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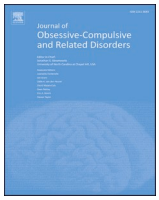

Extended follow-up of a comprehensive behavioral (ComB) treatment sample during the COVID-19 pandemic

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ABSTRACT

This study provides the longest follow-up yet for comprehensive behavioral (ComB) treatment of trichotillomania (TTM) (M = 24.59 months after pre-treatment and 15.92 months after the last follow-up point in a recent clinical trial (Carlson et al., 2021), which had shown ComB to be significantly more efficacious than minimal attention at post-treatment). This study also examined changes in TTM severity from before to during the COVID-19 pandemic. Participants (N = 23) completed a survey assessing current TTM symptoms, the impact of the pandemic on their coping with TTM, and their experience with ComB treatment. Self-reported symptom severity at this follow-up evaluation fell between the scores obtained at the clinical trial's pre-treatment assessment and at its last follow-up before the pandemic and did not significantly differ from either time point. Most participants (73%) reported some change in their TTM management since onset of the pandemic, with changes to their environment/routine (61%) and in anxiety (32%) being the most common. Pandemic-related changes were associated with variable outcomes, improving symptoms and management for some while worsening them for others. Use of strategies from ComB had declined since the most recent follow-up, but more than half (55%) of participants reported that strategies from ComB remained useful.

Although research on treatment of trichotillomania (TTM) empirically supports the use of cognitive behavioral therapies (Rehm et al., 2015; Slikboer et al., 2017), relapse continues to be a persistent problem (e.g., Falkenstein et al., 2014; Keijsers et al., 2006; Lerner et al., 1998). Comprehensive behavioral therapy (ComB; Mansueto et al., 1997) tailors treatment to individuals' pulling modalities and has shown promise in lowering TTM symptoms but lacks long-term follow-up data (Carlson et al., 2021). Given the frequency of relapse in those with TTM, further investigating the long-term effects of ComB is necessary for evaluating its efficacy and comparing it to other treatments with long-term data.

ComB therapy consists of four treatment phases: assessment and functional analysis, identification and targeting of an individual's pulling modalities, implementation of strategies for targeted modalities, and evaluation of effectiveness and modification as needed (Mansueto et al., 1999). The ComB model incorporates a wide array of possible triggers for TTM categorized as sensory, cognitive, affective, motoric, and place/environmental modalities and uses a functional analysis to target each individual's specific presentation. These modalities were included in ComB in an effort to improve treatment response by accounting for heterogeneity within individuals with TTM (Mansueto et al., 1999). Other treatments have combined behavior therapy with cognitive and affective components (Crosby et al., 2012; Haaland et al., 2017; Keuthen et al., 2010), but ComB remains the only treatment to incorporate these five hair-pulling modalities in a customized functional analysis and treatment plan. ComB also places emphasis on preventing relapse by providing psychoeducation about lapses and relapses and teaching patients how to identify modalities and apply targeted strategies.

ComB incorporates some successful elements of previous treatments, such as habit reversal training, while introducing greater treatment flexibility with specific focus on each individual's combination of hair-pulling modalities and emphasis on relapse prevention (Mansueto et al., 1999). Habit reversal training (HRT, Azrin & Nunn, 1973) is a longstanding treatment of TTM that generally involves self-monitoring, awareness training, stimulus control, and competing response training (i.e., use of a new behavior that is physically incompatible with hair-pulling). While early studies of HRT reported excellent results (Azrin & Nunn, 1973), it is not fully sufficient; in one study, for instance, only 40% of participants showed a clinically significant response to HRT

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(Nelson et al., 2014). Other treatments of TTM incorporate cognitive and affective interventions by using behavior therapy or habit reversal training enhanced with treatments such as acceptance and commitment therapy or dialectical behavior therapy.

While some of these treatments demonstrate strong treatment response (e.g., Keuthen et al., 2010), many participants show evidence of relapse over time (e.g., Crosby et al., 2012; Falkenstein et al., 2014; Haaland et al., 2017; Keijsers et al., 2006). Studies of relapse following behavior therapy have shown rates of relapse of 38–52% at three months (Falkenstein et al., 2014) and 57–60% at two years (Keijsers et al., 2006). Relapse rates in studies of acceptance and commitment therapy enhanced HRT have ranged from 20 to 40% at three months (Crosby et al., 2012) and 28–33% at one year (Haaland et al., 2017). A previous study of ComB showed overall maintenance of treatment gains at a three-month follow-up, although there was a decrease in the number of participants who met criteria for a clinically significant response (Falkenstein et al., 2016). These results suggest that those treated with ComB may better maintain treatment gains over time compared to other treatments, but more research and longer follow-ups are necessary.

