ORIGINAL ARTICLE   **SPECIAL TOPICS**

The Dysmorphic Concern Questionnaire in the German General Population: Psychometric Properties and Normative Data

Katharina Schieber[1] · Ines Kollei[2] · Martina de Zwaan[3] · Alexandra Martin[4]

Abstract

Background The Dysmorphic Concern Questionnaire (DCQ) is a widely used screening instrument assessing dysmorphic concerns ranging from a mild to an excessive level. It is often used in the setting of plastic and aesthetic surgery. The present study aimed at examining the psychometric properties of the DCQ in a random general population sample.

Methods A representative sample of the German general population ($N = 2053$, aged between 18 and 65 years, 54% females) completed the DCQ as well as questionnaires on depression and appearance concerns.

Results The DCQ showed a good internal consistency with Cronbach's $\alpha = 0.81$. Its one-factor model structure was confirmed. Normative data were stratified according to gender and age. Women reported more dysmorphic concerns than men, but also within females the DCQ scores differed between age classes. Overall, 4.0% of the sample reported excessive dysmorphic concerns based on a previously defined cutoff sum score ≥ 11.

Conclusion The DCQ is a valid and reliable screening tool to identify individuals with excessive dysmorphic concerns. Excessive concerns may indicate also the presence of body dysmorphic disorder, but for verifying a final diagnosis the use of a structured clinical interview is necessary.

Level of Evidence IV This journal requires that authors assign a level of evidence to each article. For a full description of these evidence-based medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Dysmorphic concerns · Body dysmorphic disorder · Aesthetic surgery · Cosmetic surgery · Plastic surgery · Normative data

✉ Katharina Schieber
  katharina.schieber@uk-erlangen.de

1   Department of Psychosomatic Medicine and Psychotherapy, University Hospital of Erlangen, Friedrich-Alexander University of Erlangen-Nuernberg (FAU), Schwabachanlage 6, 91054 Erlangen, Germany

2   Department of Clinical Psychology and Psychotherapy, University of Bamberg, Markusplatz 3, 96047 Bamberg, Germany

3   Department of Psychosomatic Medicine and Psychotherapy, Hannover Medical School, Carl-Neuberg-Str. 1, 30625 Hannover, Germany

4   Department of Clinical Psychology and Psychotherapy, University of Wuppertal, Max-Horkheimer-Str. 20, 42097 Wuppertal, Germany

Introduction

Dysmorphic concerns are defined as excessive preoccupations with a slight or perceived defect in physical appearance [1]. They are a symptom of body dysmorphic disorder (BDD) and may indicate BDD proneness or even a subclinical or clinical diagnosis [2, 3]. Individuals with dysmorphic concerns often seek help in cosmetic treatment or aesthetic surgery [4]. In these settings, prevalence rates of dysmorphic concerns are reasonably high ranging from 6.9 to 17.2% [5–10]. However, dysmorphic concerns are associated with a higher dissatisfaction after aesthetic surgery [11, 12]. Thus, these patients have to be identified before medical treatment.

As a screening instrument for dysmorphic concerns, the Dysmorphic Concern Questionnaire (DCQ) by Oosthuizen

et al. [1] is frequently used. It consists of seven items that include statements on appearance-related concerns and behaviors. The response format is based on the General Health Questionnaire [13] estimating one's own concern in comparison with most people [1]. Studies confirmed a good reliability with an internal consistency in Cronbach's α varying from 0.80 to 0.88 [1, 2, 5, 14–16]. The one-factor structure of the questionnaire was supported in several studies [1, 5, 14], and results on convergent and divergent validity were good [5, 14, 17]. The DCQ can be interpreted according to its sum score. Higher DCQ values correspond to higher appearance concerns, but for case identification there are also cutoff values available [5, 17].

In previous studies the DCQ has been applied in non-clinical samples of the general population [3, 15, 18, 19] and in psychiatric inpatients [1, 14]. Regarding non-psychiatric medical settings, the DCQ has been frequently used in plastic surgery patients [8–10, 20, 21], in dermatological outpatients [5, 7] and in people seeking cosmetic enhancement [22].

The DCQ is a concise and economical instrument that is considered for clinical use as well as for epidemiological studies in large samples [16, 17]. However, the validation of the DCQ was performed only in clinical settings [1, 5, 14] and non-representative samples of the general population, including mainly students [2, 17]. The DCQ has not been validated in a large representative sample of the general population yet, and a normative data set is still lacking.

