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Therapist-Guided Internet-Delivered Acceptance-Enhanced Behavior Therapy for Skin-Picking Disorder: A Randomized Controlled Trial

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Despite its high prevalence, individuals suffering from skin-picking disorder (SPD) face limited access to treatment due to several factors, including geographical and economic barriers, as well as a shortage of properly trained therapists. Offering Internet-delivered therapy could be a solution to these barriers. This study aimed to evaluate the efficacy of therapist-guided Internet-delivered acceptance-enhanced behavior therapy (iBT) for SPD compared to a wait-list control condition. Participants randomized to the intervention group received 10 weeks of iBT ($n = 35$), while those in the control group were placed on a wait-list ($n = 35$). The primary outcome was the Skin Picking Scale—Revised (SPS-R). Mixed-model regression analyses demonstrated a significantly greater improvement in SPD symptoms in the iBT group compared to the control group at posttreatment (between-group difference −5.1 points, $F = 9.69$, $p < .001$). The between-group effect size was in the large range, with a bootstrapped d of 1.3 (95% CI [0.92, 1.69]). At posttreatment, 43% of the participants in the iBT group were classified as responders, and 31% were in remission, compared to 0% responders and 3% in remission in the control group. At the 6-month follow-up, the SPD symptoms had increased compared to posttreatment. However, the improvement from pretreatment remained significant. Participants reported a high level of

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satisfaction and credibility of the treatment, and a perceived good level of working alliance. Compared to wait-list control, iBT is an efficacious treatment for SPD at posttreatment and follow-up, with the potential to substantially increase the availability and access to evidence-based treatment for this disorder. Replication studies, particularly those comparing iBT to an active control, are warranted.

Keywords: Skin-picking disorder; Behavior therapy; ACT; Internet-delivered therapy; Online intervention

SKIN-PICKING DISORDER (SPD) is characterized by recurrent picking of one's skin, leading to tissue damage as well as significant distress and/or functional impairment in occupational, social, or other important life areas (American Psychiatric Association, 2013). SPD prevalence rates vary across studies, but a recent large epidemiological study reported a 3.1% lifetime prevalence of SPD (Grant & Chamberlain, 2020).

Behavioral treatments, including well-established techniques such as habit reversal training (HRT) and stimulus control, have shown preliminary efficacy for SPD with strong between-group effect sizes against passive control conditions (Schuck et al., 2011; Teng et al., 2006). However, only 30%–42% of the population struggling with SPD actually seek treatment for their condition (Gallinat et al., 2019a; Neziroglu et al., 2008), and among those who do, most perceive the care as relatively uninformed or helpful to only a small degree (Gallinat et al., 2019a). Some reasons for this treatment gap are a lack of information related to effective treatments and stigma related to the condition (Gallinat et al., 2019a), as well as a shortage of properly trained health care professionals (Capel et al., 2024). Together with geographic and economic barriers to treatment, this leads to generally low access to behavioral treatments for SPD (Capel et al., 2024; Gallinat et al., 2019a) Table 1.

One possible way to overcome barriers to treatment and reduce the treatment gap is to provide the treatment digitally online. Internet-delivered behavior therapy (iBT) mimics traditional face-to-face therapy in several aspects, with the primary difference being the mode of delivery. In iBT, instead of visiting a clinic, the patient logs on to a secure website and works with self-help materials and homework assignments. Treatment progression is monitored by a clinician who also provides individualized feedback to the participant. In comparison to traditional therapy, iBT offers the advantage of flexibility in terms of when and where therapy is undertaken. Additionally, it has the potential to be more cost-effective by accommodating more patients within the same time frame. However, this advantage may also be viewed as a disadvantage for participants requiring additional support or tailored treatment. There are to date three randomized controlled trials that have tested digital behavioral treatments for SPD. Two trials have reported small to moderate effect sizes when compared to a passive control (Gallinat et al., 2019b: Cohen's $d = 0.67$; Moritz et al., 2023: $n^2_{partial} = 0.019$), while a third trial found a moderate effect size when compared to an active control condition (Moritz et al., 2012: $n^2_{partial} = 0.08$). One potential reason for these rather modest effect sizes in previous iBT trials could be that they have used an unguided format with no or only nontailored e-mail support, and without the frequent monitoring and guidance from a therapist. There are some data suggesting that therapist-guided online interventions have a higher degree of compliance than unguided formats (Karyotaki et al., 2021). Moreover, patients with similar body-focused behaviors have also shown a preference for therapist-guided interventions over unguided versions (Arabatzoudis et al., 2021).