A recent efficacy trial of ComB found significant improvement in self-report symptom severity on the Massachusetts General Hospital Hair Pulling Scale (MGH-HPS; Keuthen et al., 1995) from pre-treatment to post-treatment, with an effect size of $d = -.78$ (Carlson et al., 2021). Participants were randomly assigned to receive 12 weeks of ComB immediately or to a 12-week minimal attention waiting period followed by 12 weeks of ComB. Participants were assessed at five timepoints throughout the study; those who received ComB immediately were assessed at baseline, midway through treatment, the end of treatment, and three- and six-months post-treatment. Those in the delayed control group were assessed at baseline, midway through the waitlist period, after the waitlist period, at the end of treatment, and three months after treatment. Participants in the immediate ComB group had significantly decreased self-report TTM severity following 12 weeks of treatment while the minimal attention control group showed no significant changes in severity over the 12-week waiting period. Participants showed maintenance of effects at both the three- and six-month follow-ups, with the six-month follow-up being the longest follow-up available to date for ComB.

The present study builds upon these previous findings by conducting a follow-up assessment with this sample approximately one year after the completion of the trial. Conducting this additional follow-up evaluation also enabled us to examine how the ComB clinical trial participants were faring during the COVID-19 pandemic. The present study is exploratory in nature, with two aims. The first aim was to assess participants' status on clinical features (e.g., pulling style, pulling urges) at long-term follow-up in comparison to their status on those same measures at the pre-treatment and final post-treatment follow-up assessments of the ComB clinical trial. Participants in the original ComB study were enrolled on a rolling basis and randomly assigned to immediate treatment (and three- and six-month follow-up appointments) or the waitlist (and only a three-month follow-up appointment), so time between their involvement in ComB and their participation in this study varied. The study was conducted between August and September of 2020, approximately five months after the World Health Organization (WHO) declared COVID-19 a global pandemic. Mental health disorders, such as depression and anxiety, drastically increased in prevalence since the onset of the pandemic (Ettman et al., 2020; Twenge & Joiner, 2020). In the United States, nationally representative samples surveyed in April and May of 2020 were more than three times as likely to endorse symptoms of depression and anxiety than those surveyed prior to the pandemic, with more than half (52.5%) of adults surveyed reporting at least mild symptoms of depression (Ettman et al., 2020; Twenge & Joiner, 2020). Those with preexisting mental health disorders might be particularly susceptible to increases in symptoms, such as fear of contamination or of socioeconomic consequences and distress, during the pandemic (Asmundson et al., 2020).

A recent survey found that individuals with TTM reported increased disorder severity on the MGH-HPS during the pandemic; however, this study relied solely on participants' retrospective estimates of their pre-pandemic functioning (Pathoulas et al., 2021). Hair-pulling has been hypothesized to be a tool used to cope with negative emotions (Diefenbach et al., 2008; Siwiec & McBride, 2016); as negative emotions such as depression and anxiety have increased during the pandemic, this theory is consistent with the findings of Pathoulas et al. (2021). Based on these findings, and despite previous maintenance of gains at three- and six-month follow-ups (Carlson et al., 2021), we hypothesized that participants' TTM severity, including total hair-pulling and distress and impairment due to pulling, had increased since the last assessment time-point of the ComB clinical trial. This hypothesis was also consistent with the studies highlighted above showing that relapse rates over time are high in trichotillomania (Crosby et al., 2012; Falkenstein et al., 2014). In addition to analyzing changes in measures of TTM, we sought qualitative information about ways participants perceived that their management of TTM had changed, if at all, during the pandemic. Given the dramatic changes in many people's day-to-day routines, we hypothesized that participants' management of their TTM may have been altered due to variations in stressors, triggers, and access to coping tools and strategies. Participants who believed that the pandemic altered their TTM management were asked to describe the specific changes in pulling behavior, urges, and coping they experienced.

The second aim of the study was to elicit qualitative feedback on the utility of ComB. We sought to investigate what features of treatment participants found beneficial to use for long-term management of their TTM. While patients of ComB are instructed in management of their specific triggers and urges, there is no prior evidence from former patients about how they utilize the principles and skills associated with ComB post-treatment in the natural environment. Therefore, we sought feedback about what strategies and resources from treatment patients continue to use, what factors were unhelpful, and other ways to improve treatment outcomes.

