

SUPPLEMENTARY METHODS AND RESULTS

1. Outcome measures

Primary outcome measures

The primary outcome of this study was the impact of psoriasis on daily life, measured on three domains, for which total (composite) scores were computed by taking the overall average of standardized (z-)scores of the questionnaires included in each domain. All questionnaires were administered in paper-and-pencil format.

Psychological functioning

Psychological functioning was assessed with a total score of three previously validated measures: the Negative Mood (6 items, Cronbach's $\alpha=.88$ in the current study) and Anxiety (10 items, $\alpha=.79$) scales of the ISDL [40], and the total score of the revised version of the Beck Depression Inventory [BDI-II; 46, 47] (21 items; $\alpha=.85$). Higher scores reflect greater levels of negative mood, anxiety, and depressive symptoms, respectively. Higher total scores reflect worse psychological functioning.

Physical functioning

Physical functioning was assessed with a total score of two frequently reported symptoms in psoriasis: fatigue and itch. Fatigue was assessed with the 8-item fatigue subscale of the Checklist Individual Strength [CIS; 48], with higher scores reflecting higher levels of fatigue ($\alpha=.92$). Intensity and duration of itch was assessed with a 4-item subscale of the ISDL [40],

with higher scores reflecting greater itch intensity and duration ($\alpha=.81$). Higher total scores reflect lower physical functioning.

Impact on daily activities

Impact on daily activities was assessed with a total score of two subscales of the previously validated RAND-36 Health Status Inventory [49, 50], assessing the extent of role limitations due to physical health problems (4 items, $\alpha=.88$) and role limitations due to emotional problems (3 items, $\alpha=.81$), with higher scores reflecting fewer role limitations in each of the two domains. Higher total scores reflect lower impact on daily activities.

Secondary outcome measures: disease severity and compliance

Patient-rated disease severity was assessed with the widely used and validated Self-Administered Psoriasis Area and Severity Index (SAPASI; [52], consisting of silhouettes of the front and back of a body on which patients can mark their affected body areas, as well as three visual analogue scales to assess the erythema, induration, and scaliness of the average lesion. Scores on the SAPASI can range from 0 to 72, with higher scores indicating more severe psoriasis.

Clinician-rated disease severity was assessed with the Psoriasis Area and Severity Index (PASI), in which a clinician (i.e., a dermatology research nurse) assigned a numerical value of 0 to 6 to the area of involvement for 4 body regions, and rated erythema, desquamation, and induration of the plaques for each region on 5-point scale, with higher overall scores (range 0-72) signifying greater disease severity [51].

Dermatological treatment compliance was assessed with a 5-item questionnaire ($\alpha=.94$), asking how often patients adhered to treatment prescriptions/recommendations regarding hormone ointments, other ointments, medications, other professional care, and other prescriptions/recommendations. Each question could be answered on a scale from 1 to 5,

ranging from less than once a week to 7 days a week, or could be answered as ‘not applicable’. Total scores were constructed by calculating the mean of applicable items, with higher scores indicating greater compliance.

ICBT treatment satisfaction

Patients’ satisfaction with the ICBT intervention and their evaluation of its user-friendliness, was rated on a 10-point scale with higher scores reflecting higher satisfaction and greater user-friendliness. Patients were also asked to rate to which degree they thought the intervention would have a sustained positive effect and whether they would recommend the intervention to a friend or family member with a chronic somatic condition, on a four-point scale ranging from ‘no’ to ‘certainly’.

Socio-demographic and disease-related predictors of treatment outcome

Socio-demographic variables were assessed with a general checklist assessing patients’ gender, age, educational level, and marital status. Disease severity was assessed with the SAPASI [52] and PASI [51] described above. Disease duration was assessed with an item asking how old the patient was when the psoriasis diagnosis was given, which was then subtracted from the age of the patient.

Treatment-related predictors and correlates of treatment outcome

The working alliance between patient and ICBT therapist (i.e., the mutual agreement on the goals and tasks of a therapeutic intervention, in the context of a positive affective bond [55]) was assessed at the beginning of treatment (after face-to-face intakes, but before starting the internet-based treatment) by the client version of the 12-item (short version) Working Alliance Inventory [WAI-S; 53, 54], using the overall alliance score. Treatment duration was

defined as the number of weeks patients spent on ICBT treatment, excluding mutually agreed upon weeks of non-activity (e.g., vacation). Adherence to ICBT was assessed from three perspectives: 1) patient evaluation of their own adherence, 2) therapist rating of patient's adherence, and 3) intervention website usage. Patient-rated adherence was assessed at post-treatment with the following 4 items: 'During treatment, I have fully completed all assignments', 'During treatment, I have worked intensively on my treatment goals', 'During treatment, I have often practiced and applied what I have learned in daily life', and 'During treatment, the internet-based treatment was a regular part of my daily life'. Therapist-rated adherence was based on the same 4 items, in which the therapist rated the patient on these items. Both ratings were found to be reliable (patient rating: $\alpha=.67$; therapist rating: $\alpha=.94$). Intervention website usage was defined as the total number of website logins during treatment and average number of logins per week, assessed by monitoring https-server requests.

