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Body dysmorphia in common skin diseases: results of an observational, cross-sectional multicentre study among dermatological outpatients in 17 European countries*

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Summary

Background Body dysmorphic disorder (BDD) is a common psychiatric disorder associated with high costs for healthcare systems as patients may repeatedly ask for different, often not effective, interventions. BDD symptoms are more prevalent in patients with dermatological conditions than in the general population, but there are no large sample studies comparing the prevalence of BDD symptoms between patients with dermatological conditions and healthy skin controls.
Objectives To compare the prevalence of BDD symptoms between patients with different dermatological conditions and healthy skin controls and to describe sociodemographic, physical and psychological factors associated with BDD symptoms to identify patients who may have a particularly high chance of having this condition.
Methods This observational, cross-sectional, comparative multicentre study included 8295 participants: 5487 consecutive patients with different skin diseases (56% female) recruited among dermatological outpatients at 22 clinics in 17 European countries, and 2808 healthy skin controls (66% female). BDD symptoms were assessed by the Dysmorphic Concern Questionnaire. Sociodemographic data and information on psychological factors and physical conditions were collected. Each patient was given a dermatological diagnosis according to ICD-10 by a dermatologist. The study was registered with number DRKS00012745.
Results The average participation rate of invited dermatological patients was 82.4% across all centres. BDD symptoms were five times more prevalent in patients with dermatological conditions than in healthy skin controls (10.5% vs. 2.1%). Patients with hyperhidrosis, alopecia and vitiligo had a more than 11-fold increased chance (adjusted Odds Ratio (OR) > 11) of having BDD symptoms compared with healthy skin controls, and patients with atopic dermatitis, psoriasis, acne, hidradenitis suppurativa, prurigo and bullous diseases had a more than sixfold increased chance (adjusted OR > 6) of having BDD symptoms. Using a logistic regression model, BDD symptoms were significantly related to lower age, female sex, higher psychological stress and feelings of stigmatization.
Conclusions Clinical BDD symptoms are significantly associated with common dermatological diseases. As such symptoms are associated with higher levels of psychological distress and multiple unhelpful consultations, general practitioners and dermatologists should consider BDD and refer patients when identified to an appropriate service for BDD screening and management.

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The authors declare they have no conflicts of interest.

Data availability statement
The data that support the findings of this study are available from the corresponding author upon reasonable request.

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What is already known about this topic?

- Body dysmorphic disorder (BDD) is a common psychiatric disorder with a prevalence of about 2% in the general population.
- Skin diseases pose a high psychological burden on patients. People with these problems often experience increased self-consciousness, skin-related shame and stigmatization.
- Single-centre studies including small samples of patients with skin conditions showed that these patients show symptoms of a similar nature to BDD more often than the general population.

What does this study add?

- In this large multicentre study, BDD symptoms were fivefold more prevalent in dermatological patients than in healthy skin controls, and were related to young age, female sex, psychological stress and stigmatization experience.
- Certain patient groups (e.g. hyperhidrosis) had a greater than 11-fold increased chance of BDD symptoms compared with controls.
- Doctors should consider appearance-related concern and BDD more often and refer patients when needed to an appropriate service for assessment and treatment.

The skin is immediately visible,[1] and covering all of the body it influences a person's body image.[2] Appearance-related distress associated with visible skin diseases is an issue in dermatological conditions,[3,4] which can be associated with stigmatization.[5]

When persons have occasional negative thoughts about their appearance that do not interfere with daily functioning, these might be described as 'nonpathological body dysmorphic concerns'.[6] The prevalence of body dysmorphic concerns (BDC) has increased.[7] However, the diagnosis of body dysmorphic disorder (BDD) should be considered if a person is preoccupied by negative thoughts about minimal or not even obvious appearance-related flaws and their functioning in daily life is impaired. Both BDC and BDD may lead to repetitive behaviours such as mirror checking, avoidance of social events, and excessive camouflaging.[6,8] BDD is classified as an obsessive–compulsive disorder in the International Statistical Classification of Diseases and Related Health Problems[9] and the Diagnostic and Statistical Manual of Mental Disorders (DSM).[10]