1. Methods

1.1. Participants

Participants ($n = 23$) were recruited from the pool of participants at the Washington, DC site of a recent ComB randomized trial ($N = 32$; Carlson et al., 2021). The majority identified as women (78%), non-Hispanic (83%), and Caucasian (73%) with an average age of 35.75 ($SD = 10.84$). Most had a bachelor's degree or higher (91%), and slightly over half (57%) have previously received some form of therapy for TTM. Participants reported an average of 17.77 ($SD = 9.62$) years since their initial onset of hair-pulling. At the pre-treatment assessment, 39% reported pulling hair more than 1 h over the previous week, 39% reported pulling 16–60 min, and 22% reported pulling 1–15 min.

Individuals from the ComB randomized trial that participated in this follow up did not significantly differ from those that did not participate in terms of age, race/ethnicity, gender, level of education, TTM onset, or whether they previously received TTM treatment. Participants meeting criteria for bipolar or psychosis disorder or with past-month suicidal ideation at pre-treatment were excluded, and no additional data on comorbid disorders were collected. Additionally, no information on other forms of treatment (e.g., other types of psychotherapies, medication) implemented since completing ComB was assessed.

1.2. Measures

1.2.1. Trichotillomania diagnostic inventory for the DSM-5 (TDI-DSM-5)

The TDI-DSM-5 is a clinician-administered semi-structured interview used to determine DSM-5 diagnostic criteria for TTM (Falkenstein et al., 2016) and is a revision of the original TDI, based on DSM-IV criteria (Rothbaum & Ninan, 1994). The TDI has been adapted as a self-report

measure for online studies (Falkenstein & Haaga, 2016), which is the version used in the current study.

1.2.2. Massachusetts General Hospital Hair Pulling Scale (MGH-HPS)

The MGH-HPS is a seven-item self-report measure assessing hair-pulling symptom severity over the prior week (Keuthen et al., 1995). The scale asks about frequency and intensity of pulling urges, frequency of pulling, and any distress associated with TTM symptoms. The MGH-HPS has shown good internal consistency (Cronbach's alpha ranging from 0.80-.89), strong retest reliability over a 1-h delay (r = 0.97), and significant positive correlations with clinician-rated measures of TTM (r = 0.63 - 0.75; Diefenbach et al., 2005; Keuthen et al., 1995; O'Sullivan et al., 1995).

1.2.3. Milwaukee Inventory for Subtypes of Trichotillomania—Adult version, Revised (MIST-R)

The MIST-R is a 13-item scale used to identify theoretical subtypes of pulling styles in TTM (Keuthen et al., 2015). Eight items contribute to the Intention subscale, with higher scores indicating awareness and deliberation in pulling episodes (e.g., "I have thoughts about wanting to pull my hair before I actually pull."). Five items contribute to the Emotion subscale, with higher scores indicating pulling hair in response to negative emotions (e.g., "I pull my hair when I am anxious or upset."). Both subscales have shown acceptable internal consistency (α = 0.79). The subscales were not significantly correlated (r = 0.05), suggesting that they represent independent dimensions of hair pulling style. Construct validity for each subscale was also supported (Keuthen et al., 2015).

1.2.4. ComB strategy use form

ComB categorizes hair-pulling triggers into five pulling modalities (sensory, cognitive, affective, motoric, and place or environmental stimuli; Mansueto et al., 1999) to organize pulling triggers and corresponding strategies. The Strategy Use Form includes over 70 strategies designed to address triggers within these pulling modalities. This form includes behavioral and cognitive strategies such as stimulus control, mindfulness, and competing responses that were compiled and organized by the authors of the ComB manual after extensive experience working with TTM patients (Mansueto et al., 1999; Mouton-Odum et al., 2014). For example, sensory strategies include using a scalp massager or brushing one's hair; cognitive strategies include mindfulness or cognitive restructuring; affective strategies include journaling or exercise; motor strategies include wearing finger bandages or engaging in knitting/crafting; and place strategies include removing/covering mirrors and discarding tweezers. The form asks participants to mark which strategies they used to help manage their TTM symptoms during the past two weeks.

1.2.5. Client satisfaction questionnaire

The Client Satisfaction Questionnaire is an eight-question measure requesting honest feedback about participants' experience with the treatment they were provided (e.g., "How would you rate the quality of service you have received?" and "If you were to seek help again, would you come back to our program?"). Item responses range from 1 to 4 (Larsen et al., 1979).

