

# Cognitive behavior therapy as dermatological treatment: a narrative review

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## ABSTRACT

**Background:** Cognitive behavior therapy (CBT) is efficacious in treating numerous psychological disorders. It is also effective in combination with medication for chronic pain, diabetes, and other diseases. Patients with skin disease report high levels of stress, anxiety, and negative feelings.

**Objective:** To summarize the findings on the utility of CBT for the improvement of skin status and quality of life in patients with dermatological conditions.

**Methods:** PubMed and Google Scholar databases were searched for relevant articles from database inception to the time of search (October 20, 2021). A total of 30 included studies featured 10 on psoriasis, 11 on atopic dermatitis, 4 on vitiligo, 4 on acne, and 1 study on alopecia areata.

**Results:** Several studies, including randomized controlled trials with large study samples, support the effectiveness of CBT and Internet CBT for a number of dermatological conditions. Patients who completed CBT courses were less likely to rely on dermatological healthcare during follow-up.

**Limitations:** There are a limited number of studies discussing the implementation of CBT for alopecia, acne, and vitiligo.

**Conclusion:** Patients who underwent CBT or Internet CBT in addition to skin care demonstrated improvement with quality of life and severity of skin disease as compared to controls only receiving standard of care treatment.

**Keywords:** acne, alopecia, atopic dermatitis, cognitive behavior therapy, habit reversal therapy, psoriasis, psychodermatology, vitiligo, web-based interventions

## Introduction

Cognitive behavior therapy (CBT) is defined by the American Psychological Association as a method of treatment directed to recognizing problematic dysfunctions in thinking and to developing strategies to change thinking and behavior patterns in response to future stressors.<sup>1</sup> It is based on the underlying premise that challenging situations often elicit unhelpful ways of thinking and problematic patterns of behavior. Through the course of 5 to 20 short therapy sessions, CBT is prescribed to increase self-awareness and to reshape negative thoughts and emotions such that future responses to challenging situations are more effective. CBT is efficacious for numerous psychological

disorders, including depression, anxiety, attention deficit and hyperactivity disorders (ADHD), and eating disorders.<sup>1-3</sup> It is effective in combination with medication for chronic pain, diabetes, and several conditions that disproportionately affect women, including menopausal symptoms, postpartum depression, insomnia, and bulimia nervosa.<sup>4-6</sup>

Patients presenting with dermatological lesions in sensitive areas and easily visible body regions may experience high levels of emotional distress. Therefore, the importance of having awareness for the prevalence of psychological comorbidities in

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### What is known about this subject in regard to women and their families?

- Cognitive behavior therapy (CBT) is used to treat several conditions that disproportionately affect women.
- It is efficacious in the treatment of menopausal symptoms, postpartum depression, insomnia, and bulimia nervosa.

### What is new from this article as messages for women and their families?

- Dermatological conditions are associated with diminished quality of life and mental health due to pain and stigma associated with lesions and scars.
- CBT is correlated with improved outcomes in quality of life, mental health, and skin status for patients suffering from conditions like psoriasis, atopic dermatitis, acne, vitiligo, and alopecia areata.
- For women who carry the burden of employment, childcare, and other responsibilities, CBT may be an effective solution due to its cost-effectiveness, feasibility, and ability to be combined with standard skin care.

dermatological conditions is clear. The objective of this narrative review is to summarize the findings on the utility of CBT for the improvement of skin status and quality of life (QoL) in patients with dermatological conditions.<sup>7-11</sup>

## Methods

In preparation for this narrative review, PubMed and Google Scholar databases were searched for relevant articles using the keywords: cognitive behavior therapy (CBT) and dermatology, habit reversal and dermatology, psychodermatology, CBT and psoriasis, CBT and atopic dermatitis (AD), CBT and vitiligo, CBT and alopecia, CBT and acne, skin picking behaviors, CBT and itch intensity, CBT and scratch intensity, virtual CBT and dermatology, internet-delivered CBT and dermatology (Table 1). Articles from database inception to time of search (October 20, 2021) were considered. Additionally, we screened the reference sections of all included studies. A total of 30 studies were deemed eligible, including 10 studies on psoriasis, 11 on AD, 4 on vitiligo, 4 on acne, and 1 on alopecia. We did not limit our search criteria to studies published only in the United States; hence, this total includes studies performed in the Americas, Europe, and Asia.