BDD is a psychiatric disorder affecting about 2% of the general population.[11] Patients with BDD are often concerned about their skin,[12–18] but also their hair, nose and abdominal area.[12] BDD is of clinical relevance as it is associated with a lower quality of life, stress, depression, anxiety, suicidal ideation and suicidal attempts.[14,19–22] In addition, people with BDD may incur high costs for healthcare systems as they may repeatedly present for different usually ineffective interventions.[23] Besides, they often become dissatisfied with therapies and claim that any given therapy has worsened their appearance.[24]

Skin diseases can impose a high psychological burden on patients.[25] One of the aspects that contributes to this burden is change in appearance,[2] which is in contrast to the societal idea of flawless skin. People with these problems often experience increased self-consciousness,[26,27] skin-related shame,[28] feelings of stigmatization[29–31] and social anxiety.[32,33] It seems obvious that patients with skin conditions are more concerned about their appearance than people with healthy skin, and so might also experience symptoms of BDD more often than the general population.

There are studies investigating the prevalence of BDC and BDD in patients with dermatological conditions. However, most of these were single-centre studies, lacked healthy skin control groups and/or only included relatively small samples.[22,24,34–46] In addition, in previous studies factors such as age and sex were not always assessed,[11] even though they might be relevant in understanding the association between skin disease and symptoms of BDD. For example, a recent study[47] showed significantly higher appearance concerns in women than in men. In line with this, studies have reported higher prevalence of BDD in women than in men,[7,48] while others do not support these sex differences.[14,21,24]

After the first study by the European Society for Dermatology and Psychiatry (ESDaP), which primarily dealt with anxiety, depression and suicidality in dermatological patients and healthy controls,[25] the primary aims of this ESDaP Study II were to measure the prevalence of BDD symptoms in patients with different dermatological conditions and controls with healthy skin, and to investigate whether sociodemographic variables, physical factors such as body mass index and itch and psychological factors such as anxiety and stress are associated with the occurrence of BDD symptoms.

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Patients and methods

Ethics and registration of the study

The procedure of this cross-sectional observational study was approved by the institutional review board of the Department of Medicine at the University of Gießen, Germany (Protocol number 87/17) and each recruitment centre. The study was registered at the German registry for clinical studies (DRKS00012745). The study protocol was published before data collection was finished.[49] Every participant provided written informed consent before participation and was free to withdraw from the study at any time. The study was conducted in concordance with the Declaration of Helsinki.

Patient and public involvement and dissemination

Patients of the Norwegian patient society 'the Psoriasis and Eczema Fortbundet' were asked to comment on the study design and research questions before the beginning of the study.[49] They had no concerns, either about the study design or the research questions. Their opinion about the role of stigmatization was considered when planning the study. Results of the study will be made available to this and other patient organizations upon request and distributed by conference proceedings and information in the media.

Participants

The participants consisted of outpatients with different dermatological conditions and controls with healthy skin, recruited at 22 study centres in 17 different European countries (Table 1). Patients were included consecutively at each study centre. Controls with healthy skin were recruited by inviting hospital staff and visitors to participate, for example using written notices and announcements at staff meetings. They were excluded if they had any skin condition being treated. Study participants had to be at least 18 years old and able to read the questionnaires (Figure S1; see Supporting Information).

