarding symptoms, symptoms of depression and overall levels of functioning. By treatment end, completing patients evidenced a 32% improvement in severity of hoarding behaviors as assessed by the Savings Inventory-Revised, with 42% achieving clinically significant change. Qualitative feedback from patients indicate a positive experience in reducing shame and social isolation and in providing peer support and learning. The treatment results are consistent with similar studies describing GCBT for HD and suggest this is an effective therapy model that can be successfully implemented as part of treatment provision in routine clinical practice, with potential cost benefits for service delivery compared with individual home-based sessions.

**Keywords**

Hoarding Disorder, Cognitive Behavioral Therapy, Group Therapy

1. **Introduction**

Hoarding Disorder (HD) is now a distinctly recognised diagnosis having been reclassified by the DSM-5 (American Psychiatric Association, 2013). The separation from Obsessive Compulsive Disorder (OCD) has led to an increase in the number of studies and research into treatment this century, stemming from the publication of the Frost and Hartl (1996) seminal paper “A Cognitive Behavioral Model of Compulsive Hoarding”. It is acknowledged though that more research is needed, particularly on 1:1 vs. group treatment (Gilliam et al., 2011; Williams & Viscusi, 2016).

Four reviews and/or meta-analyses of treatment for HD have been conducted to date (Muroff, Bratiotis, & Steketee, 2011; Thompson, Fernández de la Cruz, Mataix-Cols, & Onwumere, 2017; Tolin, Frost, Steketee, & Muroff, 2015; Williams & Viscusi, 2016). The consensus is that cognitive behavioral therapy (CBT) is useful in reducing symptoms of HD. The Savings Inventory-Revised (SI-R; Frost, Steketee, & Grisham, 2004), which assesses clutter, difficulty discarding, and excessive acquisition behaviors, is the most commonly used self-report measure of symptom severity in HD research (Mathews et al., 2016). Gilliam and colleagues (2011) reported that 45 individuals with HD who had either 16 or 20 sessions of group CBT (GCBT) showed, on average, a 27% decrease in SI-R scores (pre-treatment mean = 64, post-treatment mean = 47), which is comparable to previous studies of individual CBT and superior to most other group studies, although the drop-out rate was 33%. The meta-analysis of Tolin and colleagues (2015) found that difficulty discarding, rather than acquisition, showed the greatest improvement, but noted that this could be due to the focus of CBT protocols on that symptom whereas more recently there has been a greater emphasis on acquisition.

HD is recognised as being life-long in nature; therefore, treatment focuses on symptom improvement rather than complete remission, with scores typically remaining within the HD range post treatment (Mathews et al., 2016; Tolin et al., 2015). Williams and Viscusi (2016) have noted that not all improvements are clinically significant and effect sizes are often modest. Typically, drop-out rates from treatment have been high (Frost, Ruby, & Shuer, 2012; Gilliam et al., 2011; Thompson, Fernández de la Cruz, Mataix-Cols, & Onwumere, 2016; Williams & Viscusi, 2016) and motivation to participate in treatment is low (Williams & Viscusi, 2016). Moreover, the chronic nature of the condition leads to a treatment pathway that can be time consuming and costly (Williams & Viscusi, 2016). Treatment can be delivered via group or individual sessions. The recognised lack of trained therapists in this specialized field (Gilliam et al., 2011; Mathews et al., 2016) has spawned a development of self-help books, in particular “Buried in Treasures” (BIT) by Tolin, Frost and Steketee (2007a). Mathews and colleagues (2016) showed that group treatment using BIT with trained peer facilitators proved as or more clinically effective than group and/or 1:1 CBT delivered by psychologists. It was also more cost effective by 100 dollars per person, although the authors acknowledge the need for trained therapists to deliver effective treatment.

It is unclear whether treatment delivered via a group or individually is more effective. While pre- to post-treatment symptom reduction in clinical trials with patients with compulsive hoarding have tended to be larger for individual CBT (Steketee, Frost, Wincze, Greene, & Douglass, 2000; Tolin, Meunier, Frost, & Steketee, 2011) than GCBT (Muroff et al., 2009), Tolin and colleagues’ meta-analysis from 2015 showed no significant difference in outcome between group (*n* = 8) and individual CBT studies (*n* = 4); effect sizes were large for both. Interestingly, the inclusion of an assistant at home during GCBT was found in one study to offer only a slight (non-significant) improvement after 20 sessions (Muroff, Steketee, Bratiotis, & Ross, 2012). The 2015 meta-analysis indicated that a mean of 20 group-based and 5.6 home-based sessions offered the best outcome for patients (Tolin et al., 2015).

