

21 Abstract

22 **Objective:** There are effective treatments of trichotillomania (TTM), but access to expert
23 providers is limited. This study tested a stepped care model aimed at improving access. **Method:**
24 Participants were 60 (95% women, 75% Caucasian, 2% Hispanic) adults ($M = 33.18$ years) with
25 TTM. They were randomly assigned to **Immediate** vs. **Waitlist (WL)** conditions for **Step 1** (10
26 weeks of web-based self-help via StopPulling.com). After Step 1, participants chose whether to
27 engage in **Step 2** (8 sessions of in-person Habit Reversal Training). **Results:** In Step 1 the
28 Immediate condition had a small ($d = .21$) but significant advantage, relative to WL, in reducing
29 TTM symptom ratings by interviewers (masked to experimental condition but not to assessment
30 point); there were no differences in self-reported TTM symptoms, alopecia, functional
31 impairment, or quality of life. Step 1 was more effective for those who used the site more often.
32 Stepped care was highly acceptable: motivation did not decrease during Step 1; treatment
33 satisfaction was high, and 76% enrolled in Step 2. More symptomatic patients self-selected into
34 HRT, and on average they improved significantly. Over one-third (36%) made clinically
35 significant improvement in self-reported TTM symptoms. Considering the entire stepped care
36 program, participants significantly reduced symptoms, alopecia, and impairment, and increased
37 quality of life. For quality of life and symptom severity, there was some relapse by 3-month
38 follow-up. **Conclusions:** Stepped care is acceptable, and HRT was associated with improvement.
39 Further work is needed to determine which patients with TTM can benefit from self-help and
40 how to reduce relapse.

41 **Keywords:** trichotillomania, stepped care, habit reversal training, web-based self-help,
42 acceptability

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Stepped Care in the Treatment of Trichotillomania

Trichotillomania (TTM) involves recurrent pulling out of one's own hair, resulting in hair loss. TTM shows a one-year prevalence of 1 to 2% (American Psychiatric Association, 2013) and can result in psychosocial impairment and stigma (Ricketts, Brandt, & Woods, 2012). A meta-analytic review concluded that habit reversal training (HRT; Azrin & Nunn, 1973) is the best-supported TTM treatment (Bloch, Weisenberger, Domrowski, Nudel, & Coric, 2007). Unfortunately, few clinicians receive adequate TTM training. In a survey of hair pullers, only 3% perceived their providers as TTM experts (Woods et al., 2006). Access to effective treatment might be improved by using stepped care, in which less intensive, restrictive, or costly methods are tried first, followed by more intensive ones only if initial results are unsatisfactory. If successful, stepped care reserves a costly and scarce resource for patients who need it.

Our research addressed four questions about a two-step model of care for TTM: (1) web-based self-help; (2) in-person HRT. First, is web-based self-help for TTM efficacious? Patients can access the Internet from anywhere, regardless of proximity to an expert therapist. An uncontrolled study of a TTM self-help site, StopPulling.com, showed reduced symptoms (Mouton-Odum, Keuthen, Wagener, Stanley, & Debakey, 2006), but there are no published controlled trials. Second, is stepped care for TTM acceptable to patients? We studied acceptability in terms of treatment satisfaction, Step 2 entry and completion, and whether motivation declined if Step 1 failed to help. Third, are those who self-select to enter Step 2 the ones who need it, and do they benefit? Stepped care logic requires that later steps are reserved for those who need them, and that at least some patients find later step(s) useful, or the program will be inefficient. Finally, we examined maintenance of gains through 3-month follow-up.

Method

67 **Participants**

68 Participants were 60 adults with TTM (57 female), averaging 33.18 years old ($SD =$
69 10.87). The majority were Caucasian (75%), with 17% African American. One (2%) was
70 Hispanic. They began hair pulling at a mean age of 11.45 ($SD = 4.67$). They were recruited
71 September 2010 through November 2011 via ads and clinician referrals. Figure 1 is the
72 CONSORT diagram of patient flow. Inclusion criteria were: ≥ 18 years old, regular Internet
73 access, and DSM-IV-TR criteria for TTM except that criteria B (tension before pulling) and C
74 (pleasure, relief, or gratification after pulling) were not required (Lochner et al., 2011). Exclusion
75 criteria were (a) those for ordinary use of StopPulling.com (i.e., any past-month suicidality,
76 major depressive episode, psychosis, severe anxiety, or substance abuse); (b) concurrent
77 psychotherapy for TTM; or (c) taking TTM medication but not on stable dose for \geq four weeks.

