HOMEWORK ADHERENCE AND TREATMENT OUTCOME IN HABIT

REVERSAL TRAINING FOR TRICHOTILLOMANIA

By

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Submitted to the

Faculty of the College of Arts and Sciences

of American University

in Partial Fulfillment of

the Requirements for the Degree of
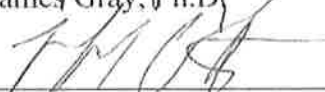
Master of Arts

In

Psychology

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April 5, 2014

Date

2014

American University

Washington, D.C. 20016

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ABSTRACT

The current study investigated the relationship between homework adherence and

treatment outcome for participants who engaged in Habit Reversal Training (HRT) for

Trichotillomania (TTM). This study also explored the importance of timing in

homework adherence and the role of autonomous motivation in the relationship between

adherence and outcome. Participants enrolled in a stepped care study of TTM. Sixty

participants enrolled in step 1 (web-based self-help). Of these, 41 entered an optional

step 2, HRT. Therapists evaluated adherence after each session using a 0-3 rating scale

regarding the quantity of the homework completed. Treatment outcome was evaluated

using the *Massachusetts General Hairpulling Scale* (MGH-HS) and the *Psychiatric

Institute Trichotillomania Scale* (PITS). Results showed that homework adherence and

treatment outcome were not significantly correlated. Timing does not make a difference

in treatment outcome, nor does motivation act as a moderator.

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CHAPTER 1

INTRODUCTION

Background and Significance

Trichotillomania (Hair-Pulling Disorder; TTM), is characterized by "recurrent pulling of one's own hair that results in hair loss," in spite of "repeated attempts to decrease or stop hair pulling," which causes "clinically significant distress or impairment in social, occupational or other important areas of functioning," and which is not better explained by another medical condition or mental disorder (American Psychiatric Association, 2013, p. 251). Researchers, using the estimate that 1% of the population is affected by TTM, extrapolated that approximately 3 million people in the United States suffer from the disorder (Duke, Keeley, Geffken, & Storch, 2010). However, this estimate was derived from a sample of college students, and may not be generalizable to the rest of the U.S. population. The authors emphasize that prevalence estimates are difficult to derive, as large-scale epidemiological studies that extend beyond the college population have not been conducted, disagreements exist over the definition of TTM, and people with TTM are secretive about their disorder. Currently, the most widely endorsed treatment for TTM is Habit Reversal Training (HRT), developed by Azrin and Nunn in 1973.

There is empirical support for the efficacy of HRT as a treatment for TTM (Mouton & Stanley, 1996), which was originally conceptualized to include four phases: awareness training, competing response training, motivation enhancement and generalization training. Competing response training is the most central aspect of HRT, which involves performing an action that is incompatible with hair pulling, such as clenching one's fist (Duke et al., 2010). HRT is

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considered to be more effective at treating TTM than pharmacological approaches (Bloch et al., 2007).

Although Azrin and Nunn (1973) did not include a formal homework component in HRT, homework has been a central element in cognitive behavioral therapy (CBT) since its inception, considered by its founders to be a fundamental aspect of treatment and not merely a secondary recommendation (Beck, Rush, Shaw & Emery 1979). In 1996, Stanley and Mouton developed an HRT manual for treating TTM in a group format (Mouton & Stanley, 1996). Each session was accompanied by a corresponding homework assignment including daily monitoring of thoughts about pulling hair, time spent thinking about hair pulling, number of hair pulling episodes, time spent pulling hair and number of hairs pulled, as well as the time, date, and circumstances surrounding hair pulling. Patients were asked to rate the amount of pleasure they received from hair pulling, and the level of anxiety both prior to and post hair pulling. In homework for later sessions, patients monitored the events, behaviors, emotions and cognitions that preceded and followed a hair pulling episode. Later, they learned about stimulus control in which they managed or changed environmental triggers that led them to pull, brainstormed competing responses to prevent hair pulling in locations or situations where they were more likely to pull, and were assigned to place themselves in at least one high risk situation a week outside of their session in order to practice competing responses. Finally, they were taught relaxation techniques such as deep breathing and postural adjustments, and were asked to use these strategies while in a situation where they were at high risk for pulling.

With the emphasis on homework in many CBT treatments, ranging from therapies for depression to a number of anxiety disorders, many researchers have asked whether homework

adherence makes a difference in treatment outcome.   If completing homework assignments makes no discernable difference in recovery, it may be worthwhile to reconsider its place in CBT treatments. On the other hand, if adhering to homework assignments correlates with better treatment outcome, therapists would be able to more strongly encourage their clients to complete homework, explaining the known benefits of homework adherence.

Homework Adherence

     Role in Treatment Outcome

Two meta-analyses looking at homework adherence and treatment outcome in CBT for depression and anxiety disorders found a significant relationship between the two. The first looked at 27 studies and found a mean effect size index (r) of .22 for homework adherence (Kazantzis, Deane, & Ronan, 2000). In a follow-up meta-analysis of 23 studies conducted between 2000-2008, Mausbach et al. (2010) found a significant relationship between homework adherence and treatment outcome (r =.26, 95% CI = .19-.33) (Mausbach, Moore, Roesch, Cardenas, & Patterson, 2010). Both studies suggest a small to medium effect size of homework adherence and treatment outcome.

