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The Effectiveness of the Dutch Cognitive-Behavioral Therapy Protocol for Hoarding Disorder: A Pilot Study

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A B S T R A C T

In this pilot study, the effectiveness of the Dutch cognitive-behavioral therapy (CBT) protocol for hoarding disorder was investigated for the first time in adult patients with hoarding disorder (N=36). A rather unique feature of this protocol is the intensive collaboration with home counselors. Results demonstrated a significant decline in hoarding related symptoms during treatment (d = .87)), including reduced acquisition of items (d = 0.88), reduced clutter (d = .98), and less difficulty discarding items (d = .0.77). Furthermore, patients reported significantly less excessive acquisition of items post-treatment (d = 0.30). Moreover, there were significant changes in underlying hoarding cognitions from pre- to post-treatment (d = 0.34). More specifically, there was a significant decrease in beliefs related to 1) identity and attachment (d = 0.53), 2) responsibility for objects (d = 0.48), and 3) using items as memory aids (d = 0.54) from pre- to post-treatment. No significant change was observed during treatment in the patients' cognitions related to the need for control over personal possessions (p = .086; d = 0.28). Furthermore, there was no significant decrease in symptoms of psychopathology from pre- to post-treatment (p = .586; d = 0.11). Finally, additional analyses indicated that whether patients were having a relationship and/or were having children was not significantly related to treatment outcome (all p's > .052). This pilot study is a first step in mapping the effect of CBT in Dutch patients with hoarding disorder, which will hopefully contribute to making treatment more widely available for these patients in the long term.

Keywords: *Hoarding disorder, CBT, Treatment effect, Clutter*

1. Introduction

Hoarding disorder is a serious, chronic, complex, and progressive psychiatric condition that has been recognized as a standalone diagnosis in the DSM-5 since 2013 (American Psychiatric, 2013). The most important characteristic of hoarding disorder is the persistent difficulty to discard possessions, regardless of their actual value. The consequences of hoarding disorder can be very serious, including: inaccessible rooms or homes, mental suffering, dangerous or unhealthy living conditions, social burden and stigmatization (Ayers et al., 2014; Bratiotis et al., 2021; Larkin et al., 2025; Prosser et al., 2024). Hoarding disorder is also associated with high psychiatric comorbidity, such as comorbid depressive disorders, anxiety disorders, and attention-deficit/hyperactivity disorder (Archer et al., 2019; Frost et al., 2011; Grassi et al., 2025; Timpano et al., 2020; Worden & Tolin, 2023). The prevalence of hoarding disorder is estimated to be around 2.5% (Postlethwaite et al., 2019) and the average age of onset is estimated at 13.4 years (Grisham et al., 2006). Research has further shown that the severity and prevalence of hoarding disorder increase linearly over the years, particularly after age 35 (Cath et al., 2017). The increase in hoarding symptoms seemed to be primarily driven by difficulty discarding items, which is also a key feature of the hoarding diagnosis.

So far, cognitive behavioral therapy (CBT) has been the most studied treatment form for patients with hoarding disorder (David et al., 2022; O'Brien & Laws, 2025; Tolin et al., 2025; Williams & Viscusi, 2016). In CBT, patients learn, among other things, to expose themselves to triggering situations, such as stores with items they would like to buy, without actually purchasing these items. This cue-exposure is aimed at strengthening inhibitory learning (Craske et al., 2022), so that patients learn to reduce the acquisition of items. CBT also challenges thoughts that hinder someone to discard possessions (cognitive therapy). In addition, various behavioral experiments are executed to practice with discarding items, to work towards behavioral change. Motivational interviewing, training decision making, and learning organization skills are also a significant part of CBT for hoarding.

In 2015, a meta-analysis (based on 10 articles) was published on the effectiveness of CBT in patients with hoarding disorder (Tolin et al., 2015), showing that the majority of patients reported significant reductions in hoarding symptoms following treatment (g = 0.82). However, the percentage of reliable and clinical change varied between 24-43% (Tolin et al., 2015), which is a relatively low rate of success compared to other patients groups. For example, it is estimated that 62-68% of patients with an obsessive compulsive disorder benefit significantly from CBT with a clinical significant change of 43% to 52% (Ost et al., 2015). Another meta-analysis, (Bodryzlova et al., 2019), including 7 studies, examined group CBT treatment for patients with hoarding disorder and reported an overall large effect size (g = *0.96;* Cohen's d = *0.98,)* and reliable clinical change in a wide range of 21% up to 68% of the patients (M = 36.7%; SD = 12.1%). A more recent meta-analysis by Rodgers and colleagues (2021), including 16 CBT studies (mainly group treatment), found large effect sizes on reducing hoarding symptoms from pre- to post-treatment (g = 1.11) and to follow-up (g = 1.25) (Rodgers et al., 2021). Finally, in a recent critical review of CBT for hoarding, David and colleagues (2022) made the qualitative interpretation based on the existing literature that less than a third of the patients experienced a clinically meaningful change after therapy (David et al., 2022). In conclusion, the results of studies on the treatment effect of CBT in patients with hoarding disorder are still somewhat variable.