GCBT for HD brings with it therapeutic benefits that are absent from individual treatment. These include positive peer pressure which can assist with motivation to complete homework, mutual support and a reduction in feelings of social isolation and stigma via identifying with others (Muroff et al., 2009; Steketee et al., 2000). From a service perspective, group treatment may be more cost effective and increase access to treatment (Gilliam et al., 2011; Muroff et al., 2009). The content of group treatment is evolving and includes psychoeducation, elements of motivational interviewing and cognitive restructuring (Mathews et al., 2016). The challenges posed by group treatment may not be unique to HD but are worth noting and include unexpected absences, late arrivals, difficulties in collecting data, limited social skills, paranoid traits, the need for concurrent treatment for co-morbidity, poor motivation for change, opportunities for comparing self with others and time spent coaching others to avoid own problems (Muroff et al., 2009). A structured yet flexible protocol is needed, with guidelines around attendance, punctuality and compliance (Gilliam et al., 2011).

Few studies have described GCBT treatments for HD outside the context of clinical trials or research-based initiatives. One recent exception, a Australian-based naturalistic outcome study of a 12-session GCBT intervention for people with HD (Moulding, Nedeljkovic, Kyrios, Osborne, & Mogan, 2017), reported significant decreases in hoarding symptoms at the end of treatment, although effect sizes were lower than other GCBT programmes for hoarding. Also, post-treatment data was only available for a little over half of participating patients complicating interpretation of effectiveness. The goal of this study is to provide further data on the effectiveness of GCBT for Hoarding Disorder with treatment groups that were instigated for clinical rather than research purposes. The number of group sessions, initially 11 then 12, is lower when compared with other studies of GCBT, which typically range from 16 to 24 sessions (Thompson et al., 2017). The factors impacting this decision to deliver a shorter duration group include the clinicians’ previous experience of running GCBT for OCD and body dysmorphic disorder (BDD) within the constraints of the local public health care system - both of which ran for 8 weeks - and testing the therapeutic model on a novel treatment group. As such, the content of the group sessions was based largely on the facilitators’ extensive experience of delivering CBT on an individual basis to people with HD and delivering GCBT to other conditions such as OCD and BDD. We wanted to explore changes in symptoms of hoarding and depression and assess the treatment impact on levels of functioning.

1. **Materials and Methods**

*2.1. Participants and service setting*

Data was gathered from participants attending 3 consecutive Hoarding Treatment Groups run in south west London covering 5 boroughs (population approximately 1 million) as part of routine clinical practice to evaluate the intervention. The study was registered as a service evaluation with the local Trust’s Clinical Effectiveness Team (reference number: SE/0004). Individuals were referred from a number of sources including GPs, Community Mental Health Teams, Social Services and local ‘Improving Access to Psychological Therapies’ (IAPT) programmes. Referrals were invited from professionals working with people suffering from hoarding problems. All treatment attendees had a diagnosis of Hoarding Disorder (HD), with clinically significant hoarding behaviors as the primary presenting problem. Exclusion criteria included those actively at risk of self-harm or significant (mis)use of alcohol and/or drugs.

All appropriate referrals were formally assessed and screened in their homes for HD by 2 senior and accredited Cognitive Behavioral Therapists, who then co-facilitated the groups. The assessment addressed all aspects relevant to DSM-V hoarding diagnostic criteria (American Psychiatric Association, 2013), that is, excessive acquisition, difficulty discarding and excessive clutter, and the psychological and environmental impact of hoarding on the patient’s life, and included the Clutter Image Rating (Frost, Steketee, Tolin, & Renaud, 2008), which enabled the Therapist(s) to obtain a visual assessment of the extent of clutter in the home. The Therapists work in a tertiary service for complex anxiety disorders. They are experienced and accustomed to working with people suffering with a range of treatment resistant anxiety disorders including HD and have backgrounds in Occupational Therapy and Mental Health Nursing. Both had worked with people suffering from HD on a 1:1 basis and had previously run OCD and BDD Treatment Groups using a CBT framework.

*2.2. Measures*

**Hoarding symptoms.** The severity of HD was determined using the Savings Inventory-Revised (SI-R; Frost et al., 2004), a 23-item self-report questionnaire that contains 3 subscales indicating levels of clutter, difficulty discarding and acquisition of items. It was utilized as the primary measure for HD symptom severity within the patient groups. Items are rated between 0 (none, not at all, never) and 4 (almost all, extreme, very often). The SI-R has good construct validity, high internal consistency and acceptable test–retest reliability (Frost et al., 2004; Frost et al., 2008; Gilliam et al., 2011), and is sensitive to change with CBT treatment (Steketee, Frost, Tolin, Rasmussen, & Brown, 2010; Tolin, Frost, & Steketee, 2007b).