Moderator analyses conducted by Mausbach et al. (2010) found no difference between depression and anxiety in terms of homework effect size, unlike Kazantzis et al. (2000) who found that the mean effect size for anxiety was considerably lower than for depression. Mausbach et al. (2010) determined that effect sizes did differ according to who rated homework adherence, type of homework rating and timing of the homework rating. Studies using both client and therapist ratings of adherence had a significantly higher mean effect size than studies

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using only therapist ratings or objective ratings. In contrast, Kazantzis et al. (2000) found that client and therapist ratings did not differ from one another, but had lower effect sizes than objective ratings. Mausbach et al. (2010) found that studies that measured homework adherence at the time of homework collection had a lower effect size than those that measured adherence retrospectively.

These results leave several questions unanswered. Do the conclusions from these meta-analyses generalize beyond anxiety and depression? This study proposes to look at individuals with TTM being treated with HRT to see whether these findings extend to people being treated for TTM. In addition, it is important to assess if the treatment effects last at a 3-month follow-up. A study by Edelman and Chambless (1995) regarding social phobia and CBT found that at the end of treatment, compliance with treatment instructions was not related to client improvement on any of their outcome measures with one exception: those who followed treatment instructions between sessions more closely reported less fear of negative evaluation (Edelman & Chambless, 1995). However, at the 6-month follow-up, clients who had completed more homework assignments were less anxious during a speech they gave and reported less anxiety in phobic situations.   From this study, it appears that perhaps homework adherence is even more important in the long-term than at the conclusion of treatment. In contrast, a 1990 experimental study regarding group CBT for depression found that those in the group assigned to homework showed greater improvement at the end of therapy than those in the no homework group. At six-month follow-up, however, this was no longer the case (Neimeyer & Feixas, 1990).

<u>Timing of Adherence</u>

Another important question is whether timing of assessment matters. This can be divided into two components: first, does rating homework adherence when, or very shortly after, it occurs versus rating it retrospectively (e.g., at the end of a course of therapy) make a difference? Second, does early adherence to homework predict better treatment outcome than late adherence to homework?

Already, results from the meta-analyses found that retrospective ratings show higher effect sizes than contemporaneous ones (Mausbach et al., 2010). The reason for this can be conjectured from the methods of several other studies. In a 1988 study of patients in a clinical setting, researchers found that those who completed their homework improved three times as much as those who did not (Persons, Burns, & Perloff, 1988). However, homework adherence was assessed as a dichotomous variable (0=almost no homework, 1 = did homework assignments at least every 2 weeks) after treatment ended. This rating scale appears limited in scope, loosely defined and open to subjective interpretation. In addition, with the bias of hindsight, it is possible that therapists viewed patients who showed more improvement as more compliant.

A similar issue arises in a study by Burns and Nolen-Hoeksema (1991), which found that subjects who completed their homework showed better outcomes.   This study is limited, since client and therapist perception of homework completion was assessed at the 12-week evaluation, and was not measured on a weekly basis. It is possible that therapists unintentionally remembered clients with greater improvements as those who were more compliant, and that clients rating themselves had a similar impression.

The current study used adherence ratings that were provided by therapists after the submission of each homework assignment. This prevented possible therapist bias associated with ratings made with the hindsight of treatment outcome.

The second question of timing relates to the timing of adherence and its relationship with better outcome. In a study regarding CBT for depression, Startup and Edmonds (1994) divided adherence into early adherence (the averaged adherence ratings of the first two homework assignments) and later adherence (the averaged adherence ratings of the rest of the homework assignments). They found that early homework adherence (looking at only the first two sessions of therapy) was responsible for 13% of the variance in Beck Depression Inventory (BDI) scores at the end of treatment, while later adherence was non-significant in predicting treatment outcome (Startup & Edmonds, 1994).

In another study of group CBT for social phobia, homework adherence was measured at three stages of the 12-session treatment: the beginning, middle and end. Better homework adherence at the first and last stage was associated with lower levels of social interactional anxiety at the end of treatment. Surprisingly, greater homework adherence at the middle stage of treatment was associated with increased fears of scrutiny and criticism at the end of treatment (Leung & Heimberg, 1996). In the present study, there were only 8 sessions and homework in sessions 7 and 8 was not always mandatory. Thus, this study proposes following the early and late adherence model of Startup and Edmonds, and will look at the average adherence over sessions 2 and 3 homework as early adherence, and the average adherence over sessions 4-8 homework as late adherence. This will help answer the question of whether timing of adherence plays a role in treatment outcome.