1.2.6. ComB feedback

Participants responded to 12 additional questions designed to elicit feedback on the utility of ComB (e.g., "Do you feel like you have continued to use the skills and strategies you learned during the ComB trial?") or participants' perceptions of their TTM management during the pandemic (e.g., "Since March 2020, do you feel that your management of your trichotillomania has changed?"[see Appendix]). The questions were structured as either multiple choice questions, utilizing a 5-point scale, or free response questions. A categorical coding system was created for answers to the free response questions. Three coders independently coded participants' responses using a coding guide; more than one code could be assigned to each response. Codes were not mutually exclusive, with the exceptions of increases vs. decreases (e.g., "increase in coping/strategy use" vs. "decrease in coping/strategy use"). The rating (0 or 1) given to a response by the majority of the 3 raters was considered the score for that variable on that participant's response. Cohen's kappa and overall percent agreement were calculated between each pair of raters for each question. Kappa values showed strong interrater reliability (median [of the three pairs of raters] values ranging from 0.68 to 0.87); overall percentage agreement was high (median values ranging from 90.3% to 96.8% across items).

1.3. Procedure

Participants from the Washington, DC site of the ComB randomized trial (Carlson et al., 2021) were contacted via email and invited to complete a one-time, follow-up survey through Qualtrics between July and September 2020. Participants received two reminder emails during the recruitment stage. Interested participants were sent a Qualtrics survey that included several measures (i.e., TDI, MGH-HPS, MIST-R, and CSQ) used during the pre-treatment and follow-up assessment of the ComB randomized trial as well as questions created for this study. As this study was not included as part of the ComB randomized trial, participants provided separate informed consent before accessing the survey. Those who completed the survey were entered in a raffle to win one of two $100 gift cards. All procedures were approved by the Institutional Review Board at American University.

Participation in this follow-up survey occurred about 5–6 months (M = 5.62, SD = 0.08) after the WHO declared the COVID-19 pandemic. On average, completion of the survey for this study occurred 24.59 (SD = 2.92) months after pre-treatment assessment in the ComB randomized trial and 15.92 (SD = 2.79) months after the participant's final assessment in that trial. Recruitment for the ComB randomized trial occurred on a rolling basis from May 2018 through August 2019 which accounts for the variability in time from assessments in that trial to this follow-up in Summer 2020.

1.4. Data analysis

All statistical analyses were conducted using IBM SPSS Statistics (Version 25; IBM Corp., 2017). Dependent t-tests were used to compare current scores on the MGH-HPS, MIST-R, and CSQ to scores from the participants' pre-treatment assessment and final follow-up assessment in the ComB randomized trial (Carlson et al., 2021) (3 or 6 months after the end of ComB treatment, depending on the participant's random assignment to delayed vs. immediate ComB).[1] Bonferroni's correction was applied to address Type I error. The two tests pertaining to a given dependent variable were treated as a family, and familywise Type I error constrained to 0.05 by conducting each test with a critical alpha level of 0.025.

2. Results

2.1. Follow-up assessment of clinical features

No significant differences were found between participants from the ComB randomized trial that elected to participate in this follow-up study and those who did not on any measures from the final follow-up assessment of the ComB trial: pulling style (MIST-R Intention t [29] =

[1] Analyses comparing pre-treatment scores to immediate post-treatment assessments showed ComB to be significantly more efficacious than delayed treatment/minimal attention in lowering self-reported symptom severity (MGH-HPS). These results have already been published (Carlson et al., 2021) and as such are not a focus of this article.

-0.67, $p = .51$, MIST-R Emotion t [29] $= -1.59$, $p = .12$), TTM symptom severity (MGH-HPS t [29] $= 0.51$, $p = .61$), or the number of ComB strategies used to decrease pulling (t [29] $= 0.73$, $p = .47$). At the time of this follow-up, 12 (52%) of the participants met diagnostic criteria for TTM while the remaining 11 did not. The percentage of participants no longer meeting TTM criteria at this follow-up (48%) is slightly higher than those no longer meeting criteria at the three- and six-month follow-ups of the randomized control trial (38% and 33%; Carlson et al., 2021).