The current pilot study is the first study that investigates the treatment effects of the Dutch CBT protocol on hoarding-related symptoms in patients with hoarding disorder. A relatively unique feature of the current Dutch protocol is the intensive collaboration with home counselors. Weekly home counseling sessions are a standard component of the Dutch CBT protocol, whereas other protocols typically involve only a limited number of sessions at home[1]. The hypothesis that weekly home sessions might improve the effectiveness of CBT in hoarding patients was further supported by the results presented in the meta-analysis of Tolin and colleagues (2015), who demonstrated that a greater number of home sessions was associated with greater improvement in difficulty discarding (Tolin et al., 2015). We expected that the Dutch CBT protocol would be effective in reducing the severity of hoarding symptoms, hoarding cognitions, and acquisition of items from pre- to post-treatment. Furthermore, we investigated whether the Dutch CBT protocol was also effective in reducing general psychiatric symptoms from pre- to post-treatment. To date, only one CBT protocol for patients with hoarding disorder

[1] For example, the meta-analysis by Tolin and colleagues (2015) reports an average of 5.6 home visits.

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has been developed in the Netherlands (Fournier & Korteweg, 2016) and no research has yet been conducted to investigate the effectiveness of this specific treatment protocol. The Dutch CBT protocol is inspired by the treatment protocol of (Steketee & Frost, 2006). In the Netherlands, hoarding patients first get home counseling financed by the municipality before they are referred to a specialised mental health center. The Dutch CBT protocol also includes a separate manual for home counselors, in addition to the manual for cognitive behavioural therapists. The close (weekly) involvement of home counselors may contribute to increased effectiveness of the treatment, since previous findings from small scale studies demonstrated enhanced treatment outcomes in individuals with hoarding who received additional at-home guidance during therapy by clutter-buddies trained and supervised by hoarding experts (Crone et al., 2020; Linkovski et al., 2018). More specifically, practical skill building (e.g., decluttering procedures and strategies), tracking of weekly progress, and the structure of the appointments were experienced as the most helpful elements of at-home guidance (Crone et al., 2020).

A second aim of this pilot study was to investigate the impact of partnership and parenthood on the treatment effect in patients with hoarding disorder. Having a partner and/or children may lead to increased motivation to address symptoms associated with hoarding, thereby contributing to an increase in treatment effect (Chasson et al., 2014). In addition, results from a recent study demonstrated that being married/living in stable cohabitation was associated with lower severity of hoarding (Muhlbauer et al., 2021). Therefore, it may be that having a partner and/or children contributes to a greater reduction in hoarding symptoms during CBT. Also, there is some evidence that higher degrees of social support are associated with improved treatment adherence in older adults with hoarding (Weiss et al., 2020). However, seen from a different perspective, the presence of a partner and/or children may *not* lead to an improved treatment effect, because patients may be less internally motivated and more 'driven' by the family to follow treatment (Bratiotis et al., 2021). Thus far, relatively little is known about whether having a partner and/or children is associated with increased or decreased effectiveness of CBT treatment in patients with hoarding disorder.

2. Methods and Materials

2.1. Participants

Between October 2017 and December 2023, treatment data of patients with hoarding disorder were collected as part of routine outcome monitoring. These patients signed up voluntarily for treatment at the Altrecht Academic Anxiety Centre, a highly specialized mental health care facility for patients with severe and complex anxiety, obsessive-compulsive, and trauma-related disorders. All patients received an intake in which the DSM-5 criteria for hoarding disorder were checked by experienced clinicians. Patients were only offered CBT in case they met the DSM-5 diagnostic criteria for hoarding disorder. Exclusion criteria were: having a current psychotic disorder and severe acute suicidality. In total, treatment data of 61 patients were collected. Data of patients were only included in the current study when patients completed a pre- and post-assessment on at least one of the standard hoarding questionnaires that were used in this study: Saving Inventory-Revised (SI-R) or Saving Cognition Inventory (SCI). Unfortunately, the data of 25 patients could not be included, because these patients did not complete the pre- ánd post-assessment for the SI-R or SCI (even though they all completed the treatment). The final sample consisted of 36 patients.

The procedure of the current study was approved by the scientific research committee of Altrecht (CWO nr-2305). In addition, the data collection method used in the current study is in accordance with guidelines for the use of patient data for research purposes.