Third Variables As Confounds

Motivation

In examining the connection between homework adherence and treatment outcome, one may wonder whether a third variable confounds the relationship between the two. Perhaps this third variable is responsible for both enhanced adherence and better treatment outcome. Several researchers propose that one such potential factor is motivation, as it is possible that homework is not helpful in its own right, but that perhaps clients who complete the homework are more motivated to recover (Burns & Nolen-Hoeksema, 1991; Thase & Callan, 2006). Helbig and Fehm (2004) found that motivation for therapy was positively associated with homework adherence. In their study, however, only one instance of homework adherence was assessed at various stages of treatment for each client. In addition, motivation was not rated at the outset of treatment, which does not allow one to determine whether greater homework adherence increased motivation or vice versa. Indeed, they found that later stage of therapy was positively associated with homework adherence, lending support to the theory that perhaps treatment leads to increased motivation, and not the other way around. Further, therapists rated both motivation level and homework adherence, raising the question of whether therapists perceived those who completed their homework as having greater motivation (Helbig & Fehm, 2004).

A study by Sutton and Dixon (1986) looked at the link between client need and homework adherence in a parenting workshop. They defined client need as perceived need for change and pretreatment commitment for involvement in the process of change. They found that both of these factors, which were measured prior to treatment through the use of questionnaires,

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were found to have significant main effects on the number of homework assignments completed (Sutton & Dixon, 1986). An issue in this study, mirroring the issue in that of Helbig and Fehm was that subjects themselves assessed homework adherence, defined as homework completion, through self-report.

Burns and Spangler (2000) explored whether there was a third variable confound in the relationship between homework compliance and treatment outcome and found that demographic variables, individual therapists, medications, therapeutic alliance and motivation did not account for the relationship between the two. In this study, the Willingness scale, which measures frequency of coping activities, the expected helpfulness of these activities, and willingness to engage in coping activities if they were suggested by a therapist or friend, was used as a proxy for motivation (Burns & Nolen-Hoeksema, 1991; Burns & Spangler, 2000). While these are important variables to consider, none of them is a precise measure of motivation to engage in therapy, which is explored in the present study.

Current TTM Literature

Although the relationship between homework adherence and treatment outcome has been explored in relation to depression and a variety of anxiety disorders, to our knowledge, little research has been conducted regarding this question in a study of HRT for treatment of TTM. In a study comparing behavioral therapy to supportive therapy for the treatment of TTM, researchers found that there was no difference in the number of homework assignments completed between the two groups. In the supportive therapy group, weeks of homework completed correlated with scores on the Clinical Global Impression - Improvement Scale (r =

0.73, p < .01), while in the behavioral therapy group, weeks of homework completed did not correlate significantly with post-treatment CGI-I scores (Diefenbach, Tolin, Hannan, Maltby, & Crocetto, 2006). However, Diefenbach et al. (2006) used a dichotomous measure of yes or no for homework completion, and did not describe the criteria for homework being considered complete. The current study addresses this with a more nuanced rating scale that takes into account partial completion of homework.

Another study of Acceptance and Commitment Therapy (ACT) and HRT for hair pulling disorder grouped homework completion together with four other measures that comprised the Treatment Compliance Ratings, assessed by both the therapist and participant. Higher scores on treatment compliance correlated positively with greater reductions in the Massachusetts General Hospital Hairpulling Scale (MGH-HS) for both participant and therapist ratings (D. W. Woods, Wetterneck, & Flessner, 2006). A limitation in this study in assessing the relationship between homework adherence and outcome is that homework was one of many compliance measures, each worth five points, that added up to a total possible compliance score of 25. Thus, other measures could be responsible for the correlation between improved MGH-HS scores and treatment compliance. The objective of the current study is to examine the influence of homework adherence alone in a study of HRT for TTM.

Aims

This study had several aims. The main question addressed by the study was whether greater homework adherence led to better treatment outcome both at the end of treatment and at follow-up. It was hypothesized that we would see similar effect sizes at the end of treatment as

in the meta-analyses previously discussed (Kazantzis et al., 2000; Mausbach et al., 2010). This study also explored whether treatment effects continued to be significant at follow-up.

The second aim explored the importance of timing of homework adherence in predicting treatment outcome, and whether early or late adherence was significantly correlated with better treatment outcome. The third aim looked at whether motivation acted as a third variable that led to greater homework adherence, or to both better homework adherence and treatment outcome. Several studies have found that patients who enter therapy with autonomous motivation have better outcomes than those who feel external pressure (Michalak, Klappheck, & Kosfelder, 2004; Ryan & Deci, 2008; Zuroff et al., 2007). Thus, it was hypothesized that higher levels of autonomous motivation might correlate with greater homework adherence, but that motivation would not account for the association between greater adherence and treatment outcome. If the findings supported the hypothesis that motivation does not account for the relationship between homework adherence and treatment outcome, we would be more confident in the direct link between homework and outcome and the efficacy of adhering to homework.

CHAPTER 2

METHODS

<u>Participants</u>

Participants included the 41 individuals from an NIMH-sponsored stepped care study of

TTM, "Stepped care in the treatment of trichotillomania" (1R15MH086852-01A1), that

proceeded from step 1 (web-based self-help) to step 2 (HRT). Sixty participants enrolled in step

1 (web-based self-help). Of these, 41 entered HRT, which was an optional step 2. Each analysis

of adherence and outcome in HRT included the patients who completed all measures relevant to

that analysis. Participants met the DSM-IV-TR criterion A, D, and E for TTM: a) Recurrent

pulling out of one's hair, resulting in noticeable hair loss; d) The disturbance is not better

accounted for by another mental disorder and is not due to a general medical condition; e) The

disturbance causes clinically significant distress or impairment in social, occupational, or other

important areas of functioning (American Psychiatric Association, 2000). Criteria B and C: b)

An increasing sense of tension immediately before pulling out the hair or when attempting to

resist the behavior; c) Pleasure, gratification, or relief when pulling out hair; were not required,

as those who do not meet these criteria do not differ significantly from those who do on

measures of TTM severity, age of onset, depression, and academic, social and interpersonal

functioning (Conelea et al., 2012).