Measures

An English version of the questionnaire items is available in Dalgard *et al.*[49] BDD symptoms were measured using a validated self-reported screening instrument for DSM-IV criteria, the Dysmorphic Concern Questionnaire (DCQ),[50–54] which measures concerns about one's own body appearance. The instrument has seven items starting with 'Have you ever', which need to be answered on a scale from 0 to 3 (for the items of the questionnaire, please see Dalgard *et al.*).[49] Thus, total scores range from 0 to 21. As an example, one item is 'Have you ever been told by others that you are normal in

Table 1 Description of the sample

	Patients, n = 5487	Controls, n = 2808	P-value
Sex (MD = 55)			
Female	3099 (57.0)	1877 (67.0)	< 0.001[a]
Age (years), mean (SD) (MD = 77)			
Overall	48.7 (17.6)	43.1 (15.6)	< 0.001[b]
Female	48.1 (17.3)	42.3 (15.0)	< 0.001[b]
Male	49.5 (18.0)	44.6 (16.6)	< 0.001[b]
Marital status (MD = 211)			
Single	1799 (33.8)	797 (28.9)	< 0.001[a]
Married/with partner	3529 (66.2)	1959 (71.1)	
Education (MD = 614)			
Without possibility to go to college	1542 (30.2)	420 (16.3)	< 0.001[a]
With possibility to go to college	1635 (32.0)	675 (26.3)	
University	1935 (37.9)	1474 (57.4)	
Self-rated income level (MD = 233)			
Low	1517 (28.7)	527 (19.0)	< 0.001[a]
Middle	3296 (62.3)	1790 (64.6)	
High	479 (9.1)	453 (16.4)	
Economic difficulties (yes)			
(MD = 185)	1470 (27.5)	474 (17.1)	< 0.001[a]
Stressful life events during last 6 months (yes)			
(MD = 260)	2376 (44.9)	983 (35.9)	< 0.001[a]
Physical comorbidities (yes)			
(MD = 201)	2546 (47.4)	753 (27.6)	< 0.001[a]
BMI (controlled for age and sex), mean (SD)			
(MD = 394)	26.5 (5.4)	24.6 (4.4)	< 0.001[a]

The data are presented as n (%) unless stated otherwise. MD, missing data. [a]From χ^2-test. [b]From t-test.

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spite of you strongly believing that something is wrong with your appearance or bodily functioning.' One clear advantage of the DCQ is its good discriminant validity, which has been demonstrated by its use in distinguishing between three groups of patients with dermatological conditions: dermatological patients with BDD, patients with disfiguring skin conditions but no BDD, and patients with nondisfiguring skin conditions and no BDD.[52] That validation study [52] showed that the optimal cutoff score value for use in patients with dermatological conditions is 14. This threshold leads to a correct classification of 72% of patients with BDD (sensitivity) and 90.7% of patients without BDD (specificity). This cutoff value of 14 has also been used in this study and should be applied in clinical practice.

Sociodemographic variables and physical conditions were assessed by self-report. The background questionnaire was completed by all participants. It included items recording age (in years), sex (male or female), height, weight, level of education, marital status (single, married or with a partner, living with a partner), household income (low, middle, high), serious economic difficulties (yes, no) and itch. Patients answered additional questions such as which skin areas were affected.[49]

Clinical assessment was conducted by the examining dermatologists, who classified the patient's skin condition according to International Classification of Diseases (ICD-10) criteria and rated the severity of the skin disease as mild, moderate or severe. Moreover, the clinician recorded comorbidities (cardiovascular disease, chronic respiratory disease, diabetes or rheumatological disease) and clinical depression and/or anxiety observed during the examination (yes/no).[49]

Psychological variables were assessed by self-report. Depression and anxiety symptoms were measured by the Patient Health Questionnaire 2 and the General Anxiety Disorder Assessment,[55] which each comprise two questions that are answered on a scale from 0 to 3 and are then summed. The cutoff value is ≥3, indicating a screened depression or anxiety disorder, respectively. Additionally, participants answered items regarding the occurrence of suicidal ideation. Participants rated their general health state on a visual analogue scale from 0 (worst imaginable health state) to 100 (best imaginable health state) using the EuroQol 5 Dimensions visual analogue scale.[56] Stigmatization was measured by the Perceived Stigmatization Questionnaire (PSQ).[57] It comprises three scales: 'absence of friendly behaviours', 'confused/staring behaviour' and 'hostile behaviour'. Stress was measured using of the Perceived Stress Scale (PSS).[58] The occurrence of stressful life events was assessed by the dichotomous question 'Have you had any stressful life events during the last 6 months (serious illness, death of close friend or family member, accident, divorce or other events)?' Further information on the instruments is given in the study protocol.[49]