Thus, the primary aim of the study was to validate the DCQ in a general population sample. Secondly, we aimed to obtain a normative data set based on the representative sample and to explore the prevalence rate of cases with significant dysmorphic concerns using different previously defined cutoff values.

Methods

Design and Participants

The present study had a cross-sectional design investigating psychometric properties of the DCQ in a random general population sample of Germany. It was part of a large survey under the topic "Healthiness in Germany" initiated by the University of Erlangen-Nuernberg. An independent demographic consulting agency (USUMA, Berlin, Germany) conducted data collection in 2011 to recruit a representative sample of the German general population. A total of $N = 4212$ individuals between 18 and 65 years were contacted, of whom $n = 2286$ (56%) completed the questionnaires online or in written form. Prior surveys of the general population revealed similar

participation rates [23, 24]. The selection process was based on a multistep procedure choosing random samples of households as well as identifying randomly a target subject of each household with the Kish selection grid. The selected sample represents the general German population in relation to age, gender and living area (www.destatis.de). Further details on the procedure were published previously by Schieber et al. [25]. All participants gave written informed consent. The survey was conducted in accordance with the Helsinki Declaration and met the ethical guidelines of the International Code of Marketing and Social Research Practice, by the International Chamber of Commerce and the European Society for Opinion and Marketing Research.

According to the primary aim of the present analysis, we excluded cases with missing values in the DCQ resulting in a final sample of $n = 2053$ individuals. The mean age of the sample was 45.5 years; 54% of the participants were female. For further sociodemographic characteristics see Table 1.

Instruments

The participants completed the survey assessing sociodemographic data as well as the following questionnaires:

DCQ

As described above, the DCQ [1] aims to assess over-concern about physical appearance. Its seven items are rated on a four-point scale from 0 to 3 (see Table 2). The sum score ranges from 0 to 21, whereby higher values indicate higher dysmorphic concerns. Previous exploratory factor analysis revealed a one-factor model as optimal accounting for 43–58% of the variance [1, 5, 14]. Stangier et al. [5] established a cutoff value of ≥ 11 to identify individuals with significant concerns in bodily appearance in a sample of female dermatological outpatients. To discriminate between individuals with BDD, individuals with disfiguring disorders and individuals with non-disfiguring conditions, the authors suggest a cutoff of ≥ 14. In a sample of undergraduates, a cutoff of 9 was showed the best balance of sensitivity and specificity [17]. Monzani et al. [15] proposed a cutoff of 17 to distinguish between individuals with BDD and individuals with eating disorders referring to unpublished data of their group. Furthermore, in a large sample of twins of the general population Monzani et al. [15] suggested a classification of the DCQ sum score to differentiate the severity degree of dysmorphic concerns in four categories. The four classes represent a three-threshold solution: no symptoms (DCQ sum score = 0), minimal concerns (DCQ sum scores 1–5),

Table 1 Characteristics of the general population samples comparing female and male participants

Sociodemographics		Total sample $N = 2053$		Statistics	p
		Women $n = 1107$	Men $n = 946$		
Age	M (SD)	45.06 (13.1)	45.9 (12.9)	t (2051) = 1.4	0.159
	Range	18–65	18–65		
Family status					
Married	n (%)	527 (47.9)	567 (60.9)	$\chi^2(2) = 53.8$	0.000
Separated, divorced, widowed	n (%)	258 (23.4)	110 (11.8)		
Single	n (%)	316 (28.7)	254 (27.3)		
Graduation					
Secondary school < 10 years	n (%)	170 (15.4)	178 (18.9)	$\chi^2(3) = 13.6$	0.003
Intermediate school < 12 years	n (%)	432 (39.1)	301 (32.0)		
High school or higher	n (%)	497 (45.0)	451 (48.0)		
Still in school	n (%)	6 (0.5)	10 (1.1)		
DCQ sum score					
	M (SD)	3.9 (3.3)	3.0 (2.8)	t (2050.7) = − 7.0	0.000
	Range	0–21	0–20		

Table 2 Distribution characteristics and item-intercorrelation matrix of the DCQ items