78 **Materials**

79 **Diagnoses.** Interviewers were graduate students trained and supervised by the last
80 author. The Structured Clinical Interview for DSM-IV-TR (SCID-I/P; First, Spitzer, Gibbon, &
81 Williams, 2002) was used for exclusion criteria. TTM was diagnosed with the Trichotillomania
82 Diagnostic Interview (TDI; Rothbaum & Ninan, 2004). TDI (and PITS—see below) interviewers
83 were made aware of the assessment time period (e.g., post-Step 1) so that they could ask about
84 treatment utilization, but not made aware of experimental condition. A 20% random sample of
85 TDIs was coded by a second rater (masked to time and condition), with high agreement ($\kappa = .77$).

86 **TTM symptoms.** The Massachusetts General Hospital Hairpulling Scale (MGH-HPS;
87 Keuthen et al., 1995) is a 7-item self-report measure of past-week TTM symptoms (total 0 to 28).
88 In our sample, alpha was .74. Using internal consistency as the reliability estimate, we required a
89 decrease of at least six points on the MGH-HPS for reliable change, a score of 9 or lower for

90 return to normal functioning [> 2 SD below dysfunctional population mean (estimated as our
91 baseline mean)], and both for clinical significance (Jacobson & Truax, 1991). The Psychiatric
92 Institute Trichotillomania Scale (PITS; Winchel et al., 1992) is a 6-item, semi-structured
93 interview (total 0 to 42). A 20% random sample of PITS interviews was coded by a second rater
94 (masked to time and condition). Single-rater reliability was high ($r = .95$, no significant
95 difference in means). The Alopecia rating (Tolin, Franklin, Diefenbach, & Gross, 2002) is a one-
96 item (1 to 7) evaluation of hair loss evident in a photo of the most affected site. Two coders
97 (masked to time and condition) rated each photo; their average rating was reliable (ICC = .82).

98 **Motivation and treatment satisfaction.** The Client Motivation for Therapy Scale
99 (CMOTS; Pelletier, Tuson, & Haddad, 1997) is a 24-item questionnaire. We analyzed subscales
100 consisting of four 1-7 items measuring intrinsic motivation, external regulation, and the sum of
101 the two. The Client Satisfaction Questionnaire (CSQ-8; Larsen, Attkisson, Hargreaves, &
102 Nguyen, 1979) is an 8-item measure of satisfaction with health services (total scores 8—32).

103 **Impairment and quality of life.** The Sheehan Disability Scale (SDS; Sheehan, 1983) is
104 a 3-item self-report of impairment in work/school, social life, and home/family life (total 0 – 30).
105 The World Health Organization Quality of Life—Brief Version (WHOQOL Group, 1998) is a
106 26-item quality of life measure (past two weeks). We used the average (4—20) across four
107 domains: physical health, psychological health, social relationships, and environment.

108 **Treatment adherence.** Step 1 adherence was measured objectively as the number of
109 days (0-70) on which a participant entered data on StopPulling.com. The therapist rated Step 2
110 homework after each session from 0 (“*not done*”) to 3 (“*fully or almost fully completed and*
111 *documented*”). HRT therapist adherence was scored on a 57-item checklist. Two raters watched
112 all sessions of five randomly selected patients; rater reliability was high ($\kappa = .78$).

