ACT-enhanced group behavior therapy for trichotillomania and skin-picking disorder: A feasibility study

Mia Asplund | Christian Rück | Fabian Lenhard | Tove Gunnarsson | Martin Bellander | Hanna Delby | Volen Z. Ivanov

Centre for Psychiatry Research, Department of Clinical Neuroscience, Karolinska Institutet, and Stockholm Health Care Services, Region Stockholm, Sweden

Correspondence
Mia Asplund, Centre for Psychiatry Research, Department of Clinical Neuroscience, Karolinska Institutet, and Stockholm Health Care Services, Psykiatri Nordväst, Ängestheneten, Visionsgatan 70A, SE-171 64 Stockholm, Sweden.
Email: mia.asplund@ki.se

Funding information
Psikiatri Nordväst, Stockholm City Council; Fredrik och Ingrid Thurings Stiftelse, Grant/Award Number: 2017-00351

Abstract
Objective: To evaluate the feasibility and efficacy of ACT-enhanced Group Behavior Therapy (AEGBT) for mixed diagnosis groups including patients with trichotillomania (TTM) and skin-picking disorder (SPD) in routine psychiatric care.

Method: Adult patients (N = 40) with TTM and/or SPD received 10 weeks of AEGBT followed by five booster sessions. The primary outcome measure for TTM was the Massachusetts General Hospital Hairpulling Scale (MGH-HPS) and for SPD the Skin Picking Scale-Revised (SPS-R), assessed at posttreatment and at booster sessions.

Results: Results showed significant reductions in hair pulling and skin-picking severity from baseline to posttreatment and large effect sizes at posttreatment. Improvements remained significant at the 12-month follow-up for patients with SPD, but not for patients with TTM. Group attendance was high and few patients dropped out from treatment. The group format enabled therapists to see 25% more patients compared with an individual format.

Conclusion: The results provide initial support for the feasibility and efficacy of an adapted treatment approach for TTM and SPD.
INTRODUCTION

Trichotillomania (TTM) and skin-picking disorder (SPD) occur in 1%–2% of the population and are characterized by recurrent pulling or picking of one’s hair or skin, leading to hair loss or skin lesions, respectively (American Psychiatric Association, 2013). Individuals with these disorders often try to stop or at least restrict the pulling or picking, which often are highly time-consuming and impairing behaviors. Patients with TTM and/or SPD can spend several hours every day pulling or picking (Snorrason et al., 2012) and trying to conceal the hair loss or skin lesions (Arnold et al., 1998; Diefenbach et al., 2005; Flessner & Woods, 2006). Clinically significant distress and impaired functioning are common consequences of these behaviors (American Psychiatric Association, 2013; Snorrason et al., 2012; Stemberger et al., 2000). Prior studies have shown that hair pulling and skin-picking interfere with everyday activities such as social interaction. For instance, all of the TTM participants and 40% of the SPD participants reported some kind of social interference, and 79% of the TTM participants and 35% of the SPD participants reported some kind of occupational interference in studies where this was investigated (Diefenbach et al., 2005; Flessner & Woods, 2006).

Treatment development for the two disorders is still in its infancy, with behavioral treatments being the most widely researched psychological treatments (Azrin et al., 1980; Keijzers et al., 2006, 2016; Keuthen et al., 2012; Schuck et al., 2011; Shareh, 2018; Teng et al., 2006; Weidt et al., 2015). Behavioral treatments are efficacious and appear superior to most pharmacological treatments (Ninan et al., 2000; Schmer et al., 2016; Selles et al., 2016; Slikboer et al., 2017; van Minnen et al., 2003). There is however some evidence suggesting that N-acetyl cysteine (NAC) is potentially at least as efficacious as behavioral treatments (Grant et al., 2009, 2016). Recent meta-analyses of behavioral treatments show that between-group effect sizes at posttreatment are generally large for TTM (effect size = 1.85, 95% confidence interval [CI]: 0.97–2.74) when compared with a passive control condition (Slikboer et al., 2017) and moderate for SPD (Cohen’s $d = 0.69$, 95% CI: 0.32–1.05) when compared with studies with either passive or active control conditions (Schumer et al., 2016). However, most people who suffer from these disorders do not have access to behavioral treatments, primarily due to the lack of knowledge about these disorders and their proper treatment among health-care professionals (Marcks et al., 2006).

Offering the treatment in a group format, enables therapists with specific competence in the treatment of TTM and SPD to treat more patients in the same amount of time. This has the potential to make GCBT a more cost-effective treatment option. This also has the potential to increase the access to treatment as it allows for more patients to be treated by fewer therapists (Morrison, 2001; Tucker & Oei, 2007). However, group treatment does not make treatment more accessible for people living in geographically remote areas. Rather, for these individuals, a web-based self-help program could make treatment for TTM and SPD more accessible. There is at least some evidence suggesting that this novel treatment format for delivering behavior therapy is potentially an efficacious way to treat TTM and SPD (Flessner et al., 2007; Mouton-Odum et al., 2006). Web-based self-help can also be followed with more treatment intense in-person habit reversal training (HRT) sessions in a stepped-care format for patients with more severe symptoms (Rogers et al., 2014).

Several similarities between TTM and SPD such as a high degree of symptom overlap with premonitory urges followed by relief or pleasure after pulling or picking (Grant et al., 2012), presence of both automatic and focused pulling/picking, shared etiological mechanisms (Monzani et al., 2014), similar course of illness (onset during puberty, chronic with waxing and waning symptoms) suggest that the disorders can be treated in a similar fashion (Snorrason et al., 2012). Moreover, the treatment protocols that have been tested for TTM and SPD separately,
largely include the same treatment components, but a treatment protocol for “mixed” diagnosis groups has not been investigated previously.