	Item	M (SD)	S	K	FL	Item intercorrelations					
						1	2	3	4	5	6
1	Have you ever been very concerned about some aspect of your physical appearance?	1.0 (0.6)	0.8	2.0	0.7						
2	Have you ever considered yourself misformed or misshapen in some way (e.g., nose/hair/skin/sexual organs/overall body build)?	0.5 (0.7)	1.4	1.6	0.7	0.5					
3	Have you ever considered your body to be malfunctional in some way (e.g., excessive body odor, flatulence, sweating)?	0.7 (0.7)	0.8	0.5	0.6	0.3	0.3				
4	Have you ever consulted or felt you needed to consult a plastic surgeon/dermatologist/physician about these concerns?	0.2 (0.6)	2.7	7.7	0.6	0.3	0.3	0.4			
5	Have you ever been told by others/doctor that you are normal in spite of you strongly believing that something is wrong with your appearance or bodily functioning?	0.2 (0.5)	2.6	7.3	0.6	0.3	0.3	0.3	0.3		
6	Have you ever spent a lot of time worrying about a defect in your appearance/bodily functioning?	0.5 (0.7)	1.5	2.0	0.8	0.4	0.5	0.3	0.4	0.5	
7	Have you ever spent a lot of time covering up defects in your appearance/bodily functioning?	0.4 (0.7)	1.6	2.3	0.8	0.4	0.5	0.3	0.4	0.4	0.7

S skewness, *K* kurtosis, *FL* loading on factor 1

moderate concerns (DCQ sum scores 6–10) and clinically significant concerns (DCQ sum scores $\geq$ 11).

Appearance Concerns

Appearance concerns were assessed by using a defects and flaws rating list containing 13 body parts [25]. We computed the total number of subjective flaws marked by the participant. Furthermore, participants had to rate their subjective impairment due to their perceived appearance concerns on a scale ranging from 0 to 10. A higher score indicated a higher subjective impairment.

Depression

The Patient Health Questionnaire PHQ-9 [26, 27] is a widely used instrument to assess symptoms of major depressive disorder during the last 2 weeks. The sum score

based on nine items indicates the severity of depression (range 0–27). Cutoff values represent the diagnostic status of depression: ≥ 5 mild, ≥ 10 moderate, ≥ 15 moderately severe, ≥ 20 severe.

Statistical Analysis

For data analysis, the software IBM SPSS statistics 21 was used. Differences in demographic features were assessed by using t tests and χ^2 tests. The analysis of psychometric properties included descriptive characteristics of the items, construct validity, divergent/convergent validity and internal consistency. Cronbach's α was used to assess the reliability of the DCQ. The examination of construct validity included an exploratory factor analysis, which was run on the seven DCQ items with orthogonal rotation. Sampling adequacy was assessed by the Kaiser–Meyer–Olkin measure. The eigenvalue of the factor was also computed. Furthermore, a confirmatory analysis was performed using the program LISREL 8.71. In addition to the respective χ^2 statistics, a range of fit indices were utilized. Model fit statistics were examined by the Comparative Fit Index (CFI), Non-normed Fit Index (NNFI), root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR). According to Kline [28], the model was regarded acceptable if the indices CFI and NNFI exceeded ≥ 0.90, RMSEA ≤ 0.08 and SRMR < 0.10. Convergent validity of the DCQ was examined by using Pearson's correlations. For divergent validity, four DCQ severity groups were compared by using the Welch's F with Games–Howell post hoc tests. The Welch test is similar to the ANOVA, but is a robust measure regarding homogeneity of variances and unequal sample sizes. Effect sizes were computed with Cohen's d and interpreted according to general guidelines: small (0.2), medium (0.5) and large (0.8). For the normative data set raw scores, percentile ranks and T values are reported. Percentile ranks were computed as data were not normally distributed. T values were computed converting raw scores into z-scores according to mean and SD of the respective age class. Then, z-scores were converted into T values with a range of 0–100 ($M = 50$, SD = 10).

Results

DCQ Item Characteristics

Table 2 presents means, standard deviations, skewness, kurtosis and intercorrelations of the DCQ items. Every item showed the full range of scores (0–3). The highest mean item score ($M = 1.0$, SD = 0.6) was found in the first item, whereas the fourth and the fifth item displayed the lowest

item scores with a mean value of 0.2. Accordingly, both items displayed higher indices of skewness as well as higher positive kurtosis indices in comparison with the remaining items indicating that there are a high number of low values in the tail of the distribution compared to the normal distribution. Items 1–3, 6 and 7 showed positive kurtosis indices ranging from 0.5 to 2.4 indicating a flatter distribution of values. Their indices of skewness ranged from 0.8 to 1.6 indicating a right skewed distribution. The DCQ sum score ranged from 0 to 21; the present sample showed a mean sum score of $M = 3.5$ (SD = 3.1).

