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Treating Hoarding Disorder in a Real-World Setting: Results from the Mental Health Association of San Francisco

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Abstract

Hoarding Disorder (HD) is associated with substantial distress, impairment, and individual and societal costs. Cognitive-behavioral therapy (CBT) tailored to HD is the best-studied form of treatment and can be led by mental health professionals or by non-professionals (peers) with specific training. No previous study has directly compared outcomes for therapist-led and peer-led groups, and none have examined the effectiveness of these groups in a real-world setting. We used retrospective data to compare psychologist-led CBT groups (G-CBT) to groups led by peer facilitators using the Buried in Treasures workbooks (G-BiT) in individuals who sought treatment for HD from the Mental Health Association of San Francisco. The primary outcome was change in Hoarding Severity Scale scores. Approximate costs per participant were also examined. Both G-CBT and G-BiT showed improvement consistent with previous reports (22% improvement overall). After controlling for baseline group characteristics, there were no significant differences in outcomes between G-CBT and G-BiT. For G-CBT, where additional outcome data were available, functional impairment and severity of hoarding symptoms improved to a similar degree as compared to previous G-CBT studies, while hoarding-related cognition improved to a lesser degree (also consistent with previous studies). G-BiT cost approximately $100 less per participant than did G-CBT.

Keywords

peer facilitation; support group; cognitive behavioral therapy; outcome

1. Introduction

Hoarding Disorder (HD) is a chronic neuropsychiatric disorder that affects up to 6% of the population(Best-Lavigniac, 2006; Frost and Gross, 1993; Grisham et al., 2006; Kim et al., 2001; Samuels et al., 2002; Seedat and Stein, 2002), and is associated with high levels of distress, social disruption, functional impairment, and personal and societal costs(Ayers et

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al., 2009; Frost et al., 2000a; Frost et al., 2000b; Kim et al., 2001; Tolin et al., 2007). In one large study, individuals with self-reported hoarding behaviors had an average of 7 work impairment days per month related to psychiatric problems(Tolin et al., 2008b). Cluttered homes due to hoarding behaviors are associated with safety hazards, leading to increased physical morbidity and mortality, and social, financial, and familial consequences. Hoarding also increases the risk of falls, health code violations, fire, eviction, and problems with self-care(Ayers et al., 2009; Frost et al., 2000a; Frost et al., 2000b; Frost et al., 1999; Harris, 2010; Kim et al., 2001; Tolin et al., 2008a; Tolin et al., 2008b; Welfare, 2007). Each year, public service agencies expend tremendous time and financial resources on HD; in San Francisco, more than 6 million dollars per year is spent by service agencies and landlords on hoarding-related issues (not including costs associated with treatment)(San Francisco Task Force on Compulsive Hoarding, 2009).

Because of its chronic nature, HD is similar to other persistent neuropsychiatric disorders in that the goal of treatment is improvement of symptoms rather than remission. Although pharmacological treatments are of use for HD, behavioral approaches are the most commonly used, and a variety of behavioral interventions designed specifically for individuals with HD have been developed and tested over the last 8–10 years(Ayers et al., 2012; Ayers et al., 2011; Frost, 2010; Gilliam et al., 2011; Meyer et al., 2010; Muroff et al., 2012; Steketee et al., 2010; Steketee and Tolin, 2011; Tolin, 2011). These interventions typically include several components, including psychoeducation about HD and its treatment, motivational interviewing or similar approaches designed to increase motivation to change, cognitive restructuring, and exercises (both in session and as homework) aimed at improving sorting and discarding, and reducing cluttering and acquisition behaviors(Steketee et al., 2006; Tolin et al., 2015). Both group and individual treatment approaches have been examined for efficacy in HD, usually compared to a waitlist control(Ayers et al., 2012; Ayers et al., 2011; Gilliam et al., 2011; Muroff et al., 2012; Steketee et al., 2010; Steketee and Tolin, 2011; Tolin et al., 2012; Tolin et al., 2007). For most, but not all studies, a change in total score on the Saving-Inventory, Revised (SI-R) was the outcome measure(Frost et al., 2004). The SI-R is a self-report measure of hoarding symptoms and their impact on functioning that is widely used in hoarding research. An improvement (change score) of 14 points or more indicates clinically significant improvement, and a change score of 10 points or more indicates a clinically meaningful improvement(Frost et al., 2012). Although there is wide variability in outcomes between the currently published studies, these studies consistently show evidence of overall improvement after treatment. A recent meta analysis by Tolin et al showed large effect sizes for CBT for HD interventions, regardless of treatment type (group vs. individual) but also noted that SI-R scores typically remained within the HD range (SI-R $\geq$ 42) post-treatment(Tolin et al., 2015).