Another challenge in the care of TTM and SPD is that many sufferers remain symptomatic after treatment (Ninan et al., 2000; van Minnen et al., 2003) and relapse is common, especially for TTM (Diefenbach et al., 2006; Keijzers et al., 2006, 2016; Maas et al., 2018; Rogers et al., 2014). For instance, a randomized wait-list controlled study comparing behavior therapy with fluoxetine for TTM showed clinically significant change among approximately 80% of the participants in the behavior therapy-group at posttreatment. However, 50% had relapsed 2 years after treatment (Keijzers et al., 2006).

A possible explanation for the limited efficacy of behavior treatments and high rates of relapse is that the main treatment component in these treatments, HRT, might not target all aspects of TTM and SPD. HRT was initially developed for reducing different types of repetitive behaviors, such as habits and tics (Azrin & Nunn, 1973) and consists of three components (awareness training, competing response training, and stimulus control). HRT does however not target intentional behaviors which function to avoid unpleasant private experiences, such as urges to pull or pick, anxiety, distressing thoughts, or even boredom (Flessner et al., 2008; Snorrason et al., 2012). This phenomenon of escaping private experiences by using maladaptive behaviors has been labeled experiential avoidance (Hayes et al., 1996). In the short run, these escape behaviors are often effective in reducing unwanted private events, but in the long run they can have the unintended effect of increasing the frequency of and the struggle with the avoided events (Hayes et al., 1996). In an attempt to enhance the effect of treatment and to prevent relapse, behavior therapy for TTM has been combined with Acceptance and Commitment Therapy (ACT) and named ACT-enhanced Behavior Therapy (AEBT) (Woods et al., 2006). AEBT aims to disrupt both the automatic pulling/picking, which often occurs out of the person’s awareness and to target the focused pulling/picking associated with experiential avoidance (Woods et al., 2006). The results demonstrated significant improvements in hair pulling severity and impairment, with 66% of the participants in the ACT/HRT condition being clinically significant improved compared with 8% of the participants in the waitlist group. Overall, the results were maintained at 3-month follow-up. Moreover, the study of Woods et al. demonstrated that decrease in experiential avoidance was significantly correlated with decrease in TTM severity, suggesting that targeting experiential avoidance may be useful in the treatment of TTM (Woods et al., 2006).

In pursuit of increasing availability to treatment and improving treatment outcomes, we adapted the protocol for individual AEBT (Woods & Twohig, 2008) into a group format and tested it in an open trial for mixed groups of patients with TTM and/or SPD in routine psychiatric care. Our hypothesis was that ACT-enhanced Group Behavior Therapy in mixed treatment groups would reduce symptoms of TTM and SPD and associated impairments at posttreatment and follow-up and decrease experiential avoidance. We also hypothesized that the treatment would be feasible for therapists and acceptable to patients, despite mixing two different diagnoses in the groups.

2 | METHODS

2.1 | Participants

The study included (N = 40) referred adults with a diagnosis of TTM (n = 19) and/or SPD (n = 28). Since seven of the participants met criteria for both disorders the sum of participants from both groups exceeds 40. Inclusion criteria were, 18 years or older, primary diagnosis of TTM or SPD according to diagnostic and statistical manual of mental disorders, fifth edition (DSM-5) (American Psychiatric Association, 2013) and currently be living in Stockholm County (Sweden). Exclusion criteria were current substance dependence or misuse, lifetime diagnosis of bipolar disorder or psychosis, suicidal ideation (a score of 4 or higher on item 10 on the Montgomery-Åsberg Depression Rating Scale-Self Report (MADRS-S) (Svanborg & Asberg, 1994), psychotropic medication changes within 2 months before treatment, other current psychological treatment that could affect TTM or SPD symptoms or that the individual had received behavior therapy for TTM or SPD in the last 12 months. Medication stability during the
| Variable | Mean/n | SD/\% |
|----------|--------|--------|
| Age in years (mean, SD) | 31 | 10.6 |
| Age of onset (mean, SD) | 17.5 | 10.3 |
| Female (n, %) | 38 | 92% |
| Previous psychological treatment for TTM/SPD (n, %) | 6 | 15% |
| Occupational status (n, %) | | |
| Employed | 24 | 60% |
| Unemployed or on sick leave | 6 | 15% |
| Student | 9 | 23% |
| Retired | 1 | 3% |
| Education (n, %) | | |
| High school | 22 | 55% |
| University/college | 18 | 45% |
| Referral (n, %) | | |
| From general practitioners | 12 | 30% |
| From psychiatric outpatient care | 21 | 53% |
| From dermatologists | 6 | 15% |
| Other | 1 | 3% |
| Stabilized psychotropic medication (n, %) | | |
| Selective serotonin reuptake inhibitor | 16 | 40% |
| Other antidepressants | 6 | 15% |
| Centrally acting sympathomimetics | 6 | 15% |
| Levothyroxine | 2 | 5% |
| Neuroleptics | 1 | 3% |
| Quetiapine | 1 | 3% |
| Current comorbidity (n, %) | | |
| Attention deficit disorder, with or without hyperactivity | 8 | 20% |
| Obsessive-compulsive disorder | 7 | 18% |
| Both trichotillomania and Skin-picking disorder | 7 | 18% |
| Major depressive disorder | 3 | 8% |
| Eating disorder | 3 | 8% |
| Social anxiety disorder | 3 | 8% |
| Autism spectrum disorder | 3 | 8% |
| Body dysmorphic disorder | 3 | 8% |
| Generalized anxiety disorder | 2 | 5% |
| Hoarding disorder | 1 | 8% |
| Tourette's disorder | 1 | 3% |
| Personality syndrome not otherwise specified | 1 | 3% |
participation in the study was not monitored, but the participants were asked to refrain from changes in medication throughout the treatment phase of the study. After verbal and written information about the study, all participants signed informed consent before inclusion in the study. The regional ethical board in Stockholm, Sweden approved the study (Dnr. 2014/702-31).