Data collection and statistical analyses

Data collection took place between September 2017 and December 2019. In spring 2020 a broader classification of dermatological conditions to be used for analysis purposes was created by four experienced academic dermatologists (F.B., A.B., F.J.D., U.G.) adapting the categorization of the former ESDaP study[25] and ICD-10. These broader categories were introduced, as otherwise statistical analyses would have not been possible because there would have been too few patients in each group. More information on which ICD-10 categories were merged is given in Table S1 (see Supporting Information). The data were systematically checked for mistakes and were statistically analysed using SPSS Statistics version 26 (IBM, Armonk, NY, USA). For the DCQ one missing item was allowed. For PSS and PSQ one missing item was allowed per scale. The scale scores for these questionnaires were extrapolated accordingly. For the General Health Questionnaire-4, missing data were not substituted. For this questionnaire, the patient or control was regarded as having screened depression or anxiety if the score of one or two items on the scale was ≥3.

Categorical variables were described by numbers and percentages, and continuous variables by means and SDs. Patients with dermatological conditions and controls were compared regarding sociodemographic variables, physical conditions and psychological factors by *t*-tests in case of continuous variables and by χ^2-tests in case of categorial variables. To determine the chances of dermatological patients having clinical symptoms of BDD, in comparison with controls, crude and adjusted odds ratios (ORs) and 95% confidence intervals (CIs) were determined for the whole group of patients and the different patient groups separately.

Stepwise binary logistic regression analyses were conducted using BDD as the criterion variable (cutoff DCQ value >14)[52] to determine whether the occurrence of clinically relevant BDD symptoms could be predicted by psychological and sociodemographic factors or physical conditions. Variables were included as predictors in the regression analysis due to theoretical and empirical considerations. Age, sex and economic difficulties were entered in the first step, physical conditions (comorbidities, the occurrence of itch, body mass index, self-rated own health and in the case of patients the severity of the skin condition) were entered in the second step, and psychological variables (suicidal ideation, screened depression, screened anxiety and stress) were entered in the third step. In patients with dermatological conditions, visibility of skin flares was entered in the fourth step and stigmatization in step five. In controls, stigmatization was entered in the fourth step. This extra step for stigmatization was conducted as stigmatization was highly correlated to most of the variables entered in step three, and we aimed to check whether stigmatization explained variance of BDD additionally to the psychological variables already included.

Results

Sample characteristics

The participation rate of dermatological patients was 82.4% on average (minimum 62.6%; Table S2; see Supporting

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Information). In four study centres the participation rate had to be extrapolated from smaller samples. The total number of participants was 8295. In total, 2388 male and 3099 female patients took part in the study. The control group consisted of 931 male and 1877 female patients. The mean (SD) age of patients was 48.7 (17.6) years, and of controls 43.1 (15.6) years. The control group was significantly younger and consisted of a greater proportion of women than the patient group ($p < 0.001$). Details of the participants' characteristics are given in Table 1.

The most common skin disease was psoriasis (25.6%), followed by nonmelanoma skin cancer (NMSC; 8.9%), atopic dermatitis (6.4%), eczema (4.7%) and infections (4.5%). Other skin diseases that occurred in >3% of the patients were acne (4.4%), naevi (4.4%), benign tumours (4.2%), connective tissue disease (4.0%) and urticaria (3.2%) (Table S3; see Supporting Information).

