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Acceptance-Enhanced Behaviour Therapy for Trichotillomania (AEBT-T) Is Effective in a Group Setting and Change in Psychological Inflexibility May Predict Symptom Reduction

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Kunnskap for en bedre verden

Forord

For et knapt år siden var trikotillomani, eller kronisk hårnapping, for meg en lite kjent og uforståelig lidelse. I dag er jeg forfatter av en hovedoppgave i emnet. Dessverre vet praktiserende klinikere, og ikke minst altfor mange av dem som selv lider under den, alt for lite om lidelsen. Jeg håper denne hovedoppgaven kan være et lite steg på veien mot en klokere forståelse og mer effektiv behandling av den ofte tabubelagte hårnappingen.

Utvikling av problemstillinger og alle statistiske analyser er gjort av forfatteren selv, med gode råd og vink fra veileder Patrick A. Vogel. Jeg har studert et mye bredere tilfang av statistiske metoder enn dem jeg presenterer i denne oppgaven, og jeg har virkelig fått oppleve verdien av problembasert læring, eksempelvis ble mitt tidligere naive syn på effektstørrelser som ensartede, objektive målestokker kraftig nyansert. Når det gjelder selve teksten er den i sin helhet forfattet av undertegnede, og den observante leser vil se at jeg har valgt å skrive på engelsk.

En takknemlig hilsen går til gruppen med forskere bak The Norwegian Trichotillomania Project for tilgang til deres data. En spesiell takk rettes til Benjamin Hummelen for hans forklaringer og hjelp, samt for inspirerende iver for å lære meg om mixed models -analyser, selv om de ikke kom på trykk i denne omgang. Jeg er sikker på vi begge kan enes om at dataene fortjener en kraftigere og mer nyansert behandling i framtiden.

Til sist vil jeg si hjertelig tusen takk til Patrick A. Vogel, for stødig veiledning gjennom større og mindre spørsmål og for hjelp med å avgrense, holde det enkelt og få ting gjort. Din alltid kvikke respons og dine utallige konstruktive innspill har vært gull verdt.

Trondheim, 9. mars, 2016
Gaute Lier Guldahl

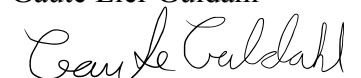


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Abstract

Trichotillomania (TTM) is a debilitating and often chronic mental disorder, with a prevalence of about 1% according to conservative estimates. Common treatment approaches include pharmacological and behavioural interventions, the most studied of which is Habit Reversal Training (HRT). However, previously studied treatments have tended to produce limited and short-lived effects. A novel approach utilizing HRT enhanced with Acceptance and Commitment Therapy (ACT) has recently been developed, and shown promising results. In the current study, using preliminary data from the Norwegian Trichotillomania Project, 58 patients meeting full DSM-IV criteria for TTM were offered ten three-hour sessions of AEBS-T in groups no larger than six participants. Post-treatment reductions in symptom severity were large as measured by self-report (Cohen's $d_z = 1.62$) and clinician rating (Cohen's $d_z = 2.49$). Based on these same measures, 29.3 and 39.7% of participants met criteria for a clinically significant change, and 36.2 and 20.7% were abstinent (for one week or more) from hair-pulling at post-treatment. Following treatment, significant reductions were also found for indices of depression (Cohen's $d_z = 0.57$), and anxiety Cohen's $d_z = 1.00$). In the regression analysis, change in self-reported psychological inflexibility, the critical theoretical component in ACT, emerged as a significant predictor of clinician rated post-treatment symptom severity ($F_{(2, 38)} = 8.34$, $p < .001$, $R^2 = .305$), when including pre-treatment symptom severity in the model. Despite several limitations, such as the uncontrolled single group design, the current study shows AEBS-T delivered in a group setting to be an effective treatment, on par with or better than previously studied group-delivered, and even some individually delivered treatments.

1 Introduction

1.1 Background

Trichotillomania or chronic hair pulling is characterized by repeatedly pulling out ones hair, thereby causing noticeable hair loss (American Psychiatric Association, 2013). The most common areas of pulling are the scalp and face but can include any area of the body (Woods, Flessner, Franklin, Wetterneck, et al., 2006). Horne (1977) cites the French dermatologist Hallopeau (1889) as being the first to introduce the term trichotillomania to describe hair loss caused by pulling. Medical accounts of the phenomenon are much older, dating back to Hippocrates, the Greek physician often regarded as the founding father of medicine (Christenson & Mansueto, 1999). Interestingly hair pulling as a psychiatric disorder seems to have received relatively little scientific attention (only through case histories) up until the second half of the 20th century (Horne, 1977) and was not included in the Diagnostic and Statistical Manual of Mental Disorders until its third revision in 1987 (Christenson & Mansueto, 1999). The frequency of Trichotillomania (TTM) and its many debilitating consequences are now acknowledged to a greater degree (Duke, Keeley, Geffken, & Storch, 2010), and the early conceptions of TTM as a benign, mechanistic, simple and extremely uncommon disorder have been thoroughly refuted during the last 20 years (Diefenbach, Reitman, & Williamson, 2000; Duke et al., 2010). TTM is associated with significant suffering for those plagued by the disorder and patients commonly report a number of distressing impairments, such as lowered self-esteem, guilt and shame, depression, negatively impacted social functioning, avoidance and isolation and reduced quality of interpersonal relationships. Physical sequelae of pulling may include scarring at the pulling site, avoidance of medical care and in rare cases serious medical problems caused by trichobezoars (hair balls in the digestive tract) as a result of the ingestion of hair (trichophagia) (Diefenbach, Tolin, Hannan, Crocetto, & Worhunsky, 2005; Duke et al., 2010; Odlaug, Kim, & Grant, 2010;

Wetterneck, Woods, Norberg, & Begotka, 2006; Woods, Flessner, Franklin, Keuthen, et al., 2006).

Leading researchers have noted the limited and often short-lived effects of the most commonly used behavioural treatments for TTM, Habit Reversal Training (HRT) (Keuthen et al., 2012), where in most studies 30-40% of those treated do not experience any clinically significant improvement at post treatment (Lerner, Franklin, Meadows, Hembree, & Foa, 1998). One uncontrolled study of behavioural treatment for TTM found that the pre- to post-treatment effect size was reduced by 70 % at two-year follow-up (Keijsers et al., 2006). Issues with maintenance of treatment gains are also apparent from meta-analysis of TTM-treatments (Bloch et al., 2007; McGuire et al., 2014). Developing new and more efficacious approaches, as well as improving existing ones, is therefore of paramount importance.

1.2 Diagnosis and classification

Trichotillomania is regarded as a heterogeneous disorder with a clinical presentation that is often poorly accounted for by current diagnostic criteria (Christenson & Crow, 1996, cited in Duke et al., 2010). Both clinical research and clients seeking treatment will likely benefit from an appreciation of the diverse and often idiosyncratic clinical presentation of TTM.

Trichotillomania was classified as an impulse control disorder in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorder (DSM-IV), grouped with pathological gambling, pyro- and kleptomania and intermittent explosive disorder. DSM-IV criteria for TTM include A) Recurrent hair pulling; B) an increasing sensation of tension before episodes of pulling; C) pleasure, gratification or relief in the act of or after pulling hair; D) not better accounted for by another DSM-disorder or dermatological condition; and E) clinically significant distress or impairment in social, occupational or other important domain of functioning (American Psychiatric Association, 1994). The ICD-10 parallels this

classification (World Health Organization, 1992). In the current DSM-V (American Psychiatric Association, 2013) TTM is grouped with the obsessive-compulsive disorders, and the controversial criteria B and C have been removed, as a significant minority of adults, and an even greater number in children and youth, do not reports such rise and fall in affect or tension (see for example Franklin & Tolin, 2007, p. 4, for a summary of the litterature). Also, in DSM-V, a new criteria was added: B) repeated attempts to decrease or stop pulling. In their analysis, Houghton et al. (2015) found that the removal of criteria B and C had no significant impact on the functionality of a diagnostic test based on the DSM-IV. Criteria B and C have likely excluded a significant number of people from receiving the DSM-IV diagnosis, despite their experiencing significant impairment from TTM.

1.3 Prevalence estimates

Early estimates of the prevalence of TTM were very low, some as low as 0.05% (Schacter, 1961, cited in Duke et al., 2010). Different definitions and inclusion criteria, small sample sizes, unsystematic use of standardized measures and other methodological problems have made a precise estimate difficult. However, from being regarded as benign and very uncommon, trichotillomania is now recognized as a severely debilitating disorder with a prevalence of 1%, using a more conservative estimate (Rothbaum et al., 1993, cited in Duke et al., 2010). Individuals with TTM often experience strong feelings of shame and guilt over their behaviour as well as their lack of control over it, and will often go to great lengths to keep it a secret from close relatives, friends and healthcare providers. Such concealment efforts combined with little knowledge of TTM among health care professionals have probably contributed to under-diagnosis (Duke et al., 2010).

TTM often starts in adolescence around the onset of puberty but both early childhood onset and onset after 50 years of age have been reported. The disorder is more commonly reported in women, but the results here are mixed, and some argue that the greater female-to-

male ratio is partly artificial and may reflect a sex-difference in help-seeking behaviour (Stein, Christenson, & Hollander, 1999). Noting this, I will nonetheless use the female pronoun throughout this text.

1.4 Comorbidity

Trichotillomania is frequently associated with psychiatric comorbidity. Approximately 80% of TTM sufferers meet, or have previously met, criteria for a comorbid Axis 1 disorder. A lifetime history of major depression is common and found in 35%-55% of individuals, a history of anxiety disorders in 50%-57%, a history of substance abuse disorder in 22%-35%, and previous or ongoing eating disorder in about 20% (Christenson, Mackenzie, & Mitchell, 1991; Christenson & Mackenzie, 1994; both cited in Woods & Twohig, 2008). Also the comorbidity with other body focused repetitive disorders such as skin picking tend to be high (Stein et al., 2010). In the largest sample studied to date of individuals with chronic hair-pulling (N = 1697), 70% reported feeling that their hair-pulling had triggered further psychiatric problems (Woods, Flessner, Franklin, Keuthen, et al., 2006).