To increase access to behavioral treatments for SPD, and to potentially boost the treatment effects from unguided formats, our research group has developed a therapist-guided version of iBT for SPD. The treatment has been evaluated in a pilot feasibility study showing high levels of module completion and participant satisfaction. In addition, results showed a significant decrease in skin-picking severity from pre- to posttreatment with a large within-group effect size (Cohen's $d = 1.75$; Asplund et al., 2022). The iBT program is based on a comprehensive treatment approach that integrates acceptance and commitment therapy (ACT) with HRT, known as acceptance-enhanced behavior therapy (AEBT; Woods & Twohig, 2008). Recent empirical evidence supports the efficacy of AEBT for trichotillomania (TTM), a related condition, and it has demonstrated preliminary efficacy across various formats, including group therapy (Asplund et al., 2021), individual therapy (Woods et al., 2022), telehealth (Lee et al., 2018), and a web-based self-help program (Capel et al., 2023). Further elaboration on the rationale for AEBT is provided in subsequent sections.

In this current study, we took the next step and investigated the efficacy of our iBT treatment against a passive control group (wait-list) in a randomized controlled trial. The reason for the pas-

Table 1
Primary Outcome Measure at Every Assessment Point for the Intention-to-Treat Sample (iBT = 35, WLC = 35)

	Pre	Mid	Post	1-mo FU	3-mo FU	6-mo FU	Effect size at post		Effect size at 1-mo FU	
SPS-R	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	Within group (95% CI)	Between group (95% CI)	Within group (95% CI)	Between group (95% CI)
iBT (*n* = 35)	17.4 (3.3)	12.2 (4.0)	10.1 (4.9)	11.2 (5.2)	11.3 (5.9)	12.07 (5.04)		1.3 [0.91, 1.70]		1.2 [0.84, 1.64]
WLC (*n* = 35)	17.2 (3.5)	15.3 (3.4)	15.2 (4.4)	15.2 (3.1)	–	–			–	

Note. iBT = Internet-delivered behavior therapy; WLC = wait-list condition; pre = pretreatment; mid = midtreatment; post = posttreatment; FU = follow-up; *M* = mean; *SD* = standard deviation; SPS-R = Skin Picking Scale—Revised; CI = confidence interval. Effect sizes, Cohen's *d*, are reported with 95% CI. The 3-month FU and 6-month FU data reported for the iBT condition contained only the participants originally assigned to iBT.

sive control group design was to minimize the risk of Type II errors (Gold et al., 2017), and obtain reliable estimates of the treatment effects before taking the next step and comparing iBT against an active comparator. We hypothesized that iBT would result in greater improvements of SPD symptoms compared to the wait-list control condition. We also hypothesized that the treatment would be found acceptable and feasible by the participants.

Method

This study is reported in accordance with the CONSORT checklist for nonpharmacological trials (Schulz et al., 2010). The study was approved by the Swedish Ethical Review Authority (DNR 2022-03296-01) and was preregistered at the Open Science Framework, https://osf.io/9qsxj/, where full details of the trial design, procedures, outcome measures, and analysis plans are publicly available.

DESIGN

This was a parallel single-blind, wait-list-controlled trial conducted at a single site, Karolinska Institutet in Stockholm, Sweden, from October 2022 to June 2023. Participants were recruited nationwide in September 2022. All participants received verbal and written information about the study and signed a digital consent form before inclusion. Random assignment was performed in a 1:1 ratio without any restrictions, with participants being allocated to either 10 weeks of iBT (n = 35) or a wait-list condition (n = 35). To mitigate potential selection bias related to the randomization process, an independent individual, not involved in the study, utilized a true number service (www.random.org) to randomize the participants. The day after the randomization, participants received an e-mail informing them of their trial arm allocation and instructions on how to access the secure website for further information. After the 1-month follow-up assessment, participants in the wait-list condition were crossed over to receive iBT.

PARTICIPANTS AND RECRUITMENT

To be eligible for the study, participants needed to meet the following criteria: primary diagnosis of SPD according to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed., DSM-5; American Psychiatric Association, 2013), age 18 years or older, ability to read and understand the iBT material, daily access to the Internet, and ability to dedicate at least 30 minutes per day to the treatment program. Exclusion criteria included severe suicidal ideation (scoring 5 or above on Item 9 on the Montgomery-Åsberg Depression Rating Scale—Self-Report [MADRS-S] Svanborg & Asberg, 1994), current alcohol or drug abuse, a history of psychosis or bipolar disorder, or any other serious comorbidity that could jeopardize treatment participation. Participants who had modified any psychotropic medication within 8 weeks prior to the pretreatment assessment, completed behavior therapy for SPD within the last 24 months, or were undergoing other psychological treatments that could affect SPD symptoms were also excluded. Included participants who were taking psychotropic medication were instructed to maintain their dosage throughout the study period and participants without medication were encouraged not to initiate medication during the study period; this was verified in the clinician postassessment. Clinical characteristics and sociodemographics of the sample are presented in eTable 2 in the online supplement.

The goal of recruiting 70 participants through an advertisement on social media was successfully

achieved in one weekend. Eight participants were also recruited through information provided to caregivers. After registering and signing a digital consent on the study's secure website, interested applicants completed an online screening consisting of the Skin Picking Scale—Revised (SPS-R; Snorrason et al., 2012b), the MADRS-S (Svanborg & Asberg, 1994), the Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993), and the Drug Use Disorders Identification Test (DUDIT; Berman et al., 2005), as well as questions regarding general background information.