## Results

### Scope for psychological intervention in patients with skin disease

Psychological conditions and dermatologic disease are closely related. Some studies implicate the involvement of the psychoneuro-immuno-endocrine pathway, highlighting the importance of treating underlying pathophysiologies related to stress in dermatology patients<sup>12,13</sup> (Figure 1). CBT has been used for: acne excoriée, AD, factitious cheilitis, hyperhidrosis, lichen simplex chronicus, needle phobia, neurodermatitis, onychotillomania, prurigo nodularis, trichotillomania, and urticaria.<sup>13</sup> CBT may be most helpful when dealing with conditions that may be triggered or exacerbated by psychological stressors. In addition to improving skin status and QoL in dermatological patients, CBT may help reduce stress, anxiety, and depression.<sup>14</sup> However, there is a paucity of dermatologists trained in CBT and a lack of access to adequate psychological resources for eligible dermatology patients.<sup>9</sup> For example, dermatologists in the Netherlands refer only 8 patients per year for psychological treatment<sup>10</sup>; 50% of dermatologists in the Netherlands have never referred to a psychologist or other psychosocial therapist.

### Psoriasis

Psoriasis is one dermatological condition wherein the scope for implementation of CBT has been extensively explored. High stress is correlated with more severe psoriasis. In a prospective study on a population of patients with psoriasis, high stress was positively associated with disease severity (0.28,  $p < .05$ ) and itch

(0.26,  $p < .05$ ).<sup>15</sup> As compared to healthy controls, lesional and non-lesional psoriasis skin have higher mRNA expression in key components of the corticotrophin-releasing hormone-proopiomelanocortin (CRH-POMC) system.<sup>16</sup> This system is active during periods of emotional stress and local trauma. The hyperactivation of this cutaneous stress system in psoriasis patients as compared to controls indicates that the hypothalamic-pituitary-adrenal axis (HPAA) is one potential mediator of the stress and skin disease relationship in psoriasis.

Recognizing the pathophysiological consequence of stress in psoriasis patients suggests it may be helpful to manage and reduce stress. Psychodermatologic interventions, such as psychotherapy or behavioral therapy, may be beneficial early in the course of treatment.<sup>10</sup> Benefits include preventing extensive scratching and improving adherence to medical treatment. However, dermatologists seldom refer patients for psychological interventions. To facilitate multidisciplinary approaches to psychodermatological problems, increased familiarity with screening, treatment, and referral practices for psychological comorbidities may be helpful.

CBT is an empirically validated psychological intervention with a history of use for psoriasis. Medical treatment only, such as psoralen plus ultraviolet A, does not always improve patient anxiety, depression, or worry, despite reduction in intensity of psoriasis-related symptoms.<sup>17</sup> Psychological treatment combined with standard medical treatment might elicit better treatment outcomes.

In studies where no medical interventions were described, psoriasis patients who received CBT reported improved anxiety, depression, and QoL scores despite no improvement in psoriasis symptoms<sup>7,18,19</sup> (Table 2). When CBT was combined with narrow-band ultraviolet B therapy, 65% of patients achieved PASI75 as compared with 15% of patients receiving UVB phototherapy only ( $p = .007$ ).<sup>20</sup> The combined treatment group also reported more improvement in depression and QoL scores (Table 2).

Similarly, combining internet-based CBT and standard medical treatment resulted in greater improvement in physical functioning ( $d = 0.36$ ,  $p = .03$ ) but no improvement in psychological outcomes when compared to a control group receiving only standard medical care ( $p < .05$ )<sup>21</sup> (Table 2). Differences in psychological outcomes between in-person and internet-based CBT interventions are not yet well characterized.

A report from the International Psoriasis Council Workshop on the Role of Stress in Psoriasis calls for more research on CBT's utility in dermatologic conditions.<sup>11</sup> More robust trials could evaluate the impact of CBT on physiological and psychological symptoms associated with psoriasis. The report also calls for dermatologists to become more skilled in offering psychodermatologic treatment in collaboration with a network of psychological experts.