113 **Procedure**

114 **Screening, randomization, and assessments.** The study was approved by the American
115 University Institutional Review Board. Figure 1 summarizes participants' progress through the
116 study. Prospective participants completed a phone screen. Those who were interested and likely
117 to be eligible were scheduled for baseline assessment. All in-person assessments were conducted
118 in the PI's lab at American University. At baseline, after informed consent, interviews were
119 conducted, followed by all self-reports (except the CSQ-8) and the photo for alopecia rating.
120 Finally, those who were eligible and interested were randomly assigned (using a pre-selected
121 random order generated via randomizer.org, with condition previously unknown to the
122 experimenter) to **immediate Step 1** or to **waitlist (WL)**.¹ Later assessments (post-WL [10 weeks
123 after baseline] for WL condition only, post-Step 1, post-Step 2 eight weeks later, follow-up three
124 months later) were mostly the same. The TDI, PITS, and Treatment Utilization interviews were
125 completed, as were all self-reports (except for motivation at follow-up), and alopecia photos
126 were taken. At Post-Step 1, participants chose whether to enter Step 2. Participants were paid for
127 their time.

128 **Step 1: StopPulling.com.** During Step 1, participants were given 10 weeks of free access
129 to StopPulling.com, consisting of assessment, intervention, and maintenance modules.² In
130 assessment participants self-monitor each urge or pulling episode, recording details such as the
131 behaviors, sensations, feelings, and thoughts preceding pulling, and what was done with the hair
132 afterward. In intervention these data are used to create a list of recommended interventions (e.g.,
133 getting rid of tweezers used to pull hair, obtaining toys for use in keeping hands busy, clenching
134 one's fists to help resist urges). Participants are asked to use three strategies a week, setting goals
135 and rewarding themselves for progress. When goals are met for four weeks, users proceed to

159 effect at week 10 ($d = .21$). As noted earlier, PITS interviewers (but not reliability raters) were
160 aware of the assessment time period, though not of experimental condition.

161 Table 3 shows Step 1 data for the full sample, including WL once they received access.³
162 Only the PITS changed significantly. Reliable change on the MGH-HPS occurred during Step 1
163 for eight participants (15%), recovery of normal functioning and clinical significance each for
164 four (8%). Use of StopPulling.com was variable. The median number of different days on which
165 a participant logged on and entered data was 12.5; 19% never entered data. Partial correlations of
166 days of use of the site with post-Step 1 symptoms, controlling for pre-Step 1 symptoms, were
167 nonsignificant for alopecia but significant ($p < .05$) for MGH-HPS, $pr = -.33$ and PITS, $pr = -.34$.

168 **Acceptability of stepped care.** Treatment satisfaction was high. CSQ-8 scores averaged
169 25.13 ($SD = 4.70$) after Step 1, 28.54 ($SD = 4.52$) after Step 2, and 28.00 ($SD = 4.49$) at follow-
170 up. By comparison, women with PTSD and substance dependence averaged 24.80 on the CSQ-8
171 after a CBT program (Najavits, Weiss, Shaw, & Muenz, 1998). Of the 54 participants who
172 completed post-Step 1 assessment and were offered Step 2 HRT, 41 (76%) enrolled in Step 2,
173 and they attended a mean of 7.61 of eight scheduled sessions. There was no significant change in
174 motivation variables during Step 1 in the full sample. For total motivation the mean declined
175 from 23.39 ($SD = 7.98$) to 22.98 ($SD = 8.13$), $t(53) = 0.64$, $p = .52$. Results were nearly identical
176 for the subsample who did not improve reliably on the MGH-HPS during Step 1.

177 **Self-selection into, and progress during HRT.** Participants choosing to enter Step 2
178 were more symptomatic at post-Step 1. HRT patients ($M = 16.75$, $SD = 3.48$) scored higher on
179 the MGH-HPS than did no-HRT participants ($M = 12.23$, $SD = 6.14$), $t(51) = 3.33$, $p = .002$.
180 They were also more likely to be diagnosed with TTM (95% to 71%), Fisher's Exact Test $p =$
181 $.033$. Differences were in the same direction but nonsignificant for the PITS and alopecia. These

182 tests were adequately powered (.80) only for large effects ($d = .91$ or greater) (Faul et al., 2007).