Applicants who fulfilled the preliminary inclusion criteria (n = 86) underwent a structured diagnostic interview over video with a clinical psychologist or with a trained student in the final year of a 5-year clinical psychology program. The aim of this interview was to establish the SPD diagnostic criteria through the Structured Clinical Interview for DSM-5—Research Version for obsessive-compulsive disorder (OCD) and related disorders (First et al., 2015), and to determine whether the inclusion and exclusion criteria were met. In addition, the participants were assessed for comorbidity with the Mini-International Neuropsychiatric Interview (MINI; Sheehan et al., 1998). The severity of the SPD was established using the clinician-rated Yale–Brown Obsessive Compulsive Scale modified for neurotic excoriation (NE-Y-BOCS; Arnold et al., 1999). General functioning was measured with the Global Assessment of Functioning (GAF) scale (Jones et al., 1995) and the clinician-rated Clinical Global Impressions Scale—Severity of Illness (CGI-S; Guy, 1976). All assessors had received extensive training in structured diagnostic interviews. To ensure reliability of the diagnostic procedure and study criteria, the project manager, who is an experienced clinical psychologist, reviewed all assessments and made the final decision on participation.

INTERVENTION

Internet-Delivered Acceptance-Based Behavior Therapy

The treatment program incorporates HRT, a specific form of behavior therapy considered to be the gold standard in treating SPD and other body-focused repetitive behaviors (BFRBs; Jones et al., 2018). HRT for SPD is designed specifically to target the automatic picking of the skin that often occurs without the individual's awareness. However, previous research suggests that HRT may be less effective when the repetitive behavior is driven by aversive emotional or physical states (Jones et al., 2018). To address this, we have combined the HRT in our program with ACT, building on previous promising research on TTM (Woods et al., 2022). Given the similarities between TTM and SPD, it has been suggested that this combination may also be effective for treating SPD (Jones et al., 2018).

The participants who were randomized to the intervention group received iBT for 10 weeks delivered via a secure Internet platform. The treatment protocol is inspired by a previously published treatment manual for individual therapy for TTM, *Trichotillomania: An ACT-Enhanced Behavior Therapy Approach*, by Woods and Twohig (2008). The iBT protocol is written in Swedish and is delivered in 10 interactive modules, with one module being delivered each week. The program includes psychoeducation, awareness training, competing response training, stimulus control, various metaphors and exercises to understand the concept of control as the problem rather than the solution, mindfulness, and explicit daily training in embracing the urges to pick without acting upon them. Additionally, the protocol includes relapse prevention. Building on our previous studies on ACT-enhanced behavior therapy for SPD (Asplund et al., 2021, 2022), the iBT protocol places a stronger emphasis on the treatment technique of "embracing the urge" to pick than the original protocol by Woods and Twohig. This technique instructs participants to deliberately trigger the urge to pick and then respond mindfully and willingly to the urge when it arises. The aim of this proactive technique is to provide the participant with skills how to resist the skin picking when the urge unexpectedly arises in everyday situations.

All core treatment components are delivered within the first six modules. All text content was also available as audio files for participants to listen to. To proceed to the next module, the participants were required to complete the homework tasks of each module as well as to monitor their time spent on picking each day, which was depicted in a digital graph. Despite not completing a module, participants retained access to their therapist for guidance and support throughout the treatment. Toward the end of the 10-week treatment, all participants were provided access to all modules. Each week, an identified therapist monitored the participants' symptoms and treatment progress, and provided them with encouragement and individualized feedback on homework tasks, as well as answered any additional questions. Feedback and answers to participants' questions were replied to within 48 hours, excluding weekends. In instances of participant inactivity, a proactive approach was implemented: when a par-

ticipant failed to submit weekly assignments on time, the therapist sent a reminder within 2 days, offering support if needed. If there was no response, similar reminders were sent weekly until the end of treatment. Additionally, automatic notifications about a new message in the treatment platform was sent to participants via text message (SMS). The Internet therapists were either licensed psychologists or psychology students in the final year of a 5-year clinical psychology program, specifically trained in iBT and with prior training in treating SPD participants. To ensure adherence to the protocol, all therapists were closely supervised, and their sent messages were monitored throughout the treatment period by the project manager. The preliminary efficacy and feasibility of the iBT protocol has previously been demonstrated in a pilot trial (Asplund et al., 2022), where a more detailed description of the treatment protocol can be found.

Wait-List Control Condition

Participants randomized to the wait-list condition received an e-mail informing them that they had been assigned to the wait-list group and would receive treatment after the 1-month follow-up assessment (1 month after posttreatment for the iBT group). They were also informed that they would receive text messages once a week as a reminder to complete weekly online self-report measures during the initial 10-week period. Furthermore, they were encouraged to reach out to the project manager if they had any questions regarding their participation in the study. After the study start, participants in the wait-list condition had no further contact with the study personnel until the postclinician assessment, which took place 10 weeks later.