In part because of the intensive and specialized nature of CBT for HD, and the limited number of trained treatment providers outside of specialty clinics, a number of self-help books have been developed. For example, Tolin, Frost, and Steketee published a book called *Buried in Treasures: Help for Compulsive Acquiring, Saving, and Hoarding*, aimed at providing information, psychoeducation, and practical approaches to reducing clutter and acquisition(Tolin et al, 2007b). This group subsequently developed a facilitator's guide for

leading BiT groups, called *Buried in Treasures* (BiT)(Shuer and Frost, 2011). BiT is a workbook-based approach that was designed for use either by individuals working on their own or by individuals in a group context with facilitators who were trained to lead the groups but were not clinicians. Only a few studies examining the efficacy of BiT have been published, where individuals were given the BiT workbook to read, but had no other intervention, as a control arm for a CBT study, two open trials of group BiT, and one examining group BiT compared to a waitlist control(Frost et al., 2011; Frost et al., 2012; Muroff et al., 2012). The meta-analysis by Tolin et al. suggested that CBT groups facilitated by mental health professionals and BiT groups facilitated by non-professionals were similar in outcome, although only two studies using non-professionals were used in the comparison(Tolin et al., 2015). Table 1, which expands upon and updates information provided in the Tolin et al meta-analysis(Tolin et al., 2015), shows the published studies of both individual and group CBT and BiT for HD, as well as weighted group means and percent change in hoarding symptom severity for each subgroup. Weighted group means were calculated as follows: 1) The mean change score for each study was multiplied by the sample size in that study. 2) These scores were then summed, and divided by the sum of the sample sizes for all of the studies. The data in Table 1 suggest that in a research setting with trained facilitators, group BiT is as effective or more effective than both individual CBT and group CBT conducted by mental health professionals, with mean improvement scores of 14.1 for G-BiT compared to 13.9 for G-CBT and 17.1 for I-CBT including the study incorporating cognitive rehabilitation(Ayers et al., 2014), and 13.6 excluding this study. As expected, individual self-help approaches, whether they were internet-based moderated interactions that were CBT-style in nature (Muroff et al., 2010), or providing individuals with the BiT workbook but no other assistance (Muroff et al., 2012), appeared to be less effective, resulting in a 6.5 point improvement on average.

While providing an important context for investigating the effectiveness of group treatment for HD, the generalizability of these studies into a real world setting is unclear, perhaps with the exception of the internet studies, which are naturalistic in nature(Muroff et al., 2010). Most treatment groups were facilitated by experts in the treatment of HD, and/or by individuals trained and closely supervised by such experts. In addition, individuals who volunteer for research studies may not be representative of the larger population of individuals with HD, particularly as HD is not yet widely recognized in the lay community as a treatable neuropsychiatric disorder. Thus, there is a need to examine and compare the effectiveness and cost-effectiveness of the currently available treatments for HD in a community setting. Outside of academic institutions, treatment for HD is likely to be provided by therapists or non-professional facilitators who do not have extensive training in HD-specific treatments, and who may or may not have a foundation in the principles of CBT or group facilitation.

This study presents preliminary outcomes of G-CBT and G-BiT in a community setting using data collected primarily for treatment purposes over the course of three years (2011 to 2013) from CBT and BiT groups run by the Mental Health Association of San Francisco (MHA-SF) for individuals with hoarding problems in the San Francisco Bay Area. Examining the outcomes of CBT and BiT groups provided in a real-world setting to individuals presenting for treatment of HD rather than for treatment studies will 1) help to

assess the generalizability of these approaches outside of an academic setting and 2) set the stage for larger community-based studies aimed at more directly comparing G-BiT to G-CBT and identifying specific predictors of treatment outcome. The aims of this study were to examine the effectiveness and costs of group CBT (G-CBT) and group BiT (G-BiT) using therapists and peer facilitators drawn from the community in a real-world setting, to compare treatment outcomes between G-CBT and G-BiT in this context, as well as to the outcomes reported in the literature, and to compare the approximate costs of these treatment. We hypothesized that 1) both G-CBT and G-BiT would have treatment outcomes that are similar to those reported previously, 2) there would be no statistically significant differences between the two types of groups, and 3) G-BiT would be more cost effective in the long term than would G-CBT.

2. Method

This is a retrospective study that analyzes pre- and post-treatment data collected opportunistically by the Mental Health Association of San Francisco (MHA-SF) during treatment groups run for clinical rather than research purposes. Below, we describe the characteristics of these treatment groups, including the setting, the clinical design of the groups, the measures used to assess severity, and the clinical inclusion and exclusion criteria used to enroll participants in the treatment groups. We also describe the research analytic approaches.

2.1 Setting

All treatment was under the auspices of the Mental Health Association of San Francisco (MHA-SF). MHA-SF is a consumer-run non-profit corporation whose mandate is to address gaps in services and opportunities for individuals with lived experience of mental health conditions, and improve mental health in San Francisco through education, advocacy, research and service. As a service to the community, MHA-SF offers both group CBT and, more recently, group BiT to individuals living within San Francisco and the larger Bay Area. Treatment is provided in the MHA-SF offices in downtown San Francisco and is free of cost —funded by the City of San Francisco. This study was approved by the IRB of the University of California, San Francisco.

2.2 Participants

Participants were individuals who self-identified as having problematic hoarding behaviors. They were recruited by emailing former members of weekly drop-in support groups for individuals with hoarding problems held at the MHA-SF, emailing attendees of the annual Institute on Compulsive Hoarding and Cluttering (ICHC) conference held by MHA-SF, and through word of mouth. Participants were given a choice between clinician led (G-CBT) and peer led groups (G-BiT). Individuals who were underinsured or uninsured and lived in the city of San Francisco were given priority for treatment; individuals from the larger Bay Area and with insurance coverage were included if there was space available. Individuals were not eligible for treatment if they had already participated in either an MHA-SF led CBT or BiT group in the prior year (MHA-SF ran an average of one CBT group per year beginning in 2007). There were no other exclusion criteria. Individuals with substance use or abuse or

psychosis were not excluded, although individuals who were disruptive to the group or who needed a higher level of care (e.g., for suicidality) were excluded on a case by case basis. Although there were no formal severity or diagnostic inclusion criteria other than self-identification of having a problem with hoarding, pre- and post-treatment data were collected, including hoarding severity scores.