Analyses comparing the pre-treatment assessment and this follow up ($M = 24.95$ months) were not significant on the MGH (t [22] $= 2.04$, $p = .054$), MIST-R Emotion subscale (t [21] $= 2.13$, $p = .048$), or MIST-R Intention subscale (t [21] $= 0.33$, p .75). Similarly, there were no significant differences between the final post-treatment ComB assessment session and this follow-up ($M = 15.92$ months) on the MGH-HPS (t [21] $= -0.88$, $p = .39$), MIST-R Emotion subscale (t [20] $= 1.52$, $p = .14$), or MIST-R Intention subscale (t [20] $= 0.18$, $p = .86$). Please see Table 1 for descriptive data.

2.2. Perceptions of the impact of COVID-19 pandemic on hairpulling

Although no significant differences were found on pulling severity or pulling style, qualitative measures were used to assess how participants perceived the effect of the pandemic on their hairpulling. Participants were asked about their pulling behavior and TTM management since the beginning of the United States COVID-19 outbreak (March 2020). The majority (73%) reported at least some change in their overall TTM management (e.g., urge to pull, pulling behavior, strategy use, exposure to triggers) since the beginning of the pandemic. The same percentage (73%) reported that their pulling had been affected by either the pandemic itself or circumstances surrounding the pandemic. Slightly less than half of the participants (45%) reported pulling more hairs than usual. Similarly, 45% reported having more frequent urges to pull. Forty-five percent also perceived that their pulling habits had changed and reported feeling that they had not been able to control their pulling since the beginning of the pandemic. About half of participants (55%) reported that their use of coping skills had stayed consistent, while 27% reported that skill use occurred less than usual. Change in their environment or routine (61%) and change in anxiety (32%) due to the pandemic were the most cited factors impacting TTM management. Table 2 provides frequencies for the coded responses concerning impact of the pandemic on TTM management and pulling habits.

2.3. Continued utility of ComB

In keeping with the lack of significant change in symptom severity, participants did not significantly differ in their level of satisfaction with ComB between their final post-treatment assessment ($M = 26.11$, $SD = 4.85$) and this follow-up ($M = 24.37$, $SD = 4.28$; t [18] $= 1.68$, $p = .11$). Forty-one percent of participants retrospectively reported having used ComB skills and strategies often or daily prior to the pandemic (23% sometimes, and 36% infrequently or almost never). Fewer (18%) reported having used ComB skills and strategies often or daily since the beginning of the pandemic (32% sometimes, and 50% infrequently or almost never). No significant difference was found between retrospective reports of skill use prior to the pandemic and current skill use (X^2 [16, $N = 22$] $= 23.90$, $p = .09$). Whereas the majority of participants (55%) reported finding ComB skills and strategies useful at the time of this follow-up, only about one-third of participants (32%) agreed that ComB helped with their pulling during the pandemic. Table 3 includes frequencies of participants' coded responses for reasons they continued or discontinued using ComB skills. When asked what would be more helpful, participants endorsed more or longer sessions (14%), more resources (e.g., access to more strategies; 18%), more focus on maintaining or adjusting strategies after termination (14%), and support groups (14%).

Participants were also asked what specific ComB strategies they continued to use. Most participants reported using at least one strategy from each of five modalities within the last two weeks (see Table 4). The

Table 1
Descriptive Data for Clinical Features Before and During Covid-19 Pandemic.

Measures	Pre-Treatment ComB Assessment	Final ComB Assessment	Covid-19 Follow-Up
	M (SD)	M (SD)	M (SD)
MGH-HPS	17.0 (3.5)	12.5 (5.9)	13.9 (6.4)
MIST-R "Emotion"	25.3 (10.5)	22.7 (10.3)	19.8 (10.2)
MIST-R "Intention"	29.4 (13.5)	28.9 (9.9)	28.0 (14.8)

Note. MGH-HPS = Massachusetts General Hospital Hair Pulling Scale, MIST-R = Milwaukee Inventory for Subtypes of TTM, Revised Version.

Table 2
Covid-19 Pandemic Impact on TTM Management and Pulling Habits.