ASSESSMENT POINTS AND OUTCOMES

Detailed information regarding the specific questionnaires and assessment points can be found in eMethod 1 and eTable 1 in the online supplement. The primary end point was the posttreatment assessment, which occurred 10 weeks after treatment start. An additional controlled follow-up was conducted 1 month after treatment termination. As the participants in the wait-list condition were subsequently crossed over to receive iBT, the follow-ups at 3 and 6 months after posttreatment were uncontrolled. Masked clinician-rated assessments were performed at pretreatment (2 weeks within start of treatment, Week 0) and at posttreatment (10 weeks). To assess the integrity of masking, clinicians were instructed to note whether participants had unintentionally disclosed their assigned group and to make educated guesses regarding treatment allocation after each assessment. Additionally, nonmasked clinician-rated assessments were carried out 6 months after posttreatment for the iBT-group. Participants were granted access to booster modules once they had completed the corresponding assessment. All self-rated measures were completed online.

PRIMARY OUTCOME MEASURE

The primary outcome measure was the self-rated SPS-R (Snorrason et al., 2012b), widely used in treatment trials for SPD (Jones et al., 2018). The SPS-R assesses skin-picking severity and impairment, and consists of eight items that evaluate skin lesions, subjective distress, and functional impairment related to picking. Scores on the scale range from 0 to 32, with higher scores indicating more severe symptoms. The scale has demonstrated acceptable psychometric properties, exhibiting high internal consistency ($\alpha = .83$) and evidence of convergent and discriminant validity for its two subscales (Snorrason et al., 2012b). In this sample, the internal consistency at baseline was acceptable ($\alpha = .75$). Previous research by Snorrason et al. found that a cutoff score of 9 or higher on the SPS-R can differentiate between normal skin-picking behavior and compulsive skin picking (Snorrason et al., 2022). Degree of self-rated remission was reported according to this cutoff. In addition, we reported clinician-rated remission based on the clinician postassessment.

SECONDARY OUTCOME MEASURES

Clinician-Rated Outcome Measures

Secondary clinician-rated outcome measures regarding skin-picking severity and impairment was the NE-Y-BOCS (Arnold et al., 1999). Global severity and improvement were measured with the CGI-S and the Clinical Global Impression—Improvement (CGI-I) scale (Guy, 1976). General functioning and symptom severity was measured with the GAF Function and Symptom (GAF-F/GAF-S) scales (Jones et al., 1995). Responder status was rated based on the CGI-I, where participants rated as 1 (*very much improved*) and 2 (*much improved*) were defined as responders. In addition to the self-rated remission cutoff described above, remission was also assessed by a clinician at posttreatment and at the 6-month follow-up, defined as no longer meeting the diagnostic criteria for SPD according to the clinician assessment.

Self-Rated Outcome Measures

We measured the social, behavioral, and emotional consequences of skin picking using the Skin

Picking Impact Scale (SPIS; Keuthen et al., 2001), assessed depressive symptoms using the widely used MADRS-S (Svanborg & Asberg, 1994), evaluated functional impairment using the Sheehan Disability Scale (SDS; Leon et al., 1997), and gauged perceived quality of life through the Satisfaction With Life Scale (SWLS; Diener et al., 1985).

Self-Rated Process Measures

The function of skin picking is often to avoid unpleasant internal experiences, such as urges to pick, anxiety, and distressing thoughts (Snorrason et al., 2012a). This avoidance behavior has previously been labeled *experiential avoidance* and one of the primary objectives of acceptance-based therapies is to reduce this behavior and enhance the psychological flexibility of the individual (Hayes et al., 1996). To assess changes in experiential avoidance and psychological flexibility during the treatment period, we utilized the Swedish Acceptance and Action Questionnaire (SAAQ; Lundgren & Parling, 2017). In addition, specifically for this trial's objectives, we also developed a visual analogue scale for acceptance, VAS–Acceptance (VAS-A; shown in the online supplement, eTable 7) in which the participants were asked to rate their level of acceptance of the urge to pick without acting upon it on a scale from 0 (*no acceptance at all*) to 100 (*full acceptance*). To investigate whether the iBT led to changes regarding the style of picking, we used the self-reported Milwaukee Inventory for the Dimensions of Adult Skin Picking (MIDAS; Walther et al., 2008).

FEASIBILITY OUTCOMES

Drawing from our previous experience with feasibility studies (Asplund et al., 2022; Bragesjö et al., 2021), we adopted an explorative approach, centering on three feasibility factors detailed below.

Participant Engagement

We investigated the participants' engagement in treatment regarding adherence, treatment activity, and level of treatment dropout. Level of adherence to iBT was analyzed based on the average number of modules completed during the treatment. A module was defined as completed when the participant had completed the homework assignments of the corresponding module and had registered the time spent picking each day of the week on the online registration form, creating a weekly graph of the level of picking. Additional response from the participants in the form of messages was not required—however, participants were strongly encouraged to reach out to the therapists whenever they needed assistance. Finally, we defined treatment dropout as coming to a mutual agreement with the therapist to terminate the treatment. All participants who decided to terminate the treatment prematurely were asked to participate in the postassessment regarding the primary outcome measure and the clinician-rated measures.