Prevalence of body dysmorphic disorder symptoms

Clinically relevant BDD symptoms were reported by 10.5% of the patients vs. 2.1% of the controls (adjusted OR 5.85, 95% CI 4.33–7.91). The occurrence of BDD symptoms differed substantially between patient groups (Table 2). Patient groups with an at least 11-fold increased chance of clinically relevant BDD symptoms compared with the control group were patients with hyperhidrosis (adjusted OR 27.7, 95% CI 11.0–69.7), alopecia areata (adjusted OR 13.3, 95% CI 6.9–25.5), other alopecias (adjusted OR 12.9, 95% CI 5.9–28.3) and vitiligo (adjusted OR 11.3, 95% CI 4.5–28.1). Patients with atopic dermatitis, psoriasis, acne, hidradenitis suppurativa, prurigo and bullous diseases had at least a sixfold increased chance of BDD symptoms compared with controls (Table 2). The mixed groups of patients with psychodermatological conditions, metabolic or systemic diseases, and venous insufficiency had an at least a fivefold increased chance of clinically relevant BDD symptoms compared with the control group.

Association between sociodemographic variables, physical conditions, psychological factors and body dysmorphic disorder symptoms

The results of the binary regression analyses (steps four/five) revealed that in patients with dermatological conditions the

Table 2 Prevalence of body dysmorphic disorder (BDD) in patients with common dermatological conditions and controls with healthy skin

Diagnosis	Screened BDD, n/N (%)	Crude OR (95% CI), cases vs. controls	Adjusted OR (95% CI)[a]
Controls	57/2754 (2.1)		
All patients	558/5290 (10.5)	5.58 (4.23–7.36)	5.84 (4.32–7.89)
Psoriasis	192/1383 (13.9)	7.63 (5.63–10.33)	7.65 (5.38–10.87)
Nonmelanoma skin cancer	15/444 (3.4)	1.65 (0.93–2.95)	4.92 (2.25–10.72)
Atopic dermatitis	55/345 (15.9)	8.97 (6.08–13.25)	8.08 (5.24–12.45)
Eczema	17/244 (7.0)	3.54 (2.03–6.19)	3.02 (1.55–5.89)
Infections	14/242 (5.8)	2.91 (1.59–5.29)	3.42 (1.81–6.50)
Acne	40/236 (16.9)	9.66 (6.29–14.84)	6.90 (4.21–11.29)
Nevi	12/226 (5.3)	2.65 (1.40–5.02)	3.09 (1.52–6.29)
Benign tumours	11/215 (5.1)	2.55 (1.32–4.94)	3.18 (1.57–6.45)
Connective tissue disorders	10/209 (4.8)	2.38 (1.20–4.73)	2.59 (1.23–5.48)
Urticaria	18/168 (10.7)	5.68 (3.26–9.89)	4.09 (2.16–7.76)
Bullous diseases	14/138 (10.1)	5.34 (2.90–9.85)	8.78 (4.20–18.37)
Hidradenitis suppurativa	31/135 (23.0)	14.1 (8.73–22.78)	7.39 (4.13–13.24)
Prurigo	12/126 (9.5)	4.98 (2.60–9.54)	6.51 (3.07–13.82)
Scaly conditions	5/117 (4.3)	2.11 (0.83–5.37)	2.39 (0.89–6.45)
Allergies/hypersensitivity	3/116 (2.6)	1.26 (0.39–4.07)	1.20 (0.36–4.03)
Pruritus	4/108 (3.7)	1.82 (0.65–5.11)	2.11 (0.60–7.38)
Metabolic/systemic diseases	16/101 (15.8)	8.91 (4.91–16.15)	7.98 (4.01–15.88)
Malignant melanoma	3/97 (3.1)	1.51 (0.46–4.91)	3.04 (0.87–10.57)
Rosacea	8/89 (9)	4.67 (2.16–10.12)	4.71 (1.98–11.23)
Alopecia areata	18/83 (21.7)	13.1 (7.31–23.5)	13.25 (6.89–25.49)
Venous insufficiency	6/73 (8.2)	4.24 (1.77–10.17)	5.26 (1.69–16.44)
Hand eczema	6/71 (8.5)	4.37 (1.82–10.49)	3.81 (1.42–10.24)
Other alopecias	13/65 (20)	11.83 (6.10–22.93)	12.94 (5.92–28.25)
Seborrhoeic dermatitis	3/56 (5.4)	2.68 (0.81–8.83)	2.71 (0.77–9.49)
Skin malformations	2/49 (4.1)	2.01 (0.48–8.49)	2.08 (0.46–9.49)
Vitiligo	10/48 (20.8)	12.45 (5.92–26.21)	11.26 (4.52–28.1)
Hyperhidrosis	12/26 (46.2)	40.56 (17.96–91.57)	27.73 (11.04–69.65)
Psychodermatological conditions	6/19 (31.6)	21.84 (8.02–59.5)	16.36 (4.12–64.98)
Others	2/61 (3.3)	1.60 (0.38–6.73)	1.25 (0.17–9.50)