Several studies have looked at comorbid depressive symptoms and their relation to TTM-severity. Pre-treatment levels of depression (using Beck Depression Inventory, BDI) predicted TTM symptoms at 2-year follow-up in one study (Keijsers et al., 2006). Another study found significant positive relationships between BDI and measures of TTM-severity (Houghton et al., 2014), and a retrospective assessment study following treatment for TTM found that improvement in TTM-symptoms were specifically associated with higher depression levels pre-treatment and larger improvement in depression post-treatment (Keuthen et al., 1998). In summary, these findings imply that depression may follow TTM-symptoms closely.

An interesting question is: what arises first, the pulling or the common comorbidities? This is hardly a simple either-or question as problems are likely to escalate together in a

transactional manner. Still, whether significant depression, anxiety or other problems not resembling a nervous habit tend to precede hair-pulling remains an open question. Effective treatments of TTM may either way also need to address the common comorbid problems found in people suffering from it. More research is also needed to investigate how comorbid disorders affect treatment outcome.

1.5 Subtypes

Two subtypes of hair-pulling behaviour have been identified in research: an “automatic” and a “focused” type (Flessner, Woods, Franklin, Keuthen, & Piacentini, 2008; Flessner et al., 2008). Automatic pulling commonly occurs during sedentary and monotonous activities such as reading, watching television or browsing the web and the individual may not become aware that she has been pulling until after the fact. This out-of-awareness, habitual type of behaviour may be sustained through reinforcing properties of the sensory consequences of the pulling (Fine et al., 2012). The focused type more closely resembles an obsessive-compulsive behaviour, elicited by an urge and a motivation to reduce mounting tension. Focused pulling may also happen in response to an impulse (i.e. to experience gratification), or negative affectivity where the individual seeks to reduce negative affect through pulling (Flessner, Knopik, & McGeary, 2012). It is very common for an individual to report both types of pulling, and Flessner et al. (2008) suggest that less than .01% exclusively perform one type of pulling. However using a psychometric measure such as the Milwaukee Inventory for Subtypes of Trichotillomania-Adult Version (MIST-A) it is possible to define subgroups that are predominantly characterized primarily by one or the other subtype as well as a mixed group (Flessner, Conelea, et al., 2008). In any case the limited phenomenological research suggests that hair pulling involves two distinct and often co-occurring behavioural processes, that each may require its own form of intervention.

Some researchers have suggested that behaviourally directed treatments working to increase awareness of pulling, such as habit reversal training, originally developed by Azrin & Nunn (1973), will be especially effective for the more habit-like automatic pulling. Conversely focused pulling may need additional treatment components directed toward the cognitive and affective antecedents (and consequences) of pulling (Duke et al., 2010; Flessner et al., 2008).

1.6 Trichotillomania and emotion regulation

Several studies, though mostly based on retrospective and self-report methods, support the notion that hair-pulling behaviour may serve the function of regulating emotion (Diefenbach, Tolin, Meunier, & Worhunsky, 2008; Roberts, O'Connor, & Bélanger, 2013; Shusterman, Feld, Baer, & Keuthen, 2009). Several naturalistic studies have used retrospective self-report to investigate emotions and their intensity before, during and following episodes of hair-pulling (see Roberts et al., 2013 for a thorough review). In summary, the most common pre-pulling emotions were boredom, anxiety, tension and frustration. These emotions tend to decrease over a pulling sequence. Other emotions, namely sadness, shame and guilt often increase after a pulling episode. Retrospective self-report methodology severely limits the conclusions that can be drawn from such studies. Establishing emotion as a trigger for pulling behaviour in TTM requires experimentally provoking such behaviour by inducing emotional states. To my knowledge only one single-case study exists that attempted such a manipulation. This study found that the strength of a 16-year old participant's urge to pull was strongest during a non-specific emotional arousal condition, compared to a neutral condition and two distraction conditions (Drysdale, Johoda and Campbell, 2009, cited in Roberts et al., 2013). Needless to say this single case study allows little generalizability. Potentially giving rise to further complications in studying emotions in TTM, Rufer et al. (2014) found a significant but modest association between

alexithymic deficits (especially difficulties in identifying emotions), and TTM severity. This suggests that a subgroup of people with TTM-diagnosis will find it difficult to recognize and report their emotions accurately.

The purported function of regulating private experiences, among them emotions, is most often associated with the focused type of pulling behaviour (see for example Woods, Wetterneck, & Flessner, 2006). The fact that automatic pulling evades conscious experience makes it difficult to study the function of such pulling, but one cannot rule out the possibility that this type may also serve to regulate emotion. Treatment approaches for TTM differ in their focus on emotion-regulation, but recently developed methods explicitly emphasize fostering alternative strategies for regulating emotion.

1.7 Treatment options and their efficacy

Psychoanalytic conceptualisations and treatments of trichotillomania were predominant until behavioural methods slowly became more common by the late 1960s, and eventually took over as the treatment of choice by the 1980s. According to Horne (1977) the earliest account of a behavioural treatment for trichotillomania is that of Taylor (1963). A woman with a 31-year history of plucking her eyebrows was taught a “thought stopping” technique where she would tell her hands “No, stay where you are” whenever they started to move. The treatment lasted ten days and was apparently effective. The most used and researched behavioural treatment-method for TTM to this day is Habit Reversal Training (HRT). Originally developed by Azrin & Nunn (1973), HRT is a multi-component treatment intervention for “nervous habits”, including TTM. Habit Reversal Training is often used as part of cognitive behaviour therapy (CBT). The terms Cognitive-behaviour therapy (CBT) and behaviour therapy (BT) will necessarily overlap to some degree. In our context, CBT is a term for a family of interventions that share many components, the most important of which is a grounding in the cognitive model (see J. Beck, 1995, p.14). Whereas CBT typically will

target cognitions, emotions *and* behaviour, and even use behavioural methods (Hofmann & Asmundson, 2008), BT usually focuses chiefly on overt behaviour. However, such distinctions are not strictly adhered to in the TTM-literature.

Habit Reversal Training (HRT). Since HRT has taken such a central role in treatment, a more detailed look is warranted. Training may employ several different techniques meant to complement each other, and simplified versions of the procedure are often used. The core components include 1) *awareness training*, usually consisting of the recording of symptoms and behaviour (e.g. through self-monitoring) and in-session practice to recognize antecedents (early signs) of pulling behaviour. These include cognitive, situational and affective antecedents. The goal is to recognize early signs and actions in the behavioural chain that often end in pulling; 2) *competing response training* involves teaching the client motor behaviours that are incompatible with hair pulling, such as pressing the arms toward the floor, clenching hands tightly or sitting on hands. This is done in response to an early sign, such as an urge to pull or an identified high risk situation; and 3) *Stimulus control*, which means taking steps to remove or change conditioned cues in the environment that may elicit hair pulling. Such steps may include covering mirrors, getting rid of tweezers or reducing time spent sedentary and alone (Azrin, Nunn, & Frantz, 1980; Azrin & Nunn, 1973a; Mouton & Stanley, 1996; Rapp, Miltenberger, & Long, 1998; Woods & Miltenberger, 1995). Stimulus control (SC) is often regarded as an intervention in its own right and specified in addition to HRT, forming acronyms such as HRT/SC or HRT Plus. Since the use of both techniques in treatment has become virtually mandatory, I will refer to it as simply HRT in this thesis.

Pharmacological and behavioural interventions. Pharmacological therapy is still used and recommended by some highly specialized treatment providers (Chamberlain, Menzies, Sahakian, & Fineberg, 2007). These recommendations seem to be based on scant evidence and moreover subsist in spite of mounting evidence for the superior efficacy of

behavioural treatment (BT) (Bloch et al., 2007; Ninan, Rothbaum, Marsteller, Knight, & Eccard, 2000; van Minnen, Hoogduin, Keijsers, Hellenbrand, & Hendriks, 2003). In the review by Bloch et al., selective serotonin reuptake inhibitors (SSRIs) was found to have little to no effect on TTM-symptoms, Clomipramine (a tricyclic antidepressant) had a medium effect, while HRT had a large effect size across the available studies. A more recent meta-analysis, though mostly based on the same studies included by Bloch et al., found larger effects for the pharmacological interventions and a non-significant advantage of clomipramine (ES = 0.71) over selective serotonin inhibitors (SRIs) (ES = 0.41) and SSRIs (ES = 0.29) (McGuire et al., 2014). Discrepancies in findings are attributable to the use of different outcome measures. The combination of BT and pharmacotherapy has shown promise in at least one small randomized controlled trial where the combination of HRT and Sertraline was significantly more effective than either treatment alone (Dougherty, Loh, Jenike, & Keuthen, 2006).

Considering BT, the random effects meta analysis by McGuire et al. also found a large, overall between-groups effect size (standardized mean difference) for this treatment modality (SMD = 1.56, 95% CI = 0.99, 2.14) when including only studies using standardized rating scales. One study included by McGuire et al. found a very large within-group effect of individually delivered BT (uncontrolled ES = 3.80) on self reported TTM-symptoms (van Minnen et al., 2003). Other studies of similar treatment have generally found somewhat smaller effect sizes, including a study by Rogers et al. (2014) (ES = 1.39) and one by Woods, Wetterneck, & Flessner (2006) (ES = 2.14), both uncontrolled, within-group values based on self-report.