Question 9: Since March 2020, do you feel that your management of your TTM has changed? (Multiple Choice)	
Responses	Frequency (%)
No	6 (27)
Yes	16 (73)
Changed a little bit	8 (36)
Changed	5 (23)
Changed a great deal	3 (14)
Question 9a: If you feel that it has changed, please describe below (Free Response)	
Coded Responses	Frequency (%)
Decrease in feelings of social accountability	5 (23)
Change in levels of stress	5 (23)
Overall increase in stress	2 (9)
Overall decrease in stress	1 (5)
Variable change in stress	2 (9)
Changes in exposure to other environmental triggers	5 (23)
Increase in exposure to environmental triggers	3 (14)
Decrease in exposure to environmental triggers	2 (9)
Change in coping or strategy use	7 (32)
Increase in coping or strategy use	4 (18)
Decrease in coping or strategy use	3 (14)
Changes in urges or pulling behavior	8 (36)
Increase in urges or pulling behavior	7 (32)
Decrease in urge or pulling behavior	1 (5)
Question 10: Do you feel like your hair pulling habits have been affected by the COVID-19 pandemic or the factors/circumstances resulting from the COVID-19 pandemic? (Multiple Choice)	
Responses	Frequency (%)
Yes	17 (77)
No	5 (23)
Question 10a: If so, how have your pulling habits changed or been affected? (Free Response)	
Coded Responses	Frequency (%)
Change in environment or routine impacting hair-pulling due to	14 (61)
Increased time at home	7 (32)
Decreased social accountability (e.g., seeing fewer people or attending fewer social gatherings)	6 (27)
Increased free time and time to pull	3 (14)
Increased access to interventions	5 (23)
Change in sleep cycle	1 (5)
Change in anxiety impacting hair-pulling related to	7 (32)
Contamination concerns	1 (4)
Embarrassment	3 (14)
Current events (e.g., racial injustice reports, protests)	2 (9)

Note. Questions included in this table were created by the authors for the purpose of this study and can be found in the Appendix.

Table 3
ComB Features That Increased or Decreased ComB Utility.

Question 11: Do you feel like you have continued to use the skills and strategies you learned during the ComB trial? If so, why? In what ways? (Free Response)	
Coded Responses	Frequency (%)
Yes. Parts were helpful	13 (57)
Psychoeducation	3 (14)
Increased self-awareness about pulling	9 (41)
Learning strategies that were designed to target personal triggers	11 (50)
No. Reasons for non-implementation	5 (23)
Lack of adaptable skills/strategies to use in new environments	1 (5)
Lack of motivation or effort	4 (18)
Lack of individualized strategies for person's pulling/triggers	1 (5)

Note. Questions included in this table were created by the authors for the purpose of this study and can be found in the Appendix.

Table 4
Frequency of ComB Strategy Use by Modality.

Responses	Frequency (%)
Sensory strategies	18 (78)
Cognitive strategies	16 (70)
Affective strategies	17 (74)
Motoric strategies	19 (83)
Place/Environment strategies	12 (52)

most endorsed sensory strategies included hand toys (43%); brushing hair (39%); and using skin, nail, or hair care products (30%). The most endorsed cognitive strategies include mindfulness (52%) and adaptive self-talk (34%). The most endorsed affective strategies include exercise (39%), deep breathing (30%), and pleasurable or self-care activities (30%). The most endorsed motoric strategies include fiddle toys (48%); wearing a hat, bandana, or headband (35%); and cutting nails (35%). The most endorsed place or environmental strategies include keeping hand toys in pulling-specific places (17%) and planning "wind down" activities before bed (13%).

3. Discussion

The first randomized controlled trial of ComB found it to be effective in reducing self-reported TTM symptoms when compared to a minimal attention control group and maintaining those changes for up to six months after treatment (Carlson et al., 2021). This study looked to expand on these findings by examining longer-term maintenance. Given the prevalence of relapse in TTM and the suggested function of hair-pulling as a way to regulate negative emotions resulting from the COVID-19 pandemic, we expected an increase in symptom severity between this study and the completion of the ComB randomized control trial. Instead, we found that long-term follow-up (during pandemic) symptom severity was intermediate between (a) pre-treatment symptom severity and (b) short-term follow-up symptom severity, not significantly different from either. Pulling style similarly did not change significantly by the time of this follow-up during the pandemic from either pre-treatment or short-term follow-up assessments.

Most studies assessing efficacy of different TTM psychotherapy options are limited to 3- or 6-month follow-ups. Few studies have examined treatment gains beyond six months, and those that have usually have small samples (e.g., 3–16 participants; Ninan et al., 2000; Rapp et al., 1998; Rosenbaum & Ayllon, 1981) or show high relapse rates. While assessing the effectiveness of CBT for TTM, Lerner et al. (1998) found considerable relapse during a 3.8-year follow-up, as only 4 of 13 participants maintained treatment gains. A study examining whether including approach-avoidance training (AAT) prior to CBT for TTM could decrease relapse found effect sizes reduced by half between the 3-month and 12-month follow-up (Maas et a., 2018). Keijsers et al. (2006) similarly found a 70% decrease in effect sizes for behavior therapy in a 2-year follow-up. Although pulling severity for this ComB-treated sample did not significantly differ from severity at the end of treatment, it similarly did not significantly differ from pre-treatment, aligning with previous studies and suggesting that benefits of ComB may degrade over time.