Reliability

All DCQ items were significantly associated with each other ($p < 0.001$). Values ranged from $r = 0.3$ to $r = 0.7$ which can be interpreted that the items are related to the same construct (see Table 2). Furthermore, internal consistency was examined using Cronbach's alpha. With a value of $\alpha = 0.81$ in the whole sample the internal consistency was proven to be good.

Factorial Construct Validity

We conducted an exploratory factor analysis on the seven DCQ items first. Sampling adequacy was confirmed with the Kaiser–Meyer–Olkin measure with KMO = 0.84. Results suggest a one-factor solution revealing an eigenvalue of 3.32. It accounted for 47.4% of the variance. Thus, the one-factor model as suggested by Jorgensen et al. [14] was confirmed in our sample. Item loadings on the factor are shown in Table 2. Item number six and seven had the highest loadings of 0.82 and 0.78. The item with the lowest loading was the third item with 0.57. The one-factor structure of the DCQ was verified by a confirmatory factor analysis. There was a significant effect for $\chi^2 = 357.0$, d$f = 14$, $p < 0.001$. Three out of the four indices supported a good to acceptable data model fit: NNFI = 0.92, CFI = 0.95, RMSEA = 0.11 and SRMR = 0.05. Furthermore, all standardized path coefficients (ranging from 0.46 to 0.82) were significant ($p < 0.001$).

Convergent Validity

Convergent validity was supported by positive correlations between DCQ score and subjective impairment as well as DCQ score and number of flaws. The higher the DCQ score the higher was the self-reported subjective impairment due to appearance concerns ($r = 0.54$; $p < 0.001$). A high DCQ score was also associated with a higher number of reported body parts of concern in the flaw list ($r = 0.45$; $p < 0.001$). Furthermore, the DCQ score was negatively correlated with age ($r = -0.19$, $p < 0.001$), whereas BMI showed no

significant association with the DCQ score ($r = 0.01$, $p = 0.779$).

We created four groups according to the categories of severity of the extent of dysmorphic concerns [15]: individuals with no symptoms (DCQ sum score = 0), minimal concerns (DCQ sum scores 1–5), moderate concerns (DCQ sum scores 6–10) and clinically significant concerns (DCQ sum scores $\geq$ 11). Mean numbers of reported flaws, subjective impairment due to appearance concern and the degree of depression in the four groups are presented in Table 3. The group main effects were highly significant for each variable. Post hoc tests revealed that individuals with minimal dysmorphic concerns reported significantly more flaws compared to individuals with no dysmorphic concerns ($p < 0.001$; Cohen's $d = 0.6$). However, individuals with moderate and individuals with clinically significant concerns did not differ in the number of reported flaws ($p = 0.150$; Cohen's $d = 0.2$), but both groups reported significantly more flaws than individuals with no symptoms or minimal concerns (p's < 0.001; Cohen's $d > 0.6$). Regarding subjective impairment post hoc tests revealed significant differences between all groups ($p < 0.001$). Effect sizes for all between group differences were at least Cohen's $d > 0.3$. Levels of depression did also differ significantly in post hoc tests between the DCQ severity groups (p's < 0.001; Cohen's $d > 0.3$). Thus, psychological impairment increased with higher levels of severity of dysmorphic concerns.

Normative Data

Normative data were obtained from the whole sample ($n = 2053$) representative for the general German population. The DCQ sum score ranged from 0 to 21; in the present sample, the mean was $M = 3.5$ (SD = 3.1). Women reported a significantly higher DCQ score than men ($t(2050.7) = -7.1$; $p < 0.001$). Analyzing DCQ scores between age groups the Welch test yielded a significant group effect (18–29 years: M (SD) = 4.7 (3.6); 30–39 years: M (SD) = 4.0 (3.4); 40–49 years: M (SD) = 3.3 (2.9); 50–59 years: M (SD) = 3.2 (2.8); 60–65 years: M (SD) = 2.8 (2.6); Welch's $F(4;907.8) = 17.1$, $p < 0.001$). Pairwise post hoc tests showed significant differences regarding DCQ sum score between young and old age groups. Both age groups 18–29 and 30–39 did not differ to each other ($p = 0.066$), but showed a higher DCQ score than all age groups > 40 years (p's < 0.027). Post hoc tests revealed no significant difference between all age groups > 40 years (p's > 0.077).