2. Data analysis: normal distribution

All continuous variables were checked for normality (skewness and kurtosis <1.5) and adjusted if necessary and possible. A skewed distribution on the physical role limitations rank score was observed at baseline. As data transformations did not lead to significant improvements, unadjusted scores were used for analyses. SAPASI and PASI scores showed substantial skewness and kurtosis, which was corrected for by square root transformation and replacing two (PASI) or four (SAPASI) outlying cases with the next highest scores (skewness and kurtosis <1.5 after transformation) [59].

3. ICBT intervention, dropout, and sensitivity analysis

ICBT modules

An overview of the frequency of the ICBT treatment modules that were applied is presented in Table S1. The modules negative mood (58%), itch (51%), and fatigue (45%) were applied most often, while the modules pain (11%) and social relationships (17%) were applied in a minority of cases. The majority of patients (n=30; 55%) worked on two treatment modules during treatment, while 16 patients worked on one module (29%) and 8 patients (15%) worked on three modules.

ICBT therapists

Therapist guidance in ICBT was given by a total of six female therapists (mean age=29.67±8.76), all having at least a Master's degree in Clinical and/or Health Psychology, with previous therapist experience ranging from 0 to 7 years (mean=2.17±2.79). Three therapists had finished further postgraduate training as healthcare psychologists (i.e. 'GZ psychologists'). All therapists were supervised by a senior clinical psychologist with post-academic training in cognitive behavioral treatment.

ICBT duration

Mean intervention duration (excluding non-starters) was 25 weeks (±12 weeks), ranging from 1-57 weeks. During the intervention, a period of ≥4 weeks of no contact with the therapist was observed in 20% of patients (n=13) and ICBT treatment was temporarily put on hold due to personal circumstances in 34% of patients (n=22). ICBT duration was calculated excluding the mutually agreed upon weeks of inactivity.

ICBT dropout

Overall intervention dropout was 26.2%, consisting of 10 non-starters (15.4%) and 7 dropouts (10.8%). The 10 non-starters did not start treatment for various reasons: personal or familial circumstances (n=3), lack of time (n=2), physical comorbidity (n=1), psychological comorbidity (n=1), not wanting to come for intake sessions (n=1), lack of computer skills (n=1), or unknown reasons (n=1). The 6 non-completers reported the following reasons: alleviated symptoms/complaints (n=1), deteriorated symptoms (n=1), personal or familial circumstances (n=1), physical/psychological comorbidity (n=1), lack of computer skills (n=1) or unknown reasons (n=1). Lastly, one of the dropouts was a patient who died during the treatment as a result of comorbidity unrelated to the treatment.

Differences between completers and dropouts

Intervention completers had higher baseline self-reported disease severity ($p=.03$) than non-starters/non-completers. Measurement completers were significantly older ($p=.04$) and showed a tendency towards a greater impact of psoriasis on daily activities ($p=.09$) than measurement dropouts.

ICBT completers: Sensitivity analysis

In sensitivity analyses excluding ICBT dropouts/non-starters ($n=16$), tendencies towards larger effects in ICBT compared to CAU were found for the primary outcomes physical functioning ($p=.051$) and impact on daily activities ($p=.097$). In subcomponents of these primary outcomes, significant between-group effects were found for fatigue ($p=.04$) and trends on role limitations due to physical ($p=.06$) and emotional ($p=.09$) health problems.

Table S1. Internet-based cognitive behavioral treatment: overview of treatment modules, in patients who started treatment (n=55).

	Treatment module				
	Negative mood	Fatigue	Itch	Pain	Social relationships
Primary module ¹	17 (31%)	14 (25%)	16 (29%)	4 (7%)	2 (4%)
Secondary module ²	14 (25%)	11 (20%)	10 (18%)	1 (2%)	2 (4%)
Tertiary module ³	1 (2%)	0 (0%)	2 (4%)	1 (2%)	5 (9%)
Not applied	23 (42%)	30 (55%)	27 (49%)	49 (89%)	46 (83%)

Note. n=1 patient started ICBT but dropped out after the first few messages, prior to commencing any modules.

¹Module that patients have worked on for the longest time, compared to the other modules.

²Module that patients have worked on for a shorter amount of time than the primary module.

³Module that patients have worked on for a shorter amount of time than the secondary module.