**Level of disability.** Overall level of functioning was determined using the Sheehan Disability Scale (SDS; Sheehan, 2007), a 3-item measure used to assess levels of disability and functional impairment, administered on a self-report basis. Whilst it is not a specific diagnostic tool, it covers 3 specific areas of impairment, work, social life and leisure activities, as well as home life or family responsibilities. In a study of 1001 patients, more than 80% with diagnosis of a mental disorder had an elevated SDS score substantiating construct validity (Sheehan, 2007). Given that HD can substantially impact on levels of functioning at home (Saxena et al., 2011), the scale has utility in assessing elements of function related to the condition.

**Depression.** Symptoms of depression were measured using the self-report Beck Depression Inventory (BDI 1A; Beck, Steer, Ball, & Ranieri, 1996). It is a well established measure used to screen for the presence of depression; the questionnaire has a high level of internal consistency with the 21 symptoms correlating positively with self-reported depression (Beck et al., 1996).

**Patient satisfaction*.*** After attending the group, patients were asked to fill in 2 feedback forms. The first included 3 questions concerning perceived effectiveness of the intervention, quality of therapy received and improvement in symptoms. Patients were asked to indicate their answers to these questions on 3 scales that ranged between 0-7 (1 = ‘not effective’ to 7 = ‘extremely effective’, 1 = ‘high quality’ to 7 = ‘low quality’ and 1 = ‘extremely improved’ to 7 = ‘not improved’, respectively). On a second form, patients were provided blank spaces for written feedback. They were asked for positive, negative and other comments about their treatment.

*2.3. Procedure*

Up to 8 people participated in treatment group 1, 7 in treatment group 2, whilst group 3 commenced with 9 participants. The first 2 groups consisted of 11 x 2 hour sessions over a 6-month period. The third group consisted of 12 x 2 hour sessions over the same time period. All groups were closed with no new attendees joining once treatment had commenced. Groups initially met weekly for the first 5 or 6 sessions, then spaced out to fortnightly, monthly and finally a session every 6 weeks. After completion of the first group, subsequent groups were home visited at assessment and prior to the final session. This second home visit was added to offer a follow-up review of progress and serve as a motivational aid. The SI-R, depression and functional impairment measures were completed by patients prior to group participation, mid-way through sessions (i.e., session 5 or 6) and at or immediately prior to the final session. The same facilitators ran each group and attended regular peer and 1:1 supervision sessions. Groups were held at a National Health Service (NHS) Recovery College in south west London.

Treatment utilized relevant literature including Steketee and Frost’s (2007) individual CBT programme for compulsive hoarding as well as topics and activities outlined in “Buried in Treasures” (Tolin et al., 2007a), and was also drawn from the therapists’ cumulative 25 years of experience treating HD on an individual basis. Weekly group plans ensured a structured protocol that was reviewed before and after each session. Audio peer supervision was carried out to ensure treatment fidelity. During the first session, the ground rules and individual group goals were established. Subsequent groups included goal setting, goal review, problem solving, achievement recognition and in vivo voiding. Other strategies introduced included psycho-education, acquisition moratorium, use of a tally chart, cost benefit of HD, golden rules of voiding, key beliefs of HD and the process of therapeutic change. Adherence to homework, punctuality and attendance were emphasized from the outset and throughout the course.

A local Fire Officer was invited to attend the 5th or 6th session to offer information about fire safety and encourage participants to sign up for a home fire safety visit. Groups 2 and 3 included the visit of a previous group member to share their experiences and assist with motivation. Later sessions included discussion of relapse management strategies. All participants were encouraged to bring in before and after photos each session to share with the group as a means of tracking progress. The use of handouts was kept to a minimum to avoid the accumulation of more clutter at home.