### Acne and skin-picking disorder

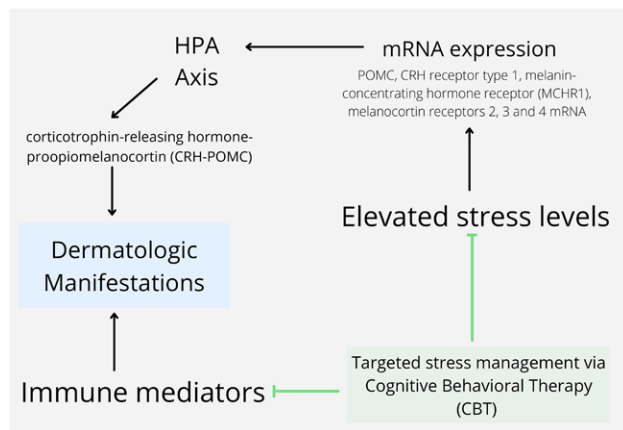
Acne is globally prevalent in 10% of the population, disproportionately affecting adolescents.<sup>22</sup> Patients with acne often have

**Table 1**

#### Types of CBT interventions used to treat dermatological conditions

Type of CBT intervention	Description
Standard CBT	Face-to-face individual or group therapy conducted through the course of 5 to 20 short in-person sessions with a provider
iCBT	Modules presented with gradual access on an internet-based platform along with opportunities to receive written feedback on homework assignments from a supervising provider
CBSH	Cognitive-behavioral modules presented through web pages with interactive features and supplementary material (personal workbooks, assessments, and additional exercises)
HRT	A specific form of CBT tailored to developing self-awareness and strategies to treat impulse control disorders, such as body-focused repetitive disorders, excoriation, and trichotillomania

CBSH, cognitive-behavioral self-help; CBT, cognitive behavior therapy; HRT, habit reversal training; iCBT, internet CBT.



**Fig. 1.** CBT targets elevated stress levels and immune pathway mediators, both of which are hypothesized to be mechanisms underlying the cutaneous manifestations seen in psoriasis AD, and other chronic inflammatory AD, atopic dermatitis; CBTs, cognitive behavior therapy.

limited knowledge in proper methods of self-care.<sup>23</sup> CBT could make patients more aware of negative cognitive distortions that influence limited adherence to recommended treatments like isotretinoin and excessive use of strong foam and oil cleansers that aggravate acne.

The scope for CBT as treatment for subtypes of acne such as acne excoriée is promising, given the underlying body-focused repetitive behavior and the correlation with other psychological disorders. CBT was 2.67 times more likely to reduce the clinical severity of lesions from moderate/severe to mild as compared to controls ( $p = .01$ ).<sup>24</sup> It also reduced mean depression scores as defined by the Beck Depression Inventory (BDI) by 5.4 more points in comparison to controls ( $p = .01$ ).<sup>24</sup> Furthermore, it reduced mean self-reported skin picking as defined by the Self-Reported Skin Picking Scale (SPS) by one point more than controls ( $p = .02$ ).<sup>24</sup> Patients undergoing CBT also report a 77% decrease in skin picking from pretreatment period compared to a 16% decrease in the wait-listed control group ( $p < .01$ ).<sup>25</sup> At 3-month follow-up, this discrepancy remained ( $p < .01$ ).

College-age patients undergoing CBT reported reduction in severity of lesions and in skin-picking behavior during CBT and 2-month follow-up.<sup>26</sup> These behaviors were reported based on the SPS ( $F = 8.68$ ,  $p < .01$ ), the Skin Picking Impact Scale ( $F = 7.8$ ,  $p < .01$ ), and the Self-Control Cognition Questionnaire ( $F = 17.89$ ,  $p < .01$ ). CBT may facilitate good long-term self-care practices correlated with better dermatological outcomes. Further studies in larger, more demographically diverse cohorts are needed to assess the impact of CBT on patient behavior and disease progression.

### Alopecia areata

The evidence for CBT in the treatment of alopecia areata is limited but promising. Taher et al.<sup>27</sup> reported QoL improvement in patients with alopecia areata as per the Skindex-16 ( $p < .05$ ) after cognitive-behavioral stress management therapy courses. These improvements were noted upon completion of the course and with 1-month follow-up. This study was conducted in a cohort of female patients in Iran, providing further evidence for CBT's effectiveness in treating conditions that affect women.

### Vitiligo

As with alopecia, the impact of CBT on vitiligo is not well characterized. Administering CBT may be challenging as patient retention can be a hurdle, arising primarily due to

the lack of understanding and appreciation for CBT among patients<sup>28</sup>; 8 of 13 enrolled patients completed their CBT course, and 5 of 8 demonstrated an improvement of 10 points from baseline in Skindex-16 scores at 12-week follow-up (no  $p$  value available). Patients who did not complete treatment cited time constraints and hesitancy to pursue treatment devoid of medication.