2.2. Measurements

The following self-report questionnaires were administered before and after the treatment to assess hoarding symptoms: Saving Inventory Revised (Frost et al., 2004) and Saving Cognition Inventory (Frost et al., 2002). Furthermore, the Compulsive Acquisition Scale (Frost et al., 2009) and Brief Symptom Inventory (Derogatis, 1993; Derogatis & Spencer, 1982) were also administered before and after treatment but were not part of standard routine outcome measuring and therefore comprised a lower sample size (see Table 3). To evaluate treatment progress, in some cases self-report questionnaires were also administered *during* treatment. However, these data were not included in the current study due to the low number of completed interim questionnaires and a high heterogeneity with respect to the

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timing of the questionnaires (there was no standard procedure in collecting interim measurements).

2.2.1. SI-R

Saving Inventory-Revised (Frost et al., 2004) is a 23-item self-report questionnaire that measures the severity of hoarding symptoms (cut off score 40, scoring range: 0-92). The SI-R consists of three subscales: Excessive clutter at home (cut off score 15), excessive acquisition of purchased and free items (cut off score 13), and difficulty discarding possessions (cut off score 13). Internal consistency and test-retest reliability of the SI-R have proven to be good (Frost et al., 2004). The internal consistency in this sample was excellent (α = .93 at the pre-treatment assessment).

2.2.2. SCI

Saving Cognition Inventory (Steketee et al., 2003), a 24-item self-report questionnaire aimed to measure beliefs about possessions (scoring range: 24-168). The SCI consists of 4 subscales: 1) the 'identity & attachment' scale is about the influence of keeping versus disposing objects on someone's emotional state (cut off score 25.3; scoring range: 10-70), 2) the 'control' scale is about the need for control that someone experiences with regard to their possessions (cut off score 12.0; scoring range: 3-21), 3) items on the 'responsibility' scale relate to cognitions about, among other things, the obligation to find a good use for an object and not to waste anything (cut off score 16.7; scoring range: 6-42), and 4) the 'memory aid' scale addresses the use of items as memory aids (cut off score 17.3 ; scoring range: 5-35). The validity and internal consistency of the SCI have been found to be good (Steketee et al., 2003). The internal consistency in this sample was excellent (α = .94 at the pre-treatment assessment).

2.2.3. CAS

The Compulsive Acquisition Scale (Frost et al., 2002) is an 18-item self-report questionnaire aimed to measure excessive acquisition of items (scoring range: 18 - 126). The questionnaire measures the urge to buy items (cut off score 41.1; scoring range: 12-84) and the extent to which free items are taken home (cut off score 23.1; scoring range: 6-42) (Frost et al., 2002). The reliability of both scales was found to be satisfactory (Frost et al., 2009). The validity of the Dutch CAS is still unknown. The internal consistency in this sample was good (α = .86 at the pre-treatment assessment).

2.2.4. BSI

The Brief Symptom Inventory (Derogatis, 1993; Derogatis & Spencer, 1982) is a 53-item self-report inventory that measures various symptoms of psychopathology in adults. The overall score on the BSI (cut off score 0.84; scoring range: 0-4) was included in the current study. The internal consistency in this sample was excellent (α = .97 at the pre-treatment assessment).

2.3. Treatment protocol

The structured Dutch CBT protocol for patients with hoarding disorder (Fournier & Korteweg, 2016) consists of either 28 individual sessions of 60 minutes or 15 group therapy sessions of 120 minutes. Group therapy includes a maximum of 5 patients per group. In this study, the majority of patients (80%, see Table 2) participated in the group treatment. Individual and group treatment are identical in substance and duration, differing only in format.

The treatment program at the outpatient clinic always starts with an intake, after which a home visit is made, in which the therapist and home counselor are guided around the patient's home (including storage boxes, garden etc.). Pictures of the different living areas are then taken by the therapist to serve as a baseline measurement. Also, showing these pictures to patients can be helpful as it raises more awareness about the amount of clutter, which could heighten their motivation. Patients are encouraged to continue taking photos during the treatment process for evaluation purposes, to visually identify differences compared to the baseline measurement.

The treatment itself consists of 5 phases, see also Table 1. The first phase consists of psycho-education, enhancing insight into the hoarding disorder (e.g. in hoarding cognitions, emotional consequences and behaviors, but also in underlying or maintaining factors such as executive dysfunctioning, significant and/or traumatic life events), and motivational techniques. In the second phase, patients are trained to stop acquiring new items into their home. An important part of that is practicing cue-exposure which encompasses guided exposure-in-vivo to visit triggering situations (such as a thrift store) without taking anything home, so patients learn to deal with their acquisition urge in combination with cognitive restructuring. In addition to cue exposure, patients also learn to consciously engage in other

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alternative enjoyable activities instead of acquiring new items. The third phase of treatment is focused on cognitive restructuring of the hoarding-related cognitions. The fourth phase is about training organizational, planning and attention focused skills. During the fifth phase, patients learn the skills to declutter, by improving decision making skills and exposing themselves to discard personal items. Exposure exercises are practiced according to the principles of inhibitory learning model (Craske et al., 2022). Patients practice this at home, but also within the treatment sessions, where they repeatedly bring part of their belongings to the sessions to practice decision making and discarding items. By guided exposure-in-vivo and using behavioral experiments, patients practice their new skills and strengthen inhibitory learning. Finally, in the last CBT sessions patients work on developing a relapse prevention plan.