*2.4. Data analyses*

Quantitative data was used to examine pre-intervention characteristics of patients in each group, attendance rates, treatment satisfaction scores, and changes in study measures over time. Means (*M*) and standard deviations (SD) were calculated for questionnaire scales and frequencies and percentages for other indicators of perceived function at pre-, mid- and post-intervention. To evaluate whether hoarding symptoms, mood, and level of disability improved in a significant manner at the mid-point of and after the intervention, an intention-to-treat (ITT) analysis was administered using linear mixed models (LMMs). This approach allows for all participants who provide baseline data to be included in analyses, and as such, yields more accurate estimates of effect compared to treatment completer (or per-protocol) analyses (West, Welch, & Galecki, 2014). Separate models, each with a random intercept, were estimated for each outcome measure, employing the covariance structure that provided the closest model fit for the residual correlation matrix: the autoregressive covariance structure was used for total SI-R, SI-R Acquisition and Discarding subscales, and the SDS; the heterogeneous autoregressive covariance structure used for BDI; and the compound symmetry covariance structure used for the SI-R Clutter subscale. Parameter estimates were obtained using the restricted maximum likelihood method (REML), with post-hoc pre-to-mid-treatment and pre-to-post-treatment effect sizes (Cohen's *d*; Cohen, 1988) calculated using the estimated marginal means (EMMs) at pre-, mid- and post-treatment assessments accounting for associations between repeated measurements. In addition to evaluating ITT outcomes, pairwise comparisons (paired sample *t*-tests for pre-to-mid-treatment and pre-to-post-treatment) including only those patients who completed treatment were carried out with Cohen’s *d* calculated (as above). Where continuous (outcome) variables did not meet requirements for univariate normality using skewness and kurtosis estimates (acceptable range between -1 and +1 and -1.5 and + 1.5, respectively; Hair, Anderson, Tatham, & Black, 1998), LMMs were estimated and effect sizes calculated with values transformed to better approximate a normal distribution using Box-Cox methods (Sakia, 1992), while bias corrected and accelerated (Bca) bootstrapping using 2000 replications (Efron & Tibshirani, 1993) was employed to calculate 95% confidence intervals of mean difference and associated *p* values in treatment completer analyses. To control for the possibility of false-positives because of multiple outcome testing across continuous measures, the false discovery rate (FDR) approach was applied to within-group comparisons, with control set to 5% (Benjamini & Hochberg, 1995).

The reliable change index (RCI) was used to establish the extent to which any individual change found on the total SI-R score was beyond measurement error (Jacobson & Truax, 1991). A change score of 14 or more points, based on the test-retest reliability and normative values from the SI-R in the original validation study (Frost et al., 2004), was used to indicate reliable improvement or deterioration in hoarding symptoms on a case-by-case basis. In line with previous treatment studies with HD (Gilliam et al., 2011; Muroff et al., 2012), clinically significant change was therefore defined as a 14-point or greater reduction from pre- to mid-/post-intervention and a mid-/post-intervention score of 42 points or less.

Finally, residualized change scores for hoarding outcome measures were computed for treatment completers and associations with change in depression and disability levels and sociodemographic and clinical factors examined using Pearson correlation coefficients (or Spearman’s rho depending on distributional properties) and *t*-tests (for categorical variables), with a criterion for statistical significance set at *p* < .05. All statistical analyses were completed with SPSS, Version 24.0 (SPSS, IBM).

1. **Results**
	1. *Sociodemographic and clinical profile of sample*

Twenty-four patients with Hoarding Disorder (HD) participated in one of the three group treatments. The sociodemographic characteristics and clinical data of participants are shown in Table 1. Three-quarters of patients were female, with a wide age range. The majority of patients were single while all but three were unemployed or retired. Most patients had experienced hoarding symptoms for many years, and all for more than 10 years. Slightly less than half of patients had previously participated in CBT treatment targeting hoarding behaviors. Almost all patients had comorbid depression, as indicated by a formal diagnosis recorded in patients’ clinical notes, with two-thirds (16) receiving one or more psychotropic medications, most commonly antidepressive medication (one patient was taking both antidepressive medication and a mood stabiliser while another was taking an augmentation for OCD in addition to antidepressive medication).

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Insert Table 1 about here

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* 1. *Group attendance*

Four patients did not complete treatment; one did not attend any sessions, two attended the first session only, and one attended 6 sessions (and completed mid-treatment measures). Non-completers tended to have higher total SI-R scores at pre-treatment (*M* = 73.00, SD = 12.94) than completers (*M* = 66.95, SD = 11.61); this difference was largely the result of greater acquisition behavior in the former (SI-R Acquisition *M* = 22.50, SD = 3.70 vs. *M* = 17.10, SD = 4.69). Of the 20 treatment completers, the average participant attended 88.4% of intervention sessions (for those in the 11-session group, *M* = 9.50 (86.4%), SD = 1.40, range = 7-11; for those in the 12-session group, *M* = 11.17 (93.1%), SD = .98, range = 10-12).