After 8 weeks of CBT and during 5-month follow-up, patients undergoing CBT for vitiligo reported better QOL as indicated by scores for DLQI, Rosenberg Self-Esteem Scale, Body Image Automatic Thoughts Questionnaire, and Perceived Stress Scale (PSS) ( $p < .001$ ).<sup>29</sup> The authors commented on CBT improving vitiligo outcomes but failed to demonstrate improved outcomes using specific instruments or benchmarks.

The effectiveness of CBT in vitiligo has been mixed.<sup>30</sup> In comparison to controls receiving no intervention, patients randomized to group CBT had better general health ( $p = .039$ ) but no better physical or psychosocial outcomes at 6- and 12-month follow-up.<sup>29</sup> A potential explanation for failure of group CBT is that therapists may not have been able to gain knowledge of an individual participant's perception of their vitiligo and its ramifications. The American Psychological Association considers the individual patient-therapist relationship to be the biggest determinant of the efficacy of psychological intervention.<sup>31</sup>

A recent study randomized vitiligo patients into 3 groups: cognitive behavioral self-help (CBSH), CBSH augmented with implementation intentions (CBSH+), or no intervention.<sup>32</sup> Both interventional groups received leaflets detailing psychoeducation, relaxation, and attentional refocusing techniques. The CBSH+ leaflets additionally offered "if-then" plans targeting specific negative feelings. Overall, 24% of participants in the CBSH+ group experienced improvement in social anxiety measures as compared with 8% in the CBSH group and 0% in the control group ( $p < .01$ ).

### Atopic dermatitis

As with psoriasis, data addressing the use of CBT for AD are more extensive. Scratching is heavily associated with anxiety.<sup>33,34</sup> Habit reversal therapy (HRT), which is a form of CBT, can reverse maladaptive responses to itch and improve self-reported skin status. CBT reduces eczema severity ( $-0.367$ ,  $p = .006$ ), itch intensity ( $-0.805$ ,  $p = .030$ ), and scratch intensity ( $-0.620$ ,  $p < .0001$ ) in patients with AD. Skin conditions ( $g = 0.54$ ), psychosocial conditions ( $g = 0.53$ ), and itch and scratch reactions ( $g = 0.67$ ) improved more with HRT in conjunction with topical therapy than with topical therapy alone.<sup>35</sup>

HRT improves self-reported scratching and skin status with 6-month follow-up (Table 3).<sup>36</sup> In chronic AD, scratching behavior and skin status also improved more with HRT in conjunction with topical therapy than with topical therapy alone.<sup>37,38</sup>

Compared to dermatological therapy only, CBT or CBT plus dermatological education was correlated with lower eczema severity, scratching, and itch intensity (Table 3).<sup>8</sup> Notably, patients receiving CBT only reported lower eczema severity than patients with CBT plus dermatological education; however, the opposite was true in the context of scratch intensity and itch frequency. In comparison to both these groups, patients who received autogenic training as relaxing therapy experienced lower levels of eczema severity and scratching; however, both CBT groups reported less itch intensity than the autogenic training group.

Similarly, itch-coping training improved skin status and reduced self-reported itching and scratching ( $p < .05$ ).<sup>39</sup> Patients who underwent therapy relied less on dermatological health-care, corticosteroid medications, and itch-relieving agents during follow-up. CBT intervention can be a "win-win" for patients, providers of dermatological care, and the healthcare system at large.