In addition to the therapy sessions, each patient receives weekly in-home treatment and coaching from a specialized home counselor or psychiatric nurse (2 to 4 hours per week). The Dutch CBT protocol contains a specific manual for home counseling, aimed at helping patients to practice their learned skills at home, and to support patients in exposure, organizing, sorting, and tidying up at home. Furthermore, home counselors are explicitly invited to actively join the therapy sessions at the outpatient clinic, which contributes to knowledge transfer and successful cooperation between the involved care providers and the patient. Depending on the available hours, home counselors attend every therapy session, or are there less often (for example once in every 5 sessions). After CBT, the home counselor will usually continue to work with the patient on further organizing and tidying up the patient's house. Around that time, patients have learned the associated skills, but it is often not feasible to completely tidy up the house within the 15 or 28 weeks of therapy. In most cases, more time is needed for that and that is also why the home counseling often continues after therapy.

During the treatment, family members and friends are invited to join an individual session and/or a group session. This session consists of psychoeducation and tips on how to help someone with hoarding disorder. Do's and don'ts are discussed, and there is room to discuss and clarify individual's wishes and potential misunderstandings. This meeting is also an opportunity to improve the patients' support network.

Table 1

Overview of the Phases in the Dutch CBT Hoarding Protocol

Individual sessions (60 minutes each)	1-4	5-6	7-11	13-14	2,16	15-26	27-28
Group sessions (120 minutes each)	1-2	3-4	5-6	7-8	9	10-14	15
Home counseling sessions (180 minutes each)	1-2	3-9	-	10-11		12-23	24-25
Phase 1 Enhancing insight Psychoeducation Personalized hoarding model Motivational techniques							
Phase 2 Stop acquiring Cue exposure Develop alternative activities In vivo training							
Phase 3 Cognitive restructuring Personalized cognitive model Cognitive techniques Behavior experiments							
Phase 4 Training Organizational skills Organization plan Problem solving skills Attention focus skills							
Family and relatives meeting							
Phase 5 Discarding possessions Guided exposure Behavioral experiments Developing decision criteria							
Relapse Prevention and termination Relapse prevention plan Evaluation of the therapy							

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2.4. *Included data*

As mentioned earlier, the data of 25 patients could not be included because these patients did not complete the questionnaires at pre- or posttreatment (they did however finish the treatment). For these patients, the treatment effect could not be calculated and missing measurements could not be imputed since the risk of bias would be too high with only 2 measurement points. Therefore, data was only included in case patients completed pre- and post treatment measurements (n = 36). To investigate whether these patients differed from patients who were not included in the dataset in terms of their baseline characteristics (age, gender, and the pre-assessment scores of the SI-R, SCI and CAS), we performed an ANOVA or chi-square test with inclusion status as independent variable and the baseline characteristics as dependent variable. Whereas there was no significant difference between the two groups in terms of age, gender, and pre-assessment score of the SCI and CAS (all p's > .05), there was a significant difference in pre-assessment score of the SI-R (F(1,55) = 6.37, p = .014) and BSI (F(1,32) = 6.28, p = .017). More specifically, patients who were excluded from the dataset because of missing data had a higher SI-R score (M = 63.40; SD = 9.25) and BSI score (M = 1.39; SD = 0.71) at the pre-assessment compared to patients who were included in the dataset (SI-R: M = 54.92; SD = 13.66; BSI: M = 0.77; SD = 0.62).

The relatively high dropout rate on the routine outcome monitoring[1] may be explained by the underlying information processing problems that many patients with hoarding disorder suffer from. Furthermore, in general, more than half of the patients have poor insight (Tolin et al., 2010), ambiguous treatment motivation and most patients have impaired functioning on multiple domains (such as mental problems, self-care and interpersonal distress) which could have consequently led to reduced motivation to fill in questionnaires.

2.5. *Statistical analyses*

To investigate whether the Dutch CBT protocol was effective in reducing hoarding symptoms in patients with hoarding disorder, multiple repeated measures ANOVA's were carried out with Time (pre- vs. post-treatment) as independent variable and the outcome measures (SI-R, SCI, CAS, and BSI) as dependent variables. To investigate whether having a relationship and having children moderated the treatment effect, the interactions between Time and Relationship Status, and Time and Parenthood status were added to the ANOVA model. In case of a significant main effect of Time and/or a significant interaction between Time and Relationship Status or Time and Parenthood Status, these significant effects were followed up by testing whether these effects were also observed when analyzing the subscales of the outcome measures separately. In case of a significant interaction effect (Time x Relationship Status and/or Time x Parenthood), a repeated measures ANOVA was conducted with the subscale as outcome measure.