* 1. *Outcomes of GCBT intervention*

Table 2 shows the estimated marginal means (SE) and main effects for treatment in LMM models on hoarding, depression and disability measures across pre-, mid- and post-treatment assessments.. Patients significantly benefitted from the intervention across all measured domains, and except for BDI at mid-treatment, all differences between pre- and mid-treatment scores and between pre- and post-treatment scores were significant after controlling for multiple comparisons. This pattern of (significant) findings was largely unchanged when considering the treatment completer sample (Supplementary Table 1; reported values for the pre-treatment data are based on the sample sizes used in the pre- to mid-treatment comparisons (*n* = 21)). By end of treatment, patients who completed treatment had made, on average, a 32.1% reduction in (SI-R) overall hoarding symptoms, with mean decreases of 28.2%, 26.1%, and 44.6% in behaviors associated with clutter, discarding and acquisition, respectively.

Estimates of effect sizes for pre- to mid-treatment and pre- to post-treatment are also shown in Table 2. Effect sizes were large (> .8; Cohen, 1988) across all measures except for clutter behavior and depression at mid-treatment where improvements were less pronounced. The magnitude of functional change was greater at post-treatment, with effect sizes ranging from .99 for disability to 1.74 for SI-R Acquisition. Effect sizes remained substantial when considering the treatment completer sample (Supplementary Table 1), most obviously at post-treatment where they ranged from 1.14 for depression to 1.66 for total SI-R score.

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* 1. *Reliable and clinically significant change in hoarding symptoms*

The combination of RCI and clinically significant thresholds was used to classify individual patients into those who made reliable reductions in symptoms and clinically significant changes in hoarding behavior. Prior to treatment, all but one patient (95.7%) were above the defined clinical threshold for overall hoarding symptoms (total SI-R score > 42; Frost et al., 2004), while 91.7%, 95.8% and 100% showed significant clutter, discarding and acquisition behaviors, respectively. By mid-treatment, 12 of 24 participants (50.0%) reliably decreased overall hoarding symptoms (12/21 or 57.1% of treatment completer sample), while 66.7% (16/24) showed reliable symptom reduction (15/20 or 75.0% of treatment completer) at post-treatment. Overall, 13.0% (treatment completer sample 15.0%) at mid-treatment and 34.8% (treatment completer sample 42.1%) at post-treatment achieved clinically significant change in hoarding symptoms.

*3.5.* *Associations between improvements in hoarding symptoms, changes in mood and disability levels, and demographic and clinical variables*

Magnitude of change (residualized change scores) in hoarding symptoms (total SI-R scores) over the course of the intervention was moderately related to the degree to which mood improved (Table 3). Reductions in discarding and acquisition behaviors were significantly related to decreased disability and improved mood levels, respectively. However, degree of observed change on the SI-R was not significantly associated with number of treatment sessions attended (*r* = .12, *p* = .619), and was unrelated to age, gender, duration of illness, whether receiving medication, or whether previously participated in a CBT intervention (for all associations, *p* > .232).

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Insert Table 3 about here

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* 1. *Patient satisfaction with the intervention*

In general, patients were satisfied with the intervention (Figure 1). All but three patients rated the effectiveness of the intervention (with respect to helping with their problem) as 5 or greater (out of 7), indicating most believed it was moderately-to-extremely effective. Patients rated the quality of therapy highly, with two-thirds indicating a maximum rating value (i.e., 7). Self-ratings of symptom improvement were more mixed; the mean score suggested patients believed their improvement was, on average, moderate.

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Insert Figure 1 about here

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Two themes were established from the written responses on the patient feedback forms. Firstly, the group format was perceived to be positive, helping people to feel less isolated by their condition and allowing people to share and learn from each other in a supportive environment. For example, one patient wrote “It has helped to meet with other people with the same problems”, while another responded “The group is really supportive. We are all at different points but have the same problems”. Secondly, the quality of the treatment provided by the therapists was emphasized. One patient noted “The expert help and guidance I received was invaluable”, and another patient wrote “The 2 facilitators provided the boundaries which made the group feel safe, like being in a well-functioning family”. One patient also described the impact of the intervention on their life; “This group has been so very helpful and life transforming”. Patients also provided positive verbal feedback about the previous group member’s visit, both immediately after the person left the session and during the following weeks, emphasising the value of this group component.

1. **Discussion**

This study is the first to demonstrate the effectiveness of GCBT to treat HD in a UK population. The results of this study complement previous treatment-research programs which show that GCBT for HD is effective in reducing HD symptoms, improving mood, and decreasing levels of functional impairment (Gilliam et al., 2011; Ivanov et al., 2018; Muroff et al., 2012), and add to the limited body of evidence suggesting that group-based CBT interventions for HD treatment can be effectively translated into real-world settings (Moulding et al., 2017). Further, they suggest that GCBT for HD administered by experienced practitioners utilizing a (relatively) short number of sessions spaced over an extended period of time may offer outcomes comparable to standard approaches to GCBT in HD, which typically require up to 20 weekly-based sessions (Tolin et al., 2015).