183 Therapist adherence in HRT was high; averaged across raters, 93% of checklist items
184 were coded as present. Patient homework adherence was moderate, with a mean session rating of
185 2.2 ($SD = 0.7$). Uncontrolled data on effects of HRT are in Table 4. There were significant and
186 large decreases in both symptom measures and a small-to-medium, significant increase in quality
187 of life. The proportion of participants meeting TTM diagnostic criteria decreased from 95% to
188 54%. One-half (50%) of HRT patients improved reliably during Step 2 on the MGH-HPS, and
189 46% recovered normal functioning, with 36% showing clinically significant response. Changes
190 in impairment and alopecia were not significant.

191 **Maintenance.** From baseline to post-Step 2 for the full sample, there were reductions on
192 the PITS (23.89 +/- 5.10 to 15.70 +/- 6.61), $t(43) = 9.85$, $p < .001$, MGH-HPS (16.92 +/- 3.72 to
193 10.44 +/- 5.45), $t(49) = 8.62$, $p < .001$, alopecia (5.02 +/- 1.53 to 4.23 +/- 1.75), $t(31) = 3.05$, p
194 $< .005$, and TTM-related impairment (8.10 +/- 6.61 to 6.25 +/- 7.05), $t(47) = 2.55$, $p = .014$, and
195 an increase in quality of life (15.72 +/- 1.77 to 16.35 +/- 2.04), $t(48) = 3.32$, $p = .002$. Follow-up
196 means did not differ significantly from post-Step 2 for impairment (6.39 +/- 6.52) or alopecia
197 (4.56 +/- 1.62). However, follow-up was worse than post-Step 2 on quality of life (15.92 +/-
198 2.31), $t(48) = 2.55$, $p = .014$, the PITS (17.48 +/- 7.67), $t(41) = 2.48$, $p = .017$, and the MGH-
199 HPS (13.78 +/- 6.08), $t(48) = 4.43$, $p = .017$ (see Figures 2.1 and 2.2). All patients met TTM
200 diagnostic criteria at baseline, 51% at post-Step 2, and 67% at follow-up.

201 Discussion

202 This study was an initial evaluation of stepped care for TTM. Efficacy results for Step 1,
203 web-based self-help, were modest. Interviewer-rated symptoms decreased more in
204 StopPulling.com than in WL, but the effect was small, and there was no significant difference on

205 self-rated symptoms, alopecia, impairment, quality of life, or diagnosis. However, those who
206 used the site more often showed more improvement. This was the first randomized trial of
207 StopPulling.com, which bolsters internal validity, but external validity may have been
208 compromised in that participants were required to have Internet access but not necessarily to
209 prefer web-based self-help. Future research might sample those who find the site on their own
210 (as in Mouton-Odum et al., 2006) and invite them to enroll in a randomized controlled trial.

211 Stepped care seemed highly acceptable. Treatment satisfaction was high. A majority
212 (76%) of participants offered Step 2 HRT entered treatment, and these patients attended 95% of
213 sessions. There was no significant decline in motivation during Step 1, even among non-
214 responders. Utility of stepped care depends not only on acceptability but also the efficiency with
215 which later steps are allocated to patients who need them and can benefit from them. In our
216 sample, self-selection into Step 2 HRT tracked well with post-Step 1 clinical status, and large
217 reductions in symptoms occurred during Step 2. Some relapse was evident on symptoms,
218 diagnoses, and quality of life.

219 This preliminary study was limited in several ways but can lay the groundwork for more
220 definitive trials. Our follow-up period was brief, and the WL control was only maintained
221 through Step 1, leaving Step 2 HRT results based on an uncontrolled study. Future research
222 could use a longer follow-up and take advantage of randomization while testing strategies in
223 which later steps are adapted to a patient's early response (Murphy, 2005). Our PITS and TDI
224 interviewers were aware of the assessment time period, though not made aware of experimental
225 condition, and reliability raters were masked to both. Future studies should use complete
226 masking to time period as well as treatment condition. Also, our stepped care model was simple,
227 with two steps and progress through them controlled by patient self-selection. Future research

228 could extend this work by deriving algorithms for (a) automatically advancing to Step 2 those
229 predicted not to respond to Step 1 and (b) identifying at post-Step 1 those who need no more
230 treatment (i.e., have recovered and can be predicted to stay well). Another challenge is to
231 determine how to improve TTM treatment for the one-half who were still diagnosable after
232 treatment and how to reduce relapse. Improved results might entail adding a third step, perhaps
233 specialized behavioral interventions incorporating elements of ACT (Woods & Twohig, 2008) or
234 DBT (Keuthen et al., 2012). Finally, we did not measure costs; future trials could compare
235 stepped care to treatment as usual in cost-effectiveness. Evidence-based stepped care models
236 could help improve access to mental health care (Kazdin & Rabbitt, 2013).