To control for Type I error due to multiple testing, a Bonferroni-Holm correction was applied for the hoarding-related outcome measures (SI-R, SCI, and CAS). As a first step, we divided the alpha level (.05) by the number of outcome measures (3). As a second step, in case of a significant effect of Time or significant interaction effects for one of the outcome measures, we divided the alpha level (.05) by the number of subscales of that outcome measure to control for Type I error in the follow-up analyses. In all cases, we ordered the p-values from smallest to largest after which each p-value was compared to a sequentially adjusted alpha (i.e., smallest p-value against .05/3, the second smallest against .05/2 and so on).

If there was a significant effect of Time, Cohen´s d was calculated by subtracting the mean at the post-assessment from the mean at pre-assessment and dividing this difference by the SD of that outcome variable at the pre-assessment. If there was a significant interaction between Time and Relationship Status or Time and Parenthood, Cohen´s d was calculated by subtracting the means of the two groups (e.g., in a relationship vs. not in a relationship) at the post-assessment and by dividing this difference by the SD at the pre-assessment.

3. Results

3.1. *Descriptive statistics*

The mean age of patients in the included sample was 57.8 years (SD = 11.1), and the majority of the hoarding patients were female (83.3%, versus 16.7% male), see Table 2 for more demographic characteristics. During intake, 38.9% of

[1]This only concerns drop-out in completing the questionnaires, not adherence to treatment.

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the patients indicated that they were using psychotropic medication. Furthermore, comorbidity was high in the sample, as 80.6% of the patients were diagnosed with at least one other mental disorder. Most common were comorbid developmental disorders (ADHD and/or autism spectrum disorder: 25%), mood disorders (19.4%), and anxiety disorders (13.9%). Hoarding treatment included on average 26.1 hours of treatment (SD = 4.3). Most patients, 80.6%, participated in the group treatment, and a minority of 19.4% received individual treatment. Home counselors were involved in the vast majority of treatments (91.7%).

The distribution of patients with and without a relationship during the treatment period was fairly even: 41.7% versus 58.3%. Also, the number of patients with and without children was quite comparable: 44.4% versus 55.6%.

Table 2

Means and standard deviations of the demographic characteristics

Baseline characteristic	*M*/*n*	*SD*/%
Age	57.78	11.11
Female	30	83.33
with partner	15	41.67
with children	16	44.44
Group treatment vs. individual	29	80.56
Home counselling present	33	91.67
Involvement GGD[a]		
Yes	3	8.33
Yes & threat of housing clearance	3	8.33
No	30	83.33
Medication[b]	15	41.67
Antipsychotics	1	2.78
Antidepressants	12	33.33
Benzodiazepines	2	5.56
Stimulants	3	8.33
Other	1	2.78
Comorbid diagnoses		
Developmental disorder	9	25.00
Mood disorder	7	19.44
Anxiety disorder	5	13.89
Other comorbid disorder	8	22.22
No comorbid disorder	7	19.44
Educational level		
Primary education	1	2.78
Secondary education	11	30.55
Intermediate vocational education	3	8.33
Higher professional education	12	33.33
Academic higher education	4	11.11
Unknown	5	13.90

Note. [a]The GGD (Gemeentelijke Gezondheidsdienst) is a Municipal Public Health Service. In case the GGD detects health risks, fire hazards or severe filth in houses of patients with hoarding symptoms, they can threaten with housing clearance, meaning that they will clean up the house irrespective of consent of the resident. [b]Medication was assessed during the intake interview. Three patients were taking different types of medication and hence the frequencies per type of medication differ from the total number of patients who took medication (n = 15).

3.2. Treatment effects

3.2.1. SI-R

In line with the expectations, the results revealed a significant effect of Time, $F(1,33) = 29.35$, $p < .001$, $d = 0.87$, reflecting that patients reported less hoarding symptoms post-treatment compared to pre-treatment. See Table 3 for means and standard deviations for each assessment and see Table 4 for the statistics of treatment and interaction effects. No significant interaction effect of Time and Relationship Status was found, $F(1,33) = 0.07$, $p = .791$, or Time and Parenthood, $F(1,33) = 1.16$, $p = .289$, indicating that the treatment effect on hoarding symptoms was not

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significantly influenced by whether patients were in a relationship or were having children.