Conclusions drawn from reviews of the TTM-literature must take into account the low number of trials, consistently low sample sizes, and frequent use of self-report which may inflate effect sizes. Noting their inferiority to BT, pharmacological treatments could still have

an important place in the management of TTM given their low cost, wide availability, and efficacy in treating common comorbid conditions of TTM, such as depression. Other studied pharmacological treatments include the antipsychotic drug olanzapine (Stewart & Nejtcek, 2003, cited in McGuire et al., 2014), topiramate (an anticonvulsant) (Lochner et al. 2006, cited in Samuel R. Chamberlain et al., 2007) and the glutamate modulator N-acetylcysteine (Grant, Odlaug, & Won Kim, 2009). Although CBT using HRT is the treatment of choice based on both the literature reviews and expert consensus (Flessner, Penzel, & Keuthen, 2010), clinicians and clinics providing HRT are still hard to come by, and for a majority this treatment option remains unavailable or poorly delivered (Franklin, Zangrabbe, & Benavides, 2011).

New treatment approaches to TTM. Not unlike avoidance behaviours in anxiety and depression, focused hair-pulling resembles an emotion-regulating behaviour, although in a maladaptive form. One common ground of these disorders seems to be low affect tolerance. HRT was not designed to address such problems, nor the anxiety and depression often accompanying trichotillomania. Besides CBT, other approaches recently applied to TTM may address these issues more effectively, namely Dialectical Behaviour Therapy and, central to this thesis, Acceptance and Commitment Therapy (ACT).

ACT (pronounced as the verb “act”) was developed as an alternative to conventional methods of cognitive-behavioural therapy in which the focus and overall aim, at least according to some proponents of ACT, is to reduce the intensity and frequency of unwanted private experiences and symptoms (Flaxman, Blackledge, & Bond, 2011). Rather than trying to alter private experiences, ACT promotes behaving in accordance with valued ends in spite of unpleasant or otherwise aversive affective, cognitive or even physical experiences (Flaxman et al., 2011; Hayes, 2004). The rationale for this approach is that avoidance or change-efforts directed at inner experience often has the paradoxical effect of enhancing or

prolonging the very thing we want to avoid or change. Most often the desired change is not even under our control in the first place (e.g. avoidance of personal history) and even successful avoidance often comes at a considerable cost that can seriously impede pursuing important life goals and a fulfilling life (consider agoraphobia, where a man may successfully avoid all that he fears in the prison of his home). All humans are to some extent experiential avoiders, partly because it is so strongly negatively reinforced. Avoidance offers instant relief from aversive experience, and behaviour is much more strongly influenced by this immediate consequence than by eventual long-term negative consequences (Hayes, Strosahl, & Wilson, 2011).

An ACT-therapist will therefore attempt to modify three key capabilities: 1. she will help the client to abandon experiential avoidance, an important concept within most cognitive approaches; 2. she will seek to change excessive literal responding to thoughts, a process named defusion (comparable to the term *distancing* in Becks cognitive therapy [A. T. Beck, 1970]); and 3. strengthen a clients ability to commit and follow through on value-based behaviour change (Kohlenberg, Hayes, & Tsai, 1995, p. 584, cited in Hofmann & Asmundson, 2008). In a single expression, the goal of ACT is to foster psychological flexibility, defined as “the ability to fully contact the present moment and the psychological reactions it produces as a conscious person and to persist or change behaviour in the situation in the service of chosen values.” (Fletcher & Hayes, 2005, p. 319). In neuroscience terms, increased psychological flexibility may approximate increased executive functioning. A review of the literature on mediational research of ACT processes, found over 50 studies, in sum suggesting that ACT works by fostering acceptance of private experiences and weakening literal believing in dysfunctional thoughts, including the belief that private experience has any real power to hinder valued actions (Ciarrochi, Bilich, & Godsell, 2010).

These are all markers of psychological flexibility. The typical way of measuring this construct is by self-report, such as with the Acceptance and Action Questionnaire-II (AAQ-II).

The concept of acceptance is a frequently misunderstood one within the ACT framework. Acceptance is not a passive process of tolerating or resigning, nor is it a technique to lower the aversiveness of, or otherwise change present experience. In ACT-terms it is “the voluntary adoption of an intentionally open, receptive, flexible, and non-judgemental posture with respect to moment-to-moment experience” (Hayes et al., 2011, p. 272). Acceptance is tied to the concept of workability. If a life-strategy or behaviour is not working in producing the intended result, a necessary first step in changing behaviour is to accept the futility of the current one. In this way, acceptance is not an end in itself, it is not wallowing in one’s feelings, but a values-based choice prompted by the challenges raised through pursuing a valued life.

Let us consider the case of trichotillomania. The ACT-oriented clinician will help a client see that her problem is not the urges to pull, but the various ways in which she tries to alter and avoid her inner experience, such as seeking relief from urges or difficult feelings through pulling. Evidence is accumulating to suggest that the positive relationship between certain emotional states and the severity of TTM may be moderated by an individual’s tendency toward experiential avoidance (Begotka, Woods, & Wetterneck, 2004; Houghton et al., 2014; Norberg, Wetterneck, Woods, & Conelea, 2007). In this sense, it is not the *content* itself of aversive feelings, urges to pull, or dysfunctional thoughts such as “all gray hairs must go” that determine severity and suffering in TTM, it is the *process* of relating to this content in a rigid and inflexible way, fusing with it, attempting to avoid it and always fighting it that is the actual source of suffering and increased pulling severity.

The central element of overt behaviour (pulling) in TTM also lends well to an ACT-intervention. In ACT-Enhanced Behaviour Therapy for TTM (AEBT-T), which is essentially

ACT elements combined with HRT, the client is helped to become aware of the costs of pulling and is given ample opportunity to practice skills of mindful awareness, defusion, and acceptance, as she implements habit reversal training and stimulus control procedures. HRT and stimulus control become important actions a client can commit to performing, in the service of valued ends in other areas of life. For example, hair pulling and related behaviour may take a lot of time for a client. She may value being a loving parent, which for her entails spending time with her children. Engaging in HRT could then become an act in pursuing loving parenting, by freeing up the time and attention required.

With regard to the effect of enhancing HRT with ACT-components in the treatment of TTM, McGuire et al., (2014) found a significantly larger effect for so called “mood-enhanced” therapies utilizing DBT or ACT components (SMD = 2.26) compared to non-enhanced core BT (SMD = 1.02). However, only three small RCTs have evaluated the efficacy of HRT to date, and no head to head comparisons of core HRT vs. enhanced HRT have been carried out. Also, the advantage of ACT/DBT was confounded by more hours of therapist contact in these mood-enhanced studies. Hence, a definitive conclusion for the added benefit of enhancement is premature.

Group-therapy. If treatment-availability is a problem, reducing its cost and the therapist-resources required should be a main concern, along with disseminating effective approaches. Group-therapy is a promising modality in this regard, but remains understudied. Interestingly, one meta-analysis evaluating the cost-effectiveness of group vs. individual CBT found that the evidence is mixed: in spite of a trend toward the superiority of groups, the most cost-effective modality will vary across different disorders and individuals (Tucker & Oei, 2007). No such evaluation has been published for TTM.

In my review of the literature I found only two studies of group-delivered treatment, both RCTs, comparing either Group-BT or Group-CBT to supportive therapy. In the first, a

total of 24 patients, 12 in each condition, were treated in groups of 2-6 people over 8, weekly, 1-1.5-hour sessions. The HRT-based BT was effective in reducing self-reported hair-pulling, with a post-treatment effect size Cohen's $d_z = 1.39$. BT did a little better than supportive group therapy at post ($d_s = 0.25$). The effect was however greatly diminished at 6-month follow-up, at which point the conditions did not differ (Diefenbach, Tolin, Hannan, Maltby, & Crocetto, 2006). The second study randomized 44 patients to either group-CBT (HRT not incorporated) or supportive group therapy over 22 sessions (duration not specified). Group-CBT was effective, with a large post-treatment effect on self-reported hair-pulling severity (Cohen's $d_z = 1.84$, (the formula for this approximation can be found in appendix B). The current study is the first to examine Acceptance-Enhanced Behavioural Therapy for trichotillomania in a group-format.

1.8 Research questions

The first aim of this thesis was to assess the effect of group administered AEBT-T in an adult Norwegian sample. The outcome variables chosen included measures of depression, anxiety and hair pulling severity. The prediction was that the treatment would be on par or better than what previous studies have found for group-delivered treatments (Diefenbach et al., 2006; Toledo, De Togni Muniz, Brito, de Abreu, & Tavares, 2015).

The second aim will explore possible correlates of positive change in the studied treatment, including Psychological Inflexibility (PI). Previous research has implicated psychological flexibility as a mechanism of change in successful outcomes of ACT-interventions, and the inverse, PI, as a partial mediator of the relationship between depression and TTM-severity (Houghton et al., 2014). In our data, PI was measured by both the Acceptance and Action Questionnaire-II (AAQ-II) and the disorder specific AAQ for Trichotillomania (AAQ-4TTM), but this analysis was limited to the AAQ-4TTM, as it was hair pulling specific. Does the acceptance-enhanced treatment lower PI as it should, and how

does PI relate to improvements in TTM-symptoms and other comorbid problems such as anxiety and depression?

2 Method

The data for this thesis were obtained from The Norwegian Trichotillomania Project, an open (single group, uncontrolled), multisite study of group delivered ACT-Enhanced Behavioural Therapy for Trichotillomania (AEBT-T). The Norwegian Trichotillomania Project (NTP) is carried out collaboratively at three treatment sites in Norway: 1) Outpatient Department for Anxiety Disorders, Department of Personality Psychiatry, Clinic of Mental Health and Addiction, Oslo University Hospital; 2) Clinic of Mental Health, Sørlandet Hospital, Kristiansand; and 3) Treatment Unit for Obsessive-compulsive Disorders, St. Olavs Hospital, Trondheim. A single group design using repeated measures was carried out in four waves between 2013 and 2014 and follow-up data are still being collected (December 2015). Access to preliminary data were granted from the leaders of the study via Patrick A. Vogel, co-researcher on the NTP. All information regarding recruitment, practical and treatment-related procedures were also obtained from the NTP directors (Moen et al., 2015).

2.1 Participants and recruitment

Recruitment procedures included advertisements in local newspapers and periodicals, letters to general practitioners, mental health clinics, student health services, and by announcements on the websites of each of the three hospitals. The participants were first screened by a brief telephone interview and a second time at the clinic through structured diagnostic interviews using the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV).