Therefore, normative data were stratified according to gender and age groups. Subgroups consisted of an adequately large number of individuals ranging from $n = 126$ to $n = 291$. In Table 4, percentile ranks and T values of the respective DCQ raw sum score are reported for women, men as well as the whole sample. In particular, the subgroup of young woman (age range 18–29 years) reported high DCQ scores. According to the classification of severity by Monzani et al. [15], a DCQ score of 6 and higher represents at least moderate dysmorphic concerns. Applying the score of 6 the subgroup of young woman up to 29 years scored only in the 69th percentile, whereas men of the same age group scored in the 88th percentile. The DCQ cutoff value of 11 proposed by Stangier et al. [5] indicating excessive dysmorphic concerns represented a percentile rank of 97 in the whole sample.

Prevalence of Screening Positive Cases for Excessive Dysmorphic Concerns

Table 5 shows point prevalence rates of DCQ screening positive cases with dysmorphic concerns according to different cutoff proposals in previous studies, as well as 95% confidence intervals [5, 15, 17]. Applying the most commonly used cutoff values of 11 and 14 as proposed by

Table 3 Mean scores and standard deviation [M (SD)] of numbers of reported flaws, subjective impairment related to appearance concerns and degree of depression by groups classified according to the categories of DCQ severity

	Whole sample N = 2053	No symptoms[A] DCQ = 0 n = 205	Minimal concerns[B] DCQ = 1–5 n = 1434	Moderate concerns[C] DCQ = 6–10 n = 332	Clinically significant concerns[D] DCQ $\geq$ 11 n = 82	Welch's F	p
Number of flaws	1.4 (1.4)	0.5 (0.7)	1.2 (1.2)	2.4 (1.7)	2.8 (1.8)	$F(3;290.0) = 142.4$	< 0.000
Subjective impairment	1.8 (1.9)	0.5 (1.1)	1.5 (1.5)	3.1 (2.0)	4.8 (2.7)	$F(1;277.7) = 178.3$	< 0.000
Depression (PHQ-9)	4.2 (3.9)	2.7 (3.1)	3.8 (3.3)	6.1 (4.6)	8.5 (5.5)	$F(3;272.8) = 56.8$	< 0.000

Post hoc tests regarding number of flaws: A < B < C = D; post hoc tests regarding subjective impairment, as well as regarding depression: A < B < C < D

Table 4 Normative data

	Men									
	18–29 years $n = 126$		30–39 years $n = 145$		40–49 years $n = 261$		50–59 years $n = 239$		60–65 years $n = 175$	
Raw	PR	T	PR	T	PR	T'	PR	T	PR	T
0	7	37	10	39	12	40	17	39	18	40
1	23	41	31	42	34	43	35	43	40	44
2	40	44	45	45	58	47	57	47	62	48
3	53	47	58	48	75	50	75	51	72	52
4	65	51	70	52	81	53	81	55	80	56
5	79	54	78	55	87	57	86	60	90	60
6	88	57	90	58	90	60	92	64	93	65
7	92	61	91	61	94	64	96	68	96	69
8	94	64	93	65	95	67	98	72	97	73
9	95	67	96	68	96	71		76	98	77
10	96	71		71	96	74	99	80		81
11	97	74	97	74	97	78	99	85	100	85
12	98	77	99	77	98	81	100	89		90
13		81	99	81	99	84	100	93		94
14		84		84	99	88		97		98
15	99	87		87	99	91		100		100
16	100	91		90	100	95		100		100
17		94		94		98		100		100
18		97		97		100		100		100
19		100		100		100		100		100
20		100	100	100		100		100		100
21		100		100		100		100		100
M (SD)	3.8 (3.0)		3.5 (3.1)		2.9 (2.9)		2.7 (2.4)		2.5 (2.4)	