When inspecting the subscales, participants reported significantly less excessive clutter at home at post-treatment compared to pre-treatment, $t(35) = 5.88$, $p < .001$, $d = 0.98$, and less acquisition of items post-treatment compared to pre-treatment, $t(35) = 5.30$, $p < .001$, $d = 0.88$. Similarly, patients reported significantly less difficulty with discarding possessions post-treatment compared to pre-treatment, $t(35) = 4.59$, $p < .001$, $d = 0.77$.

3.2.2. SCI

As expected, the results revealed a significant effect of Time, $F(1,23) = 9.02$, $p = .006$, $d = 0.34$, reflecting that patients reported less hoarding-related beliefs about possessions post-treatment compared to pre-treatment (see Table 3). However, we did not observe a significant interaction effect of Time and Relationship Status, $F(1,23) = 0.04$, $p = .848$, or Time and Parenthood, $F(1,23) = 0.22$, $p = .644$. These results indicate that whether patients were in a relationship during treatment or were having children did not influence the treatment effect on hoarding-related beliefs about possessions.

When inspecting the subscales, as expected, participants reported significantly less beliefs related to identity and attachment from pre- to post-treatment, $t(25) = 2.71$, $p = .006$, $d = 0.53$. Similarly, as expected, patients reported significantly less beliefs related to responsibility for objects at post-treatment compared to pre-treatment, $t(25) = 2.47$, $p = .010$, $d = .48$. Furthermore, participants reported significantly less beliefs related to using items as memory aids from pre- to post-treatment, $t(25) = 2.75$, $p = .006$, $d = .54$. However, the results revealed that patients did not report a significant decrease in beliefs about the need for control of possessions from pre- to post-treatment, $t(25) = 1.41$, $p = .086$, $d = .28$

Table 3

Means and Standard Deviations of the Outcome Measures at Pre-Treatment and Post-Treatment

Outcome Measures	Pre-treatment			Post-treatment		
	M	*SD*	*n*	*M*	*SD*	*n*
SI-R total score	54.92	13.66	36	43.03	14.22	36
Clutter subscale	20.03	5.12	36	15.50	5.29	36
Difficulty discarding subscale	16.90	4.68	36	13.50	4.90	36
Acquisition subscale	17.99	4.66	36	14.03	4.70	36
SCI total score	101.56	27.62	32	92.10	30.75	29
Control subscale	15.26	3.55	33	15.05	4.15	30
Responsibility subscale	24.55	6.70	33	21.98	8.27	29
Memory Aid subscale	21.32	7.74	33	18.50	7.87	30
Identity & Attachment subscale	40.41	16.53	32	36.60	15.66	30
CAS total score	52.88	17.94	16	47.40	15.83	20
Buy subscale	32.38	11.81	16	29.95	10.24	20
Free subscale	20.58	8.40	19	17.62	6.67	21
BSI total score	0.77	0.64	23	0.81	0.71	17

Note. SI-R= Saving Inventory – Revised; SCI = Saving Cognition Inventory; CAS = Compulsive Acquisition Scale; BSI = Brief Symptom Inventory

Table 4

Statistics of treatment effects and Interaction effects for all outcome measures

Outcome measures		F/t	df	p value	Cohen's d
SI-R					
	Time	0.87	1,33	<.001	0.87
	Time x Relationship	0.07	1,33	0.791	
	Time x Parenthood	1.16	1,33	0.289	
Clutter subscale	Time	5.88	35	< .001	0.98
Difficulty discarding subscale	Time	4.59	35	< .001	0.77
Acquisition subscale	Time	5.30	35	< .001	0.88
SCI					
	Time	9.02	1,23	0.006	0.34
	Time x Relationship	0.04	1,23	0.848	

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	Time x Parenthood	0.22	1,23	0.644	
Control subscale	Time	1.41	25	0.086	0.28
Responsibility subscale	Time	2.47	25	0.010	0.48
Memory aid subscale	Time	2.75	25	0.006	0.54
Identity & Attachment subscale	Time	2.71	25	0.006	0.53
CAS					
	Time	7.24	1,10	0.023	0.30
	Time x Relationship	4.86	1,10	0.052	
	Time x Parenthood	0.05	1,10	0.825	
Buy subscale	Time	1.50	12	0.080	0.42
Free subscale	Time	1.74	16	0.051	0.42
BSI					
	Time	1.27	1,13	0.280	0.11
	Time x Relationship	0.48	1,13	0.502	
	Time x Parenthood	0.31	1,13	0.586	

3.2.3. CAS

As expected, the results revealed a significant effect of Time, $F(1,10) = 7.24$, $p = .023$, $d = 0.30$, reflecting that patients reported less excessive acquisition of items at post-treatment compared to pre-treatment. Furthermore, we did not observe a significant interaction effect of Time and Relationship Status, $F(1,10) = 4.86$, $p = .052$, or Time and Parenthood, $F(1,10) = 0.05$, $p = .825$, indicating that the treatment effect on hoarding symptoms was not significantly influenced by whether patients were in a relationship or were having children.