Persons between 16 and 67 years of age meeting full criteria for a DSM-IV diagnosis of TTM (with or without skin picking disorder) were included in the study. Exclusion criteria were the following: a diagnosis of schizophrenia spectrum disorder, substance addiction,

severe antisocial, schizotypal or paranoid personality disorder, severe eating disorder, current suicidal ideation, pervasive developmental disorder, mental retardation and severe sequelae after brain injury. Diagnosed bipolar disorder and ADHD were not exclusion criteria on the condition that related symptoms were acceptably regulated.

In total, 79 patients were referred to the project for treatment. Eight did not show up for assessment and 6 did not finish assessment, were not eligible for treatment or were not disturbed enough for inclusion. One patient was offered individual therapy and 2 were put on a waiting list for 2016. Of the remaining 62 who started group treatment, 4 dropped out, resulting in 58 patients completing treatment by December 2015. However, the current preliminary dataset retrieved in mid August 2015, included baseline measurements for 58 patients, and pre- and post-treatment measurements for only 47 patients. I did not impute any values for missing data, the valid n for many variables is therefore below 47.

2.2 Treatment

Therapy was carried out over ten three-hour sessions in groups of six or fewer patients, every group lead by two therapists. Three booster sessions were also given. Treatment was manualized and conducted according to a guide developed by Woods & Twohig, (2008). Accompanying the manual is a patient workbook (both available in Norwegian translation). All sessions were videotaped and checks of adherence and integrity carried out by four psychology students supervised by Patrick A. Vogel. An outline of treatment is provided in Appendix A, along with copies of the outcome-measures used.

2.3 Primary outcome measures

Massachusetts General Hospital Hairpulling Scale (MGH-HS). The MGH-HS (Keuthen et al., 1995) was used to assess self-reported TTM symptoms, therein the frequency, intensity, and perceived control of urges and behaviours as well as distress caused by hair-pulling. The translation into Norwegian was carried out by Erna Moen, Kjetil Mellinger, Lars

Morså and Benjamin Hummelen (2013). Using the seven items all rated on a five-point Likert scale (0-4), a sum score was calculated for each participant resulting in a range of 0 to 28. The MGH-HS has shown good internal consistency and test-retest reliability (Keuthen et al., 1995; O'Sullivan et al., 1995). In our sample the scale demonstrated good to excellent internal consistency as measured at baseline ($\alpha=0.90$, $n=60$) and post treatment ($\alpha =0.89$, $N=47$).

National Institute of Mental Health Trichotillomania Severity Scale (NIMH-TSS).

The NIMH-TSS is the first half of a semi-structured clinical interview consisting of two scales derived from the Yale-Brown Obsessive Compulsive Scale (Y-BOCS): The Trichotillomania Severity Scale and the Trichotillomania Impairment Scale (Swedo et al., 1989). The NIMH-TSS asks five questions that cover time spent pulling (on average the past week and yesterday), resistance to urges, resultant distress and resultant impairment. Independent ratings were not available at the time of analysis, so the variable is based on the interviewing clinicians own ratings. The answers are scored on a six-point scale (0-5) where higher scores indicate more severe symptoms. Resistance to urges are scored such that no urges gives a score of 0, successfully resisted urges a score of 1, moderate and limited success a score of 2 and 3, and an unsuccessful attempt or no attempt gives 4 and 5 respectively. A sum score was calculated over the 5 items (range 0-25). The scale demonstrated poor internal consistency at baseline ($\alpha=0.53$, $n=55$); but showed good internal consistency at post treatment ($\alpha =0.83$, $n=44$). This is possibly due to the restricted nature of the sample of patients accepted at pre-treatment (e.g. strict use of full DSM-IV criteria). The good consistency at post-treatment means the scale is sensitive to important variations in treatment outcome and thus the use of NIMH-TSS is acceptable for the purposes of this research. Translators were the same as for the MGH-HS.

2.4 Secondary outcome measures

Patient Health Questionnaire-9 (PHQ-9). To assess depression severity, the PHQ-9 was administered. It is a brief measure of nine items, part of a larger self-report diagnostic instrument called the Patient Health Questionnaire (Kroenke & Spitzer, 2002). The PHQ-9 assesses each of the nine DSM-IV criteria for depressive disorder on a four-point scale varying from 0 (not at all present) to 3 (present nearly every day), giving a range of 0 to 27. The instrument can be used to make a provisional diagnosis of depression, with a total score equal to or greater than 10 established as a cut-off with good sensitivity (88%) and specificity (88%) in a binary test for major depression (Kroenke, Spitzer, & Williams, 2001). This means that sorting patients into two groups using this cut-off correctly identifies 88% of the actual depressed patients as such (true positives), and correctly classifies 88% of the non-depressed as such (the true negatives). The PHQ-9 showed good and acceptable internal consistency at baseline ($\alpha=0.87$, $n=53$) and post treatment ($\alpha =0.70$, $n=44$) respectively.

Generalized Anxiety Disorder Scale (GAD-7). The GAD-7 mirrors the PHQ-9 in structure with seven items gleaned from the DSM-criteria for generalized anxiety disorder, each rated on a four-point Likert scale (0 = not at all, 3 = nearly every day) (range 0-21). A summed cut-off score equal to or greater than 10 was found to optimize sensitivity (89%) and specificity (82%) for making a diagnostic judgement. Also the scale has demonstrated good reliability, and good validity of several kinds, such as criterion (related to diagnostic outcome), construct (correlates as expected with other measures and indices of functional impairment), factorial (correlates with a factor determined by factor-analysis) and procedural validity (correlates with interview-based diagnostic procedures) (Spitzer, Kroenke, Williams, & Löwe, 2006). In our study the instrument exhibited good internal consistency at baseline ($\alpha=0.87$, $n=53$) and post treatment ($\alpha =0.89$, $n=47$). A Norwegian translation was prepared by Sverre Urnes Johnson, Asle Hoffart, Pål Ulvenes, Harold Sexton and Bruce E. Wampold.

Acceptance and Action Questionnaire for Trichotillomania (AAQ-4TTM). Being a broad measure, the AAQ-II is often not very precise at measuring psychological flexibility in narrow clinical populations. Several disorder-specific versions have therefore been developed in an attempt to improve the psychometric properties in clinical samples and better predict outcomes in particular disorders (Houghton et al., 2014). The AAQ-4TTM consists of nine statements about hair pulling, such as “When I feel the urge to pull, I am unable to take care of my responsibilities” and “The urge to pull is bad”. Respondents are asked to rate each statement on a seven-point scale from 1 (“never true”) to 7 (“always true”), giving a summed total score ranging from 9 to 63 points. Item 1, 4, 5, and 6 are reversed so that lower scores indicate lower and healthier levels of PI. Please make note that the currently studied measure (AAQ-4TTM) differs from the AAQ-TTM, recently developed by Houghton et al. (2014). The latter is based on the AAQ-II, whereas the AAQ-4TTM is based on the now outdated AAQ-9. The measure had questionable internal consistency in the present study at baseline ($\alpha=0.62$, $n=55$), but showed acceptable internal consistency at post treatment ($\alpha = 0.78$, $n=45$). The translators of the MGH-HS also translated the AAQ-4TTM.

2.5 Statistical analyses and hypotheses

The analyses were carried out using IBM SPSS Statistics version 21.0. All outcome variables were inspected for outliers and normality using visual inspection of histograms, Q-Q plots as well as the Shapiro Wilks test. One case was excluded due to extreme values. The following variables measured at post-treatment showed positive skew and were significantly non-normal: the NIMH-TSS ($W[43] = .91$, $p = .002$), PHQ-9 ($W[46] = .92$, $p = .003$), and the GAD-7 ($W[46] = .90$, $p < .001$). A deviation from the Gaussian ideal does not necessarily forbid use of parametric tests, and all variables at pre- and post- were considered acceptably normally distributed for analysis. Nothing was imputed for missing values in the data and incomplete cases dropped analysis by analysis.

Assessing treatment effect. The first part of the analysis sought to quantify the acute effect of the treatment intervention using paired samples t-tests. Effect sizes were calculated using Cohen's d for dependent samples, d_z . An effect on par with the two previous studies providing group-treatment served as our benchmark, Cohen's $d_z \geq 1.39$ (Diefenbach et al., 2006), and $d_z \geq 1.84$. (Toledo et al., 2015). Cohen's d for independent samples, d_s , is also reported (formulas are given in Appendix B). Corresponding 95% confidence intervals were calculated using a Microsoft Excel spreadsheet designed by Coe (n.d.), based off of Hedges & Olkin (1985). The first hypothesis was that AEBT-T would have a large effect on TTM-symptoms, and also significantly reduce depression and anxiety.

In addition to effect sizes, the proportion of patients who were clinically significantly changed on the two primary outcome variables was determined. Clinical significance as a concept was introduced by Jacobson & Truax in 1985 and later defined as “[moving a client] from the dysfunctional to the functional range during the course of therapy on whatever variable is being used to measure that clinical problem” (Jacobson, Roberts, Berns, & McGlinchey, 1999). Because normative data were not available for the MGH-HS or the NIMH-TSS, the following criteria were used: The change had to be 1) statistically reliable, and 2) equal to or more than 2 standard deviations + SEM/2 below the baseline mean, where SEM is the standard error of measurement. For further details, see Appendix B. The first criteria, a *reliable* change, was met for changes of at least $6.22 \approx \underline{7}$ points on the MGH-HS and $8.69 \approx \underline{9}$ points on the NIMH-TSS. The second criteria was met for post-treatment scores falling below 6.98 points on the MGH-HS and 6.84 on the NIMH-TSS, giving a 6-point cut-off for both measures. Patients meeting both criteria had a clinically significant change (CSC). As recommended in a recent study on response indicators for TTM, abstinence-rates are also reported (Nelson et al., 2014).