The mean reduction of 23 points on the SI-R, and improvement of 32% in treatment completers was in line with previous HD studies investigating the effectiveness of GCBT for symptom improvement. For example, Gilliam et al (2011) reported a 27% reduction in HD symptoms as rated on the SI-R, Muroff and colleagues (2009) showed a 22% reduction, while a follow-up study (Muroff et al., 2012) reported a 30% reduction. Our study showed 35% of the modified ITT sample (42% of completers) achieved clinically significant change (CSC) as measured with the SI-R. This compares favorably with other GCBT studies; Gilliam and colleagues (2011) reported 23% of the modified ITT sample (31% of completers) met the criteria for CSC, Moulding and colleagues (2017) observed CSC in 27% of patients with available data, while Thompson and colleagues’ (2017) recent review reported a range of 21% to 36% of GCBT treatment completers evidenced CSC. Overall, we observed an effect size of HD symptom change of *d* = 1.62. This is consistent with most previous studies (Gilliam et al. (2011), *d* = 1.31; Ivanov et al. (2018), *d =* 1.57; Muroff et al. (2009), *d* = 1.57), although less than the group receiving GCBT in the study described by Muroff and colleagues (2012) (*d* = 2.03).

The treatment gains for HD patients observed in the present study are notable given the intervention was delivered as part of routine clinical care and administered to patients outside of a motivated treatment trial. The number of GCBT sessions (11 or 12) was lower when compared with other studies of GCBT, where between 16 and 20 sessions were administered (Gilliam et al., 2011; Ivanov et al., 2018; Muroff et al., 2012; Muroff et al., 2009; Tolin et al., 2007b), although the total duration of treatment (22 to 24 hours) was comparable with some interventions (Gilliam et al., 2011; Moulding et al., 2017). Across previous studies of HD patients, a greater number of CBT sessions has been associated with better outcomes in clutter behaviors and decreased overall impairment (Tolin et al., 2015). However, the interventions described in the studies typically are administered on a weekly basis, whereas in the present study, the groups were initially run every week then spaced apart with increasing intervals between each. The rationale for the spacings of the groups was to impart theory discussion and knowledge about strategies in the first 6 weeks; once this was consolidated, groups were spaced apart to put greater emphasis on the self-help model of treatment. Principles and strategies were reinforced throughout the groups. Motivation for treatment was a theme that ran throughout and considered in various ways, allowing flexibility in the group plans. Despite the relatively long duration of the treatment period, treatment completion rate was good (83%), indicating high levels of enduring engagement in participating patients.

The structured yet flexible approach to CBT sessions adopted here appeared to benefit participating patients, as with previously described interventions (Gilliam et al., 2011; Muroff et al., 2012). Most patients reported high satisfaction with the intervention; the group setting was considered to be particularly helpful, as reported by patients in qualitative feedback. The powerful presence of group processes, as identified by Yalom (1995), can play a key role in treatment gains for patients in GCBT. Universality often establishes itself in the first session and quickly gives way to cohesion, mutual aid and social contact among HD patients (Schmalisch, Bratiotis, & Muroff, 2010). These processes were explicitly promoted in the present treatment, for instance, opening out discussion to all, encouraging attendees to relate to each other by commenting on goal reviews and inviting a past group member. Of course, delivering GCBT in HD can be challenging due to a number of therapy-interfering behaviors, including a tendency to want to talk and analyze, and speak over each other, rather than take action. Some participants felt a strong need to ‘tell their story’ and struggled with behavior change. However, firm boundaries were repeatedly emphasized and established with ground rules (shown on a poster each group), which the facilitators took responsibility in implementing, and this was acknowledged in feedback from participants. The invitation of a former group member to return to talk to a new group about their treatment experience was also a useful exercise. Based on verbal feedback, this appeared to harness real hope for change and understanding; it also allowed members to ask relevant questions of a peer whom they can directly relate to.

The re-assessment (home visit) introduced at Group 2 was intended to confirm changes reported by participants (given their limited levels of insight) and to also act as a further extrinsic motivator. Although the impact of the re-assessment was not examined here, previous studies have indicated that the addition of home visits to GCBT leads to small but non-significant benefits (Muroff et al., 2012). Encouragingly, robust effects were observed across all three behavioral domains of HD; clutter, difficulty discarding and acquisition. Although previous research indicates the greatest benefits of CBT treatment for HD relate to difficulty discarding (Tolin et al., 2015), the core behavioral tenet of HD, the strongest treatment effect observed in the present study was for acquisition behavior. This likely reflected the increased focus on acquisition behavior in the group; a ban on non-essential acquisition was emphasized in Session 1 and throughout the treatment process.