**Table 2**

**Studies on CBT and psoriasis**

Author	Sample size, mean age (SD)	Participant characteristics	Study setting	Study design	Intervention	Control group	Psoriasis outcomes	Mental health outcomes	Quality of life outcomes
Bundy et al, <sup>7</sup> 2013	135; 45 (12.7)	Patients with physician-diagnosed mild-to-moderate chronic plaque psoriasis recruited from a community-based population by advertisement	Online	RCT	A self-designed a web-based psoriasis-specific CBT treatment program	Wait list	No significant improvement as per SAPASI	Lower anxiety scores (intervention 7.6 [3.6] at baseline and 6.1 [3.5] at follow-up vs control 8.3 [3.5] at baseline and after intervention 8.1 [4.4], [p = .004]) as per HADS	Improved QoL ratings (before 6.6 [4.2] and after intervention 5.0 [5.1] vs control before 7.4 [4.4] and after intervention 7.7 [4.5], [p = .042]) as per DLQI
Faridhosseini et al, <sup>19</sup> 2016	16; N/A	Psoriasis patients reporting to clinic	Mashhad University of Medical Sciences, Mashhad, Iran	RCT	Cognitive-behavioral stress management in 8 sessions	No intervention	None reported	Average scores of anxiety and depression were decreased (< .05) as per HADS	Quality of life in the experimental group was increased (p < .05) as per DLQI
Alipour et al, <sup>18</sup> 2013	20; N/A	Psoriasis patients reporting to clinic	Tehran University of Medical Sciences, Tehran, Iran	RCT	CBT treatment for 12 sessions	No intervention	No significant improvement as per PASI	Improvement in anxiety, insomnia (effect size 0.45 and p = .004), depression (effect size: 0.25 and p = .044) per GHQ	Improvement in overall physical symptoms (effect size 0.28 and p = .033), and social functioning (effect size 0.41 and p = .003) per ItchyQoL
Piaserico et al, <sup>20</sup> 2016	40; 49.7	Moderate-severe plaque psoriasis, clinically eligible for narrow-band UVB (TL-01) phototherapy	A psoriasis specialty clinic at University Hospital of Padova, Italy	RCT	8-Week CBT plus concomitant narrow-band UVB phototherapy	Narrow-band UVB phototherapy	65% of patients who received this combination of treatment achieved PASI75 as compared with 15% of standard UVB patients (p = .007)	GHQ-12 cases were reduced by 35% in the treatment group and 10% in control group (p = .05)	Skindex-29 showed more improvement in the CBT group in comparison to controls (-2.8 points; p = .04)
van Beugen et al, <sup>21</sup> 2016	131; 52.7 (11.27)	Diagnosis of psoriasis, age ≥ 18 years, and a positive psychological risk profile	Participants recruited through outpatient centers from 1 academic and 3 non-academic hospitals and through Dutch Psoriasis Association	RCT	Internet-based, therapist-guided CBT intervention for an average of 25 wk + standard medical treatment	Standard medical treatment	Improved physical functioning (d = 0.36, p = .03) per RAND-36 Health Status Inventory, and Checklist Inventory Strength	No significant improvement per ISDL and BDI	Improved engagement in daily activities post-treatment (d = 0.35, p = .04) per ISDL

BDI, Beck Depression Inventory; CBT, cognitive behavior therapy; COPE, Cognitively-oriented Psychotherapy for Early Psychosis; DLQI, Dermatology Life Quality Index; GHQ, General Health Questionnaire; GHQ-12, General Health Questionnaire 12; HADS, Hospital Anxiety and Depression Survey; IPQ, Illness Perception Questionnaire; ISDL, Impact of Chronic Skin Disease on Daily Life; ItchyQoL, pruritus-specific Quality of Life survey; PASI, Psoriasis Area and Severity Index; PASI75, a drop in 75% in PASI score; PDI, Psoriasis Disability Index; PLSI, Psoriasis Life Severity Index; PSWQ, Penn State Worry Questionnaire; PUVA, Psoralen and Long-wave Ultraviolet Radiation; QoL, Quality of Life; RAND-36, health-related QoL survey composed of 36 items; RCT, randomized controlled trial; SAPASI, Self-Administered Psoriasis Area and Severity Index; UVB, Ultraviolet B-ray.