Treatment Satisfaction, Credibility, and Therapeutic Alliance

Treatment satisfaction was assessed using the Client Satisfaction Questionnaire (CSQ; Nguyen et al., 1983). We used the categories of satisfaction as proposed by Smith et al. (2014): *poor* (score 8–13), *fair* (score 14–19), *good* (score 20–25), and *excellent* (score 26–32). Credibility of the treatment was assessed using the Treatment Credibility Scale (TCS; Borkovec & Nau, 1972). Therapeutic alliance between the participant and the Internet therapist was assessed using the self-reported Working Alliance Inventory—Short Form (WAI-S; Busseri & Tyler, 2003), which generates a total score ranging from 12 to 84, with higher scores reflecting a more positive rating of working alliance. Additional information about these scales is available in eMethod 1 in the online supplement.

Adverse Events

Adverse events as defined by Rozental et al. (2014) were self-reported at Week 5 and at posttreatment in both groups. Participants were asked to report whether they had experienced any adverse events during the study period and, if so, how often and how negatively this event had affected them when it occurred, as well as whether the event still affected them negatively. The questionnaire, previously used in comparable trials (Andersson et al., 2021) and yielding results akin to face-to-face interviews (Andersson et al., 2015), can be found in the online supplement (eFigure 2).

SAFETY PROCEDURES

For the safety of participants, major changes in depression as well as suicidality was monitored biweekly during treatment using the MADRS-S (Svanborg & Asberg, 1994). If participants scored $\geq$5 points on Item 9, indicating suicidal ideation, they were contacted the same day by their therapist for a psychiatric assessment.

POWER CALCULATIONS AND STATISTICAL ANALYSES

The power calculation for this trial was based on data from our previous pilot trial of iBT for SPD (Asplund et al., 2022). A sample size of 35 per group (accounting for 25% data attrition) was required to obtain 88% power and an alpha level

of α = 5% (two-sided) for detecting a mean difference between iBT and the wait-list group of at least 3 points on the primary outcome measure, SPS-R (Snorrason et al., 2012b).

All statistical analyses in this study were calculated using Stata, version 13.1, and were conducted according to the intention-to-treat (ITT) principle, including all 70 participants. Linear mixed-effects models (Verbeke & Molenberghs, 2009) with maximum likelihood estimations with fixed effects of group (iBT vs. wait-list), time (pretreatment (Week 0, Weeks 1–10, 1-month follow-up), and Group × Time interaction, as well as random intercepts (except for the assessments that were only conducted at pre- and posttreatment), were carried out. The maintenance of the therapeutic gains of the iBT group beyond the 1-month follow-up was evaluated by testing the effect of time from posttreatment to the 3- and 6-month follow-up assessments.

Effect sizes (Cohen's *d*) were calculated in a conservative manner, using all available data instead of completers only. To calculate the effect sizes, we used the Stata-command m_effectsize, which gives an estimation of the effect sizes by dividing the estimated change score in a mixed-effects regression analysis (the estimated Group × Time interaction based on data from all weekly measures) by the pooled standard deviation at pretreatment. In addition, in order to construct a 95% confidence interval (CI) around the estimated effect size, 1,000 bootstrap replications were conducted. The m_effectsize command can be downloaded to Stata, using the command "net install m_effectsize, from (http://www.imm.ki.se/biostatistics/stata) replace." In order to detect a possible correlation of decreased symptoms of skin-picking and significantly increased psychological flexibility and decreased experiential avoidance during the treatment period, we did a post hoc correlation analysis between the delta value on the SAAQ (Lundgren & Parling, 2017) and the VAS-A and the delta value on the SPS-R (Snorrason et al., 2012b). Missing data of the primary outcome measure at posttreatment and follow-up were deemed to be missing at random by using analyses with logistic regression models (p = .527–.199).

Results

The sociodemographic and clinical characteristics of the participants at baseline are presented in eTable 2, in the online supplement. Participant flow through the trial is illustrated in eFigure 1, also found in the online supplement. Data attrition at posttreatment (primary end point) was low (6%), with equal distribution across groups (three participants in iBT, one participant in wait-list condition). Two participants revealed their group allocation at the posttreatment clinician assessment. The masked assessors' guesses of group allocation were not significantly associated with actual allocation when controlled for CGI-I status (β = –0.20, Z = –0.18, p = .858). No changes in medication during the study period were reported.

PRIMARY OUTCOME MEASURES

Effects on Skin Picking

SPS-R scores were significantly lower in the iBT group than in the wait-list condition at posttreatment (10 weeks; β = 0.52, Z = 9.69, p < .001). The standardized between-group effect size was large at both posttreatment and at the 1-month follow-up: bootstrapped d = 1.3, CI [0.91, 1.70] and d = 1.2, CI [0.84, 1.64], respectively. The iBT group had a modest worsening of symptoms from posttreatment to the 6-month follow-up (β = 0.57, Z = 2.65, p = .008). However, the difference from pretreatment to 6-month follow-up remained significant (β = –5.51, Z = –8.36, p < .001).