Potential participants were excluded if they reported any of the following within the past

month: suicidality, a major depressive episode, psychosis, severe anxiety or substance abuse. In

addition, those who were contemporaneously in treatment for TTM or taking medication for

TTM that had not been at a stable dosage for at least 4 weeks were excluded from the study.

Participants ranged in age from 21-65 (Mean = 33.49, SD = 10.87). 95% of the sample was female (n=39), with males comprising 4.9% of the sample (n=2). 2% of the sample was Hispanic/Latino (n=1). 78% of the sample identified as White (n=32), 12% identified as Black or African American (n=5), 5% were Asian (n=2), 2% were native Hawaiian or Other Pacific Islander (n=1) and 2% identified as Other (n=1). 68% of the sample was employed full-time (n=28) and 85% of the sample had obtained a college degree (n=35).

The number of years from the first reported incidence of pulling ranged from 2 to 57, with an average of 21.94 (SD=13.30). Participants reporting currently pulling from an average of 2.3 sites (SD=1.5). Sites included were: scalp (73%), eyelashes (39%), eyebrows (51%), pubic region (20%), moustache (2%), beard (2%), trunk (2%), armpits (7%), arms (12%) legs (17%) and other (2%, ears). 46% of the sample only pulled from one site. Of the 21 participants who pulled from only one site, 15 pulled from the scalp, 1 pulled from the eyelashes and 3 pulled from the eyebrows.

Measures

TTM Symptom Severity

Massachusetts General Hospital Hairpulling Scale (MGH-HS; Keuthen et al., 1995). The MGH-HS is a 7-item self-report instrument rated on a severity scale from 0-4. It measures urges to pull hair, the ability to control one's urges, frequency of hairpulling, attempts to resist hairpulling, control over hairpulling and associated feelings of distress. Scores range from 0-28, with the highest score indicating the greatest severity. The MGH-HS has high internal

consistency and retest reliability and is sensitive to change during treatment (Keuthen et al., 1995; O'Sullivan et al., 1995). In our sample at baseline, Cronbach's alpha was .80.

The Psychiatric Institute Trichotillomania Scale (PITS; Winchel et al., 1992). The PITS is a semi-structured interviewer-rated measure of TTM symptom severity comprised of 6 items, each rated on a scale from 0 to 7. It measures sites where one pulls hair, the duration of hairpulling per week, the ability to resist the urge to pull, how pulling interferes with one's life and feelings of distress. Scores range from 0 to 42, with lower scored indicating less severity. The PITS has low internal consistency, and the alpha of .56 at baseline in this study's sample reflects this. The PITS has demonstrated convergent validity with self-report and other clinician-rated TTM measures (Diefenbach, Tolin, Crocetto, Maltby, & Hannan, 2005).

Motivation for therapy

Client Motivation for Therapy Scale (CMOTS; Pelletier et al., 1997). The CMOTS is a 24-item questionnaire containing 6 subscales that measure different types of motivation, amotivation, four forms of extrinsic motivation and intrinsic motivation, on a scale from 1 to 7 (1=Does not correspond at all, 7= Corresponds exactly). The 6 different types of motivation are: amotivation, external regulation, introjected regulation, identified regulation, integrated regulation and instrinsic motivation. Amotivation is when one does not see a relationship between one's actions and their outcomes (ex. "Honestly, I don't really understand what I can get from therapy"). Behaviors that are extrinsically motivated are done for some instrumental purpose. External regulation behaviors are controlled by external sources, such as constraints put

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in place by another person or physical reward (ex. "Because my friends think I should be in therapy"). Introjected regulation behaviors have been internalized and do not require the presence of an external source, but are motivated by guilt or anxiety (ex. "Because I would feel bad about myself if I didn't continue my therapy"). Identified regulation is in line with one's goals and values, although still driven by extrinsic motivation (ex. "Because I believe that eventually it will allow me to feel better"), and integrated regulation is congruent with self-identity (ex. "Because I value the way therapy allows me to make changes in my life"). Finally, intrinsically motivated behaviors are driven by the satisfaction and delight they provide (ex "Because I experience pleasure and satisfaction when I learn new things"). The identified regulation, integrated regulation and intrinsic scales are considered to be autonomously motivated. There is a Pearson correlation of .57 between the intrinsic and integrated regulation scale, an r of .37 between the intrinsic and identified regulation scale, and an r of .49 between the integrated regulation and identified regulation scales. The scales possess adequate internal consistency (Pelletier, Tuson, & Haddad, 1997). In this study, the scores of the three autonomous motivation scales will be combined as the measure of motivation (intrinsic: sum of items 3, 4, 12, 16; integrated regulation: sum of items 17, 18, 23, 24; identified regulation: sum of items 6, 7, 15, 20). In our sample at baseline, alpha of these three scales combined was .90.