Exploring Psychological Inflexibility as a predictor. To explore the relationship between PI and post-treatment TTM-severity, correlation and regression were used. To reduce redundancy, the following analyses only include the NIMH-TSS clinician-ratings for TTM-severity, as it is commonly considered the highest quality rating scale (see for example McGuire et al., 2014). My second hypothesis was that the level of PI would correlate positively with TTM-severity, depression and anxiety at both pre- and post-treatment.

With the goal of predicting TTM-symptoms at post, the data were explored using multiple regression. Deciding on independent variables to include in the regression was guided by the limited previous research available as well as the aim of the thesis. For the variable of interest, PI, the TTM specific AAQ-4TTM was chosen over the general AAQ-II in this analysis, because it specifically addresses hair-pulling. Depression was one important candidate that has also been implicated in previous studies. Other candidates include gender, age and level of anxiety. Because it was expected that pre-scores would greatly influence post-scores, pre-treatment symptoms were included as an independent variable. To narrow down the number of independent variables, four preliminary simple regressions were first conducted at the $p = 0.10$ level to test for any relationships between TTM-symptoms and age, gender, change in depression, and change in anxiety respectively. Next, post-treatment TTM-severity (NIMH-TSS) were entered as the dependent variable and severity at pre-treatment and changes in PI (Δ AAQ-4TTM) were entered as independent (predictor) variables.

All tests were two-tailed and the critical alpha level set at .05.

3 Results

3.1 Treatment effects of AEBT-T

Demographic information and baseline scores on all studied measures are reported in Table 1. To give an overview of the pattern of attrition and missing values, subgroups were

Table 1

Descriptive statistics at baseline for the total sample, completers, and non-completers.

	Evaluated at baseline	Treatment- Completers, Pre and Post	Non-completers (lost between pre and post)	p-value (completers vs. dropouts)
	N=58	n=47	n=11	n=47/n=11
Age (SD)	31.6 (11.7)	30.9 (11.7)	34.8 (11.7)	0.32
% female	89.7	89.4	90.9	
<u>Outcome measures</u>	<u>Mean (SD)</u>	<u>Mean (SD)</u>	<u>Mean (SD)</u>	
MGH-HS	17.85 (5.53)	18.06 (5.04)	17.01 (7.56)	0.57
NIMH-TSS	16.6 (4.2) ^a	16.2 (4.3) ^c	18.28 (3.0) ^g	0.18
PHQ-9	12.2 (6.3) ^b	12.1 (6.1) ^e	12.76 (7.5)	0.76
GAD-7	11.3 (5.1) ^b	11.3 (5.2) ^e	11.0 (4.6)	0.87
AAQ-TTM	43.3 (7.6)	44.1 (7.7)	40.1 (6.9)	0.13

^a n = 55, ^b n = 56, ^c n = 46, ^d n = 57, ^e n = 45, ^f n = 40, ^g n = 9, ^h n = 6.

Abbreviations: MGH-HS = Massachusetts General Hospital Hairpulling Scale; NIMH-TSS = NIMH Trichotillomania Symptom Severity Scale; PHQ-9 = Patient Health Questionnaire; GAD-7 = Generalized Anxiety Disorder Screener; MCQ-30 = Metacognitions Questionnaire 30; AAQ-II = Acceptance and Actions Questionnaire-II; AAQ-4TTM = Acceptance and Action Questionnaire for Trichotillomania.

formed based on attendance and completed questionnaires at pre and post-assessment.

One-way ANOVA did not reveal any significant differences in any measured variable at baseline

between participants who completed treatment (n = 47), and participants who dropped out during or before treatment began (n = 11). Note also that the single excluded participant was included in Table 1. This is the reason for the small differences between Table 1 and Table 2 in *n* and other statistics.

Regarding the primary aim of this thesis, assessing the effects of treatment, the results of paired samples t-tests are presented in Table 2. The strongest effect was found for TTM-symptoms, which were greatly reduced between pre- and post-treatment, both as measured by self-report on the MGH-HS ($t[45] = 10.97, p < .001$), and the clinician-rated

Table 2

Mean scores, t-values, and effect sizes for all measures at pre- and post-treatment.

	Range	Completers	Completers	Paired samples t-tests t-value	Pre-post ES	
		Pre-treatment Mean (SD)	Post-treatment Mean (SD)		Cohen's d_s [95% CI]	Cohen's d_z
MGH-HS ^a	0-28	18.11 (5.12)	7.63 (5.13)	10.97***	2.04 [1.52, 2.53]	1.62
NIMH-TSS ^b	0-25	16.48 (4.11)	5.08 (4.04)	16.15***	2.80 [2.17, 3.37]	2.49
PHQ-9 ^c	0-28	12.33 (5.98)	8.61 (6.41)	5.11***	0.60 [0.17, 1.02]	0.57
GAD-7 ^c	0-21	11.37 (5.25)	6.55 (5.03)	6.61***	0.94 [0.49, 1.37]	1.00
AAQ-4TTM ^a	9-63	44.59 (6.78)	30.82 (9.47)	9.27***	1.67 [1.18, 2.13]	1.37

^an = 46, ^bn = 42, and ^cn = 44.

***p < .001

Note. Lower scores indicate more healthy functioning.

NIMH-TSS ($t[41] = 16.15$, $p < .001$). Pre- to post-treatment standardized effect sizes were very large for the MGH-HS (Cohen's $d_z = 1.62$), and even larger for the NIMH-TSS (Cohen's $d_z = 2.49$). Following treatment, all other variables including the measures of depression, anxiety and TTM-specific psychological inflexibility (PI) were significantly reduced at $p < .001$.

3.2 Clinical significance

As determined by a cut-off score of 6 on the MGH-HS, 29.3% ($n = 17$) of all 58 participants exhibited clinically significant change at post (intention to treat). The NIMH-TSS

Table 3

Number of patients reporting at least 1 week abstinence, a reliable change, and a clinically significant change at post-treatment.

	Reporting one-week abstinence ^a n (% of 58)	Reliable change n (% of 58)	Clinically significant change (CSC) n (% of 58)	CSC (completers only) n (% of 47)
MGH-HS	21 (36.2)	34 (58.6)	17 (29.3)	17 (36.2)
NIMH-TSS	12 (20.7)	25 (43.1)	23 (39.7)	23 (48.9)
Inter-measure agreement (% of valid measurement-pairs)	73.8	63.4	61.0	61.0

^aMGH-HS item #4 = 0, NIMH-TSS item #1 = 0

characterized 39.7% ($n = 23$) with clinically significant change. The last column in Table 3 includes CSC rates for completers only, enabling comparison with previous studies. In total, 58.6% ($n = 34$) and 43.1% ($n = 25$) demonstrated a reliable change (with or without crossing below the 6-point cut-off) on the MGH-HS and NIMH-TSS respectively. Thirty-six percent ($n = 21$) reported being abstinent from hair-pulling for more than one week at post. The clinician reported rate of abstinence was lower, at 20.7% ($n = 12$) (see Table 3). One participant experienced a significant worsening in TTM-symptoms as indicated by self-report, but not by clinician report. Regarding agreement between measures, clinician- and self-report agreed in 73.8% of non-missing cases when classifying abstinence, 63.4% of cases for reliable change, and 61.0% when classifying clinically significant change.

3.3 Correlation and regression results

To explore relationships between the different outcome measures at pre- and post-treatment, Pearson's product moment correlations were computed. The correlation matrix is presented in Table 4, in order to highlight two sets of findings. First, in descending order of strength, post-treatment TTM-severity was correlated with post-scores on the AAQ-4TTM ($r = .69$), anxiety ($r = .44$), and depression ($r = .42$). Second, the AAQ-4TTM was related to indices of anxiety and depression, as measured at the same point in time ($.3 < r < .6$, $p < .01$).

Table 4

Correlation matrix including clinician rated TTM severity, depression, anxiety, and TTM specific Psychological Inflexibility.

	NIMH-TSS 2	P H Q - 9 3	4	G A D - 7 5	6	A A Q - 4 T T M 7	8
1 NIMH-TSS pre	.371 ^{*b}	.262 ^f	.178 ^c	.153 ^f	.076 ^c	.212 ^h	.260 ^e
2 NIMH-TSS post		.309 ^{*a}	.415 ^{**b}	.290 ^g	.440 ^{**b}	.317 ^{*c}	.691 ^{***b}
3 PHQ-9 pre			.698 ^{***d}	.810 ^{***g}	.530 ^{***g}	.586 ^{***g}	.382 ^{*d}
4 PHQ-9 post				.541 ^{***d}	.694 ^{***f}	.247 ^f	.453 ^{**f}
5 GAD-7 pre					.557 ^{***d}	.437 ^{**g}	.453 ^{**d}
6 GAD-7 post						.058 ^f	.389 ^{**f}
7 AAQ-4TTM pre							.267 ^f
8 AAQ-4TTM post							

* $p < .05$, ** $p < .01$, and *** $p < .001$.^a $n = 41$, ^b $n = 42$, ^c $n = 43$, ^d $n = 44$, ^e $n = 45$, ^f $n = 46$, ^g $n = 47$, and ^h $n = 48$.

The four preliminary regressions did not find any significant relationship between clinician reported hair-pulling symptoms after treatment and either of the variables age, gender, change in depression, or change in anxiety at the 0.10 confidence level. These variables were therefore excluded from the model. For the final model, post-treatment NIMH-TSS was still the dependent variable and predictors were the NIMH-TSS pre-score and Δ AAQ-4TTM. The fitted model, using forced entry, reached significance ($F[2, 38] = 8.34, p < .001$), with an $R^2 = .305$. Participants' predicted post-treatment symptom severity (\hat{Y}) was given by

$$\hat{Y}_{post} = 0.67 + 0.33(TTM_{pre}) - 0.16(\Delta PI_{AAQ-4TTM})$$

The first term, the intercept, does not make sense here as the variables were not centred. For every additional point of TTM severity at pre-, the predicted post-treatment severity was 0.33 points higher, holding the other predictors fixed. Again, holding other predictors fixed, for every point of change (reduction) in TTM-specific psychological inflexibility, there was a predicted decrease of 0.16 points in post-treatment TTM-severity.