**Table 3**  
**Studies on CBT and AD**

Author	Sample size, mean age (SD)	Participant characteristics	Study setting	Study design	Intervention	Control group	AD outcomes	Mental health outcomes	Behavioral outcomes
Rosenbaum and Aylton <sup>36</sup> 1981	4; N/A	Patients aged 16–34 referred for treatment of neurodermatitis	Clients referred by dermatology to Department of Pediatrics, University of South Alabama Med Center, Mobile, ALA	Case series	Single treatment session of habit reversal therapy	None	Improvements in skin status for all 4 participants as defined by dermatologists (ie, decreased redness, flakiness, size of lesion)	NA	Reduction in self-reported scratching for all 4 participants
Melin et al, <sup>37</sup> 1986	17; 30.5	AD present for at least 3 y before study; no obvious psychiatric issues	Participants recruited through dermatology clinic	Non-blinded RCT	Habit reversal therapy in conjunction with topical hydrocortisone	Topical hydrocortisone	Improvement in skin status as per physician-designed survey to assess skin status	NA	67% scratch reduction for case group vs 37% scratch reduction in controls (p < .05) per surveys (physician-designed) on scratch frequency and itch intensity
Norén and Melin, <sup>38</sup> 1989	45; 20.4	Moderate to severe AD; no psychiatric issues	Participants recruited from dermatology clinics by the Dept. of Clinical Psych., University of Uppsala, Sweden	RCT	Habit reversal therapy in conjunction with topical hydrocortisone or betamethasone valerate	Topical hydrocortisone or betamethasone valerate	Improvement in skin status per physician-designed assessment tool (p < .01)	NA	88% scratch reduction in case groups vs 65% scratch reduction in control groups (p < .05) per self-reported scratching tool
Ehlers et al, <sup>9</sup> 1995	137; 24.6	AD for >1 y without concomitant acute medical condition or psychiatric illness	Participants recruited from outpatient clinic of the Department of Dermatology, Marburg University	RCT	CBT; autogenic training; CBT+ dermatological education	Dermatological education	Patients who received CBT or CBT + education demonstrated lower eczema severity, (p < .05) per MADQ	NA	Patients who received CBT or CBT plus dermatological education demonstrated lower scratching and itch intensity as per STAI and other self-designed survey instruments
Evers et al, <sup>39</sup> 2009	61; 37 (13.7)	AD with self-reported itch/scratch and without concurrent severe medical or psychiatric condition; fluency in Dutch language	Patients offering consent during time of intake at Dept. of Medical Psych, Radboud University, Nijmegen, The Netherlands	RCT	Itch-coping training	Wait list	improved skin status as per EASI scores (p < .05)	Decreased catastrophizing, and increased acceptance, health-related QoL and perceived benefits per ISDL and DLQI (p < .05)	Reduced itching and scratching at 3- and 6-mo follow-up as per ISDL (p < .05)

(Continued)

**Table 3**  
**(Continued)**

Author	Sample size, mean age (SD)	Participant characteristics	Study setting	Study design	Intervention	Control group	AD outcomes	Mental health outcomes	Behavioral outcomes
Hedman-Lagerlöf et al., <sup>40</sup> 2019	9; 42.8 (14.2)	AD for >6 mo; Swedish language proficiency; no serious psychiatric problems; no UV therapy, perioral or psychological treatment for AD	Participants recruited from Dermatological Clinic at the Karolinska University Hospital in Stockholm, Sweden	Case series	Exposure-based CBT conducted in 10 weekly sessions over 10 wk	None	Improved AD symptoms ( $p = .02$ ) as per PO-SCORD	Improvement in general anxiety ( $p = .005$ ) as per BAI; no significant improvement in depression or QoL outcomes as per MADRS-S and QOLI	NA
Hedman-Lagerlöf et al., <sup>41</sup> 2021	102; 37 (11)	Moderate/severe AD; internet connection with Swedish fluency; stable dosage of medication for >1 mo if prescribed; no acute medical conditions	Participants recruited nationwide to a medical university in Stockholm, Sweden	RCT	2 wk of therapist-guided internet-delivered CBT	Standard care	Reduced symptoms per POEM ( $B = 0.32$ , $p < .001$ )	Reductions in stress per PSS ( $B = 5.09$ , $p = .001$ ), sleep problems per ISI ( $B = 3.38$ , $p = .001$ ), and depression per PHQ-9 ( $B = 2.42$ , $p = .008$ )	NA

BAI, Beck Anxiety Inventory; CBT, cognitive behavior therapy; DLQI, Dermatology Life Quality Index; EASI, Eczema Area and Severity Index; ISL, Impact of Chronic Skin Disease on Daily Life; ISI, Insomnia Severity Index; MADRS-S, Marburg Atopic Dermatitis Questionnaire; MADRS-S, Montgomery-Åsberg Depression Rating Scale; PHQ-9, Patient Health Questionnaire 9; POEM, Patient-Oriented SCORing Atopic Dermatitis; QOLI, Quality of Life Index; RCT, randomized controlled trial; STAI, State-Trait Anxiety Inventory.

Despite a majority of positive outcomes, there are mixed results with the use of CBT for AD. In a group of patients with AD ( $n = 9$ ), CBT improved self-reported measures of AD symptoms ( $p = .020$ ) and general anxiety ( $p = .005$ ); however, self-reported depression and QoL did not improve (Table 3).<sup>40</sup> Limitations of this study include small sample size and lack of a control group.