Homework

Homework was based on the HRT manual by Stanley and Mouton (1996) with several adjustments. The manual, which is written for group training for 6 sessions was altered for 8

sessions of individual therapy. In addition, relaxation training was not included in homework assignments, and more emphasis was placed on stimulus control.

Homework Adherence

Homework adherence was assessed by therapists on a weekly basis using a Likert scale from 0-3 (0=not done, 1=reportedly done but not documented, 2=partially completed and documented, 3=fully or almost fully completed). Homework adherence ratings were averaged over the number of sessions attended.

Procedure

Participants who proceeded through Step 1 of the NIMH-sponsored stepped care study of TTM, "Stepped care in the treatment of trichotillomania" (1R15MH086852-01A1) were administered the MGH-HS, PITS and CMOTS, along with a number of other measures not included in this study. Participants were seen individually in a university outpatient clinic for 8 weekly sessions of HRT conducted by doctoral student therapists ranging from their first to fifth year of clinical training. All sessions were videotaped, and the seven therapists were trained and supervised by the PI. Therapists attempted to schedule sessions in consecutive weeks; however, many clients were unable to attend perfectly one session per week. As there were 8 sessions, ideally the first and last sessions should have been completed 7 weeks apart. Of the 35 participants with available data, the median was 10 weeks to treatment completion (11 sessions total), and only 23% (n=8) completed treatment within 7 weeks (8 sessions total).

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The HRT manual was based on that of Stanley and Mouton (1996). Participants were assigned homework following each session that they were instructed to turn in at the beginning of the next session. Homework for sessions 1 and 2 addressed self-monitoring in situations where the participant was likely to engage in hair pulling. Session 3 homework focused in more closely on behaviors, cognitions and affects surrounding a hair pulling episode. Homework for session 4 concentrated on stimulus control techniques and the use of stimulus control strategies. For example, if one is more prone to hair pulling in bed, then a strategy would be to lie in bed only once one is ready to fall asleep. Homework in sessions 5 and 6 worked on monitoring one's use of competing responses to hair pulling, such as making a fist instead of pulling one's hair, while session 7 and 8 varied with each participant, possibly focusing on maintenance of therapy gains or attending to areas where participants still struggled. Throughout all 7 homework assignments, participants were given daily logs to monitor the number of times and amount of time they thought about pulling hair, the number of hair pulling episodes, time spent pulling hair and number of hairs pulled.

Therapists collected homework at the beginning of each session, and rated the homework on a scale of 0-3, with 0 meaning the homework had not been completed and 3 meaning the homework was fully or almost fully completed.

CHAPTER 3

RESULTS

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
MGH-HS PS1	40	9	23	16.75	3.48
MGH-HS-PS2	39	3	20	10.56	5.18
MGH-HS FU	39	2	22	13.72	5.85
PITS PS1	40	13	37	21.78	5.43
PITS PS2	35	4	28	16.03	6.64
PITS FU	39	5	37	17.77	7.67
CMOTS - autonomy (PS1)	40	24	81	57.23	14.28
Mean Patient Adherence	41	0.57	3	2.12	0.70
Late Patient Adherence	41	0	3	2.03	0.86
Early Patient Adherence	41	0	3	2.41	0.64

MGH-HS: Massachusetts General Hospital Hairpulling Scale; PS1: Post-Step 1; PS2: Post-Step 2; FU: Follow-up;
PITS: The Psychiatric Institute Trichotillomania Scale; CMOTS: Client Motivation for Therapy Scale

Table 2. Correlation Matrix

	MGH-HS PS1	MGH-HS PS2	MGH-HS FU	PITS PS1	PITS PS2	PITS FU	Mean Patient Adherence	Early Patient Adherence	Late Patient Adherence
MGH-HS PS2	.25								
MGH-HS FU	.26	.55**							
PITS PS1	.40*	.53**	.26						
PITS PS2	.36*	.77**	.54**	.84**					
PITS FU	.36*	.56**	.67**	.71**	.80**				
Mean Patient Adherence	-.14	-.23	.02	.13	.17	.18			
Early Patient Adherence	-.37*	-.23	-.20	.11	.16	.07	.65**		
Late Patient Adherence	-.05	-.22	.08	.09	.11	.16	.95**	.39*	
CMOTS – autonomy (PS1)	.14	.17	.24	.09	.17	.01	-.07	-.16	-.05

MGH-HS: Massachusetts General Hospital Hairpulling Scale; PS1: Post-Step 1; PS2: Post-Step 2; FU: Follow-up; PITS: The Psychiatric Institute Trichotillomania Scale; CMOTS: Client Motivation for Therapy Scale
*correlation is significant at the 0.05 level (2-tailed); **correlation is significant at the 0.01 level (2-tailed)

Treatment outcome was evaluated using the MGH-HS and the PITS at the beginning of HRT, or post-step 1 (PS1), after HRT, or post-step 2 (PS2), and at a 3-month follow-up (FU). For all analyses involving the correlation of scores on the MGH-HS at PS2, 3 participants were excluded for incomplete data, and for all analyses including the PITS at PS2, 6 people were excluded for providing insufficient data. For all analyses involving the correlation of scores on the MGH-HS at FU, 3 participants were excluded for incomplete data, and 3 participants were

also excluded from all analyses of correlation of scores on the PITS at FU for providing insufficient data.