CI, confidence interval; OR, odds ratio. [a]Adjusted for sex, age, income, stress, comorbidities and body mass index.

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occurrence of BDD was significantly related to younger age, female sex, higher self-rated stress and stigmatization (perception of confused and hostile behaviour by others; Nagelkerke $R^2 = 0.31$). In controls the occurrence of BDD was significantly related to younger age, female sex, lower self-rated health, screened symptoms of depression, higher self-rated stress levels and stigmatization (perception of confused behaviour by others; Nagelkerke $R^2 = 0.34$).

Discussion

This study is the first to investigate the prevalence of symptoms of BDD in a large European sample of patients with different dermatological conditions in comparison with controls with healthy skin. Overall, the prevalence of clinically relevant BDD symptoms was fivefold higher in patients compared with controls (10.5% vs. 2.1%). These findings correspond with former studies showing BDD prevalences of 0.5–2.4% in the general population[7,11,14,21,59–61] and of 4.9–36% in dermatological patients.[34–44,46] The broad range of prevalences of BDD reported in dermatological patients can partly be explained by the use of different instruments across studies. The gold standard to measure psychiatric diseases is a structured clinical interview, for example the Structured Clinical Interview for DSM 5 criteria (SCID).[62,63] In studies in which BDD was recorded by the SCID or a diagnostic instrument based on the SCID in general dermatological patients there was a prevalence of 14.4% in the USA[34] and of 6.7% in Brazil.[39] In another study from Turkey, 8.8% of patients with mild acne had BDD based on the SCID interview.[35] These prevalences support our findings derived by questionnaire data and suggest that a high proportion of dermatological patients do actually experience symptoms of BDD in addition to their skin disease.

For the first time this study systematically explored symptoms of BDD among patients with all dermatological conditions. It has revealed that patients with the common dermatological conditions psoriasis, atopic dermatitis and acne have an at least sixfold increased chance of having significant BDD symptoms. Moreover, the group with the highest chance of having BDD symptoms was patients with hyperhidrosis, who usually do not have obvious skin lesions.

The finding that the visibility of flares did not significantly contribute to BDD prevalence is in line with a former study,[43] in which the location of signs did not significantly contribute to symptoms of BDD. It may be that some patients with dermatological conditions perceive hostile and confused behaviour by others as being due to their signs and might therefore develop a higher symptom awareness during their lives. This idea is supported by a study[64] in which dermatological patients with BDD recognized minimal differences in appearance more accurately than patients with dermatological conditions without BDD. However, in another study, a higher attentional bias towards disease-related stimuli was found only in patients with alopecia, but not in patients with psoriasis compared with healthy controls.[65] Further research should thus investigate whether higher symptom awareness might occur only in certain subgroups of dermatological patients.

The current study also confirmed the known relationships between sociodemographic factors (e.g. age and sex), psychological factors (e.g. stress, anxiety, depression and suicidal ideations) and BDD (step 3 of the regression model).[14,20,21] Also, in line with the results of former studies,[7,48] women were more often affected by BDD symptoms than men, and younger patients more often than older patients.