Self-Rated Remission

According to the cutoff established by Snorrason et al. (2022), 34% of the participants in the iBT group achieved remission at posttreatment compared to none of the participants in the wait-list condition. At the 1-month follow-up, 26% of the participants in the iBT group remained remitted, while still none of the participants in the wait-list condition had reached remission. At the uncontrolled follow-ups at 3 and 6 months after posttreatment, 31% and 17%, respectively, of the participants in the iBT group were in remission Table 1.

SECONDARY OUTCOME MEASURES

Clinician-Rated Outcome Measures

At posttreatment, 43% (n = 15) of the participants in the iBT group were rated as responders based on the CGI-I, compared to none in the control group. The number of responders in the iBT group had increased to 49% (n = 17) at the 6-month follow-up. The CGI-S and CGI-I results are presented in eTable4 in the online supplement. According to the clinician assessment, 11 participants (31%) in the iBT group no longer fulfilled the diagnostic criteria for SPD at posttreatment compared to 1 participant (3%) in the control group. At the 6-month follow-up the number of participants no longer fulfilling the criteria had decreased to 7 (20%) in the iBT group. Skin-picking severity and impair-

ment according to NE-Y-BOCS, were significantly lower in the iBT group compared to the wait-list condition at posttreatment ($\beta = 6.73$, $Z = 6.01$, $p < .001$). The NE-Y-BOCS improvements of the iBT group were sustained at the 6-month follow-up. Significantly larger improvements for the iBT group from pre- to posttreatment were also found regarding non-disorder-specific functional impairment and general symptoms according to GAF-F ($\beta = -6.86$, $Z = -5.19$, $p < .001$) and GAF-S ($\beta = -7.59$, $Z = -5.38$, $p < .001$). The effect sizes of these improvements were large. Detailed information of the results from the clinician-rated outcome measures are presented in eTables 3 and 4, in the online supplement.

Self-Rated Outcome Measures

Significantly larger improvements in the iBT group compared to the wait-list condition were also seen on self-rated behavioral and emotional consequences of skin picking (SPIS; $\beta = 3.10$, $Z = 3.39$, $p = .001$). These improvements were maintained at the 3- and 6-month follow-ups. Results from the non-disorder-specific self-rated outcome measures are presented in eTable 4 in the online supplement.

Self-Rated Process Measures

No significant differences between the iBT group and the wait-list condition were found regarding general psychological inflexibility and experiential avoidance according to the SAAQ, $\beta = -1.90$, $Z = -1.49$, $p < .137$, Cl [–4.41, –0.60], from pre- to posttreatment. However, according to the more SPD-specific questionnaire VAS-A, the increase in acceptance toward the urges to pick was significantly larger in the iBT group compared to the wait-list condition from pre- to posttreatment, $\beta = -0.03$, $Z = -9.00$, $p < .001$, and the effect size was large (bootstrapped $d = 1.35$, Cl [0.85, 1.85]). The degree of acceptance toward the urges in the iBT group was maintained at the 6-month follow-up. The increase in acceptance according to VAS-A in the iBT group at posttreatment was strongly correlated with reductions in skin-picking severity (SPS-R, rho = –0.56, $p < .006$, $N = 32$). There were no significant changes from pre- to posttreatment regarding styles of picking for none of the two groups. This was true for both automatic (MIDAS automatic, $\beta = 1.20$, $Z = 1.68$, $p = .093$) and focused picking (MIDAS focused, $\beta = -0.04$, $Z = -0.04$, $p = .965$). For further details, see eTable 4 in the online supplement.

FEASIBILITY OUTCOMES

Participant Engagement

Participants in the iBT group completed an average of 8.2 modules ($SD = 2.6$, range = 2–10) and sent an average of 10.4 additional messages to therapists ($SD = 6.0$, range = 3–30) during the 10-week treatment. A majority of the participants (83%, $n = 29$) took part of the core components of the treatment by completing at least 6 modules (in which the main HRT and ACT techniques were presented) out of the total 10 modules. In addition, half of the sample (51%, $n = 18$) completed all 10 modules. However, a linear regression did not show any significant association between the number of completed modules and decrease in SPS-R, $\beta = -0.29$, $p = .450$, $N = 32$). The completion rate of the three booster modules was lower, with a mean of 1.3 modules ($SD = 1.3$) in the iBT group. Half of the iBT group (54%) completed at least one booster module, whereas all of the booster modules were completed by less than a third (29%) of the iBT group. Only two participants (6%) decided to end the treatment prematurely (at Modules 2 and 4), based on reasons extrinsic to treatment (extensive work load).