This study also allowed for an examination of the impact of the COVID-19 pandemic on TTM and on the utility of ComB treatment. Although the COVID-19 pandemic is a unique stressor associated with exacerbating pre-existing mental health symptoms and triggering the onset of new ones (Asmundson et al., 2020; Ettman et al., 2020; Twenge & Joiner, 2020), participants in this study did not on the whole endorse increased pulling severity or distress. Statistical analysis of pulling severity did not show a significant change from either pre-pandemic time-points, and qualitative responses from participants suggest the COVID-19 pandemic had mixed effects on their pulling behavior. Fewer than half of participants believed that their pulling behavior, urges, or symptom management was negatively affected by the pandemic while about one-third of individuals believed their pulling behavior decreased during this time. Additionally, slightly more than a third of participants disagreed or strongly disagreed when asked if the pandemic affected their TTM. These findings for ComB-treated hair-pullers differ from generally observed trends reflecting increased pulling severity and distress during the pandemic (Pathoulas et al., 2021).

Even those who did report changes in how they managed TTM did not always describe these changes as making a negative impact. Change in routine that resulted in decreased feelings of accountability or embarrassment and increased free time and time spent at home were the most cited adjustments made in response to the COVID-19 pandemic; however, these changes did not consistently result in worsening symptoms. Some individuals reported that not being around others lessened their motivation to use strategies and increased pulling. One participant who reported increased pulling stated that "typical coping I would use has decreased since I don't have a need to hide my pulling sessions like I would if I was going into an office." Others reported that being at home meant they had much more access to features of their environments (e.g., mirrors, tweezers) that tend to increase pulling. Conversely, many participants stated that working from home allowed them to avoid environmental triggers, such as driving or putting on makeup, that typically prompt pulling episodes. Working from home also allowed them to have more access to coping strategies they would not usually use, such as wearing hats or bandaging their fingers during the workday. One individual, who reported decreased pulling since the beginning of the pandemic, described being able to "exercise more [which] helps to lessen 'latent anxiety,' and thus reduces my urges to pull" and that "not needing to go in my office lessens my anxiety around people seeing me, which seems to result in less urges to pull." Increased time for self-care was also endorsed by those who believed that their pulling had decreased. These responses suggest that the pandemic did not have a consistent, generalizable effect on people with TTM.

In particular, ComB may have buffered some aspects of the COVID-19 pandemic that could have increased pulling severity and distress for most people with TTM. Completing ComB may have provided access to strategies that helped individuals adjust to the changing reality of the COVID-19 pandemic. As highlighted above, many of the participants were able to implement skills during this time to maintain or further decrease pulling. The targeted strategies taught in ComB and the focus on increased awareness may have helped these individuals make necessary adjustments. Almost all participants endorsed using at least one ComB strategy in the past two weeks. However, participants reported being less likely to use ComB skills and strategies after the beginning of the COVID-19 pandemic than they were previously. They were almost evenly divided in their belief about the usefulness of ComB during the pandemic with about a third, respectively, agreeing, disagreeing, or neither agreeing nor disagreeing that ComB was helpful. The variability in individuals' views on the utility of ComB may suggest that individual-level factors such as economic and health status,

additional responsibilities related to parenting, and health-related anxiety are more closely related to the effects of the COVID-19 pandemic on pulling than participation in ComB. For example, participants that found ComB skills to be useful during the pandemic may have experienced an increase in pulling urges due to distress from the pandemic but also had more time and availability to practice ComB skills due to changes in their schedule and environment. Alternatively, those that did not find ComB skills useful during the pandemic may have found themselves in new situations where they could not readily use the skills they relied on or experienced low motivation to use skills previously implemented due to a significant increase in distress. For example, if a parent experiences significantly greater anxiety and stress due to assisting their children in virtual learning and returns to pulling hair as an easy and reliable way to regulate negative emotions, they may have less motivation to use ComB skills or find more adaptative ways to emotionally regulate. They then may consider the skills to be unhelpful as they are not as accessible or reliable as pulling.