Demographics and clinical characteristics of the participants are presented in Table 1. The majority of the participants were females (92%) and the participants ranged in age from 18 to 57 years (mean = 31, SD = 10.6). Most of the participants started pulling/picking in their teens, at a median age of 15. A majority of the participants (58%) had at least one additional psychiatric disorder. The most common comorbid disorders were attention-deficit/hyperactivity-disorder (ADHD/ADD; 20%), followed by obsessive-compulsive disorder (OCD; 18%). Several participants also met the diagnostic criteria for both TTM and SPD (18%).

2.2 | Recruitment

Participants were recruited from August 2013 to November 2016, through referral to Ångestenheten, a specialist clinic for OCD and related disorders operated by the Stockholm County Council. The majority of the referrals came from other psychiatric clinics (54%). Participants were also referred from general practitioners (31%), dermatologists (13%), and treatment centers for eating disorders (3%). Figure 1 describes the participant flow through the trial, according to the Consolidated Standards of Reporting Trials (CONSORT) (Eldridge et al., 2016).

2.3 | Assessment and outcomes

Potential participants were screened by a psychiatrist using the Mini-International Neuropsychiatric Interview (M.I.N.I) (Sheehan et al., 1998) and the DSM-5 criteria for TTM and SPD (American Psychiatric Association, 2013). Substance abuse was assessed with the Alcohol Use Disorders Identification Test (AUDIT) (Saunders et al., 1993) and the Drug User Disorders Identification Test (DUDIT) (Berman et al., 2005). If the initial assessment generated a diagnosis of TTM and/or SPD and the patients were considered to preliminarily meet the inclusion criteria, they were contacted by a clinical psychologist for a final assessment of eligibility within 1 month before treatment was to begin. Participants meeting the inclusion criteria and who had not made any changes in medication at this final stage of assessment were provided with verbal and written information about the study and signed an informed consent form. After this final assessment, the participants were asked to refrain from changes in medication throughout the treatment. However, we did not control for changes initiated by neither the participants themselves nor by psychiatrists outside our clinic. The baseline assessment regarding the primary and secondary outcome measures described below were done the same day as the treatment started.

2.4 | Primary outcome measure

Primary outcome measure for the participants with TTM was the Massachusetts General Hospital Hairpulling Scale (MGH-HPS) (Keuthen et al., 1995), which is a self-report questionnaire measuring hair-pulling severity. The scale includes seven items with questions about urges to pull hair, pulling behavior, and the consequences of pulling. The items are rated from 0 to 4 and then summed into a 28-point total score, where higher numbers represent greater severity. The MGH-HPS has demonstrated good test–retest reliability ($r = 0.97$), internal consistency ($\alpha = 0.89$), and convergent and divergent validity (O'Sullivan et al., 1995). The internal consistency in this sample was good ($\alpha = 0.89$).
Primary outcome measure for the participants with SPD was the Skin Picking Scale-Revised (SPS-R) (Snorrason et al., 2013). The SPS-R is a self-report measure of skin-picking severity and impairment. The scale includes eight items that altogether cover the three impairment domains in the DSM-5 criteria for SPD (skin lesions, subjective distress, and functional impairment). The items are rated from 0 to 4 and then summed into a 32-point total score, where higher numbers represent greater skin-picking severity. The SPS-R has demonstrated acceptable psychometric properties; high internal consistency ($\alpha = 0.83$) and preliminary convergent and discriminant validity for the two subscales (severity and impairment). The internal consistency in this sample was good ($\alpha = .80$).

**Participant flow through the study**

Initial assessment (n=46)

Excluded (n=2)
- Bipolar disorder (n=1)
- Declined participation (n=1)

Assessed for eligibility (n=44)

Excluded (n=4)
- TTM/SPD not primary diagnosis (n=2)
- Declined participation (n=2)

Commenced treatment (n=40)

Lost to follow up (n=4)
- Discontinued intervention (n=3)
- Unable to reach at post-treatment follow-up (n=1)

Post-treatment follow-up (n=36)

Lost to follow-up (n=6)
- Unable to reach at 1-month follow-up (n=6)

1-month follow-up (n=32)

Lost to follow-up (n=8)
- Unable to reach at 2-month follow-up (n=8)

2-month follow-up (n=30)

Lost to follow-up (n=7)
- Unable to reach at 3-month follow-up (n=7)

3-month follow-up (n=31)

Lost to follow-up (n=9)
- Unable to reach at 6-month follow-up (n=9)

6-month follow-up (n=29)

Lost to follow-up (n=15)
- Unable to reach at 12-month follow-up (n=15)

12-month follow-up (n=23)

ITT analysis (n=40)
2.5 | Secondary outcome measures

For the participants with SPD, an additional outcome measure of the social, behavioral, and emotional consequences of skin-picking was used. The Skin Picking Inventory Scale (SPIS) (Keuthen et al., 2001) is a self-report measure including 10 items rated from 0 to 5 summed into a 50-point total score, with higher scores indicating greater skin-picking severity.

As measures of psychological inflexibility and experiential avoidance, we used the self-report measures Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011) and Acceptance and Action Questionnaire for Trichotillomania (AAQ-4-TTM; Houghton et al., 2014). The AAQ-II is a 7-item scale summed into a 49-point total score. The AAQ-4-TTM is based on the AAQ-II but specifically developed for TTM populations. In the current study, this scale was also used for the SPD participants. The scale has nine items that are summed into a 63-point total score. Higher scores on both scales reflect greater levels of psychological inflexibility and greater unwillingness to experience aversive private events, such as urges to pick.