When inspecting the subscales, patients reported less urge to buy items at post-treatment compared to pre-treatment but this decrease over time was not significant, $t(12) = 1.50$, $p = .080$, $d = 0.42$. Furthermore, participants reported that they took less free items at home at post-treatment compared to pre-treatment, but this effect was not significant, $t(16) = 1.74$, $p = .051$, $d = 0.42$.

3.2.4. BSI

The results did not reveal a significant effect of Time, $F(1,13) = 1.27$, $p = .280$, $d = 0.11$, indicating that patients did not report a decrease in symptoms of psychopathology from pre- to post-treatment. Furthermore, we did not observe a significant interaction effect of Time and Relationship Status, $F(1,13) = 0.48$, $p = .502$, or Time and Parenthood status, $F(1,13) = 0.31$, $p = .586$, indicating that the treatment effect on psychopathology symptoms was not significantly influenced by whether patients were in a relationship or were having children.

3.2.5. Post-hoc power

Given that the data was collected as part of routine outcome monitoring, an a priori power analysis was not conducted. Therefore, we conducted a post-hoc power analysis to investigate how much power we had to detect a decrease in hoarding symptoms over time (main effect of Time) given the sample size, effect size, and Bonferroni-Holm corrected alpha for each outcome measure. The power to detect an effect of time was .99 for the SIR, .47 for the SCI, .21 for the CAS, and .13 for the BSI.

4. Discussion and Conclusion

In this pilot study, the effectiveness of the Dutch CBT protocol for patients with hoarding disorder (N=36) was investigated for the first time. In line with our hypothesis, CBT was effective in reducing the severity of hoarding-related symptoms from pre- to post-treatment. More specifically, at post-treatment, patients reported less acquisition of items, reduced clutter, and less difficulty discarding possessions compared to pre-treatment (all large effect sizes, measured with the SI-R). These findings are in line with large effect sizes reported in previous meta-analyses (Rodgers et al., 2021; Tolin et al., 2015). Additionally, patients reported that they less excessively acquired items at post-treatment compared to pre-treatment (small to medium effect size, measured with the CAS). Furthermore, as hypothesized, there was a significant reduction in underlying hoarding cognitions (medium effect sizes, measured with the SCI), which is consistent with findings from previous studies (Bodryzlova et al., 2019). More specifically, a reduction in beliefs was found in the current study which related to 1) identity and attachment, 2) responsibility for objects, and 3) using items as memory

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aids. However, no change was found in cognitions regarding control over possessions during treatment (which will be discussed in the next alinea). Overall, findings of the current pilot study suggest that CBT is effective in diminishing hoarding-related symptoms, excessive acquiring of items as well as changing hoarding-related cognitions in patients with hoarding disorder. This pilot study provides the first empirical support for the effectiveness of the Dutch CBT protocol, challenging the longstanding misconception that patients with hoarding disorder do not benefit from psychological treatment.

As stated above, results of the current study further showed that there was no significant change during treatment regarding thoughts related to the 'control' subscale of the SCI questionnaire. This subscale relates to someone's need for control with regard to their possessions. To date, most treatment studies have focused more on behavioral outcomes and less is yet known about changes in cognitions associated with treatment. One explanation for our finding is that there is little focus in the treatment on changing these specific control-related cognitions. Instead, patients are encouraged to make their own decisions about their possessions, so that they can acquire these decision-making skills themselves during treatment. Another explanation might be that in the short term, patients remain afraid of losing control, but as they continue to diminish their hoarding-related behaviours, they might experience and learn that they need less control to handle their emotions and develop a feeling of safety independent of their possessions. In other words, future studies should investigate whether changes in thoughts related to control over possessions occur in the long term.

In the current pilot study, we found no significant change in overall psychopathology (measured using the BSI) during treatment. This can be explained in a variety of ways. One explanation for the lack of these effects is that Dutch CBT protocol was not primarily designed to affect broader psychopathology, but is clearly aimed at reducing hoarding symptoms. Also, the power related to analyzing this specific questionnaire may have been insufficient to demonstrate a significant effect. And finally, there may have been a floor effect in the BSI, as the mean score of the current sample at pre-measurement ($M = 0.77$; $SD = 0.64$) was lower than the cutoff for clinically relevant symptoms (cutoff: 0.82; (Schulte-van Maaren et al., 2012)).