Post-treatment scores on measures of the BDI-II and SDS reflected benefit in depressed mood and levels of functioning, consistent with previous GCBT studies with HD patients (Gilliam et al., 2011; Muroff et al., 2012; Muroff et al., 2009). This is especially important considering comorbid depression and severely impaired function are experienced in high proportions of patients with HD (Frost, Steketee, & Tolin, 2011; Saxena et al., 2011). Degree of change in depressed mood and levels of functioning showed a close relationship with the magnitude of improvement made in HD symptoms, indicating that successful CBT treatment for HD is likely to offer meaningful benefits to patients’ overall quality of life, including affective function. Interestingly, change in depressed mood was closely related to improvement in SI-R Acquisition, broadly consistent with previous research suggesting depression is specifically linked with acquisition behaviors in HD (Frost, Tolin, Steketee, Fitch, & Selbo-Bruns, 2009; Tolin & Villavicencio, 2011). Improvements in levels of functioning were significantly related to improvement in difficulty discarding. We infer that this relates to patients experiencing a greater sense of mastery over their environment and ability to function in it. Future research focused on the relationship between change in specific behavioral domains of HD after CBT treatment and outcomes related to psychiatric comorbidity and overall level of functioning is needed.

There are limitations for this study. Firstly, the small sample (*n* = 24) which, at least for examinations of relationships between groups, change in hoarding symptoms and sociodemographic and clinical factors or other aspects of function, may have precluded identification of significant associations. Secondly, assessment for HD did not use standardized modules such as the Structured Interview for Hoarding Disorder (Nordsletten et al., 2013), while a diagnosis of comorbid depression relied on a confirmed diagnosis in patient notes rather than formal assessment using the Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998). Thirdly, there was a high prevalence of comorbid depression in the present sample (88%) in contrast to other studies (e.g., 40%, Muroff et al., 2012), limiting cross study comparisons. Fourthly, HD has a chronic nature, but no follow-up reviews were conducted with the sample. Therefore, the impact of the group on HD symptoms and function post treatment over time cannot be ascertained. Fifthly, because the study was uncontrolled, symptom reduction may be due to non-specific factors such as time or therapeutic relationships. However, such is the magnitude of observed effects across measures of hoarding symptoms and functional domains, the pattern of findings would seem highly unlikely in the absence of some type of treatment effect. Sixthly, although the severity of hoarding behaviors was assessed using the SI-R, the breadth and range of measures used was limited. Additionally, the three treatment groups were facilitated by the same clinicians and no conclusions can be drawn about the potential to replicate these results by other clinicians. Finally, the number of female participants at 75% was higher than recent studies related to group treatment for HD (62%, Mathews et al., 2016; 64%, Muroff et al., 2012) nor does the sample reflect local cultural diversity.

1. **Conclusion**

As group treatment for HD remains a relatively novel approach, interventions used have developed in response to clinical experience gained and remain embryonic in nature. The positive outcomes of the groups in this service, most obviously the high treatment completion rates and significant decreases in hoarding symptoms and levels of associated disability, are comparable to those in similar studies describing longer GCBT interventions for HD. Given the chronic and unremitting course of HD, the average duration being 37 years for this sample, these results suggest that this is an effective therapy model with potential cost benefits for service delivery and treatment provision compared with individual home-based sessions or GCBT with a higher number of sessions. The findings also suggest that GCBT can be successfully delivered as part of routine clinical practice in a limited-resource public health care system, outside the context of a research study. Further real-world effectiveness studies utilizing a broader range of assessment and outcome measures that focus on long-term follow-up are needed. This treatment model also requires further replication across a range of clinicians. Exploration of approaches that use information technology as an adjunct to face-to-face treatments is also warranted. The use of new technology, aside from digital photography and encouraging between session email contact, was limited in the present study. Ivanov and colleagues (2018) included formal internet-based support for HD patients in addition to GCBT. Whilst results were roughly in line with previous studies, group attendance was high and drop-out minimal, suggesting this approach offers greater flexibility should clients not be able to attend group sessions and provides a mechanism for patients to access support as well as feedback progress in homework tasks.

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**Contributors**

AC and RF conceived the evaluative study, conducted literature searches and provided summaries of previous research studies, and wrote the study protocol. JGS, AC and RF wrote the analysis plan. JGS undertook all statistical analyses. All authors contributed to the interpretation of data analyses and drafting of the final manuscript.