As improvement on the MGH-HS and PITS is shown by a decrease in scores, one would expect to see a negative correlation between homework adherence and TTM symptom severity scores. The partial correlation of homework adherence with MGH-HS scores at PS2, controlling statistically for pre-treatment symptoms (PS1), was -.24 (p = .15). Although the association between homework adherence and better treatment outcome according to the MGH-HS at PS2 was nonsignificant at this small sample size, it is quite consistent with earlier research. In particular, previous meta-analyses showed an average effect size r of .26 (Mausbach et al., 2010) and .22 for the relationship between homework adherence and treatment outcome (Kazantzis et al., 2000).

In contrast, the partial correlation of homework adherence with PITS scores at PS2, controlling statistically for pre-treatment symptoms (PS1) was .07 (p=.70). This does not follow the expected negative correlation, in addition to its non-significance.

The partial correlation of the homework adherence and MGH-HS scores at FU controlling statistically for pre-treatment symptoms was .08 (p=.62), while the partial correlation of homework adherence and PITS scores at FU was .12 (p=.48).

In regards to timing of adherence, neither early nor late adherence showed a significant correlation with homework adherence at the end of treatment or at follow-up. Early homework adherence was measured by averaging homework ratings from session 2 and 3, while a late homework adherence score was determined by dividing the combined available ratings from sessions 4-8 by the number of sessions for which ratings were provided. The partial correlation

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of mean early homework adherence and MGH-HS scores at PS2 was -.16 (p=.34), while the

partial correlation with the PITS at PS2 was .08 (p=.66). Mean late homework adherence when

partially correlated with MGH-HS scores at PS2 was -.25 (p=.13). The partial correlation of

PITS scores at PS2 with mean late patient adherence, controlling for PITS scores at PS1, showed

a correlation of .03 (p=.87). None of the partial correlations at FU showed significance (see

Table 3).

Motivation does not explain the relationship between MGH-HS scores at PS2 and

homework adherence when statistically controlling for MGH-HS scores at PS1 and the CMOTS

autonomy subscale at PS1, with r(34) = -.24 (p=.15), as the correlation remains nearly the same

as when the autonomy subscale was not taken into account. Using the PITS score at PS2 as the

measure of TTM severity and controlling for PITS scores at PS1 and the CMOTS autonomy

subscale at PS1, the correlation with homework adherence is .07 (p=.68), which also does not

show a significant influence of motivation on the relationship between homework adherence and

symptom severity.   In addition, the CMOTS autonomy scale was not significantly correlated

with homework adherence r(40) = -.08 (p=.64).

Table 3. Partial Correlation of Severity Measures at Follow-Up by Timing of Homework Adherence[1]

	MGH-HS	PITS
Early mean patient adherence	r(35) = -.09 (p=.59)	r(32) = -.004 (p=.98)
Late mean patient adherence	r(35)= .12 (p=.48)	r(32) = .12 (p=.46)

MGH-HS: Massachusetts General Hospital Hairpulling Scale; PITS: The Psychiatric Institute Trichotillomania Scale 1 Early mean patient adherence is the average homework adherence score of sessions 2 and 3. Late mean patient adherence refers to the average of homework adherence scores in sessions 4-8, excluding sessions that were not attended.

CHAPTER 4

DISCUSSION

The main hypothesis of this study was that homework adherence would be significantly, if modestly, correlated with treatment outcome at the end of treatment. The correlation between homework adherence and self-reported TTM symptoms showed a similar effect size to those found in previous meta-analyses that looked at the relationship between homework adherence and treatment outcome in CBT for depression and anxiety disorders (Kazantzis et al., 2000; Mausbach et al., 2010), However, this relationship was not significant, nor in evidence for interviewer-rated TTM symptoms.

Kazantzis (2000) pointed out that homework adherence effects are in the small to medium range, making them more difficult to find without adequate power (Kazantzis, 2000). Many studies looking at homework adherence and treatment outcome do not use adequate sample sizes to achieve adequate power for detecting a small or medium effect. For example, Edelman and Chambless (1993, 1995), which both found no significant correlation between treatment outcome and homework adherence, had just a 10% and 11% chance, respectively, of detecting a small effect (Kazantzis, 2000). In this study, with N=38 as in our analyses involving all MGH-HS scores and the PITS scores at follow-up, using the more conservative population parameter of r = .22 from the meta-analysis by Kazantzis et al. (2000), our probability of obtaining a significant result was just .38. With N=35 as in our analyses involving all other scores on the PITS, if the population parameter were r=.22, our probability of obtaining a significant result was only .36.

Kazantzis (2000) also shows that studies which divided participants into equal homework and no homework groups have even less power to detect small effects. This is certainly the case in the Kornblith et al. (1983) study, which divided subjects into four groups, one of which had no homework assignments, and found no significant difference in outcome between the groups. Since only 39 subjects completed therapy in that study, the four groups consisted of very small samples (Kornblith, Rehm, O'Hara, & Lamparski, 1983).