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Footnotes

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¹For safety monitoring, WL participants received a check-in call five weeks later. None

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met criteria for reliable deterioration (≥ 6 -point increase on the MGH-HPS) or otherwise

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required immediate intervention.

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²We completed a mid-Step 1 check-in five weeks after the beginning of Step 1. One

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participant [who had been in the WL condition] experienced reliable deterioration per the MGH-

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HPS from post-WL to mid-Step 1 and was therefore offered (and accepted) immediate Step 2

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HRT.

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³Uncontrolled evaluation of Step 1 is based for all participants on change during only the

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10 weeks of Step 1 access to StopPulling.com. For those in the Immediate condition, this is

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Baseline to Post-Step 1. For WL participants, it is Post-Waitlist to Post-Step 1.

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324 Table 1

325 *Efficacy of Step 1 Web-based Self-Help: Descriptive Data at baseline and Week 10*

| | Baseline | | Week 10 ^a | |
|------------------|--------------|--------------|----------------------|--------------|
| | Immediate | Waitlist | Immediate | Waitlist |
| TDI ^b | 30 (100) | 30 (100) | 23 (82) | 25 (83) |
| PITS | 24.27 (5.15) | 23.37 (3.76) | 20.75 (6.39) | 21.90 (4.63) |
| MGH-HPS | 17.07 (3.37) | 16.77 (4.08) | 14.78 (4.49) | 15.40 (4.34) |
| Alopecia | 5.04 (1.49) | 5.22 (1.56) | 4.73 (1.73) | 5.00 (1.69) |
| SDS | 7.87 (6.30) | 9.03 (6.52) | 6.46 (5.59) | 8.00 (6.36) |
| WHOQOL | 15.77 (1.87) | 15.73 (1.64) | 15.75 (2.12) | 15.50 (2.02) |

Note. TDI = Trichotillomania Diagnostic Interview. PITS = Psychiatric Institute

Trichotillomania Scale. MGH-HPS = Massachusetts General Hospital Hairpulling Scale.

SDS = Sheehan Disability Scale; WHOQOL = World Health Organization Quality of Life.

Data are presented as mean (SD) unless otherwise indicated. At baseline: *N* = 60 for PITS,

MGH-HPS, QOL; *n* = 59 for SDS; *n* = 53 for Alopecia. At Week 10: *n* = 57 for MGH-

HPS, SDS; *n* = 58 for PITS, QOL; *n* = 52 for Alopecia.

^aWeek 10 data are from the Post-Step 1 assessment for the Immediate condition and from the Post-waitlist Assessment for the WL condition.

^bNumber (%) of participants meeting diagnostic criteria according to the TDI.

Table 2

Efficacy of Step 1 Web-based Self-help: Inferential Tests of Immediate vs. Waitlist

Condition

| Response | # missing at 10 weeks (baseline) | Models fit with imputed data | | | | | | | | |
|----------|---|------------------------------|------|------|-------------------|------|-------|------------------|------|-----|
| | | Time*TXc | | | Time ⁺ | | | TXc ⁺ | | |
| | | $\hat{\beta}$ | SE | p | $\hat{\beta}$ | SE | p | $\hat{\beta}$ | SE | P |
| MGH-HPS | 3 (0) | 0.91 | 0.95 | .34 | 1.82 | 0.47 | .0001 | -0.16 | 0.95 | .87 |
| PITS | 2 (0) | 2.06 | 1.03 | .046 | 1.47 | 0.72 | N/A** | -1.16 | 1.31 | .37 |
| Alopecia | 8 (7) | 0.23 | 0.40 | .57 | 0.24 | 0.20 | .23 | -0.16 | 0.37 | .67 |
| SDS | 3 (1) | 0.29 | 1.08 | .79 | 1.19 | 0.55 | .03 | -1.31 | 1.51 | .38 |
| QOL | 2 (0) | -.23 | 0.36 | .52 | 0.06 | 0.18 | .75 | 0.16 | 0.46 | .73 |

Note. Time = Baseline versus week 10. TXc = Immediate versus Waitlist. Time*TXc = Baseline*Immediate.