**Conflicts of interest**

None of the authors have any conflicts of interests to disclose.

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| **Table 1**Sample description (*n* = 24). Please note: Values represent frequency (percentage) unless otherwise stated. |
| Female / Male |  18 (75.0) / 6 (25.0) |
| Age (years) |  *M* = 57.8 (SD = 11.3; range 32-74) |
| Marital status |  |
| Single/Separated |  21 (87.5) |
| Wife/Husband or partner |  3 (12.5) |
| Employment status |  |
| Employed/Student |  3 (12.5) |
| Unemployed |  10 (41.7) |
| Retired |  11 (45.8) |
| Duration of hoarding (years) |  *M* = 37.1 (SD = 14.7; range 10-65) |
| Comorbid depression |  21 (87.5) |
| Previous CBT for hoarding |  11 (45.8) |
| Medication use |  17 (70.8) |
| Antidepressive |  14 (58.3) |
| Mood stabiliser |  3 (12.5) |
| *M* = mean number/score; SD = standard deviation; CBT = cognitive behavioral therapy. Comorbid depression was indicated by a formal diagnosis recorded in patients’ clinical notes. |

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| **Table 2**Estimated marginal means (SE), overall treatment effects and effect sizes for Hoarding Disorder patients at pre-, mid- and post-treatment. |
|  | Pre-treatment | Mid-treatment | Post-treatment | Treatment effect | Pre- to mid-treatment | Pre- to post-treatment |
|  | Mean (SE) | Mean (SE) | Mean (SE) | F (df) | ES (95% CI) | ES (95% CI) |
|  |  |  |  |  |  |  |  |
| SI-R Total (0-92) |  67.96 (2.78) |  52.14 (2.91) | 44.97 (3.00) | 26.13 (2,40.51)\*\*\* | 1.13 (.63,1.62)\*\*\* |  1.62 (.96, 2.27)\*\*\* |
| Clutter (0-36) |  27.83 (1.47) |  23.10 (1.54) | 19.66 (1.57) | 17.13 (2,38.66)\*\*\* | .69 (.25,1.11)\*\* |  1.14 (.63,1.64)\*\*\* |
| Discarding (0-28) | 22.17 (.93) | 16.83 (.97) | 15.83 (1.01) | 24.34 (2,28.73)\*\*\* | 1.19 (.68,1.68)\*\*\* |  1.42 (.80,2.02)\*\*\* |
| Acquisition (0-28) | 18.00 (.97) |  12.10 (1.02) |  9.41 (1.05) | 26.59 (2,30.49)\*\*\* | 1.21 (.66,1.75)\*\*\* |  1.74 (1.03,2.42)\*\*\* |
| BDI (0-63) |  25.30 (2.45) |  20.89 (2.20) | 14.49 (1.56) | 13.18 (2,21.78)\*\*\* |  .39 (-.02,.79) |  1.07 (.52,1.61)\*\*\* |
| SDS (0-30) |  22.63 (1.50) |  16.27 (1.58) | 15.27 (1.62) |  9.37 (2,42.24)\*\*\* |  .81 (.33,1.29)\*\*\* |  .99 (.41,1.56)\*\*\* |
| *Note*. SI-R = Savings Inventory-Revised; BDI = Beck Depression Inventory; SDS = Sheehan Disability Scale; SE = standard error; CI = confidence interval; ES = Cohen’s *d* effect size; Positive effect sizes represent an improvement in symptoms; \*\**p* < .01, \*\*\**p* < .001. |

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| **Table 3**Associations between change in hoarding symptoms over the course of the treatment (pre- to post-treatment) and change in depressive symptoms and disability levels.  |
|  | BDI | SDS |
| SI-R Total |  .52\* |  .51\* |
| Clutter | .36 | .40 |
| Discarding | .32 |  .45\* |
| Acquisition |  .49\* | .40 |
| *Note.* Change on each measure was determined by residualized change scores; BDI = Beck Depression Inventory; SDS = Sheehan Disability Scale; \**p* < .05 |

**Figure caption**

**Figure 1**

Patient satisfaction with CBT intervention according to perceived effectiveness (1 = ‘not effective’ to 7 = ‘extremely effective’), quality of therapy (1 = ‘low quality to 7 = ‘high quality’ (reverse scored)) and improvement in symptoms of most concern (1 = ‘not improved’ to 7 = ‘extremely improved’ (reverse scored)). Error bars represent the standard error of the mean.

**Figure 1**