Another factor to consider when looking at the apparent lack of relationship between homework adherence and treatment outcome is the assumption of a dose-response relationship between homework and outcome. Stiles and Shapiro (1994) addressed a concept in process-outcome correlations that they termed the "drug metaphor," which presumes that if a component of therapy, such as homework, is an important part of successful treatment, then a high "dosage" will be associated with positive results. Furthermore, a higher dosage will correlate with more improvement than a relatively lower dosage across participants. In their study, which looked at specific verbal response modes (VRMs) in therapists and clients, they found no relationship between presumably "active ingredients" in treatment such as the amount of Therapist Interpretation and Client Disclosure in sessions and treatment outcome. They suggest that the non-significance of these correlations is misleading, and that VRMs should still potentially be interpreted as important parts of treatment. They reason that different clients require different amounts of specific verbal interventions, and that therapists are responsive to these needs. Thus, one would not find the same amount of Therapist Interpretation in sessions with different clients but may find similar levels of improvement. In that case, a linear correlation between the process component and outcome to determine the effectiveness of Therapist Interpretation would

be inappropriate (Stiles, Honos-Webb, & Surko, 1994). In this study, each client was instructed to complete the homework as fully as possible, so therapists were not responsive by assigning less homework, but it is possible that patients were responsive to what they perceived as their own needs in relation to homework adherence, and may have adhered more or less to homework completion accordingly, whether or not they were correct in their assessment. Thus, the absence of a significant correlation between greater adherence and improvement at the end of treatment does not imply that homework adherence is an "inert" ingredient in treatment, but rather that the assumption of a linear relationship between the process of adherence and outcome may not be correct.

Along the same vein, Yovel and Safran (2006) address the idea that studies relating homework adherence to outcome in a full sample may be misleading if adherence is related to improvement for some participants and none for others. They assert that the effectiveness of homework may be similar to that of patients with different responses to the same medication, and use the term "homework utility" to describe this concept in a study of CBT for adult ADHD. In order to measure homework utility, the authors looked within subjects at homework adherence and symptom change on a session-by-session basis, and created a homework utility index for each participant, correlating adherence with the weekly symptom change.[1] The study found that participants who showed more homework utility had better treatment outcomes than those with

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[1] As correlations were conducted within-subjects, a positive correlation, or high homework utility, showed that there was greater symptom improvement during weeks in which a participant adhered more to homework. Those with low homework utility did not show a significant relationship between better adherence and symptom improvement. Had correlations been conducted across all subjects, as in our study, a positive correlation would have meant that more adherent participants showed higher weekly symptom improvement, and further correlation of those results with treatment outcome would have been redundant. Since Yovel and Safran looked at the relationship between symptom improvement and adherence relative to one's own performance during other sessions, it was possible that participants with low homework utility could have shown major improvement at outcome and vice versa, although this is not what the study found.

less homework utility while correlations between average homework adherence and treatment outcome measures were not significant (Yovel & Safren, 2006). The authors recommend that for those showing low homework utility, a different treatment or case conceptualization would be appropriate. In this study we did not measure change in treatment scores between each session, and thus are unable to compute the homework utility scores for each of our participants, but recommend this approach in future studies.

Another question this paper attempted to answer was whether treatment outcome at follow-up was correlated with homework adherence. The results of this study suggest that homework adherence is unrelated to outcome at follow-up. In this study, there was not adequate power to detect significance. Currently, there is little information in the field as to whether homework adherence correlates with treatment outcome at follow-up, and it is possible that the two are not related. If that is the case, one may suppose that since homework assignments end at the conclusion of treatment, gains made specifically through homework adherence may be lost at follow-up if patients discontinue homework practices, which may be seen as time-consuming or may not be recognized as providing benefit, or if patients only find homework to be helpful when accompanied by therapist feedback.

This study found no difference in timing of homework adherence in relation to treatment outcome. As past studies have found differing results regarding timing of homework adherence, future studies with more power should address this issue.

Intriguingly, MGH-HS scores at PS1 were significantly negatively correlated with early homework adherence, showing that those with lower scores (those who were less symptomatic) adhered more to homework at the early stage than those with higher scores. This is not the case

when looking at the correlation between MGH-HS scores at PS1 and late adherence, which are not significantly correlated. Thus, less symptomatic participants did not continue to adhere more to homework than those with worse scores during later sessions. As this pattern is not replicated with PITS scores, this finding may not be substantive. However, it is possible that after completing Step 1 (web-based self-help) which largely included self-monitoring, those who were more symptomatic became pessimistic about the efficacy of the first two homework assignments in HRT, which also consisted mostly of self-monitoring and therefore adhered less to early homework assignments.

As there was not a significant relationship between homework adherence and treatment outcome, motivation was not found to be a confounder. Surprisingly, autonomous motivation was not correlated with homework adherence. There are several possibilities as to why this is the case. First, motivation for therapy may not extend to homework assignments. Daily homework can be an overwhelming proposition that is much different from a commitment to attend a certain number of therapy sessions. Even if the idea of homework appeals to the subject, it is possible that certain subjects had busier schedules than others, and that despite motivation to do well in therapy, daily schedules stood in the way of homework adherence.