In a larger randomized controlled trial (RCT), internet-delivered CBT produced a greater reduction in AD symptoms when compared with a control group in which patients received standard care instructions ( $B = 0.32$ ,  $p < .001$ ; Table 3).<sup>41</sup> There were also reductions in stress levels, sleep problems, and depression. All findings were sustained at 12-month follow-up.

### Discussion

Support for psychotherapy interventions is increasing. As yet, there is not a consensus on the general impact of psychotherapy intervention in dermatology. CBT is perhaps most promising in dermatology. Administration of CBT is feasible—typically consisting of 5 to 20 weekly sessions that address specific behavioral issues, such as itching or triggering of negative emotions—and may offer benefit to patients with chronic diseases that are not easily cleared with medical treatment.

Among 30 studies that met our inclusion criteria, CBT improved either QOL, mental health, disease severity, or all of the above. On several occasions, improvement in QOL and mental health occurred in the absence of objective disease improvement.<sup>7,18,19</sup> QOL/mental health benefits are not due solely to improved objective disease outcome. However, CBT typically improved both disease severity and mental health/QOL.<sup>20,21,39–41</sup> CBT is designed to improve health outcomes by cultivating helpful thoughts and habits. CBT + standard care may be superior to standard care alone; standard of care alone may improve disease severity without improving mental health or QOL.<sup>17</sup>

Patients who completed CBT courses were less likely to rely on dermatological healthcare during follow-up periods.<sup>11,21</sup> CBT may be beneficial to patients who are wary about the side effects associated with taking more medications.

Given the impact of COVID-19 social distancing on stress and isolation, virtual CBT programs may be both helpful and practical.<sup>7,21,41</sup> Such flexibility makes CBT a cost-effective and accessible form of treatment that aligns well with the growing interest in telemedicine for dermatology. Further studies in larger, demographically diverse cohorts are needed to assess the impact of CBT and virtual CBT in reducing the objective and subjective burdens of skin diseases.

### Conclusion

CBT is helpful for a number of dermatological conditions, including psoriasis, AD, acne subtypes, vitiligo, and alopecia. Patients who underwent CBT in addition to skin care had greater improvement in mental health and severity of skin disease as compared to standard of care treatment alone. Data on the usefulness of CBT are more robust for psoriasis and AD than for other conditions; however, positive results in a limited number of studies on alopecia, acne, and vitiligo are encouraging. Dermatologists should consider a multidisciplinary psychodermatological approach to screening and treatment of disease. When possible, dermatologists should aim to increase patient access to psychological resources. Patients with worsening disease or QOL who demonstrate negative thinking and behavior may benefit from referral for CBT. Future studies similarly should investigate the potential for CBT in the management of psychocutaneous diseases like trichotillomania and delusional disorder.

## Conflicts of interest

S.R.F. has received research, speaking, and/or consulting support from a variety of companies including Galderma, GSK/Stiefel, Almirall, Leo Pharma, Boehringer Ingelheim, Mylan, Celgene, Pfizer, Valeant, Abbvie, Samsung, Janssen, Lilly, Menlo, Merck, Novartis, Regeneron, Sanofi, Novan, Quriq, National Biological Corporation, Caremark, Advance Medical, Sun Pharma, Suncare Research, Informa, UpToDate and National Psoriasis Foundation. He is founder and majority owner of www.DrScore.com and founder and part owner of Causa Research, a company dedicated to enhancing patients' adherence to treatment. The remaining authors have no conflicts to disclose.

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## Study approval

N/A.

## Author contributions

Rishab R. Revankar, Nikita R. Revankar, Esther A. Balogh, and Steven R. Feldman contributed to conception and design of the study. Heli A. Patel, Rishab R. Revankar, Nikita R. Revankar, and Steven R. Feldman contributed to acquisition of data, and analysis and interpretation of data. Heli A. Patel, Esther A. Balogh, Rishab R. Revankar, Sebastian G. Kaplan, and Steven R. Feldman contributed to drafting the article and revising it critically for important intellectual content. Rishab R. Revankar, Nikita R. Revankar, Heli A. Patel, Esther A. Balogh, Sebastian G. Kaplan, and Steven R. Feldman contributed to final approval of the version to be submitted.

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