⁺From main effects only models if the Time*TXc interaction is not significant (p-value > 0.05).

**Time main effect estimate from interaction model is 1.466667 across all 20 imputed data sets for PITS – hence no p-value.

Table 3 327
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Uncontrolled Step 1 results for full sample 329
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| | Pre-Step 1 | | Post-Step 1 | | t | p | Effect size d |
|----------|------------|------|-------------|------|----------------|------|---------------|
| | M | SD | M | SD | | | |
| MGH-HPS | 16.49 | 3.92 | 15.64 | 4.65 | 1.18 | .24 | .19 |
| MGH-T | 7.32 | 1.89 | 7.11 | 2.21 | .61 | .55 | .10 |
| PITS | 23.28 | 5.14 | 21.00 | 5.75 | 3.78 | <.01 | .41 |
| Alopecia | 5.07 | 1.64 | 4.79 | 1.78 | 1.31 | .20 | .16 |
| SDS | 7.96 | 6.59 | 7.11 | 6.48 | 1.54 | .13 | .13 |
| WHOQOL | 15.64 | 1.88 | 15.75 | 2.02 | -.64 | .52 | .06 |
| | N | % | N | % | X ² | df | p |
| TDI | 55 | 92 | 48 | 80 | .44 | 1 | .51 |

Note. “Pre-Step 1” is the post-waitlist assessment for those in the WaitList condition, and the baseline assessment for those in the Immediate condition. TDI = Trichotillomania Diagnostic. PITS = Psychiatric Institute Trichotillomania Scale. MGH-HPS = Massachusetts General Hospital Hairpulling Scale. MGH-T = Massachusetts General Hospital Hairpulling Scale – Truncated version (items 4, 5, and 6; consistent with Mouton-Odum et al., 2006). SDS = Sheehan Disability Scale; WHOQOL = World Health Organization Quality of Life; % = percent of participants meeting TTM diagnostic criteria.