For measures of self-assessed functional impairment, we used Sheehan Disability Scale (SDS) (Leon et al., 1997) and EQ 5D EuroQol (EQ-5D) (“EuroQol—a new facility for the measurement of health-related quality of life,” 1990), which also assesses health-related quality of life. Depressive symptoms were assessed with the self-reported MADRS-S (Svanborg & Asberg, 1994) and the Patient Health Questionnaire 9 (PHQ-9) (Kroenke et al., 2001). The MADRS-S includes nine items measuring depressive symptoms during the past 3 days on a 7-point scale from 0 (normal) to 6 (pathological). The PHQ-9 includes nine items measuring the frequency of depressive symptoms and anhedonia during the past 2 weeks on a scale from 0 (not at all) to 3 (nearly every day). All self-reported measures above were administered at pretreatment, posttreatment, and at follow-up after 1, 2, 3, 6, and 12 months.

Clinician rated global severity of illness and functioning were assessed by independent clinicians with the Clinical global impression-severity scale (CGI-S), in which, scores range from 1 (not at all ill, normal) to 7 (extremely ill) (Guy, 1976) and the Global Assessment of functioning scale (GAF) (Jones et al., 1995). Clinical improvement was also rated by independent clinicians with the Clinical global impression-improvement scale (CGI-I) (Guy, 1976) on a 7-point scale: (from 1 = very much improved, to 7 = very much worse). These reports were administered at pretreatment, posttreatment, and at 6- and 12-month follow-up.

Clinically significant change for TTM patients was determined based on a cut-off score of 6 or below on the MGH-HPS according to analyses by Diefenbach et al. (2006). Clinical significance was also calculated according to the guidelines by Nelson et al. (2014) recommending researchers to report treatment response as the proportion of participants who achieve a symptom reduction of 25% or greater on the MGH–HPS. As a supplement, they also recommend that complete abstinence from hair pulling is reported based on the score of Item 4, in which a score of 0 indicates complete abstinence from hair pulling.

Since there is no validated cut-off score for clinically significant change on the SPS-R, clinically significant change for the participants with SPD was based on sensitivity and specificity analyses on the SPIS made by Keuthen et al. (2001). These analyses yielded a cut-off score of 7 and above, to differentiate compulsive skin-picking from normal skin-picking (Keuthen et al., 2001). Secondary outcomes also included responder status and remission. Response was defined as clinician-rated scores of 1 (very much improved) or 2 (much improved) on the CGI-I. Remission was defined as not meeting the diagnostic criteria for TTM or SPD at posttreatment and was evaluated by a psychiatrist.

Participants’ experiences of the AEGBT were evaluated with a questionnaire, specifically designed for this study, and contained free text questions regarding the strengths and weaknesses of the treatment.

2.6 | Treatment

The treatment consisted of 10 group sessions during 10 weeks and was conducted in groups of five to eight patients, led by two psychologists per group. The protocol used was based on the treatment manual for individual
therapy, AEBT for TTM, by Woods and Twohig (2008) and included both HRT and elements from ACT. We made some changes to the original manual. The content was translated to Swedish and modified into a group format by presenting the content through visual slides and incorporating group exercises and discussions. For adaptation of the manual to an SPD population, we also added suitable terminology like “picking” in addition to “pulling” and incorporated clinical examples of skin picking. Based on our clinical experience, we also introduced the treatment technique “Embracing the urge of pulling/picking instead of acting upon it,” at Session 6 instead of Session 8. All psychologists were cognitive behavioral therapy therapists trained in both ACT and HRT. In total, six groups were conducted between February 2014 and May 2017. To prevent relapse, five booster sessions were offered after 1, 2, 3, 6, and 12 months. For a summary of the treatment sessions, see Table 2.

### Table 2: Overview of the treatment sessions

| Session | Contents |
|---------|----------|
| 1       | Overview of ACT-enhanced Behavior Therapy and the treatment program, psychoeducation about TTM and SPD, short introduction of HRT and its four components, stimulus control assessment of trigger situations, introduction of self-monitoring homework, and weekly assessment of progress. |
| 2       | Weekly assessment of progress, review of homework, implementation of HRT by awareness training (describing the pulling/picking and describing the preceding sensations and behaviors), competing response training, and introduction of stimulus control procedures. |
| 3       | Sessions 3–10 all began with a weekly assessment of progress, review of homework regarding competing response training, and stimulus control procedures. Initial work of identifying what is important to the patient and how the struggle against urges has interfered with these values. |
| 4       | Continued discussion of values and introduction of the concept of control as the problem not the solution. |
| 5       | Continued discussion of control and willingness as an alternative to trying to control the urges. Introduction to the concept of behavioral commitments and planning of a commitment to follow out during the week. |
| 6       | Review of homework regarding behavioral commitments and planning of a new commitment to follow out during the following week. Discussion of defusion of language and how it can help us see that urges, feelings and thoughts are not true events that must be acted upon. Introduction to the concept of embracing the urges, by actively getting them show up and then practice willingness to accept them without fighting them. In-session practice of embracing the urges. |
| 7–8     | Review of homework regarding behavioral commitments and practice of embracing the urges. Continued work with defusion of language and acceptance. In-session practice of embracing the urges. |
| 9–10    | Review of homework regarding behavioral commitments and practice of embracing the urges. In-session practice of embracing the urges. Introduction of relapse prevention. Helping the patients make their own individual relapse prevention plans. Summarizing the progress the patients have made in treatment by reviewing their whole graph of progress. Planning of behavioral commitments to follow out until the first booster session. |
| Booster 1–5 | Reviewing progress and problem solving of challenges since the last session. In-session practice of embracing the urges. Reviewing the behavioral commitments the patients have followed through with and planning new commitments to follow out until the next booster session. |

Abbreviations: ACT, Acceptance and Commitment Therapy; TTM, trichotillomania; SPD, skin-picking disorder.
2.7 | Statistical analyses

The study was conducted as an open trial. Longitudinal data, with primary and secondary outcome measures as outcome variables, were analyzed with linear mixed effects models which is particularly suitable for dealing with missing data (Verbeke & Molenberghs, 2009). The models included fixed effects for time and a random intercept for individuals included in the model. Pearson’s and Spearman’s correlation were run to assess the relationship between change in symptoms related to pulling/picking and experiential avoidance. All analyses were done according to the Intention-to-treat (ITT) principle including the full sample of 40 participants. Missing data at posttreatment were regarded to be missing at random after analyses with logistic regression models ($p = 0.076–0.829$). Within-group effect sizes were calculated using Cohen’s $d$ (Cohen, 1988). All statistical analyses were made in Stata statistical software, 13.1. In all tests, values of $p < 0.05$ were considered statistically significant.