Treatment Satisfaction, Credibility, and Therapeutic Alliance

The mean score of the CSQ ($M = 25.1$, $SD = 4.4$, $n = 32$) indicated a good overall level of satisfaction with the iBT in accordance with the definitions proposed by Smith et al. (2014). Within the iBT group, 26 (81%) participants rated the quality of the treatment as "excellent" or "good." A majority of the participants ($n = 30$; 94%) stated that they would recommend iBT to a friend. Furthermore, 23 participants (72%) stated their intention to seek help from a similar program if they were to seek treatment again.

Credibility ratings of the iBT were fairly high, with a mean total score of 36.8 ($SD = 9.5$, $n = 32$) on the TCS total score ranging from 5 to 50. The mean score on the WAI-S, measuring therapeutic alliance, was 62.6 ($SD = 12.7$, $n = 32$) on a scale ranging from 12 to 84 in total score, indicating a high degree of working alliance. Additional detailed information is available in eTable 4 and eTable 5 in the online supplement.

Adverse Events and Protocol Deviations

No serious adverse events were reported during the study period. Seven (20%) participants in the iBT group, compared to one participant in the control group, reported mild adverse events. We deemed all of these events to be expected and treatment related as they are commonly reported in psychological treatment trials (Gullickson et al., 2019). For instance, the participants reported experiencing increased stress and anxiety when working with the treatment modules. One of the affected participants reported that the

increased feelings of shame and anxiety led to enhanced motivation to make behavioral changes with regard to their SPD. At posttreatment, the adverse events had subsided for two of the participants, and for the other five participants the experiences were only mildly affecting them. See eTable 6 in the online supplement for more detailed information on adverse events.

All participants taking psychotropic drugs at baseline reported in the clinician postassessment that their dose was kept stable during the treatment period, except for one participant who reported an increased dose during the last week of the treatment period. None of the participants who were not taking psychotropic drugs at baseline reported starting medication during the treatment period. Furthermore, none of the participants reported receiving any other form of psychological treatment during the treatment duration.

Crossover Participants

The participants in the wait-list control condition were offered iBT after the 1-month follow-up. One participant declined treatment because of a stressful job situation. Participants who crossed over to iBT ($n = 34$) demonstrated a significant reduction in SPD symptoms according to the SPS-R after receiving 10 weeks of iBT, with a mean reduction of −4.21 ($Z = -7.46$, 95% CI [−5.31, −3.10], $p < .001$). Clinically significant change according to Snorrason et al. (2022) was achieved by 29% of the crossed-over participants after receiving treatment.

Discussion

In the current study we examined whether a therapist-guided iBT program was more effective than a wait-list control condition in reducing SPD-symptoms. As predicted, iBT demonstrated significantly greater improvements in skin-picking symptoms compared to the wait-list group. This finding was observed in both clinician- and self-rated outcomes with large between-group effect sizes at posttreatment and at the controlled 1-month follow-up. Furthermore, participants in the iBT group, on average, completed 80% of the program's 10 modules, aligning with participant engagement levels observed in previous iCBT trials for OCD and body dysmorphic disorder (BDD; Andersson et al., 2012; Enander et al., 2014). Given that participants were not required to send messages to the therapist, except for completing the homework assignments, the average number of additional messages exchanged in this trial serves as an indicator of patient engagement. Moreover, a majority of participants reported being satisfied or very satisfied with the treatment and over 90% reported that they would recommend it to a friend. Additionally, there were only a few reported adverse events and none of them were serious. The majority of the participants rated iBT as highly acceptable and credible, with a positive perception of the working alliance. Strengths of this trial include the large sample size, low degree of data attrition, clinician-verified diagnoses, long-term follow-ups, and the use of blinded assessors.

Overall, the between-group effect sizes found in this trial are consistent with those reported in previous wait-list controlled studies testing conventional face-to-face behavior therapy for SPD (Cohen's $d = 0.76–1.33$; Schuck et al., 2011; Teng et al., 2006). The effect sizes found in this trial were generally larger than previous studies that tested unguided online interventions ($d = 0.28–0.67$; Gallinat et al., 2019b; Moritz et al., 2012, 2023; Rozental et al., 2014). One potential reason for this difference could be that the iBT treatment used in this trial was guided by a therapist, which in turn could have led to higher compliance rates. It is also possible that the incorporation of ACT elements into traditional HRT may have contributed to an increase in engagement with the active exercises. While these results highlight the effectiveness of our therapist-guided iBT approach, it's important to note that understanding the underlying processes of change during treatment and identifying the most effective elements of iBT remain open questions. Similar to a previous trial on sudden gains in individuals with OCD (Hamdeh et al., 2019), future studies should delve into investigating the processes of change during treatment, identifying when and for whom change occurs, and exploring the specific elements of iBT that are most effective in treating SPD.