2.3 Measures

Self-report pre- and post-treatment data were collected for all participants. For G-CBT participants, the Saving Inventory-Revised (SI-R), the Saving Cognitions Inventory (SCI), and the Activities of Daily Living in Hoarding Scale (ADL-H) were collected. For G-BiT participants, only the Hoarding Severity Scale (HSS) was collected.

2.3.1 Saving Inventory-Revised (SI-R)(Frost et al., 2004)—The SI-R is a 23-item self-report questionnaire that measures hoarding symptoms and their impact. The 3 subscales measure problems with excessive acquisition, clutter, and difficulty discarding. The SI-R is widely used in hoarding research, has good test-retest reliability (kappa =0.86), and reliably discriminates between HD and elderly community controls (validity of 0.70--0.80 when compared to clinical interview). A cutoff score of >42 indicates clinically significant hoarding. A change score (improvement) of 14 points or more has been suggested as the criterion for clinically significant improvement, while a change score of 10 points or more is clinically meaningful (noticeable improvement from a patient's and health care provider's perspective)(Frost et al., 2012).

2.3.2 Hoarding Severity Scale (HSS)(Tolin et al., 2007b)—The Hoarding Severity Scale (HSS) is a 15-item abbreviated version of the 23-item Saving Inventory-Revised (SI-R). Similar to the original measure (SI-R), the HSS is a self-report measure with 3 subscales that assesses clutter, difficulty discarding, and excessive acquisition, and was developed specifically for use with the *Buried in Treasures* workbooks(Tolin et al., 2007b). Items are scored on a 0–4 scale, and the maximum possible total score is 60. A score of 8 on each subscale or a total score of 24 is considered to be moderate hoarding, while a score of 13 or over on each subscale, or 39 or higher total score is considered to be severe hoarding. Because HSS scores can be directly derived from the SI-R, and because only HSS data were available for the G-BiT group, HSS scores were calculated for all participants; change in HSS total score from pre-to post-treatment was used as the primary outcome variable in this analysis. The correlation between HSS total scores and SI-R total scores was 0.98. Note that there are no published psychometric data available for the HSS.

2.3.3 Activities of Daily Living in Hoarding Scale (ADL-H) (Frost et al., 2013; Steketee and Frost, 2007a)—The Activities of Daily Living in Hoarding Scale assesses impairment in activities of daily living specifically due to hoarding problems. Questions assess activities such as ability to prepare food and use the kitchen, ability to move and exit the home, ability to use toilet and bath facilities, and ability to find things, sleep in a bed, and sit in sofas and chairs. Items are scored from 0 (can do it easily) to 5 (unable to do). Items that are not applicable are not included in the total score. There are two versions of the ADL-H, the original, long version that contains 29 items, and a shortened, 15-item version.

Here we report data for the 15-item short version. The ADL-H short version has good test/re-test and inter-rater reliabilities, and good discriminant validity for individuals with HD compared to those with OCD and community controls(Frost et al., 2013).

2.3.4 Saving Cognitions Inventory (SCI)(Steketee et al., 2003)—The Saving Cognitions Inventory is a 24 item questionnaire that measures cognitions or thoughts associated with hoarding and saving behaviors. This questionnaire assesses four components of hoarding-related thoughts, beliefs, or attachments: emotional attachments, beliefs about memory, control, and responsibility(Frost and Hristova, 2011). Although the SCI does not measure hoarding behaviors or severity, it is correlated with the SI-R. Changes in SCI scores may indicate readiness to change hoarding behaviors.

2.4 Treatment procedures

As stated above, the MHA-SF CBT and BiT groups were intended for treatment purposes rather than for research purposes. Therefore, the group leaders based their approaches to attendance and other policies on their own backgrounds, experiences, and expectations for the group. The BiT group leaders used a consensus policy arrived at by the group members to derive the policies on attendance and other group participation elements, while the CBT leader used her clinical experience in running similar types of CBT groups.

2.4.1 G-CBT—Participants in the G-CBT treatment groups received 16 sessions of weekly group therapy over approximately 20 weeks. The G-CBT treatment schedule was based on and modified from the therapists' guide to group treatment for hoarding disorder by Muroff et al., modified from the original manual by Steketee and Frost (Muroff et al., 2009; Steketee and Frost, 2007a), and the associated participant workbook by Steketee and Frost(Steketee and Frost, 2007b). The original protocol called for 16 sessions plus two home visits over 16 weeks. The facilitator for the G-CBT groups modified the treatment protocol to incorporate breaks such that the 16 sessions were delivered over 20 weeks. The aim of these breaks were to make the groups more accessible to the community, decreasing burnout among group members, facilitating adherence to the strict attendance policy (allowing for vacations, other scheduling conflicts, etc). Home visits were often, but not always, conducted during the scheduled breaks.