4 Discussion

The main goals of this thesis were to assess changes in hair-pulling severity, anxiety, depression and Psychological Inflexibility for patients completing group AEBT-T. In summary, the first hypothesis was supported and group-delivered AEBT-T had a large effect on TTM-symptoms, and also lowered the mean levels of depression and anxiety significantly.

The effect we found is not easily comparable to those reported in meta-analyses (Bloch et al., 2007; McGuire et al., 2014), as the latter were based on comparisons between active treatment and active or passive control conditions, resulting in considerably smaller (between-subjects) effects. The current study had no control group, and will most likely overestimate the effect. Nonetheless, valid comparisons with the simple changes in active conditions of previous studies are still possible. The within-subjects standardized effect on TTM-symptoms at post-treatment was on par with previous studies, exceeding what Diefenbach et al., (2006) reported for their group-delivered HRT. Although Toledo et al. (2015) found a somewhat larger effect as measured by self-report in their study of Group-CBT, this difference is probably not significant. It could also be a spurious difference, as the current treatment fared more than 1.5 times as well if evaluated on raw mean differences ($M_{\text{diff}} = 10.5$ vs. $M_{\text{diff-Toledo}} = 6.7$), as opposed to on effect standardized by SD and corrected for within-subjects correlation and sample size. Furthermore, the formula used to calculate effect sizes for the Toledo et al. study is an approximation that penalizes large samples, thus favouring said study ($n=22$) over the current one ($n=47$). Also worthy of comment is the fact that Toledo et al. (2015) used 22 sessions compared to 13 in the current study.

On self-reported symptoms about a third of enrolled patients were clinically significantly changed at post-treatment. Counting only completers the rate is up to 36.2 %, a rate similar to what one study found (Rogers et al., 2014 [36%]), but somewhat lower than what other previous studies have reported for individually delivered treatments (Rogers et al.,

2014)(van Minnen et al., 2003 [64%]; Woods, Wetterneck, et al., 2006[66%]). The rate of CSC was over twice what Diefenbach et al. (2006) reported for their group-delivered treatment (16.7%). Based on clinician-report nearly half of completers (48.9 %) reached CSC-criteria.

The existing evidence in the literature on TTM appears to be mixed regarding whether group-therapy actually is inferior to individual therapy. There is a trend in favour of individual therapy, but this is also the vastly more studied modality. A possible explanation for the trend is that treatment time devoted to each individual, as well as personal tailoring of treatment is necessarily lower in a group-setting. Whether the discrepancy persists over time and whether it can be compensated for by superior cost-effectiveness of group-therapy, remain open questions to date. Another important consideration is whether relapse rates differ between these modalities, because an expensive and lasting change may be superior to a cheap and short-lived one. The current study is a promising addition to the study of group-delivered treatment.

There is also some intuitive merit to treating often shame-ridden and isolated individuals suffering from TTM in groups, as it may be a particularly good setting for conveying universality (a feeling of common humanity, as in the term “we’re all in the same boat”), purported as a central therapeutic common factor (Yalom & Leszcz, 2005, ch. 1). The patients in the current study showed most of their improvement during the first 3 sessions (analysis not used in this thesis). Such a rapid improvement may suggest that content and technique specific to treatment is not solely at work, but at least powerfully helped along by common factors as mentioned above, such as universality, community, and hope and expectancy effects instigated through entering a group for therapy. It could also indicate that HRT-components, first introduced in session two, were more important than the ACT-

components presented later, although the latter could still be important in the maintenance of gains.

Results of the current study also supported the second hypothesis. Level of TTM-specific PI correlated positively with depression and anxiety, and showed a particularly strong correlation with TTM-symptoms at post, indicating that the degree to which a patient manages to accept, and take less literally, her urges and other difficult private experiences, is associated with less severe hair-pulling. Furthermore, change in PI over the course of treatment explained a considerable part of the variance in TTM-symptoms, about 30%. To better understand the significance of this finding, we may compare it to the 7% variance explained by therapeutic alliance, one of the single factors most strongly related to change in individual psychotherapy (Flückiger, Del Re, Wampold, Symonds, & Horvath, 2012).

Contrary to expectations based on previous studies, depression did not significantly predict TTM-symptoms in our sample.

4.1 Limitations

As no control group or randomization were used in this study, we can not properly evaluate the efficacy of treatment. Several threats to internal validity are inherent in the design, such as historical events, multiple testing administrations, and regression to the mean, the last of these being the most serious and most likely to have inflated both treatment effects and regression findings. Non-random or systematic dropout could also have skewed results, even though completers and dropouts were not significantly different at pre-treatment. Other limitations are duly noted: Some variables in the current data-set did not meet the ideals for fulfilling assumptions required of parametric tests, a potential risk to the accuracy of results, although not to the main findings; lack of counterbalancing in administered questionnaires make the data vulnerable to order effects; and missing data could ideally have been handled differently, for instance with multiple imputation.

The poor and questionable internal consistency of the NIMH-TSS and AAQ-4TTM measures at pre-treatment means that results including these variables, including the regression analysis, should be interpreted with due caution. However, low internal consistency does not necessarily mean low reliability, and may have little bearing on validity (McCrae, Kurtz, Yamagata, & Terracciano, 2011).

Also of note is that correlational methods can not determine causality. We do not know the direction of observed relationships, and cannot know whether reduced TTM-specific Psychological Inflexibility leads to more improvement in TTM-symptoms, whether it is the other way around, or whether other confounding variables give rise to spurious relationships. The inclusion of follow-up data and data collected during treatment will help clarify these issues.

Regarding the regression analysis, although statistically significant, the slope of the regression-line may not be clinically significant. To be meaningful, the result is also in need of replication. Moreover, the treatment and disorder specific nature of our PI-measure (in contrast to therapeutic alliance), and the inclusion of pre-treatment symptoms as an independent variable no doubt boosted R^2 considerably, perhaps making the above comparison with therapeutic alliance findings unfair. Still, if replicated, this finding indicates that PI processes play an important role in trichotillomania and its treatment.

4.2 Future directions

Future work should analyse data from follow-up in order to assess maintenance of gains. Measurements during treatment should also be included with careful use of statistical methods appropriate for longitudinal analyses (such as linear mixed models). The Norwegian Trichotillomania Project will likely provide both in time, when data-collection is complete. Complete and high resolution longitudinal data could answer whether TTM-symptoms or PI changes before the other, a powerful way to look for a causal mechanism.

To reach firmer conclusions regarding the predictive power of PI, finding better or complementary ways of measuring it would be beneficial. As has been noted by some researchers (Ciarrochi et al., 2010, p. 21), the different AAQ-questionnaires don't actually measure (or at best only measure some markers of) a persons tendency to persist in or change behaviour, which is what psychological flexibility is really all about. Developing more valid measures, perhaps using clinician ratings could be a fruitful pursuit in this regard. Other predictors of change could also be evaluated, such as metacognition, a related but distinct concept posited by the metacognitive model of psychopathology (Wells, 2000).

The literature on moderators of treatment outcome, such as comorbid disorders, is sparse, and remains an important topic for future research, especially given the high rates of comorbidity in TTM.

A crucial next step for group AEBT-T is evaluation using controlled trials, preferably with an active control group such as supportive therapy, pharmacotherapy, or pill placebo. In parallel, head-to-head comparisons of enhanced HRT versus core HRT should be carried out, to better understand and evaluate the usefulness of different enhancements.

4.3 Concluding remarks

The studied treatment, AEBT-T delivered in a group setting, is an effective treatment for trichotillomania, reducing both hair-pulling symptoms and anxiety and depression. About a third of patients experienced a clinically significant reduction in symptoms, comparable to the rate achieved in previous studies, and psychological inflexibility was a significant predictor of this reduction. Further development, evaluation, and subsequent dissemination of Acceptance-Enhanced HRT is warranted to help treat those afflicted with trichotillomania.

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Appendix A – Treatment and outcome measures

AEBT-T treatment outline

A summary based on (Woods & Twohig, 2008)

Session 1

Patients are presented an overview of treatment. Psychoeducation about TTM and expectations for therapy are discussed.

Session 2

Habit Reversal Training (HRT) and Stimulus Control (SC) is implemented.

Session 3

Values work begins with a joint exploration of what is important in the client's life and how urges to pull are interfering with doing what is valued and important.

Session 4

The goal of this session is to establish the futility of controlling an urge (indeed all private experience), and how the struggle with it can do more harm than good.

Session 5

The theme of session 4 is extended with exercises and metaphors to further explore how hard and even counterproductive the struggle with urges can be. Alternative responses to aversive private experiences are discussed and willingness and acceptance presented, along with behavioural commitments.

Session 6 and 7

These sessions are devoted to teach and practice cognitive defusion.

Session 8

Previous material is practiced. Fully embracing the urge is encouraged and practiced through exposure to likely triggers of hair-pulling urges.

Session 9

Another session devoted to practice. The therapist and client review previous material and discuss barriers to maintenance of gains.

Session 10

Central processes for each client's maintained success are identified and relevant themes reviewed. The last session also involves relapse prevention, distinguishing a lapse from a relapse, and encouraging the continued practice of HRT/SC and other components of treatment.

Booster sessions

The current implementation of the manual also included three booster sessions.

Throughout treatment the therapist(s) conduct weekly progress assessments, and give the client homework relevant to the session. Such homework may include self-monitoring of hair-pulling episodes, implementing HRT and SC procedures, practicing acceptance and defusion, and various other exercises encompassing mindful awareness, exposure to triggering urges and making behavioural commitments.

Complete list of administered measures in the Norwegian Trich. Project

Measures used in the current analysis are in **bolded** text.