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Table 4

Uncontrolled Results for those who Used Step 2 HRT Treatment

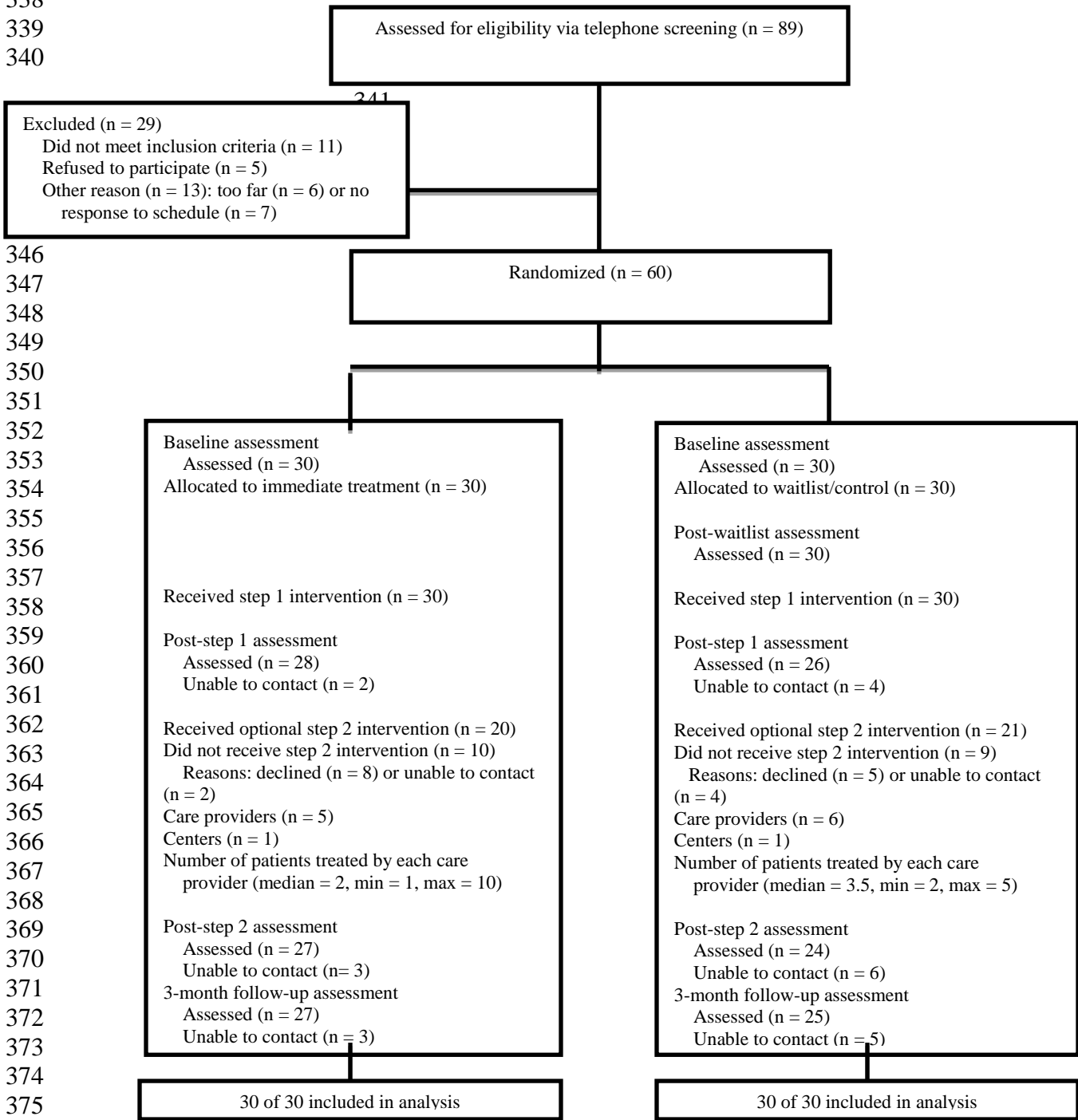
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| | Post-Step 1 | | Post-Step 2 | | t | p | Effect size d |
|----------|-------------|------|-------------|------|------|-------|---------------|
| | M | SD | M | SD | | | |
| MGH-HPS | 16.61 | 3.41 | 10.47 | 5.22 | 6.94 | <.001 | 1.39 |
| PITS | 22.17 | 5.69 | 16.03 | 6.64 | 9.94 | <.001 | .99 |
| Alopecia | 4.98 | 1.74 | 4.83 | 1.83 | 0.69 | .50 | .08 |
| SDS | 7.72 | 7.46 | 6.75 | 7.26 | 1.64 | .11 | .13 |
| WHOQOL | 15.70 | 2.13 | 16.49 | 2.08 | 4.10 | <.001 | .38 |

Note. PITS = Psychiatric Institute Trichotillomania Scale. MGH-HPS = Massachusetts General Hospital Hairpulling Scale. SDS = Sheehan Disability Scale; WHOQOL = World Health Organization Quality of Life.

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Figure 1. CONSORT Flowchart



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Figure 2.1. TTM Symptom Severity Over Time