More than half of the participants stated that they have continued to use what they learned from ComB 15 months after the last assessment session for the ComB randomized trial. Some of the most helpful aspects of treatment reported by participants are found in different cognitive-behavioral models for TTM, such as psychoeducation about TTM, self-monitoring, and increasing motivation to stop pulling. Yet, the treatment feature most commonly cited as beneficial, learning personalized strategies based on each individual's modalities, is uniquely emphasized in ComB. One participant said, "It's been helpful to think about the why of pulling in terms of what needs I'm addressing (sensory, etc.), and to use the interventions I've learned," and another reported, "It's much more manageable now that I can focus on the triggers instead of the actual hair pulling." Whereas other treatments also discuss identifying triggers and using strategies, individualizing strategies based on the specification of pulling modalities is a hallmark of ComB.

A desire for longer therapy, booster sessions, or support groups was frequently reported by participants. One participant reported, "I don't know who to talk to that follows this program … I feel like this therapy works but mostly and especially when there's ongoing checkpoints to continue the habits it creates." Another said, "[ComB] was a helpful program but I realize I need a group to continue talking about this issue with others that also struggle or understand. I don't think I can maintain just on my own with the strategies. I need the continued support." ComB is a 12-session manualized treatment; however, clinicians may want to consider flexibility within fidelity (i.e., Kendall et al., 2008) when implementing ComB by setting up continued support through booster sessions or support groups to help individuals maintain treatment response.

This study has several methodological limitations, requiring cautious interpretation of the results. Given the primary purpose of this study was to further assess the maintenance of ComB, the sample was limited to those that participated in the ComB randomized trial and, thus, results may not generalize beyond this sample. The impact of the COVID-19 pandemic for participants in this sample may differ from the impact on TTM-affected individuals that did not recently receive treatment before the onset of the pandemic. However, this sample provided the opportunity to directly assess changes in TTM symptoms from before to during the pandemic. The small sample size, coupled with use of multiple comparison procedures to constrain the Type I error rate, limited statistical power. Additionally, all data collected during the randomized control trial prior to the pandemic were collected in person while the data collection for this study was solely online. Online data collection allowed participants to follow social distancing guidelines but limits our ability to compare clinician-rated measures such as the TDI, which may produce varied results when used as a self-report measure. A lack of published data on the reliability and validity of the self-report adaptation of the TDI further suggests a need for caution in interpreting the data on diagnostic status of participants in the study.

4. Conclusions

Despite these limitations, this study offers helpful long-term follow-up data for ComB, feedback for researchers and clinicians about the treatment, and unique insight into the ways that some individuals have managed their TTM during the COVID-19 pandemic. The focus of this study allowed us to examine some of the nuances that differentiate individual experiences in ComB and the COVID-19 pandemic. Effects reported by Carlson et al., 2021 in their randomized trial were smaller than have been reported in meta-analyses (e.g., Farhat et al., 2020) for other behavioral therapies like habit reversal training. Our results may point to ways in which ComB could be improved. Participants reportedly found the use of individualized strategies based on ComB pulling modalities to be particularly beneficial, although individuals generally reported less usage over time. Participants identified additional booster sessions, longer sessions, and ComB-specific support groups as ways that may help individuals to continue using strategies and improve treatment response; however, research on the effectiveness of booster sessions for maintaining treatment effects of behavior and cognitive behavior therapy across disorders is mixed (e.g., Andersson et al., 2014; Baker & Wilson, 1985; Kolko et al., 2014; Whisman, 1990). Other possibilities for improving treatment response may be to spend more time in session helping individuals learn how to adapt strategies to better fit changing circumstances and to establish more personalized strategies. The lack of consistency of the effects of the COVID-19 pandemic on TTM symptoms highlights the importance of personalizing treatment and demonstrates how diverse individuals' TTM experience can be. Circumstances surrounding the pandemic reduced symptomology for some but worsened it for others, emphasizing the individualistic nature of pulling stressors and triggers. Clinicians should consider how crises such as the pandemic affect each individual to help conceptualize ways to mitigate the distress and impairment caused by TTM symptoms.

Contributors

Meghan K. Flannery: Conceptualization, Methodology, Formal Analysis, Investigation, Data Curation, Resources, Writing - Original Draft, Writing - Review & Editing, Project Administration.

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Emily J. Carlson: Investigation, Data Curation.

David A. F. Haaga: Writing - Review & Editing, Supervision, Funding acquisition.

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Declaration of competing interest

All authors declare that they have no conflicts of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jocrd.2021.100706.

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