There was a highly significant correlation between depression, anxiety and stigmatization in patients with dermatological conditions. However, stigmatization was a more relevant predictor of BDD symptoms than depression, anxiety and suicidal ideations when included in the regression analysis. This result underlines the need for strategies to reduce stigmatization in patients with skin conditions early,[29–31] even before clinically relevant BDD symptoms develop. It also indicates that BDD-type presentations in patients with skin conditions may well be phenomenologically different from BDD occurring in people without an objective condition affecting the skin. Indeed, there are qualitative studies with dermatology patients indicating that appearance-related distress is related to experience of stigmatization. e.g.[66]

Both the high prevalence of BDD symptoms in dermatological patients and its significant association with psychological stress and stigmatization emphasize that it is important for dermatologists to consider psychosocial aspects of skin disease in their daily patient encounters. In the past, BDD was often under-recognized and thus remained untreated,[67,68] probably because BDD symptoms are often deliberately concealed by patients.[69] The results of this study should contribute to making dermatologists aware of what is a common condition among dermatological patients. When encountering a patient with little objective signs of skin disease but with high suffering and many complaints, BDD could be the explanation of the patient's condition. If the dermatologist has a suspicion that a patient has a body image problem the patient should be referred to a psychodermatology colleague or unit who can screen with a BDD instrument such as the Dysmorphic Concern Questionnaire. Where appropriate the patient can then be examined further for other mental health issues such as depression, anxiety or personality disorder. The patient's issues can then be addressed, often with a combination of skin treatment, psychotherapy and psychopharmacological treatment.

There are some limitations to this study, for example the distribution of age and sex in the group of patients with dermatological conditions compared with healthy controls. This difference is important and might have derived from the different recruitment strategies used for the samples. Future studies should thus more closely match sex and age. However, this group difference could be statistically controlled by adjusting for these variables (Table 3). Another limitation is that BDD was assessed by self-report (DCQ). Along with BDC related to BDD as a subtype of obsessive–compulsive disorder, there are also BDC as symptoms of delusional disorders.

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Table 3 Results of the binary logistic regression models, with the presence of clinically relevant body dysmorphic disorder (BDD) symptoms as the criterion variable, and sociodemographic factors and physical and psychological conditions as predictor variables

	Patients	
	B	EXP(B) (95% CI)
Step 1		
Age	−0.026*	0.974 (0.968–0.98)
Sex (male/female)[a]	0.476*	1.609 (1.308–1.98)
Economic difficulties (n/y)	0.564*	1.758 (1.436–2.151)
Constant	−1.425	0.241
Step 2		
Age	−0.031*	0.969 (0.963–0.976)
Sex (male/female)[a]	0.441*	1.554 (1.256–1.922)
Economic difficulties (n/y)	0.329*	1.39 (1.125–1.718)
Comorbidities (n/y)	0.034	1.034 (0.828–1.292)
Itch (n/y)	0.288*	1.334 (1.056–1.685)
Body mass index (cont)	0.011	1.011 (0.993–1.029)
Own health (cont)[b]	−0.023*	0.977 (0.972–0.982)
Severity of the skin condition (mild, moderate, severe)	0.228*	1.256 (1.083–1.456)
Constant	−0.575	0.562
Step 3		
Age	−0.023*	0.977 (0.97–0.984)
Sex (male/female)[a]	0.219	1.245 (0.996–1.556)
Economic difficulties (n/y)	0.003	1.003 (0.802–1.255)
Comorbidities (n/y)	−0.115	0.891 (0.704–1.127)
Itch (n/y)	0.151	1.163 (0.911–1.485)
Body mass index (cont)	0.016	1.016 (0.998–1.035)
Own health (cont)[b]	−0.007*	0.993 (0.988–0.999)
Severity of the skin condition (mild, moderate, severe)	0.134	1.143 (0.977–1.337)
Suicidal ideation (n/y)	0.30*	1.35 (1.058–1.724)
Screened depression (n/y)	0.37*	1.448 (1.117–1.876)
Screened anxiety (n/y)	0.318*	1.375 (1.056–1.789)
Stress (cont)	0.103*	1.108 (1.086–1.131)
Constant	−3.812	0.022
Step 4		
Age	−0.023*	0.977 (0.97–0.984)
Sex (male/female)[a]	0.223	1.25 (0.999–1.564)
Economic difficulties (n/y)	0.009	1.0009 (0.806–1.263)
Comorbidities (n/y)	−0.122	−0.885 (0.70–1.12)
Itch (n/y)	0.109	1.115 (0.868–1.432)
Body mass index (cont)	0.017	1.017 (0.998–1.036)
Own health (cont)[b]	−0.006*	0.994 (0.988–0.999)
Severity of the skin condition (mild, moderate, severe)	0.116	1.122 (0.957–1.317)
Suicidal ideation (n/y)	0.297*	1.346 (1.053–1.719)
Screened depression (n/y)	0.357*	1.429 (1.102–1.853)
Screened anxiety (n/y)	0.315*	1.37 (1.052–1.783)
Stress (cont)	0.103*	1.109 (1.086–1.132)
Visible flares (n/y)	0.26	1.297 (0.976–1.722)
Nonvisible flares (n/y)	0.023	1.024 (0.803–1.305)
Constant	−4.01	0.018
Step 5		
Age	−0.021*	0.98 (0.972–0.987)
Sex (male/female)[a]	0.321*	1.378 (1.088–1.744)
Economic difficulties (n/y)	−0.075	0.928 (0.733–1.175)
Comorbidities (n/y)	−0.154	0.857 (0.67–1.097)
Itch (n/y)	−0.070	0.932 (0.718–1.211)
Body mass index (cont)	0.007	1.007 (0.988–1.027)
Own health (cont)[b]	−0.002	0.998 (0.991–1.004)
Severity of the skin condition (mild, moderate, severe)	0.033	1.034 (0.873–1.225)
Suicidal ideation (n/y)	0.148	1.16 (0.895–1.503)