Each session was two hours in length. In order to enter treatment, participants were asked to abide by an attendance policy. In order to continue participation, group members were asked not to be late by more than 15 minutes or to miss more than two group sessions. Groups were led by a psychologist trained in the administration of the manualized G-CBT and a doctoral level student in training. Two out of the four groups were led by both the psychologist and the doctoral student while the remaining two were led by the psychologist only. Two home visits between 30–45 minutes in length were conducted by the psychologist, along with the graduate student, if available. The 1st occurred after sessions 4 to 5, and the 2nd occurred the week before the 16th and final session. The purpose of the home visits were to conduct further assessment of the severity of the hoarding symptoms both early and late in treatment, as well as to help the group members design a feasible treatment plan. During the home visits, the psychologist completed a Clutter Image Rating (CI-R) scale, and

compared it to the client's own ratings on the CI-R. The psychologist also completed as an informal checklist assessing safety and health hazards. The psychologist then worked with this information to help the client develop a feasible treatment plan and, in the later visit, to assess progress.

2.4.2 G-BiT—Participants in the BiT groups received 15 sessions of weekly group therapy conducted over 20 weeks. Sessions were two hours in length, and followed the exercises in the self-help book *Buried in Treasures: Help for Compulsive Acquiring, Saving, and Hoarding*(Tolin, 2007) and an early, unpublished version of the *Leading the Buried in Treasures Workshop,* a peer facilitator manual(Shuer, 2011) (Lee Shuer, personal communication). As in the G-CBT sessions, participants were asked to agree in advance to an attendance policy. In this case, members were asked to have no more than three absences and were strongly encouraged to notify the leaders of any inevitable absences. If potential members could foresee more than three absences, they were encouraged to attend a future session rather than beginning in the groups. Weekly voice mail or check in/reminder calls to each participant were made prior to that week's group meeting. There were no home visits in the G-BiT treatment protocol.

Groups were led by four peer facilitators, who each received 16 to 20 hours of training in the facilitation of BiT groups over 2 days from Lee Shuer, a co-author of the facilitator's guide. Each group was led by two peer facilitators. Peers are defined as individuals living in the community who do not have formal mental health training, but do have experience with hoarding. Three of the four peer facilitators identified as persons with lived hoarding experience. The fourth peer did not have lived experience of hoarding, but has over 30 years of experience in teaching and facilitating groups, and had experience with hoarding through his involvement with the MHA-SF's Institute on Compulsive Hoarding and Cluttering support groups and peer response teams. The three peers with lived experience of hoarding but no formal experience in group facilitation received one hour of weekly individual and group supervision with this facilitator, who was also a full time mental health advocate employee at MHA-SF.

2.5 Cost approximations

Approximate costs for the G-CBT and G-BiT groups were obtained from the MHA-SF, which funded both forms of treatment. Costs were approximated for one complete cycle of treatment (20 weeks) and included salaries for the psychologist who led the CBT groups and the peer facilitators who led the BiT groups, as well as training and costs associated with supervising the peer facilitators. Costs of the workbooks used in conjunction with the CBT and BiT groups were also included. Current prices for the workbooks were obtained from the Oxford University Press website. Meeting space was provided free of charge by the MHA-SF for both CBT and BiT groups; rental costs are therefore not included in the approximations.

Salary costs included time to conduct the groups (two hours per group), fifteen minutes of preparation time per group, and 30 minutes per participant for each home visit. Costs for the

home visits were estimated as salary costs for the psychologist only; travel time and travel expenses were not included in the estimate.

Training costs included fees, travel, and lodging for an expert in facilitating BiT groups (Mr. Shuer) to come to San Francisco and provide two full days of training to the peer facilitators. Training costs were assumed to be one-time only, while supervision was assumed to be ongoing. Costs were estimated for both the first cycle of groups, including training costs, and also for an additional subsequent cycle, not including training costs. Formal training in CBT for HD was not available at the time the groups started. Rather, the psychologist had previous experience in treating HD, and in leading CBT-based groups, and consulted informally with the authors of the CBT therapist's guide for guidance as needed. However, we have approximated the costs of attending the Hoarding Behavior Therapy Institute provided by the International OCD Foundation (IOCDF), including registration and travel costs for a four-day trip from San Francisco to Boston.

2.6 Analyses

Statistical analyses were conducted in Stata 11.2(StataCorp, 2012). Group differences were examined using chi square tests for categorical variables and t-tests for continuous variables. Differences in pre- and post-treatment scores within groups were examined using paired t-tests. Differences in change scores between the CBT and BiT groups controlling for baseline group characteristics were examined using linear regression. Differences in post-treatment HSS scores between the CBT and BiT groups were examined using repeated measures regression analyses. This analysis did not control for baseline demographic characteristics. Because there are no published psychometric data for the HSS, we also conducted pairwise comparisons between the HSS and its subscales and the SI-R and its subscales to determine its correlation (and thus comparability) with the more standard instrument, the SI-R. For these comparisons, we used pre-treatment scores only.

3. Results

Four G-CBT groups were held during the time period from 2011 to 2013 (one or two per year), and two G-BiT groups were held, one each in 2012 and 2013. CBT groups were 10–12 members each, and BiT groups were 10 members each. All individuals who were eligible based on residence and insurance status were included in treatment; no one was excluded for mental health or medical reasons. Two of the participants in the CBT groups had received prior CBT treatment, and 6 participants in the BiT groups had received prior CBT treatment (all > 1 year prior). None of the participants had received prior BiT treatment. Forty-one individuals participated in the G-CBT groups and 20 participated in the G-BiT groups. Of these, both pre- and post-treatment data are available for 31 of the CBT participants and for all 20 of the BiT participants. Pre-treatment data only were available for the other ten CBT participants; these individuals either did not complete the post-treatment assessments, or these data have subsequently been lost. Other than two individuals who declined to state their gender, there were no individuals with missing data for the demographic variables examined.