3 | RESULTS

3.1 | Attrition

In total, 3/40 participants (7.5%) terminated treatment prematurely (one at Session 4, one at Session 6, and one at Session 10) and did not complete measures at posttreatment or follow-ups. The reported reasons for discontinuation were all extrinsic to treatment: (a) conflicts in the family and (b) other diagnosis than SPD turned out to be the primary diagnosis and considered more urgent to deal with for the participant. The termination of the third participant was a case of administrative withdrawal from the study, due to the absence of more than 50% of the group sessions and noncompliance with the study protocol. A descriptive comparison of pretreatment status on demographic and clinical variables between dropouts and treatment completers did not demonstrate any significant differences. All three dropouts were included in the primary analysis according to ITT.

The primary analysis involved 40 participants of whom 19 met criteria only for TTM and 28 only for SPD whereas 7 met criteria for both disorders. Consequently, the disorder-specific analyses below, include all participants that met criteria for the disorder and thus, the sum of participants from both groups exceeds 40.

3.2 | Primary outcome

3.2.1 | Effects on hair-pulling and skin-picking

There were significant improvements from baseline to posttreatment on both the primary outcome measures and the effect sizes were medium to large, $\text{MGH-HPS, } z(19)=8.36, p < 0.05, d = 0.77$; $\text{SPS-R, } z(27)=10.27, p < 0.001, d = 1.24$. At the 1-year follow-up, the positive change in symptom reduction remained for patients with SPD ($\text{SPS-R, } z(27)=10.07, p < 0.001, d = 0.73$), but not for patients with TTM ($\text{MGH-HPS, } z(19)=10.28, p = 0.672, d = 0.19$). Table 3 summarizes the means, standard deviations, and within-group effect sizes including confidence intervals for ITT participants for all seven assessment points for MGH-HPS and SPS-R.

3.3 | Secondary outcomes

Means ($M$), standard deviations ($SD$), and within-group effect sizes, including confidence intervals, for ITT participants for all seven assessment points for the secondary outcomes at all assessment points are reported in Table 4.
### TABLE 3  Primary outcome measures at every assessment point

| Measure   | Pre          | Post         | 1-month FU   | 2-month FU   | 3-month FU  | 6-month FU  | 12-month FU  | Within-group effect size $d$ |
|-----------|--------------|--------------|--------------|--------------|-------------|-------------|----------------|-------------------------------|
|           | M (SD)       | M (SD)       | M (SD)       | M (SD)       | M (SD)      | M (SD)      | M (SD)        | Pre to post $d$ CI $-$ CI $+$ |
| MGH-HPS   | 16.68 (5.68) | 11.89 (6.70) | 12.20 (7.10) | 9.75 (5.89)  | 14.19 (5.55)| 15.07 (3.69)| 15.36 (7.94)  | 0.77 $-$ 0.1, 1.44, 0.32 $^*$ |
| SPS-R     | 17.48 (4.58) | 11.56 (4.91) | 11.35 (5.24) | 12.43 (5.85) | 11.48 (6.70)| 11.43 (5.93)| 12.19 (10.39) | 1.24 $-$ 0.64, 1.83, 1.17 |

Note: Effect sizes, Cohen’s $d$, are reported with 95% CIs.
Abbreviations: FU, follow-up; MGH-HPS, Massachusetts General Hospital Hairpulling Scale; M, means; n.s., not significant; PRE, pretreatment; POST, posttreatment; SD, standard deviations; SPS-R, Skin Picking Scale–Revised.
Overall, we observed significant improvements from pretreatment to posttreatment, with effect sizes varying from moderate to large, on all secondary outcome measures, with the exception of general health status and quality of life measured with the EQ-5D. Moreover, all improvements from pretreatment to posttreatment were largely maintained until the end of the follow-up period at 12 months.

3.3.1 | Response and remission

At posttreatment, 45% of the participants were responders (much improved or very much improved) according to the CGI-I. The clinician-rated improvements were maintained at follow-up after 6 and 12 months, respectively, but no further statistically significant improvements were made at these assessment points. At posttreatment, 21% of the participants \( (n = 4) \) with TTM, and 11% \( (n = 3) \) of the participants with SPD were considered to be in remission.

3.3.2 | Clinically significant change

According to the definition of clinically significant change by Diefenbach et al. \( (2006) \), 21% \( (n = 4) \) of the participants with TTM achieved clinically significant change at posttreatment. At the 1-year follow-up, the frequency of participants with clinically significant change had dropped to 5%. The proportion of participants who achieved a symptom reduction of 25% or greater on the MGH–HPS, and thus were regarded as treatment responders according to the guidelines by Nelson et al. \( (2014) \) was 53% \( (n = 10) \) at posttreatment. At the 1-year follow-up, this proportion had dropped to 37%. At posttreatment 21% \( (n = 4) \) of the participants with TTM showed complete abstinence from hair pulling. At the 1-year follow-up, data in abstinence were available for three participants, of which, one had maintained abstinence (11%).