	Women										Total sample	
	18–29 years $n = 175$		30–39 years $n = 168$		40–49 years $n = 291$		50–59 years $n = 289$		60–65 years $n = 184$		18–65 years $n = 2053$	
Raw	PR	T	PR	T	PR	T	PR	T	PR	T	PR	T
0	2	36	6	38	5	37	7	38	14	39	10	39
1	15	38	21	41	24	41	28	41	36	43	29	42
2	26	41	33	43	44	44	48	45	53	46	48	45
3	37	44	51	46	61	48	57	48	64	50	61	48
4	48	46	62	49	69	51	69	51	77	53	71	52
5	59	49	72	52	79	55	78	54	85	57	80	55
6	69	52	82	55	85	59	84	57	90	60	86	58
7	75	54	87	58	91	62	90	61	92	63	91	61
8	82	57	89	61	93	66	91	64	96	67	93	65
9	87	59	91	63	95	69	93	67	97	70	95	68
10	91	62	93	66	96	73	96	70	98	74	96	71
11	93	65	95	69	98	76	97	74	98	77	97	74
12	93	67		72	100	80	98	77	99	81	98	77
13	96	70	95	75		84	99	80	100	84	98	81
14	97	73	98	78		87	100	83		88	99	84
15	98	75	99	81	100	91		86		91	99	87

Table 4 continued

| Raw | Women | | | | | | | | | | | | Total sample | |
| | 18–29 years $n = 175$ | | 30–39 years $n = 168$ | | 40–49 years $n = 291$ | | 50–59 years $n = 289$ | | 60–65 years $n = 184$ | | 18–65 years $n = 2053$ | |
	PR	T	PR	T	PR	T	PR	T	PR	T	PR	T
16	99	78	99	83		94	100	90		94	99	90
17	99	81	100	86		98		93		98	100	94
18		83		89		100		96	100	100	100	97
19		86		92		100		99		100	100	100
20		88		95		100		100		100	100	100
21	100	91		98		100		100		100	100	100
M (SD)	5.4 (3.8)		4.3 (3.5)		3.6 (2.8)		3.7 (3.1)		3.1 (2.9)		3.5 (3.1)	

PR percentile rank, T T value

Table 5 Prevalence rates of screening positive cases for excessive dysmorphic concerns according to different DCQ cutoff proposals in the present sample of the general population ($N = 2053$)

| | Proposed DCQ cutoff | Prevalence rates | | |
		n	%	95% CI (%)
Mancuso et al. [17]	9	145	7.1	6.0–8.2
Stangier et al. [5][a]	11	82	4.0	3.2–4.9
Stangier et al. [5][b]	14	28	1.4	0.9–1.9
Monzani et al. [15]	17	5	0.2	0.0–0.4

Stangier et al. [5] proposed two cutoff values

[a]Cutoff with 100% sensitivity, [b]cut-off with the best balance of sensitivity and specificity

Stangier et al. [5] resulted in prevalence rates of 4.0 and 1.4% in the present sample.

Discussion

To our knowledge, this is the first study to validate the DCQ in a large sample of the general population. Previous studies included mostly samples of help-seeking individuals [1, 5, 14] or non-representative samples [2, 17]. The results of the present analyses confirmed the good reliability of the DCQ, as well as its one-factor structure [2, 14]. Associations between DCQ sum score and subjective impairment due to appearance concerns, number of reported flaws and depression indicate that the DCQ measures appropriately the intended construct.

Furthermore, the present study provides a normative data set of the DCQ scores, which is important for a valid interpretation of the scores in clinical practice. This may be of special interest in the setting of aesthetic surgery as patients with clinical dysmorphic concerns have to be identified before undergoing an operation. The study provides a large-scale data set which contains percentile ranks and T values for the DCQ sum scores classified according to gender and age class. The discrimination between gender and age groups appeared relevant for the interpretation of the DCQ scores as prior research showed gender differences regarding body dissatisfaction [29]. Even in the present study, women reported more dysmorphic concerns than men, but also within females the DCQ scores differed between age classes. This indicates that for women a higher threshold for clinical significant dysmorphic concerns may be applied than for men, as different thresholds may be applied also for different age classes. Thus, the normative data set provides important information for clinical practice and may lead to a more precise evaluation of the patients.

In the present sample, we applied the various cutoff values ranging from 9 to 17 used in prior studies [5, 15, 17]. Accordingly, the resulting prevalence rates of excessive dysmorphic concerns show a broad range from 0.2 to 7.1%. The cutoff of ≥ 11 by Stangier et al. [5] is often used in previous studies, but their sample included only female dermatological outpatients, whereas Mancuso et al. [17] suggested a lower cutoff value of ≥ 9 conducting analyses in a sample of undergraduates. However, there might be a bias as the samples were very specific. Furthermore, normative data of the present study showed differences in the DCQ score according to gender and age. Therefore, future research is needed conducting cutoff

analysis with a clinical structured interview as external criterion in a representative sample of the general population.