The vast majority of participants lived in San Francisco, with only three living in other Bay Area cities (one in the BiT group and two in the CBT group). Individuals in the CBT groups who had pre-treatment data only did not differ significantly from those with both pre- and post-treatment data by gender ($p = 0.58$), age ($p = 0.14$), employment status ($p = 0.12$), or hoarding symptom severity scores ($p = 0.56$). More individuals with both pre-and post treatment data were Caucasian compared to those with pre-treatment data only; these results trended towards significance (61.3% vs. 25%, $chi2 = 3.37$, $p = 0.07$).

3.1 Baseline characteristics

Baseline characteristics of the CBT and BiT groups are shown in Table 2. For comparison purposes, only individuals with both pre- and post-treatment data were included in these analyses. There were no significant differences between groups by gender, age, or pre-treatment hoarding severity scores. Individuals in the BiT group were somewhat more likely to be Caucasian, and less likely to be currently employed. The majority of individuals were over age 40, with approximately half over age 60. Only 25% of total sample was employed at the time of their participation in group; 17.7% were retired, and 33.4% were receiving disability.

Correlations between pre-treatment outcome measures were as follows. The HSS and the SI-R total scores were highly correlated, as expected (pairwise correlation = 0.98, $p < 0.0001$). The SI-R and HSS subscales were also highly correlated (discarding = 0.96, acquisition = 0.97, clutter = 0.98, all p values < 0.00001). The ADL-H and the SI-R had a pairwise correlation of 0.65 ($p = 0.0002$), and the ADH-H and the HSS had a pairwise correlation of 0.61 ($p = 0.0006$). The SCI had a pairwise correlation of 0.25 with the SI-R ($p = 0.65$), 0.29 ($p = 0.12$) with the HSS, and -0.09 with the ADL-H ($p = 0.65$).

3.2 Change in hoarding severity scores with treatment

Table 3 provides a summary of the pre- and post-treatment mean scores, change scores between pre- and post-treatment, and relevant effect sizes for all outcome variables. Pre- and post-HSS scores were available for 51 participants, while pre- and post-SI-R scores, SCI scores, and ADL-H scores were available for the G-CBT participants only (N= 26–31). All but six participants in the total sample showed a net improvement in total HSS scores after treatment (N = 51); the mean improvement overall was 9.1 points (SD = 7.1 points). This pre- to post-treatment change was statistically significant ($t = 9.11$, $df = 50$, $p < 0.00001$). The mean percent change in HSS scores for the total sample was 21.9% (SD = 2.0). Three participants had worse HSS scores post-treatment, two in the CBT group and one in the BiT group. There were no statistically significant associations between HSS change scores and gender, age, employment status, or ethnicity. The overall effect size (Cohen's d) was 1.19.

In the CBT group, significant improvement was also seen in SI-R scores, ADL-H scores, and SCI scores. SI-R scores improved 9.9 points, on average (N = 31, SD = 10.3, df = 50, 5.81, $p < 0.00001$), ADL-H scores improved by 0.36 points (N = 30, SD = 0.55, $t = 3.49$, $df = 50$, $p = 0.002$), and SCI scores improved by 13.7 points (N = 26, SD = 34.7, $t = 2.01$, $df = 50$, $p = 0.056$). Symptom severity as measured by the HSS and the SI-R, and functional impairment as measured by the ADL-H, improved to a similar degree (17.6%, 15.2%, and

13.4%, respectively), while changes in hoarding-related cognition showed less substantial improvement (6.9%). Paired t-tests indicate that there were no significant differences in percent change between any of the four measures assessed (HSS and SI-R: t = -1.65, df = 30, p = 0.11; SI-R and ADL-H: t = 0.39, df = 29, p = 0.70; SI-R and SCI: t = 1.15, df = 25, p = 0.23; HSS and ADL-H, t = 0.86, df = 29, p = 0.40; HSS and SCI: t = 1.51, df = 25, p = 0.14; ADL-H and SCI: t = 0.72, df = 25, p = 0.48).

3.3 Comparison of CBT and BiT outcomes

Although the BiT group showed more overall improvement than the CBT group in HSS total scores (11.6 point change vs. 7.5 point change; 28.2% change vs. 17.9% change) (Figure), a repeated measures analysis controlling for pre-treatment HSS scores but not for differences in baseline characteristics showed no difference in pre- to post-treatment HSS scores by group (F < 0.001, df = 1, p = 0.95). When gender, employment status, race and baseline HSS scores were controlled for in a linear regression that did not include pre-treatment scores as a covariate, the differences in change scores between CBT and BiT groups were also not statistically significant (t = 1.58, p = .012 for group term). The effect size for the difference between the G-CBT and G-BiT groups was -0.62 (Cohen's d, corrected for unequal group size, but not correcting for differences in baseline characteristics between groups).

3.4 Comparison of costs between G-CBT and G-BiT

Estimated costs for the G-CBT and G-BiT sessions are detailed in Table 4. The costs of a complete cycle of G-CBT averaged approximately $100 more per than did G-BiT. In the first cycle, which included the costs of training the facilitators, G-BiT cost $691 per participant, while G-CBT cost .$795 per participant. In subsequent cycles, assuming that no additional training was required, G-BiT cost $481 per participant for BiT, compared to $595 per participant for G-CBT. The cost differentials between the two forms of group treatment were due to differences in salaries for the psychologist and the peer facilitators, and to the fact that the CBT workbooks cost more than did the BiT workbooks.