Diagnostic interviews

ADIS - Anxiety Disorders Interview Schedule

SCID-II - Structured Clinical Interview for DSM-IV Axis II Disorders

DI-TTM – Diagnostic interview for Trichotillomania

TTM severity (Clinician rated)

NIMH-TSS - National Institute of Mental Health Trichotillomania Symptom Severity Scale

CGI-TTM - Clinical Global Impressions Scale - TTM

Self-report package

MGH-HS - Massachusetts General Hospital Hairpulling Scale

AAQ-II - Acceptance and Action Questionnaire-II

AAQ-4TTM – Acceptance and Action Questionnaire for Trichotillomania

MIST-A - Milwaukee Inventory for Subtypes of Trichotillomania - Adult version

GAD-7 - Generalized Anxiety Disorder Screener

PHQ-9 - Patient Health Questionnaire

WSAS - Work and Social Adjustment Scale

QoL – Quality of life

RSES – Rosenberg Self-esteem Scale

MCQ-30 – Metacognitions Questionnaire

CAS-1 – Cognitive Attention Syndrome Scale

YSQ-SF – Young Schema Questionnaire – Short Form

DERS - Difficulties in Emotion Regulation Scale

NEO-PI-R - NEO Personality Inventory-Revised (NEO PI-R)

CTQ - ChildhoodTrauma Questionnaire

PBI - Parental Bonding Instrument

WAI – Working Alliance Inventory

GHS – Group Cohesiveness Scale

National Institute of Mental Health Trichotillomania Scales

Trichotillomania Symptom Severity Scale

Subject name _____ Date _____

Rater _____ Total score _____

- 1) In the average day, for the past week, how much time did you spend pulling hairs?
- None _____ ≤15 minutes _____ 16-30 minutes _____ 31-60 minutes _____
(0) (1) (2) (3)
- 1-2 hours _____ 2 hours _____
(4) (5)

(SCORE)

Which hairs did you pull this week?

Scalp/head _____ Arm/leg/body _____
Eyebrow _____ Pubic _____
Eyelash _____ Other _____

- 2) How much time did you spend pulling hairs yesterday?

None _____ ≤15 minutes _____ 16-30 minutes _____ 31-60 minutes _____
(0) (1) (2) (3)

1-2 hours _____ 2 hours _____
(4) (5)

(SCORE)

- 3) What were the thoughts or feelings preceding the pulling episode?

- a) I felt anxious and this calmed me down _____
b) I felt compelled to pull and reacted to that urge _____
c) I had a troublesome thought and the ritual/habit of pulling made the thought "okay" _____
d) Other _____

- 4) Did you attempt to resist the urge to pull?

No urges: _____ (0)

YES _____:

- a) Successfully resisted the urge to pull _____ (1)
b) Moderately successful in resisting the urge to pull _____ (2)
c) Limited success in resisting the urge to pull _____ (3)
d) Unsuccessful in resisting the urge to pull _____ (4)

NO _____ (5):

- a) Too much effort to resist _____
b) Previously unable to resist so didn't try _____
c) Didn't think about resisting _____
d) Other _____

(SCORE)

5) How much are you bothered by this compulsion/habit?

0	1	2	3	4	5
Not at all					Very, very much

(SCORE)

6) How much does hair pulling interfere with your daily life?

0	1	2	3	4	5
None					A great deal

In what ways?

Resulting appearance embarrassing or prohibits activities_____

Interference because of time expended_____

Other_____

(SCORE)

Total Score (0-25)_____

Trichotillomania Impairment Scale/Trich “Global” Scale

0 **No impairment**

1-3 **Minimal impairment**—patient feels some embarrassment or shame but hasn’t changed hairstyle or been “found out,” may think she wants to quit and tried on her own. Rarely thinks about it, and finds self pulling a few times each day, no resultant bald spots.

4-6 **Mild impairment**—impairment is noticeable to close friends and family. Preoccupied by urge to pull hair, upset about appearance, has small bald spot/regrowing area. Has tried to quit and feels ashamed of appearance or finds pulling interferes with activities.

7-10 **Moderate/severe impairment**—pulling is obvious to others either because of time spent or resulting lack of hair. Large bald areas apparent, patient spends time/money to conceal disfigurement, has sought out therapy or tried a number of things to stop. Feels pulling causes significant interference in life because of time/money/embarrassment.

Physician Rating of Clinical Progress

0	10	20
Cured	Baseline	Worst ever imaginable

Spørreskjema om hårnapping

Instruksjoner: For hvert spørsmål, velg det utsagnet som best beskriver din atferd og / eller følelser den siste uken. Hvis du har hatt oppturer og nedturer, prøv å anslå et gjennomsnitt for den siste uken. Pass på å lese alle utsagn i hver gruppe før du velger.

I de neste tre spørsmålene, skal du bare vurdere trangen til å nappe hår.

1. Frekvens av trang.

På en gjennomsnittlig dag, hvor ofte følte du trang til å nappe hår?

- 0 Denne uken følte jeg ikke trang til å nappe hår.
- 1 Denne uken følte jeg av og til en trang til å nappe hår.
- 2 Denne uken følte jeg ofte trang til å nappe hår.
- 3 Denne uken følte jeg veldig ofte trang til å nappe hår.
- 4 Denne uken jeg følte en nesten konstant trang til å nappe hår.

2. Intensitet på trangen.

På en gjennomsnittlig dag, hvor intens eller "sterk" var trangen til å nappe hår?

- 0 Denne uken følte jeg ingen trang til å nappe hår.
- 1 Denne uken følte jeg mild trang til å nappe hår.
- 2 Denne uken følte jeg moderat trang til å nappe hår.
- 3 Denne uken følte jeg alvorlig trang til å nappe hår.
- 4 Denne uken følte jeg ekstrem trang til å nappe hår.

3. Evne til å kontrollere trang.

På en gjennomsnittlig dag, hvor mye kontroll har du over trangen til å nappe hår?

- 0 Denne uken kunne jeg bestandig kontrollere trangen, eller jeg følte ingen trang til å nappe hår.
- 1 Denne uken var jeg i stand til å distrahere meg fra trangen til å nappe hår mesteparten av tiden.
- 2 Denne uken var jeg i stand til å distrahere meg fra trangen til å nappe hår en del av tiden.
- 3 Denne uken var jeg sjelden i stand til å distrahere meg fra trangen til å nappe hår.
- 4 Denne uken jeg var aldri i stand til å distrahere meg fra trangen til å nappe hår.

På de neste tre spørsmålene, skal du bare skåre selve hårmappingen.

4. Frekvens av hårmappingen.

På en gjennomsnittlig dag, hvor ofte nappet du faktisk ut hår?

- 0 Denne uken nappet jeg ikke hår.
- 1 Denne uken nappet jeg bare av og til hår.
- 2 Denne uken jeg nappet ofte hår.
- 3 Denne uken nappet jeg hår veldig ofte.
- 4 Denne uken nappet jeg hår så ofte at det føltes som om jeg gjorde det hele tiden.

5. Forsøk på å motstå hårmappingen.

På en gjennomsnittlig dag, hvor ofte gjorde du et forsøk på å stoppe deg selv fra å faktisk nappe hår?

- 0 Denne uken følte jeg ingen trang til å nappe hår.
- 1 Denne uken prøvde jeg å motstå trangen til å nappe hår nesten hele tiden.
- 2 Denne uken prøvde jeg å motstå trangen til å nappe hår litt av tiden.
- 3 Denne uken prøvde jeg sjelden å motstå trangen til å nappe hår.
- 4 Denne uken prøvde jeg aldri å motstå trangen til å nappe hår.

6. Kontroll over hårmappingen.

På en gjennomsnittlig dag, hvor ofte lyktes du med å faktisk stoppe deg selv fra å nappe hår?

- 0 Denne uken nappet jeg ikke hår.
- 1 Denne uken jeg var i stand til å motstå hårmapping nesten hele tiden.
- 2 Denne uken jeg var i stand til å motstå hårmapping mesteparten av tiden.
- 3 Denne uken jeg var i stand til å motstå hårmapping litt av tiden.
- 4 Denne uken jeg var sjelden i stand til å motstå hårmapping.

På det siste spørsmålet, skal du skåre konsekvensene av hårmappingen din.

7. Tilhørende ubehag.

Hårmappingen kan gjøre at noen mennesker føler seg humørsyke , «på tuppet», eller triste.

I løpet av den siste uken, hvor dårlig følte du deg på grunn av hårmapping?

- 0 Denne uken følte jeg ikke ubehag angående min hårmapping.
- 1 Denne uken følte jeg et vagt ubehag angående min hårmapping.
- 2 Denne uken følte jeg merkbart ubehag angående min hårmapping.
- 3 Denne uken følte jeg betydelig ubehag angående min hårmapping .
- 4 Denne uken følte jeg intenst ubehag angående min hårmapping.

The Massachusetts General Hospital Hair Pulling Scale. Oversatt av Erna Moen, Kjetil Mellingen, Lars Morså og Benjamin Hummelen (2013).

AAQ-II

Nedenfor finner du en liste med utsagn. Vennligst vurder hvor godt hvert utsagn stemmer for deg, ved å sette en ring rundt ett av tallene på samme linje. Bruk skalaen nedenfor når du gjør din vurdering.

1 -----	2 -----	3 -----	4 -----	5 -----	6 -----	7 -----
Stemmer aldri	Stemmer veldig sjelden	Stemmer sjelden	Stemmer av og til	Stemmer ofte	Stemmer nesten alltid	Stemmer alltid
1. Mine smertefulle erfaringer og minner gjør det vanskelig for meg å leve et liv jeg ville satt pris på						1 2 3 4 5 6 7
2. Jeg er redd for mine følelser						1 2 3 4 5 6 7
3. Jeg uroer meg over at jeg ikke klarer å kontrollere mine bekymringer og følelser						1 2 3 4 5 6 7
4. Mine smertefulle minner hindrer meg i å ha et givende liv						1 2 3 4 5 6 7
5. Følelser fører til problemer i livet mitt						1 2 3 4 5 6 7
6. Det virker som de fleste mennesker håndterer livene sine bedre enn jeg gjør						1 2 3 4 5 6 7
7. Bekymringer hindrer meg i å lykkes						1 2 3 4 5 6 7

Acceptance and Action Questionnaire-Version II. Overstatt til norsk av Roar Fosse, Didrik Heggdal, Børge Holden, Steffen Holthe, Trym Nordstrand Jacobsen, Ayna B. Johansen, Lars Mariero, Med.Stud.