According to the current state of research, however, for clinical practice in the setting of aesthetic surgery we would suggest a cutoff value of ≥ 11 [5]. Although a lower value leads to a higher number of individuals that are falsely identified with BDD, it reduces the number of individuals that are not detected. As the purpose of a screening instrument is to individuate people at risk and to avoid missing them, it seems to be reasonable to apply a lower cutoff. However, for an adequate interpretation of the results it is necessary to interpret individual values to the normative data according to gender and age class.

Some aspects of the DCQ, however, have to be considered with caution. As it is a short instrument, every single item can have a strong influence on the final score. The examination of item characteristics revealed item 3 (related on body malfunction) to be the weakest item representing dysmorphic concerns. Further investigation of an adaption of the item should be a topic of future research. Furthermore, one needs to keep in mind that it is not sufficient using the DCQ to establish a final BDD diagnosis. BDD is mainly characterized by excessive appearance concerns, while the perceived flaws or defects are not observable or only appear slight to others. Patients with BDD furthermore show repetitive behaviors or mental acts that include thinking excessively about the perceived defect, trying to camouflage or alter it or avoiding social situations. These behaviors or mental acts result in distress or lead to impairment in important areas of functioning [30]. However, the DCQ is primarily intended for measuring the severity of dysmorphic concerns, which are relevant in various disorders and health problems. As a screening instrument, the DCQ helps to identify individuals at risk, but a structured diagnostic interview is necessary to verifying the presence of BDD.

This outlines also a limitation of the present study. Appearance concerns and symptoms of depression were based on self-report measurements only. A large population-based survey like the present one has the advantage of generalizability, but certainly underlies some procedural restrictions. Face-to-face diagnostic interviews would be preferable and should be considered in future studies.

Conclusions

Overall, the DCQ has proven to be a valid and reliable questionnaire. It has been developed as a screening measurement to identify individuals with dysmorphic concerns. Now there is a normative data set available to interpret the scores according to gender and age. Subsequently to the DCQ screening it is important to add an exhaustive diagnostic test to ensure the diagnosis of BDD. The best method for this purpose would be a face-to-face interview as symptoms can be evaluated in detail to distinguish between clinical and subclinical cases.

References

1. Oosthuizen P, Lambert T, Castle DJ (1998) Dysmorphic concern: prevalence and associations with clinical variables. Aust N Z J Psychiatry 32:129–132
2. Senin-Calderon C, Valdes-Diaz M, Benitez-Hernandez MM, Nunez-Gaitan MC, Perona-Garcelan S, Martinez-Cervantes R, Rodriguez-Testal JF (2017) Validation of Spanish language evaluation instruments for body dysmorphic disorder and the dysmorphic concern construct. Front Psychol 8:1107
3. Gieler T, Schmutzer G, Braehler E, Schut C, Peters E, Kupfer J (2016) Shadows of beauty—prevalence of body dysmorphic concerns in Germany is increasing: data from two representative samples from 2002 and 2013. Acta Derm Venereol 96(217):83–90
4. Fang A, Wilhelm S (2015) Clinical features, cognitive biases, and treatment of body dysmorphic disorder. Ann Rev Clin Psychol 11:187–212
5. Stangier U, Janich C, Adam-Schwebe S, Berger P, Wolter M (2003) Screening for body dysmorphic disorder in dermatological outpatients. Dermatol Psychosom 4:66–71
6. Wiedersich AK (2010) Die Körperdysmorphe Störung—Das Bild der körperdysmorphen Störung in verschiedenen klinischen Settings. Dissertation Universität Giessen
7. Ritter V, Fluhr JW, Schliemann-Willers S, Elsner P, Strauss B, Stangier U (2016) Body dysmorphic concerns, social adaptation, and motivation for psychotherapeutic support in dermatological outpatients. Journal der Deutschen Dermatologischen Gesellschaft [J Ger Soc Dermatol JDDG] 14(9):901–908
8. Dey JK, Ishii M, Phillis M, Byrne PJ, Boahene KD, Ishii LE (2015) Body dysmorphic disorder in a facial plastic and reconstructive surgery clinic: measuring prevalence, assessing comorbidities, and validating a feasible screening instrument. JAMA Fac Plast Surg 17(2):137–143
9. Woolley AJ, Perry JD (2015) Body dysmorphic disorder: prevalence and outcomes in an oculofacial plastic surgery practice. Am J Ophthalmol 159(6):1058–1064
10. Metcalfe DB, Duggal CS, Gabriel A, Nahabedian MY, Carlson GW, Losken A (2014) Prevalence of body dysmorphic disorder among patients seeking breast reconstruction. Aesthet Surg J 34(5):733–737
11. Picavet VA, Gabriels L, Grietens J, Jorissen M, Prokopakis EP, Hellings PW (2013) Preoperative symptoms of body dysmorphic disorder determine postoperative satisfaction and quality of life in aesthetic rhinoplasty. Plast Reconstr Surg 131(4):861–868