There may be other factors that are better related to homework adherence. Researchers have proposed potential third variables such as expectancy for change (Westra, Dozois, & Marcus, 2007), use of active coping strategies prior to treatment (Burns & Nolen-Hoeksema, 1991) and therapeutic alliance (Woody & Adessky, 2002). Future studies would benefit from using measures that allow the exploration of these possible confounding variables.

There are several limitations to this study. The first is the small sample size. Analyses involving the MGH-HS and the PITS at follow-up included 38 participants while all other analyses using the PITS used data from 35 participants. In order to be sure that the study's results are accurate and that there is actually no relationship between homework adherence and treatment outcome, it is necessary to have adequate power to detect significance. In future studies, it would be beneficial to recruit a much larger sample.

Another limitation is that therapy sessions were not conducted on a consecutive weekly basis for at least 27 participants. As homework assignments were intended to be completed for the seven days in between meetings, it is unclear if knowing that sessions would not be held the following week somehow diluted adherence or if failing to meet with the therapist the following week to integrate the skills learned in the homework weakened the effects of the assignments. For instance, if participants had two weeks in between sessions and only completed seven days of homework, they were certainly not receiving the full benefits of consistent homework adherence followed by solidification of gains made at home in therapy. If they were to have completed 14 days of a certain assignment on the other hand, their treatment and practice of certain skills would not match those of the rest of the participants. In future studies, it would be preferable to determine if participants are able to meet on a weekly basis in order to receive the maximum benefit of therapy and homework and to ensure that treatment is as similar across subjects as possible.

A further limitation is that homework adherence ratings were given by the therapist instead of an objective rater. The meta-analysis by Kazantzis et al. (2000) indicates that the use of adherence scores based on objective ratings may have resulted in a higher association of

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homework adherence with treatment outcome. In addition, it is possible that therapists provided

unintentionally biased, invalid ratings of adherence, perhaps influenced by their overall alliance

with the patient or by the patient's rate of progress in treatment. Unfortunately, it is not possible

to evaluate this concern empirically, as rater and therapist caseload are completely confounded in

this study. Therefore, even if a particular therapist in this study gave reliably higher or lower

adherence scores than the other therapists, it would be impossible to discern whether certain

therapists were more lenient or harsh in their ratings, if specific therapists had more or less

adherent clients, or if a particular therapist inspired greater adherence in his or her patients. After

the completion of this study, it was unfeasible to have an independent rater supply objective

ratings of homework adherence since not all homework was collected from the subjects, and it

would be necessary to rely on the memory of the therapists themselves to determine whether

homework was completed, was reported as being left at home, or was simply not done. In future

studies, it would be useful to have an independent rater conduct ratings at the time that

homework is handed in.

As not all homework was collected in this study, an assessment of homework quality was

not possible after treatment concluded. However, perhaps the extent to which subjects truly

understand and engage in homework activities would be more significantly associated with

improvement in symptoms than solely the amount of homework completed. In fact, homework

quality has been found to be a better predictor of outcome than homework quantity in a study of

behavioral therapy for panic disorder (Schmidt & Woolaway-Bickel, 2000). This has not been

entirely supported by other findings. In a study looking at both anxiety and depression, the

authors found stronger evidence that quantity of homework was related to treatment outcome

than quality of homework, and that there was only a tentative connection between quality of homework and symptom improvement (Rees, McEvoy, & Nathan, 2005). In another study of panic disorder with agoraphobia and obsessive-compulsive disorder, both quality and quantity of homework were unrelated to treatment outcome (Woods, Chambless, & Steketee, 2002). A possible explanation of the different findings in the studies related to panic disorder results from differences in the measures of quality. While Woods et al. (2002) simply used a measure of participant reduction in distress from the beginning of an exposure to its end, Schmidt and Woolaway-Bickel (2000) assessed a number of factors, including whether a specific homework task was identified, whether the task generated moderate levels of fear, whether fear was extinguished at the end of the task, and whether the participants used any coping strategies. Perhaps this more nuanced assessment of the quality of homework provides a better window into the relationship between homework quality and treatment outcome. Future studies would benefit from assessing quality of homework to see if it captures an element of homework completion that is more closely related to treatment outcome that homework quantity.

Additionally, the word "homework" may carry a negative connotation for patients, who could potentially associate it with unpleasant experiences from school. Therapists may consider avoiding the word "homework" when giving an assignment, or designating it with a more positive label, such as a "skill-building exercise" in order to promote adherence.

This study found that homework adherence for patients with TTM undergoing HRT was not related to treatment outcome at the end of treatment or at follow-up. Timing of adherence made no difference in treatment outcome, and autonomous motivation at the beginning of treatment was not significantly correlated with homework adherence. Future studies of treatment

for Trichotillomania with a larger sample size, weekly therapy sessions, objective ratings of homework adherence as well as measurements of homework quality and homework utility are necessary before deciding whether homework is an additive component of HRT.   As there is evidence supporting homework's efficacy in treatments for other disorders, it would be unwise to discontinue the practice of assigning homework in treatment for TTM until further attention has been paid to this topic.

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