4. Discussion

The aim of this study was to examine and compare outcomes for two types of group treatment for Hoarding Disorder conducted in a naturalistic community setting. Although other studies have been conducted in a community setting, to our knowledge, this is the only study to examine data collected not for research purposes, but primarily for treatment purposes by an advocacy group whose goal is to provide mental health services. Similarly, this is the first study to directly compare groups facilitated by mental health professionals to those facilitated by peers with little formal training in CBT approaches, and the first to provide approximate costs per group cycle.

The results of this study have several important implications. First, they show that community-based treatment is effective. The percent improvement in hoarding severity from pre- to post-treatment for the sample as a whole was 22%, and the overall effect size pre-to post-treatment was 1.19, comparable to previously published studies of treatments conducted in a research frame (see Table 1). Second, our results suggest that group CBT and

group BiT may be equally effective in treating HD, although there are hints that group BiT, at least in this setting, may be more effective. The effect size estimates show that the BiT group participants improved more than the CBT group participants on average; however, once group differences in baseline characteristics were controlled for (including pre-treatment severity), these differences were not statistically significant. This finding has important implications for communities and service agencies with limited resources. Cost data from the MHA-SF suggest that the costs of conducting BiT groups and CBT groups are relatively comparable, and that even with ongoing supervision for peer facilitators, in the long term the BiT groups may be more cost effective. Costs associated with conducting these groups include salaries for the psychologist and peer facilitators, purchase of the workbooks, costs associated with training the peers and the psychologist prior to initiating the groups and ongoing clinical supervision, in addition to rental of appropriate group space (not included in our analyses). While rental, salary, workbook prices, and supervision costs are likely to remain fairly stable over time, the costs associated with training are one time costs only, and the salary differential for peer facilitators vs. mental health professionals results in a net cost savings for BiT. Ongoing peer supervision is embedded in the MHA-SF model, as the peer facilitator who is a long-time employee of the MHA-SF and had previous experience in leading groups was also responsible for ongoing supervision of the less experienced peer facilitators.

Finally, based on data from the CBT group, which collected outcome data using multiple measures, improvement following treatment for HD appears to occur across a range of relevant constructs, including symptom severity, functional impairment, and hoarding-related thought processes. Of these, perhaps the most clinically relevant is the improvement in ADL-H scores, as this measure assesses the ability (or inability) of an individual to function adequately in their home environment due to hoarding related problems. Improvements on this measure suggest that individuals may not only experience a reduction of symptoms following treatment, but also that they may experience an improved quality of life. Although not directly measured in this study, such improvements in functioning may also be associated with increased health and safety, as individuals are more easily able to prepare food, move around inside the home, sleep in their beds, and use their kitchens and bathrooms. The previous meta-analysis of CBT for HD(Tolin et al., 2015) also showed improvements in functional impairment as measured by the ADL-H; the effect size for the ADL-H was somewhat smaller than the effect size for hoarding symptoms, however. Our results parallel the previous findings—although the percent change scores were similar between the measures, the effect sizes for symptom improvement were higher than those for functional improvement in our sample. Similarly, our study showed less improvement in hoarding-related cognitions than in other hoarding-related measures, consistent with previous studies (Frost et al., 2011; Muroff et al., 2009). It is also worth noting that the percent improvement as measured by the SI-R of 15.2% is on the low end of the reported range of previously reported G-CBT studies (12.6% to 29.9%). Although difficult to interpret due to small sample sizes, the relatively small percent improvement in severity scores may represent either differences in delivery of the group treatment (for example, lack of fidelity to the published treatment protocols) or to differences in the patient population. Both of these possibilities represent real aspects of clinical practice, where patient

populations are much more heterogeneous than is typically seen in research treatment studies, and treatment providers will usually have less experience and training than do the HD experts that developed the treatment protocols and conducted the studies.

4.1 Limitations

The primary limitations of this study relate to the sample size and the way in which the data were collected. Although comparable in size to other published studies of psychotherapy for HD, the sample is still very small, and is probably underpowered to detect outcome differences between the CBT and BiT groups. The CBT groups and the BiT groups were not conducted for research purposes, and as a result, pre- and post-treatment data were not available for all individuals and we do not have follow up data to examine the durability of the improvement. Similarly, the standard hoarding severity measures, including the SI-R and the ADL-H, were only collected for the CBT groups, preventing us from examining changes in these measures for the BiT groups. In addition, individuals were not formally assessed for Hoarding Disorder or for other psychiatric comorbidities. Instead, they were eligible if they self-identified as having problems with hoarding and/or cluttering. Nevertheless, almost all participants met cutoff criteria for HD on the HSS and/or on the SI-R, suggesting that HSS scores confirm self-identification of problematic hoarding behaviors. Only one individual fell below the cutoff—this individual, who participated in a G-CBT group, had an HSS score of 20, indicating mild to moderate hoarding symptoms. Interestingly, this participant's HSS scores worsened rather than improved post treatment, possibly biasing our results towards lower effectiveness of treatment. In addition, as participants were not randomized to CBT or BiT, but were allowed to choose the form of treatment they preferred, the baseline characteristics of each group differed in several key areas. Although we controlled for these differences in our analyses, the possibility remains that gender, race, ethnicity, or employment status may be associated with differential improvement in the CBT or BiT groups, or that differences in these characteristics prevented us from seeing true group differences. Our cost data, although providing an approximate comparison of CBT and BiT related costs, are also limited by the available data, and in some cases (e.g., training costs for the psychologist) are approximated. In addition, we do not have data for non-treatment related costs related to hoarding. Finally, as this was a study examining outcomes data from real-world treatment groups, the protocols for G-CBT and G-BiT were not directly comparable to what has previously been published. For example, some of the G-CBT groups had two facilitators and some had one, the 16 sessions were conducted over 20 weeks, rather than 16 or 20 weekly sessions, etc. However, we believe that these differences, which reflect the reality of conducting treatment for hoarding in a community setting, add robustness and generalizability to our findings, and do not necessarily represent limitations.