12. Lekakis G, Picavet VA, Gabriels L, Grietens J, Hellings PW (2016) Body Dysmorphic disorder in aesthetic rhinoplasty: validating a new screening tool. Laryngoscope 126(8):1739–1745

13. Goldberg DP (1972) The detection of psychiatric illness by questionnaire. Maudsley Monograph 21, Oxford University Press, London

14. Jorgensen L, Castle D, Roberts C, Groth-Marnat G (2001) A clinical validation of the Dysmorphic Concern Questionnaire. Aust N Z J Psychiatry 35:124–128

15. Monzani B, Rijsdijk F, Anson M, Iervolino AC, Cherkas L, Spector T, Mataix-Cols D (2011) A twin study of body dysmorphic concerns. Psychol Med 42(09):1949–1955

16. Picavet V, Gabriëls L, Jorissen M, Hellings PW (2011) Screening tools for body dysmorphic disorder in a cosmetic surgery setting. The Laryngoscope 121(12):2535–2541

17. Mancuso SG, Knoesen NP, Castle DJ (2010) The Dysmorphic Concern Questionnaire: a screening measure for body dysmorphic disorder. Aust N Z J Psychiatry 44:535–542

18. Liao Y, Knoesen NP, Deng Y, Tang J, Castle DJ, Bookun R, Hao W, Chen X, Liu T (2010) Body dysmorphic disorder, social anxiety and depressive symptoms in Chinese medical students. Soc Psychiatry Psychiatr Epidemiol 45(10):963–971

19. Mancuso SG, Knoesen NP, Chamberlain JA, Cloninger CR, Castle DJ (2009) The temperament and character profile of a body dysmorphic disorder outpatient sample. Personal Mental Health 3:284–294

20. Kisely S, Morkell D, Allbrook B, Briggs P, Jovanovic J (2002) Factors associated with dysmorphic concern and psychiatric morbidity in plastic surgery outpatients. Aust N Z J Psychiatry 36:121–126

21. Javanbakht M, Nazari A, Javanbakht A, Moghaddam L (2012) Body dysmorphic factors and mental health problems in people seeking rhinoplastic surgery. Acta Otorhinolaryngol Ital 32(1):37–40

22. Castle DJ, Molton M, Hoffman K, Preston NJ, Phillips KA (2004) Correlates of dysmorphic concern in people seeking cosmetic enhancement. Aust N Z J Psychiatry 38(6):439–444

23. Buhlmann U, Glaesmer H, Mewes R, Fama JM, Wilhelm S, Brahler E, Rief W (2010) Updates on the prevalence of body dysmorphic disorder: a population-based survey. Psychiatry Res 178(1):171–175

24. Rief W, Buhlmann U, Wilhelm S, Borkenhagen A, Brahler E (2006) The prevalence of body dysmorphic disorder: a population-based survey. Psychol Med 36(6):877–885

25. Schieber K, Kollei I, de Zwaan M, Martin A (2015) Classification of body dysmorphic disorder: what is the advantage of the new DSM-5 criteria? J Psychosom Res 78(3):223–227

26. Kroenke K, Spitzer RL, Williams JB (2001) The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med 16(9):606–613

27. Löwe B, Spitzer R, Zipfel S, Herzog W (2002) Gesundheitsfragebogen für Patienten (PHQ-D). Komplettversion und Kurzform. Testmappe mit Manual, Fragebögen, Schablonen (Patient Health Questionnaire (PHQ-D). Complete and short version. Test folder with manual, questionnaires, templates.). Pfizer, Karlsruhe

28. Kline RB (2005) Principles and practice of structural equation modeling, 2nd edn. Guilford Press, New York

29. Algars M, Santtila P, Varjonen M, Witting K, Johansson A, Jern P, Sandnabba NK (2009) The adult body: how age, gender, and body mass index are related to body image. J Aging Health 21(8):1112–1132

30. American Psychiatric Association (2013) Diagnostic and statistical manual of mental disorders (5th ed.). Washington