Based on the cutoff scores yielded from analyses on the SPIS made by Keuthen et al. \( (2001) \), 7% \( (n = 2) \) of the participants with SPD achieved clinically significant change at posttreatment. At the 1-year follow-up, the frequency of participants with clinically significant change had increased to 14%.

3.3.3 | Experiential avoidance

A significant decrease in experiential avoidance was demonstrated from baseline to posttreatment on AAQ4TTM for participants with TTM \( (z(19)=18.75, p < 0.001, d = 0.78) \), as well as for participants with SPD \( (z(28)=20.30, p < 0.001, d = 1.24) \). The decrease remained significant at the 1-year follow-up for both TTM participants \( (z(19)=17.74, p = 0.001, d = 0.83) \) and SPD participants \( (z(28)=17.54, p < 0.001, d = 1.34) \). However, on AAQ2, a significant decrease in experiential avoidance was only demonstrated for participants with SPD \( (z(27)=14.61, p < 0.001, d = 0.72) \), but not for TTM participants \( (z(19)=13.75, p = 0.653, d = 0.02) \). The decrease in experiential avoidance \( (AAQ4TTM) \) was moderately correlated with a decrease in skin-picking severity \( (SPS-R \ (r_s = 0.58, p < 0.05)) \). This was true also for AAQ2 \( (SPS-R \ (r_s = 0.44, p < 0.05)) \). For MGH-HPS however, a decrease in symptoms of hair-pulling severity was only weakly and nonsignificantly correlated with a decrease in experiential avoidance \( (AAQ4TTM \ (r_s = 0.33, p > 0.05), AAQ2, (r = 0.28, p \geq 0.05)) \).

3.4 | Treatment activity and adherence

In a qualitative questionnaire at posttreatment, a large majority of the patients stated that they were very satisfied with the treatment and especially with the group format, as it had decreased their feelings of shame and increased
### TABLE 4  Secondary outcome measures at every assessment point

| Measure | Pre | Post | 1-month FU | 2-month FU | 3-month FU | 6-month FU | 12-month FU |
|---------|-----|------|------------|------------|------------|------------|------------|
|         | M (SD) | M (SD) | M (SD) | M (SD) | M (SD) | M (SD) | M (SD) |
| SPIS    | 33.57 (11.23) | 23.88 (11.67) | 22.78 (12.36) | 21.91 (11.53) | 20.53 (13.12) | 20 (11.79) | 19.13 (11.30) |
| AAQ-II  | 40.85 (11.43) | 35.86 (12.62) | 32.41 (11.71) | 33.17 (12.23) | 38.23 (14.78) | 34.48 (11.12) | 35.57 (13.59) |
| AAQ4TTM | 45.28 (6.95) | 36.83 (10.06) | 34.57 (8.90) | 37.53 (8.44) | 35.72 (9.08) | 35.43 (11.46) | 0.99 |
| MADRS-S | 16.7 (9.08) | 12.83 (9.46) | 12.07 (8.76) | 13.76 (9.68) | 12 (9.50) | 10.24 (8.10) | 0.42 |
| SDS     | 1243 (8.28) | 9.29 (7.97) | 7.32 (7.84) | 7.5 (8.96) | 8.84 (8.97) | 7.97 (8.74) | 7.36 (6.66) |
| EQ-SDa  | 0.69 (0.21) | 0.79 (0.20) | 0.77 (0.21) | 0.79 (0.21) | 0.49 | 0.02, 0.95 | 0.38n.s. |
| PHQ-9   | 9.79 (5.36) | 7.21 (5.95) | 6.43 (5.50) | 6.04 (5.24) | 0.46 | -0.03, 0.95 | 0.53 |
| GAFa    | 56.42 (7.65) | 64.07 (8.53) | 65.86 (10.84) | 66.67 (10.90) | 0.94 | 0.12, 1.75 | 1.06 |
| CGI-S   | 4.11 (0.89) | 3.28 | 3.04 (0.81) | 2.95 (1.13) | 0.92 | 0.44, 1.40 | 1.2 |
| CGI-I   | 2.32 (1.07) | 2.37 (0.96) | 2.65 (0.99) | 2.62 (0.99) | 0.05n.s. | -0.61, 0.51 | 0.32n.s. |

Note: Effect sizes, Cohen's d, are reported with 95% CIs.

Abbreviations: AAQ-II, Acceptance and Action Questionnaire-2; AAQ4TTM, Acceptance and Action Questionnaire for Trichotillomania; CGI-I, Clinical Global Impressions Scale–Improvement; CGI-S, Clinical Global Impressions Scale–Severity of Illness; CI, confidence interval; EQ-SD, EuroQol; FU, follow-up; GAF, Global Assessment of Functioning; M, means; MADRS-S, Montgomery Åsberg Depression Rating Scale Self-report; n.s., not significant; PRE, pretreatment; POST, posttreatment; PHQ-9, Patient Health Questionnaire 9; SD, standard deviation; SPIS, Skin Picking Impact Scale; SDS, Sheehan Disability Scale.

aHigher scores indicate better health. Sign of effect sizes changed for clarity.
bEffect sizes of CGI-I are reported from posttreatment to 6-months follow-up and from posttreatment to 12-months follow-up.
their sense of not being alone with their problems. “Talking about my hair pulling with others having similar problems, who listened in a non-judgmental way, made me feel less abnormal and crazy.” Several participants also mentioned that they appreciated the technique of embracing the impulses instead of acting upon them, “...it was totally different from the tricks I had tried before, which were all about getting rid of the impulses temporarily. Embracing the impulses was very challenging in the beginning, but after a while I felt it made me less afraid of the impulses and that it gave me a sense of mastery.” The average number of sessions attended during the treatment period was high (M = 8.9 out of 10, SD = 1.4). However, during the booster period, the average number of sessions attended markedly dropped to M = 2.6 (SD = 1.9) out of 5. The attendance based on diagnosis was similar (three booster sessions attended for TTM participants, 2.33 for SPD, and 3.14 for participants with both TTM and SPD).