4.2 Conclusions

This study suggests that both group CBT and group BiT are effective forms of treatment for HD when performed in a community setting. In this real-world context, the magnitude of improvement in severity scores and in functional impairment related to hoarding was comparable to that seen in carefully controlled research studies. However, as with previous studies, our results also show that more work is needed to further improve treatment outcomes, and to identify factors, whether individual or group-based, that predict treatment

response. Such factors may include personal preference, demographics such as age or gender, or health-related or neuropsychological characteristics such as comorbid psychiatric conditions or deficits in information processing. Similarly, as noted above, there are multiple limitations inherent in conducting retrospective analyses on data that were collected for treatment rather than research purposes. Our group is currently in the process of more formally comparing treatment outcomes for group CBT and group BiT and assessing the baseline characteristics that predict improved treatment outcomes in a large sample of individuals with HD drawn from a community setting.

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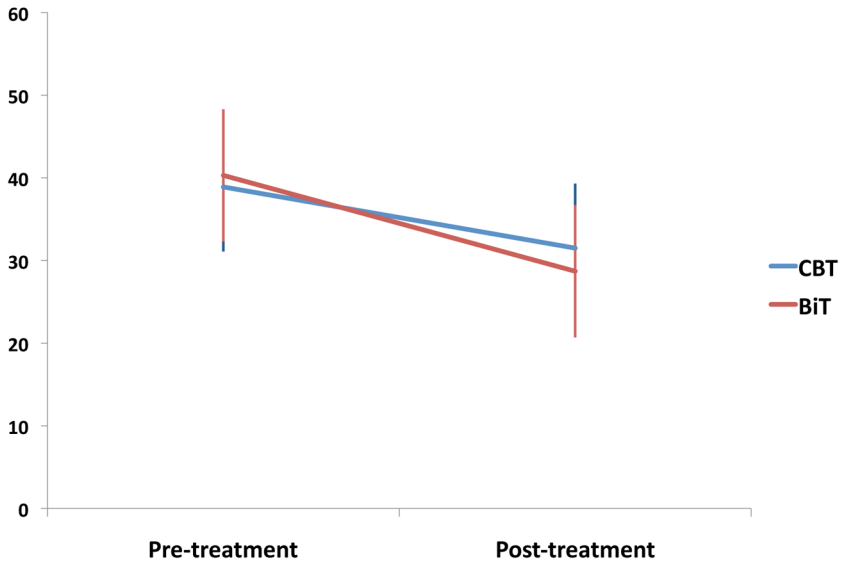

Figure.

Mean pre- and post-treatment HSS scores, with standard deviations, for the CBT and BiT groups. HSS = Hoarding Severity Scale.

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Table 1

Results of treatment studies for HD.

Study	Type of treatment	Number of sessions	Number of participants	Mean pre-treatment score	Mean SI-R change score	Percent change
Individual CBT						
Tolin et al, 2007+	I-CBT	26	10	67	18.6	27.8
Steketee et al 2010+	I-CBT	26	36	61.6	16.9	27.4
Ayers et al 2011+	I-CBT (strict)	20	12	58.3	11.6	19.9
Turner et al 2012+	I-CBT + weekly home visits	28–41	6	4.1 (CI-R score, see legend)	N/A	29.8
Ayers et al 2014	I-CBT + cog rehabilitation	24	11	59.9	22.4	37.4
Weighted mean (SD) and percent change across studies					**17.1 (3.5)**	**28.5**
Group CBT						
Muroff et al 2009+	G-CBT + 2 home visits	16	32	60.5	8.6	14.2
Muroff et al 2009+	G-CBT (strict) + 2 home visits	16	8	64.8	14.3	22.1
Gilliam et al 2011+	G-CBT (no home visits)	16	45	64.2	17.0	26.5
Muroff et al 2012+	G-CBT + 4 home visits	20	11	63.6	14.8	23.2
Muroff et al 2012+	G-CBT + 4 home visits + non-clinician coach (4 visits)	20	14	61.8	18.5	29.9
Tolin 2012	G-CBT (no home visits)	16	6	50.7	6.4	12.6
Weighted mean (SD) and percent change across studies					**13.9 (4.5)**	**21.4**
Individual self-help, including bibliotherapy						
Muroff et al 2010	Internet self help	6 months	100	56.6	6.1	10.8
Muroff et al 2010	Internet self help	15 months	23	56.6	8.9	15.7
Muroff et al 2012	I-BiT	20 weeks	13	59.8	5.4	9.0
Weighted mean (SD) and percent change across studies					**6.5 (1.9)**	**11.8**
Facilitated group bibliotherapy						
Frost et al 2011 Study 1+	G-BiT	13	17	54.7	14.8	22.7
Frost et al 2011 Study 2+	G-BiT	13	11	56.3	12.3	21.8
Frost et al 2012+	G-BiT	13	18	59.8	14.7	23.4
Weighted mean (SD) and percent change across studies					**14.1**	**22.6**