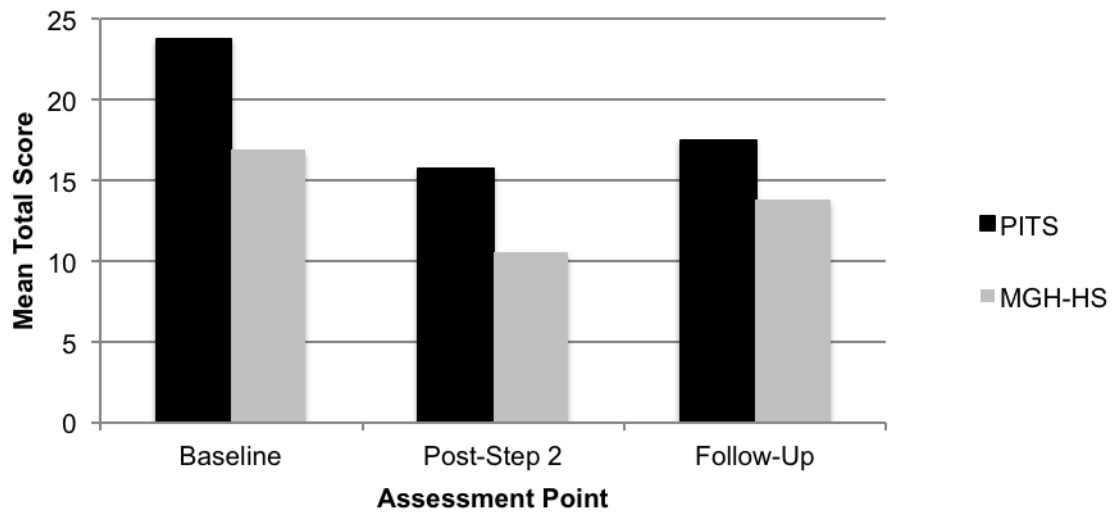


Figure 2.1. The above graph illustrates mean total scores on the PITS ($n = 42$) and the MGH-HS ($n = 49$) at baseline, post-step 2, and 3-month follow-up.

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Figure 2.2. TTM-Related Impairment, Alopecia, and Quality of Life Over Time

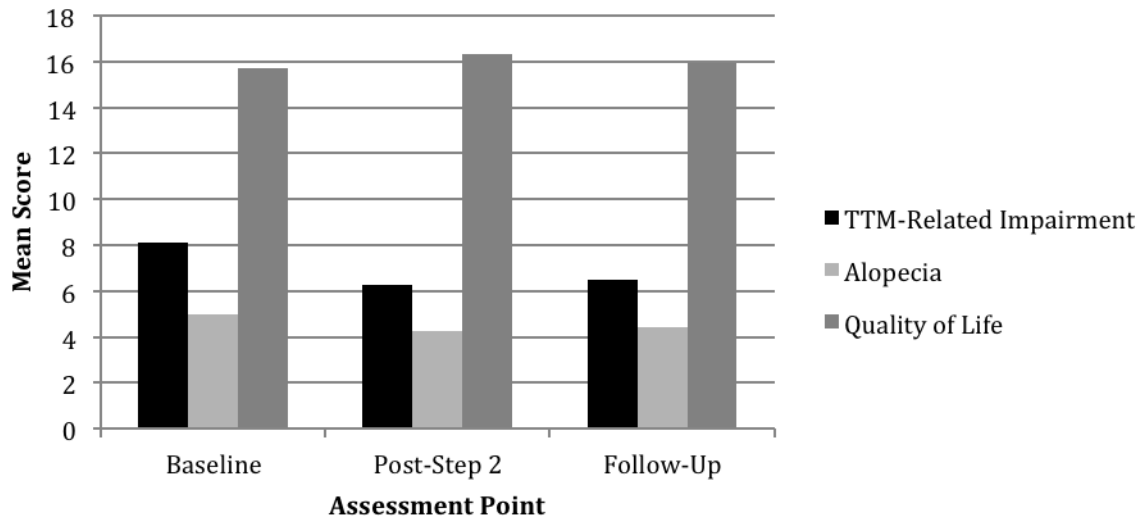


Figure 2.2. TTM-Related Impairment ($n = 48$) = the sum of all three items on the SDS. The above graph illustrates the mean TTM-Related Impairment at baseline, post-step 2, and 3-month follow-up. Alopecia ($n = 29$) = the average alopecia rating of two independent raters. The above graph illustrates the mean Alopecia at baseline, post-step 2, and 3-month follow-up. Quality of Life ($n = 49$) = the mean score across the four domains of the WHOQOL that have undergone one transformation. The above graph illustrates the mean Quality of Life at baseline, post-step 2, and 3-month follow-up.