The group format was less time-consuming than individual treatment. The maximum number of participants in the groups was eight and the weekly 3-h group sessions were led by two psychologists during 10 weeks. In total, this demanded 60 therapist hours per group treatment. Thus, compared with the number of therapist hours needed to treat eight patients individually (80 h), the group format enabled the therapists to see 25% more patients.

4 | DISCUSSION

Our results suggest that ACT-enhanced group behavior therapy for mixed treatment groups is efficacious in decreasing symptoms of TTM and SPD in the short term. The long-term treatment effects varied between participants with TTM versus SPD. Based on the low drop-out rate and the high attendance during the treatment period, we also conclude that the treatment was highly acceptable to the participants. Moreover, our subjective clinical impression is that the group format seems to have contributed to decreased feelings of stigma and shame.

The results for the participants with SPD are in line with previous meta-analyses (Schumer et al., 2016; Selles et al., 2016), whereas the effect size of the primary outcome measure for TTM is somewhat lower than in prior studies (McGuire et al., 2014; Slikboer et al., 2017). Posttreatment outcomes in the study are comparable to other studies of behavior group therapy for TTM (Diefenbach et al., 2006; Toledo et al., 2015) and to outcomes in individual behavior therapy for SPD (Schuck et al., 2011).

As in most previous studies (Ninan et al., 2000; van Minnen et al., 2003), we found that full abstinence from pulling/picking after treatment was rare, with only a few participants considered to be in remission at posttreatment. Since long-term maintenance of treatment gains for these disorders is generally rare (Keijsers et al., 2006), we offered five booster sessions during the following year after the end of the 10-week treatment period to potentially boost the long-term outcome. However, in contrast to the high level of attendance during the treatment (on average 90% of sessions), the average number of sessions attended during the booster period was low (on average 50%). This lower rate of attendance might be explained by logistic and economic barriers which were frequently reported by the patients. During the treatment, all patients who were employed were offered paid preventive sickness benefit to be able to take time to travel to and attend the treatment sessions once a week. In accordance with Swedish law, it was not possible to offer this benefit to the patients during the posttreatment booster period.

Earlier studies have shown sustained treatment effects for patients with SPD, with comparable effect sizes, up to 3 months (Schuck et al., 2011; Teng et al., 2006) but not beyond that. To our knowledge, this is the first study for SPD with a follow-up period of 12 months. The treatment effect for TTM remained significant only until the 2-month follow-up. This finding could possibly be due to a lack of power, since the TTM participants were fewer than the SPD participants. However, these results are in line with most previously reported results of long-term outcomes for TTM, in which relapse after treatment termination is common (Diefenbach et al., 2006; Keijsers et al., 2006; Woods et al., 2006). One possible explanation for why maintenance is harder to achieve for the TTM patients is that their hair lesions recover less rapidly than the skin damage of the SPD patients. Even though the SPD patients often suffer from scars from previous picking, the healing of the skin appears faster than it takes for...
the hair of the TTM patients to grow back. Thus, the advantages of treatment with regard to appearance comes much faster for the SPD patients, making their efforts during treatment more rewarding. Since attendance at booster sessions was fairly similar in TTM and SPD patients, we cannot conclude that the greater maintenance for the SPD symptoms was due to the booster intervention.

We also predicted that the treatment would help the participants decrease their experiential avoidance and increase their willingness to experience the urge to pull or pick a, without engaging in pulling/picking. As in the previous AEBT-trial for TTM by Woods et al. (2006), this was true for both TTM and SPD participants. Moreover, a decrease in experiential avoidance was moderately correlated with a decrease in symptoms of skin-picking. However, decrease in symptoms of hair-pulling was only weakly and nonsignificantly correlated with decrease in experiential avoidance. This finding might be due to a lack of power, since the TTM participants were fewer than the SPD participants. In conclusion, these results support the rationale for combining ACT and HRT and suggest that this combination might be most beneficial for patients with SPD.

Although the decrease in hair pulling symptoms remained significant only until the 2-month follow-up, functional impairment and clinician-rated severity of illness decreased significantly from pretreatment to posttreatment and the decrease was maintained at the 12-month follow-up. This was true for all outcome measures of functional impairment. The effects of the increased function according to clinician-rated CGI-S and GAF were strong, whereas the effects on self-rated SDS and EQ-5D were small. According to CGI-I nearly half of the patients were improved at posttreatment and the improvement was maintained at the 12-month follow-up. This is also somewhat contradictory to the weak and nonsignificant effect on the symptom measure MGH-HPS for the participants with TTM at the 12-month follow-up. Our interpretation of this result is that the participants who were much improved at posttreatment remained so, while the symptoms of the participants who had only slightly improved worsened to follow-up. Taken together, this highlights that improvement after treatment can be defined in many ways. One potential meaning of the somewhat contradictory results above is that when assessing the severity of illness, clinicians also took into consideration more broader terms of improvement, such as overall improved level of functioning, rather than merely the severity of pulling/picking.

The percentage of participants with TTM achieving clinically significant change in the current study was markedly lower compared with the study of Woods et al. (2006). One explanation for this difference is that we calculated clinically significant change according to the more conservative definition by Diefenbach et al. (2006) and thus, set the limit for clinically significant change at 6 points on the MGH-HPS, compared with 12.74 in Woods et al. (2006). If we had used the same definition as Woods et al. the percentage of participants achieving clinically significant change would have increased from 21% to 47% in our study. This result would be more in line with the results of Woods et al. (66% defined as achieving clinically significantly change) (Woods et al., 2006). When we calculated clinical significance according to the definition by Nelson et al. (2014), the proportion of participants achieving clinically significant change at posttreatment increased even more (53%). At the 1-year follow-up this proportion had dropped, but 37% of the participants were still defined as clinically significantly changed. Regardless of the definition used, our results clearly indicate that there is room for further improvement in psychological treatments for TTM and SPD, as is evident from the effect sizes on the primary outcomes, which ranged from small to medium from pretreatment to 12-month follow-up.