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I-CBT= individual cognitive behavioral therapy, G-CBT = group cognitive behavioral therapy, I-BiT = individuals were provided with the Buried in Treasures manual, but no other intervention., G-BiT = Buried in Treasures peer-facilitated bibliotherapy, SI-R= Saving Inventory, Revised. Studies presented here used waitlist controls or were open trials without a control. For studies using a waitlist control, there was no change in SI-R scores for the waitlist group. In Muroff et al (2012), G-CBT was compared to I-BiT. (strict) indicates that special attention was paid to treatment adherence. *=weighted to account for differences in sample size. +=included in the meta-analysis by Tolin et al. (2015) Note that Turner et al. used the Clutter Inventory-Revised (CI-R) rather than the SI-R, and mean SI-R change scores are not available.

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Table 2

Baseline characteristics for G-CBT and G-BiT groups with available pre- and post-treatment data.

	G-CBT pre tx data only (N = 10)*	G-CBT (N=31)	G-BiT (N=20)	X^2 or t statistic (df), p value
Gender, % female	62.5	48.3	70.0	2.31, 0.13
Age, %				0.99, 0.60
≤40	25	3.2	0	
41–60	25	45.2	55.0	
>60	50	51.6	45.0	
Caucasian, %	25	61.3	85	3.29, 0.07
Employed, %	12.5	37.9	5.0 (N = 20)	6.94, 0.008
Mean HSS pre-treatment score	37.2, SD = 7.79	38.9, SD = 7.7	40.3, SD = 9.6	-0.57 (df = 59), 0.57

HSS = Hoarding Severity Scale. tx = treatment. df = degrees of freedom

*G-CBT pre-tx data only group is not included in the G-CBT/G-BiT comparison.

See text for comparison between G-CBT with pre-tx data only and G-CBT with both pre- and post-tx data.

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Table 3

Pre- and post-treatment outcomes for the G-CBT and G-BiT groups.

	G-CBT (N=41 except where noted)					G-BiT (N=20)				
	Pre-tx Mean (SD)	**Post-tx Mean (SD)**	**Change score Mean (SD)**	**Pre- to post-tx percent change Mean (SD)**	**Effect size change score Cohen's d**	**Pre-tx Mean (SD)**	**Post-tx Mean (SD)**	**Change score Mean (SD)**	**Pre- to post- tx percent change Mean (SD)**	**Effect size change score Cohen's d**
HSS total score	38.5 (7.7)	31.1 (8.1)	7.5 (6.9)	17.6 (22.1)	0.96	40.3 (9.6)	28.7 (7.7)	11.6 (6.9)	28.2 (14.2)	1.37
Acquiring subscale	10.1 (3.7)	8.5 (3.4)	1.5 (3.1)	10.7 (40.1)	0.42	11.6 (4.2)	7.8 (3.8)	3.8 (3.5)	32.9 (29.3)	0.98
Discarding subscale	13.2 (3.7)	10.5 (3.7)	2.7 (3.9)	18.0 (32.4)	0.77	14.5 (3.2)	10.5 (3.0)	4.0 (3.0)	26.7 (18.6)	1.33
Clutter subscale	15.1 (3.9)	12.0 (4.7)	3.2 (3.2)	20.2 (21.3)	0.80	14.2 (4.1)	10.5 (4.4)	3.8 (3.1)	32.9 (29.3)	0.90
SI-R	60.4 (10.5)	50.2 (11.9)	9.9 (10.3)	15.2 (18.3)	0.92	N/A				
Acquiring subscale	14.2 (5.1)	10.9 (4.4)	3.2 (4.1)	19.5 (36.3)	0.71					
Discarding subscale	18.1 (4.9)	13.6 (4.6)	4.4 (5.0)	6.8 (9.4)	0.95					
Clutter subscale	24.3 (5.6)	25.1 (8.6)	−0.7 (6.1)	−3.2 (24.4)	0.11					
ADL-H 15 item short scale (N = 39)	2.25 (0.82)	2.01 (0.86)	0.36 (0.55)	14.3 (19.0)	0.42					
SCI (N=37)	95.5 (36.5)	81.1 (32.0)	13.7 (34.7)	6.9 (41.7)	0.39					

tx = treatment. SD = standard deviation. N/A = not applicable. HSS = Hoarding Severity Scale. SI-R = Savings Inventory-Revised. ADL-H = Activities of Daily Living in Hoarding Scale. SCI = Saving Cognitions Inventory. Change score = mean difference between pre-treatment scores and post-treatment scores.

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Table 4

Approximate costs of CBT and BiT groups for initial cycles and for each subsequent cycle.

	CBT first cycle	BiT first cycle	CBT subsequent cycles	BiT subsequent cycles
Facilitator salaries	$5600	$3600	$5600	$3600
Facilitator training	$2000	$2100		
Ongoing supervision		$1000		$1000
Participant workbooks	$350	$210	$350	$210
Total costs	$7950	$6910	$5950	$4810

Calculated for 20 weeks per cycle and 10 participants per cycle. Blank cells indicate that there were no costs associated with that cell. Salary estimates are based on one PhD level therapist facilitating the CBT group and on two non-mental health professional facilitators drawn from the community facilitating the BiT group