As in our pilot trial of iBT, the findings related to experiential avoidance were ambiguous (Asplund et al., 2022). We observed significant decreases in only one of the two acceptance-related outcome measures from pretreatment to posttreatment. As hypothesized in the pilot trial, it is possible that increases in domain-specific acceptance of urges to pick was not fully captured by the more general measure of experiential avoidance assessed by the SAAQ. For the specific purpose of this trial, we instead developed the one-item VAS-A, which showed a surprisingly strong relationship with improvements in SPD symptoms. Future studies should aim to compare the VAS-A with other similar instruments in the

field and to investigate whether scores on this scale can moderate or mediate treatment outcome in acceptance-based interventions for SPD.

Several limitations apply to the study results. First, we used a passive control condition, and could therefore control for a number of unspecific factors, such as the passage of time and repeated assessments. However, passive comparators do not allow to control for unspecific treatment effects, such as expectancy or alliance effects. Therefore, one next step would be to compare iBT against an active comparator and/or benchmark this treatment against face-to-face BT. Another limitation was the uncontrolled long-term follow-ups, which ended 1-month posttreatment. Future trials should include longer controlled assessment points. A third limitation was that participants in the current study were self-referred and this might affect the generalizability of the findings to SPD patients in psychiatric outpatient clinics. However, the sample demographics in this trial did not substantially differ from the clinician-referred sample in our previous iBT pilot study, which was conducted within a psychiatric setting (Asplund et al., 2022). Finally, as in most other trials on SPD (Gallinat et al., 2019b; Moritz et al., 2012; Schuck et al., 2011; Teng et al., 2006), very few men were included in the current trial, which might further affect the generalizability of the findings. Recent research suggests that skin-picking is equally prevalent in men and women (Grant & Chamberlain, 2020) and future studies should investigate novel recruitment methods to also reach men who suffer from SPD.

While participants randomized to iBT experienced substantial improvements in skin-picking severity, fewer than one third were deemed to be in remission at posttreatment. This aligns with previous research (Schuck et al., 2011) and underscores the need for further advancements and innovations for the large population of individuals who struggle with SPD. One potential strategy for enhancing the effectiveness of iBT could involve early identification of individuals at high risk of being nonresponders, followed by tailored adjustments or scaling of the treatment, as demonstrated in Internet-delivered treatment for insomnia (Forsell et al., 2019). For instance, low treatment adherence in the early stages of the intervention could serve as an indicator of poor treatment response, as was demonstrated in face-to-face OCD, where early patient adherence significantly predicted treatment outcome (Simpson et al., 2011). Identifying individuals with low treatment adherence and offering them additional forms of complementary support (e.g., video sessions and SMS text reminders) may potentially enhance the effectiveness of iBT. Another important revenue for future research is to explore what predicts positive treatment outcomes following iBT for SPD. For instance, previous research on predictors of Internet-based cognitive-behavioral therapy (iCBT) for OCD (Wheaton et al., 2021) has demonstrated that higher baseline symptom severity, pretreatment avoidance behaviors, and prior history of face-to-face CBT, predicted worse treatment outcome. Identifying such predictors in the context of iBT for SPD could possibly allow enhancements of iBT in order to maximize treatment outcomes. Additionally, in conjunction with baseline screening assessments, these predictors could help clinicians determine when an alternative treatment is a better option.

Another potential approach to enhance patient engagement could be to offer "modular treatments," which allow patients to concentrate on modules or components that address their unique needs. Modular treatments have demonstrated benefits compared to fixed module sequencing in the treatment of various psychiatric disorders (Chorpita et al., 2017). In the context of treating SPD, this approach would allow for tailoring the treatment so that patients can concentrate their efforts on the components designed to target their specific type of skin-picking behavior. Individualizing the program by offering optional modules for specific problems that some patients may experience, could be another way to increase patient engagement. For instance, individuals whose picking behaviors are predominantly triggered by emotional instability could be provided with an optional module that specifically provides emotion regulation techniques. A third strategy to further improve treatment outcomes could be to identify those individuals who deteriorate and/or relapse after receiving the acute treatment. There were some modest detoriations on the SPS-R from posttreatment to the 6-month follow-up and it is possible that this deterioration is driven by certain individuals' trajectories during treatment. Future studies should investigate this more in-depth. In alignment with the trial of an online intervention for participants with TTM by Rogers et al. (2014), iBT could also serve as the first step in a stepped-care approach. Participants not responding to iBT or experiencing relapse after acute treatment could be offered a second step in the form of face-to-face therapy.

One final limitation and a potential avenue for future research lies in the current trial's design. Our design precludes definitive conclusions regarding the optimal number of modules required

for treatment success. A prospect for future investigation may involve a comparative analysis between a more condensed treatment package and the current 10-week approach, aiming to assess whether comparable treatment effects can be achieved within a shorter time frame.

CONCLUSIONS

In conclusion, the results from this study suggest that iBT is a promising treatment for individuals with SPD. The treatment format has the potential to significantly increase the access to an evidence-based intervention for individuals with SPD. Future trials should incorporate active comparators to investigate the specific effects of this treatment.

Supplementary data to this article can be found online at https://doi.org/10.1016/j.beth.2024.04.006.

Data Availability

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.

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