Spørreskjema om aksept og handling for trikotillomani

Nedenfor finner du en liste med påstander. Vurder hvor sanne de er i forhold til deg. Bruk den følgende skalaen:

1 -----	2 -----	3 -----	4 -----	5 -----	6 -----	7
Stemmer aldri	Stemmer veldig sjelden	Stemmer sjelden	Stemmer av og til	Stemmer ofte	Stemmer nesten alltid	Stemmer alltid
1. Jeg er i stand å la være å nappe når trangen til å nappe er sterk.						1 2 3 4 5 6 7
2. Jeg tar meg ofte i å dagdrømme om napping og hva jeg vil gjøre annerledes neste gang jeg får trang til å nappe						1 2 3 4 5 6 7
3. Når jeg føler trang til å nappe, er jeg ute av stand til å ta meg av mine forpliktelser.						1 2 3 4 5 6 7
4. Jeg bekymrer meg sjelden om å få kontroll over min trang til å nappe.						1 2 3 4 5 6 7
5. Jeg er ikke redd for trangen min til å nappe.						1 2 3 4 5 6 7
6. Når jeg ser på trangen til å nappe som noe negativ, innser jeg vanligvis at det bare er en reaksjon, ikke en objektiv sannhet.						1 2 3 4 5 6 7
7. Når jeg sammenligner meg selv med andre, virker det som om de fleste takler livene sine bedre enn jeg gjør.						1 2 3 4 5 6 7
8. Trangen til å nappe er forkastelig.						1 2 3 4 5 6 7
9. Hvis jeg på magisk vis kunne fjerne alle mine smertefulle opplevelser knyttet til hårnapping, ville jeg gjøre det.						1 2 3 4 5 6 7

Acceptance and action questionnaire for trichotillomania. Oversatt av Erna Moen, Kjetil Mellingen, Lars Morså og Benjamin Hummelen (2013).



MOLDE KOMMUNE

Helsetjenesten

GAD-7

Hvor ofte har du vært plaget av de følgende problemene i løpet av de to siste ukene:

0
Ikke i det hele tatt

1
Noen dager

2
Mer enn halvparten av dagene

3
Nesten hver dag

1. Følt deg nervøs, engstelig eller på tuppet	0	1	2	3
2. Ikke klart å stoppe eller kontrollere bekymringene dine	0	1	2	3
3. Bekymret deg for mye om ulike ting	0	1	2	3
4. Hatt vansker med å slappe av	0	1	2	3
5. Vært så rastløs at det har vært vanskelig å sitte stille	0	1	2	3
6. Blitt lett irritert eller ergret deg over ting	0	1	2	3
7. Følt deg redd som om noe forferdelig kunne komme til å skje	0	1	2	3

Total = ___ + ___ + ___ + ___

Hvis du har opplevd ett eller flere av de problemene som nevnes, i hvor stor grad har problemene gjort det vanskelig for deg å utføre arbeidet ditt, ordne med ting hjemme eller å komme overens med andre?

○
Ikke i det hele tatt

○
Litt vanskelig

○
Svært vanskelig

○
Ekstremt vanskelig

Kilde: Spitzer RL, Kroenke K, Williams JBW, Lowe B. A brief measure for assessing generalized anxiety disorder. *Arch Intern Med.* 2006; 166: 1092-1097.

Oversatt til norsk av Sverre Urnes Johnson, Asle Hoffart, Pål Ulvenes, Harold Sexton & Bruce E. Wampold.



Rask Psykisk Helsehjelp

SPØRRESKJEMA OM HELSEN DIN-9 (PHQ-9)

Hvor ofte har du vært plaget av ett eller flere av de følgende problemene i løpet av de siste 2 ukene?
(Sett "✓" for å vise hvilket svar du velger)

	Ikke i det hele tatt	Noen dager	Mer enn halvparten av dagene	Nesten hver dag
1. Lite interesse for eller glede over å gjøre ting	0	1	2	3
2. Følt deg nedfor, deprimeret eller fylt av håpløshet	0	1	2	3
3. Vansker med å sovne eller med å sove natten gjennom uten å våkne – eller med at du sover for mye	0	1	2	3
4. Følt deg trett eller slapp	0	1	2	3
5. Dårlig appetitt eller å spise for mye	0	1	2	3
6. Vært misfornøyd med deg selv eller følt deg mislykket - eller følt at du har sviktet deg selv eller familien din	0	1	2	3
7. Vansker med å konsentrere deg om ting, slik som å lese avisen eller se på TV	0	1	2	3
8. Beveget deg eller snakket så langsomt at andre kan ha merket det? Eller motsatt – følt deg så urolig eller rastløs at du har vært mye mer i bevegelse enn vanlig	0	1	2	3
9. Tanker om at du like gjerne kunne vært død eller på annen måte ville skade deg selv	0	1	2	3

FOR OFFICE CODING 0 + + +

=Total Score:

Hvis du har opplevd ett eller flere av de problemene som nevnes, i hvor stor grad har problemene gjort det vanskelig for deg å utføre arbeidet ditt, ordne med ting hjemme eller å komme overens med andre?

Ikke vanskelig i det hele tatt

Litt vanskelig

Veldig vanskelig

Ekstremt vanskelig

Appendix B – calculating effect sizes and clinically significant change

Effect-size estimation

The Cohen's d –family of effect sizes computes a standardized mean difference (SMD) by dividing the difference between the means in question by some variant of the standard-deviation (SD). This could be SD_1 , SD_2 , the average SD , or the pooled SD of the groups. For a between-subjects design that looks at the effect between independent groups, the commonly used parameter is Cohen's d_s , the subscript indicating the sample as the basis for the parameter:

$$\text{Cohen's } d_s = \frac{M_1 - M_2}{SD_{pooled}}$$

and written out

$$\text{Cohen's } d_s = \frac{M_1 - M_2}{\sqrt{\frac{((SD_1)^2)(n_1 - 1) + ((SD_2)^2)(n_2 - 1)}{(n_1 + n_2) - 2}}}$$

However, when samples are not independent, usually because they are the same subjects tested with repeated measurements (like in the current study), a different parameter with a different formula is generally used. Because the *difference* between scores is now the unit of analysis, the d is subscripted with a z . As the dependent samples t-test, the d_z takes into account the within-subject correlation inherent in comparing subjects to themselves, giving

$$\text{Cohen's } d_z = \frac{M_{diff}}{SD_{diff}}$$

$$\text{Cohen's } d_z = \frac{M_{diff}}{\sqrt{\frac{\sum(X_{diff} - M_{diff})^2}{N - 1}}}$$

Alternatively, a very close approximation to d_z can be calculated from the dependent samples t-test value and sample size, like this

$$\text{Cohen's } d_z \approx \frac{t}{\sqrt{N}}$$

Distinguishing between d_s and d_z is not arbitrary as is readily observed from Table 2, and is especially important when comparing effect sizes across studies with different designs.

See Lakens (2013) for an article-length treatment of these and other effect-size calculations.

Clinically significant change (CSC) per Jacobson & Truax (1984)

For a measured change to reach clinical significance, the change must be both reliable and pass below a defined cut-off for the range of pathological functioning.

Reliable change index

First a reliable change index (RCI) was calculated

$$RCI = \frac{X_{Diff}}{S_{Diff}}$$

Where X_{Diff} is the mean difference score of the measure and S_{Diff} is the standard error of the difference score, which gives

$$RCI = \frac{X_{Diff}}{SD_{Diff}\sqrt{2}\sqrt{1-r}}$$

An $|RCI| > 1.96$ qualifies for a reliable change.

Determining the cut-off

Then, a cut-off for a clinically significant change was defined as a post-treatment score of

$$Cutoff = M_{Pre} - 2SD_{Pre} - \frac{SEM}{2}$$

Where M_{Pre} is the mean-measurement at pre-treatment and SEM is the standard error of measurement, given by

$$SEM = SD_{test}\sqrt{1-r}$$

Where SD_{test} is the standard deviation of the test (at pre).

It follows from the above that to be statistically reliable, a change in the primary outcome measures must be at least

MGH-HS

$$\begin{aligned} MGH_{minimum\ reliable\ \Delta} &= 1.96 \times SD_{Diff} \sqrt{2} \sqrt{1-r} \\ MGH_{minimum\ reliable\ \Delta} &= 1.96 \times 6.48 \sqrt{2} \sqrt{1-0.88} \\ MGH_{minimum\ reliable\ \Delta} &= \underline{6.22} \end{aligned}$$

NIMH-TSS

$$\begin{aligned} TSS_{minimum\ reliable\ \Delta} &= 1.96 \times 4.57 \sqrt{2} \sqrt{1-0.53} \\ TSS_{minimum\ reliable\ \Delta} &= \underline{8.69} \end{aligned}$$

To reach clinical significance, the post score must also fall below the following cut-offs

MGH-HS

$$\begin{aligned} MGH_{cutoff} &= 18.11 - 2(5.12) - \frac{5.12\sqrt{1-0.88}}{2} \\ MGH_{cutoff} &= 18.11 - 10.24 - 0.89 \\ MGH_{cutoff} &= \underline{6.98} \end{aligned}$$

NIMH-TSS

$$\begin{aligned} TSS_{cutoff} &= 16.48 - 2(4.11) - \frac{4.11\sqrt{1-0.53}}{2} \\ TSS_{cutoff} &= 16.48 - 8.22 - 1.41 \\ TSS_{cutoff} &= \underline{6.84} \end{aligned}$$

In conclusion, clinical significant change required a change score above 7 on the MGH-HS or 9 on the NIMH-TSS, combined with a post-treatment score of 6 points or less on either.