In addition to analyzing the treatment effect of the Dutch protocol, our second aim was to investigate the impact of (not) having a partner and (not) having children on the treatment effect in patients with hoarding disorder. Results indicated that whether patients were in a relationship during treatment or were having children did *not* influence the treatment effect. A study of Edwards, Salkovskis & Bream (2023) showed that *irrespective* of partnerships (being married/living as a couple) (Edwards et al., 2023), hoarding patients reported more loneliness and less thwarted belongingness (i.e., their need to belong is less met) relative to both OCD patients and healthy controls. In addition to this, a recent study showed that hoarding psychopathology in college students negatively impacted interpersonal functioning, even when controlling for comorbid psychiatric symptoms (Dozier et al., 2025). The lack of association between having a support system (partner and/or children) on the one hand, and treatment effect as well as loneliness on the other hand, may initially seem counterintuitive, but can also be understood from the idea that partners and/or children are often exhausted and suffer from mental problems at the time a patient with hoarding seeks help (Guzick et al., 2022). Since hoarding symptoms increase when patients are in their thirties and progressively deteriorate (Cath et al., 2017), most relatives of the patients in this study (who are middle-aged) have lived with the impact of hoarding for a long time already. Furthermore, as we only assessed whether patients had a partner or children but did not measure the degree to which they felt supported by their partner and other close ones, it remains a question whether experiencing support of others positively influences treatment outcome in hoarding patients. Therefore, in future studies, it would be interesting to further explore the relationship between (experienced) social support and treatment effect, and to look at the possible moderating factor of the duration and severity of the disorder.

4.1. Limitations and Suggestions

Several limitations of the current study should be mentioned. First, the current study included a relatively small sample size for all outcome measures (N ranged from 16 to 36, see Table 3), which led to small power to detect an effect of time on the SCI, CAS, and BSI. The small sample size was the result of routine outcome monitoring that was often only partially completed by patients, despite repeated reminders to complete the questionnaires. As a result, data from almost half of the patients could not be included in the analyses, which may have led to a selection bias in the studied sample. This assumption was further supported by results demonstrating higher SI-R and BSI scores at pre-

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treatment for patients who were excluded from the dataset due to missing data, as compared to patients who filled in the questionnaires at pre- and posttreatment (and whose data were therefore included in the study). Furthermore, the lack of a control group is a limitation, because the effectiveness of the current treatment could therefore not be compared with a waiting list group or another treatment program. In addition, a future randomized controlled trial could provide useful insight into the potential added value of the collaboration with home counselors on improving CBT outcome. Lastly, we only assessed treatment effects on hoarding symptoms and general psychopathology while hoarding symptoms have an impact on multiple domains of functioning (mobility, self-care, cognitive and social functioning) independent of comorbidity rate (Nutley et al., 2022). Future studies should also assess treatment effects on functional impairment, for example by using the WHODAS2.0 (Ustün et al., 2010) and we recommend measuring long term treatment effects in future studies.

A strength of the current pilot study is that this is the first study to investigate the treatment effect of the Dutch CBT protocol in patients with hoarding disorder. A rather unique feature of this protocol is the intensive involvement of home counselors, which may add to better treatment results. Home counselors can help to learn motivational skills, practice exposure skills according to the principles of inhibitory learning (Craske et al., 2022) and improve home sessions with the knowledge of hoarding specific skills. Results on the effectiveness of the Dutch CBT protocol are promising, since a significant decline in hoarding related symptoms was demonstrated as well as changes in underlying hoarding cognitions. These promising results are of great importance as patients with hoarding disorder are often considered as difficult to treat in the Netherlands, and treatment is currently only available at three locations in the country. This is in stark contrast to the treatment options available for patients with other obsessive-compulsive related disorders. Therefore, the results of this study can contribute to social awareness of the treatment of hoarding patients in the Netherlands. Furthermore, the recently updated Dutch guidelines for the treatment of anxiety disorders did not include a recommendation for the treatment of patients with hoarding disorder due to insufficient scientific evidence. With the current study we contribute to the evidence supporting CBT as an effective treatment for hoarding, which may also positively influence long-term availability of hoarding treatment in clinical practice. Recent qualitative research also emphasises the importance of this, demonstrating that participants with hoarding behaviours experience problems in finding appropriate help (McGrath et al., 2024).

In sum, this is the first study to demonstrate that the Dutch CBT protocol is effective in reducing hoarding-related symptoms in patients with hoarding disorder. The protocol is based on CBT techniques and involves close collaboration with home counselors. The results of this pilot study support further implementation of the treatment protocol, and the current findings are an important contribution to provide evidence for the guideline treatment for hoarding patients in the Netherlands. To corroborate the current findings, future studies should test the effectiveness of the Dutch CBT protocol by means of a randomized controlled design with follow-up assessments and a larger sample size. Moreover, hoarding disorder can be considered as a multidimensional problem as it affects multiple domains of living and hence, future studies should also assess treatment effects on functional impairment.

Authors' Contributions

Authors equally contributed to this article.

Declaration

None.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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