(continued)

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Table 3 (continued)

	Patients	
	B	EXP(B) (95% CI)
Screened depression (n/y)	0.157	1.17 (0.885–1.548)
Screened anxiety (n/y)	0.256	1.292 (0.977–1.709)
Stress (cont)	0.084*	1.087 (1.064–1.111)
Visible flare (n/y)	0.123	1.13 (0.841–1.52)
Nonvisible flares (n/y)	−0.041	0.96 (0.745–1.237)
Stigma 1 (cont)	0.008	1.008 (0.99–1.027)
Stigma 2 (cont)	0.089*	1.093 (1.074–1.112)
Stigma 3 (cont)	0.076*	1.079 (1.043–1.116)
Constant	−4.138	0.016

CI, confidence interval; cont, continuous variable. Stigma 1: Perceived Stigmatization Questionnaire (PSQ) scale 'absence of friendly behaviour'. Stigma 2: PSQ scale 'confusing behaviour'. Stigma 3: PSQ scale 'hostile behaviour'. n, no = 0; y, yes = 1. [a]Male = 1, female = 2. [b]A higher value indicates better health. *Significant results at a significance level of $\alpha = 0.05$.

Further, BDC can also stem from experience of actual stigmatization or outright discrimination.[70] To distinguish such subtypes in further studies, structured clinical interviewing would be required. Also, prospective studies could identify whether dermatological patients have a higher risk of developing BDD symptoms than the healthy population.

The external validity of this study is also limited, as only selected dermatology patients who arrived at dermatology clinics were included. Also, the proportion of patients with psoriasis was high, with 25.6% of the dermatological patients having this condition. This occurred because at some clinics data collection coincided with psoriasis clinics. The study could have been improved further by including people with skin disease sampled from across the general population. Moreover, it would have been preferable to assess the participation rate not only for patients with dermatological conditions, but also for the healthy skin control group.

In conclusion, this study demonstrated that >10% of patients with dermatological conditions experience potentially distressing symptoms of BDD. This highlights that doctors should keep in mind this condition and refer patients not responding to treatment to an appropriate healthcare service for further psychological assessment.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Table S1 Diagnostic categories.

Table S2 Information on the participating centres.

Table S3 Number of participants with different dermatological conditions and healthy skin controls from each country.

Figure S1 Number of included and excluded patients with skin conditions and healthy skin controls.

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