4.1 | Strengths and limitations

A strength with the current study is that it was conducted in routine psychiatric care, as opposed to the majority of prior TTM and SPD studies that recruited participants among students or employees at universities (Schuck et al., 2011; Teng et al., 2006) or self-referred (Diefenbach et al., 2006; van Minnen et al., 2003). No self-referrals were accepted, instead all participants were recruited from the ordinary referrals to the clinic. Moreover, the majority of the patients with TTM and/or SPD referred to our clinic during the time period for the study were included. Also, patients with a wide range of comorbidities including neuropsychiatric conditions that previous
studies excluded (Diefenbach et al., 2006) or did not specifically report (Ninan et al., 2000; Schuck et al., 2011; Teng et al., 2006; Toledo et al., 2015; van Minnen et al., 2003; Woods et al., 2006) took part of this trial. Only one prior study (van Minnen et al., 2003) had a lower drop-out rate (6%) than our study. In other studies, the drop-out rate ranged from 11% to 37% (Diefenbach et al., 2006; Ninan et al., 2000; Schuck et al., 2011; Weidt et al., 2015; Woods et al., 2006). Given the above, we believe that the results of our study can be generalized to other specialized clinical settings where OCD and related disorders are treated. Lastly, by offering group therapy and mixing patients with TTM and SPD in the same treatment groups, we were able to save therapist time and start treatment groups more regularly and thus increase availability to treatment. Based on these findings, we believe that this treatment format will contribute to the dissemination of evidence-based treatment for TTM and SPD, making it more feasible also for nonspecialized clinics to offer the treatment.

The current study has limitations with regard to the sample size and the lack of a control group. Another limitation is that we did not control for changes in medication during the treatment. Hence, we cannot conclude that the specific techniques used in our treatment program (HRT and ACT) were responsible for the symptom reductions. However, based on the chronicity of TTM and SPD (Snorrason et al., 2012) and by comparing the effect size of the supportive therapy in the study of Diefenbach et al. (2006) with the greater effect size from our study (Cohen's $d$ 0.45 vs. 0.77), it is likely that our results might not be due to generic treatment components or spontaneous remissions. A further limitation of the current study is the lack of supervision during treatment to ensure that the treatment protocol was delivered as intended. We did however make several efforts to ensure compliance with the protocol. For example, all treatment groups followed exactly the same written treatment protocol in which the group leaders were thoroughly trained. Moreover, the protocol included a set of visual slides for each treatment session. These included a pedagogic summary of each topic brought up during the session, as well as detailed instructions to the group leaders on what to say to the participants for each slide. However, the lack of supervision and monitoring of the treatment sessions means we cannot be certain that the treatment protocol was delivered entirely as intended and that some deviations from the protocol were made. Taken together, in future research on the efficacy of ACT-enhanced group behavior therapy for TTM and SPD, studies with larger sample sizes and active control conditions are warranted.

4.2 | Future directions

There is also a need to make further improvements to the treatment format to enhance maintenance of treatment gains, especially for patients with TTM. Adding internet-based support between sessions has been used successfully to increase attendance in hoarding disorder (Ivanov et al., 2018) and to prevent relapse of depression (Hollandare et al., 2013) and might be a viable option for individuals with TTM/SPD. Apart from improving treatment outcomes in the long-term, there is also a pressing need to develop new ways of dramatically increasing availability to evidence-based treatment for TTM and SPD. Delivering therapist-guided behavior therapy entirely via the Internet, which has been successful for OCD (Andersson et al., 2012) and body dysmorphic disorder (Enander et al., 2016) could substantially increase the accessibility, and as we suggest above, enable even more patients to participate in treatment, in spite of full-time employment or other obstructive factors. Indeed, some promising results of computer or internet-delivered self-help treatments for TTM (Lee et al., 2018; Mouton-Odum et al., 2006; Rogers et al., 2014) and SPD (Flessner et al., 2007; Gallinat et al., 2019) have already been presented.

4.3 | Conclusions

The results of this study provide preliminary support that ACT-enhanced Group Behavior Therapy reduces symptoms of TTM and SPD and that treatment gains among patients with SPD but not patients with TTM are
maintained at follow-up. Lastly, the results preliminarily support the notion that the treatment increases the participants' psychological flexibility, hinting at a potential treatment mechanism.

ACKNOWLEDGEMENT
Thanks to Philip Brenner and Sasa Markovic for diagnostic assessment. Many thanks also to group leaders Anna Holmberg and Ulrika Kolmodin. This study was supported by grants from Psykiatri Nordväst, Stockholm County Council, and Fredrik and Ingrid Thuring foundation.

CONFLICT OF INTERESTS
The authors declare that there are no conflict of interests.

PEER REVIEW
The peer review history for this article is available at https://publons.com/publon/10.1002/jclp.23147

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ORCID
Mia Asplund http://orcid.org/0000-0002-4804-5668
Martin Bellander http://orcid.org/0000-0003-0377-4979
Volen Z. Ivanov http://orcid.org/0000-0001-6349-0500

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**How to cite this article:** Asplund, M., Rück, C., Lenhard, F., Gunnarsson, T., Bellander, M., Delby, H., & Ivanov, V. Z. (2021). ACT-enhanced group behavior therapy for trichotillomania and skin-picking disorder: A feasibility study. *Journal of Clinical Psychology*. 77, 1537–1555. https://doi.org/10.1002/jclp.23147