

Changes in Body Image and Health-Related Quality of Life Following Breast Reduction Surgery in German Macromastia Patients

A New Tool for Measuring Body Image Changes

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Abstract: Health insurance funds in Germany are increasingly reluctant to fund the cost for reduction mammoplasty. However, several studies have already demonstrated the beneficial effects of breast reduction on symptom relief and health-related quality of life. More specifically, the psychologic and social consequences of breast reduction surgery were also recently evaluated. Relating to the contemporary debate on financial restraint, the present article describes a follow-up study conducted in a sample of 40 patients undergoing reduction mammoplasty. The purpose of the investigation was to assess indicators of health-related quality of life following reduction mammoplasty. Furthermore, the study aimed to assess body image changes and to test a new assessment instrument, Digital-Body-Photo-Test (DBPT), in comparison with a well-validated body image measure (Color-a-Person Body Dissatisfaction Test, CAPT) (concurrent validity). As hypothesized, the findings indicate significant improvements in health-related quality-of-life measures and body-image characteristics. The substantial improvement of body-image satisfaction of all body areas suggests a generalized positive effect of reduction mammoplasty on overall body image. The strong association between the DBPT and the CAPT scores in this study indicates that DBPT is an efficient and valid new tool for measuring body-image changes relating to patients' evaluations of their average satisfaction of specific body parts or areas and their overall appearance acceptance.

Key Words: body image, reduction mammoplasty, health-related quality of life, self-esteem, surgery outcomes

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Reduction mammoplasty is one of the most common procedures in plastic surgery. In contrast to the United States, there is no valid information about the number of breast reductions performed in Germany. Experts guess that about 30,000 breast reductions were performed in Germany per year. Unfortunately, rejection of insurance coverage and policy exclusions for breast reduction are becoming increasingly common in Germany.¹ More often, reduction mammoplasty is seen as a purely cosmetic operation by the German health insurance funds. According to the definition of reconstructive surgery by the American Society of Plastic Surgeons (ASPS), reduction mammoplasty is considered reconstructive in nature. Women who seek reduction mammoplasty are primarily interested in having average-sized breasts that are proportional to the rest of their bodies.² The improved physical and psychosocial functioning that leads to an enhanced quality of life has to be seen as an additional benefit of reduction mammoplasty. Accordingly, several studies in recent years revealed positive changes in body image and increase in self-esteem in patients following reduction mammoplasty.² But studies investigating the outcome and the implications on psychosocial functioning of German women undergoing reduction mammoplasty are very rare.³

Health-Related Quality of Life, Mood, Complaints, and Body Image in Patients With Macromastia

The majority of reduction mammoplasty patients present with physical complaints ranging from neck, shoulder, and upper back pain to the inability to perform daily or work-related activities. Most empirical studies describe a high satisfaction rate after reduction mammoplasty. Significant improvements in emotional, psychologic, and physical well-being^{2,4–13} were reported by patients who underwent bilateral breast reduction. In a meta-analysis of published studies, Chadbourne et al¹³ reported that current evidence suggests that women undergoing reduction mammoplasty have significant postoperative improvement of symptoms and quality of life.

Jones and Bain¹¹ found in their review of studies^{14–18} on the benefits of reduction mammoplasty consistent im-

TABLE 1. Mean Values and Standard Deviation of Complaints on GBB

Scale	t ₁ \bar{x} (s)	t ₂ \bar{x} (s)	t ₃ \bar{x} (s)	Norm Date
Exhaustion	6.88 (4.72)	5.12 (3.71)	5.38 (4.25)	6.49
Stomach	4.55 (4.21)	3.42 (3.83)	4.24 (5.08)	2.21
Muscle	11.05 (4.74)	6.70 (4.06)	6.66 (4.98)	6.65
Thorax	4.22 (3.53)	2.91 (2.67)	3.10 (2.81)	3.51
Total complaints	26.68 (13.36)	18.15 (10.77)	19.38 (14.65)	18.9

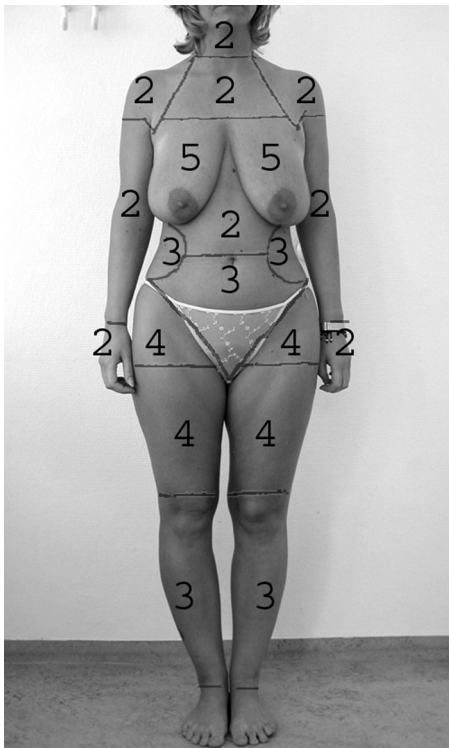


FIGURE 1. Example of a Digital-Body-Photo-Test of a 35-year-old patient with macromastia. Scale: 1 = very satisfied; 2 = satisfied; 3 = neither satisfied nor unsatisfied; 4 = unsatisfied; 5 = very unsatisfied.

Improvements in patients' quality-of-life scores, as well as body image and psychologic well-being (especially self-esteem).^{17,18} Young and Fung² added in their review 3 current studies,¹⁹⁻²¹ which revealed also significant improvement in quality of life, as well as in psychologic well-being. Mizgala and MacKenzie¹⁸ demonstrated an improvement in self-esteem of 85% and of 77% in activity level. Ninety-five percent of the respondents felt they had made the right decision in having breast reduction surgery, and 31% of patients reported improvement in their intimate relationship postoperatively. The prospective study by Hollyman et al¹⁰ showed that the women displayed a distorted body image, low self-esteem, and poor body perception prior to mammoplasty. After reduction mammoplasty, body image returned to normal, and patients' views of their femininity and sexual attractiveness were enhanced. The distorted body image adversely affects psychosocial functioning, and quality of life in reduction mammoplasty patients is often described. Glatt et al⁶ specifically investigated the body image concerns of reduction mammoplasty patients after procedure. They found the reduction patients' postoperative scores on the BDDE-SR (Body Dysmorphic Disorder Examination-Self Report) were significantly lower than those reported by women awaiting breast reduction surgery, as well as those who sought other forms of cosmetic surgery. But studies about health-related quality of life and changes in body image in German reduction mammoplasty patients are rare.³

METHODS

In this prospective study, we assessed 40 consecutive female mammoplasty patients, preoperatively and postoperatively, using measures of health-related quality of life and body image (body-part satisfaction and overall body image).

We evaluated a specific new assessment tool (Digital-Body-Photo-Test, DBPT) in comparison with a well-validated instrument, Color-a-Person Body Dissatisfaction Test (CAPT).²² Investigating health-related quality of life following breast reduction surgery, scores on complaints lists were compared pre- and postoperatively, using scores in general German population as a benchmark. The following German standardized questionnaires were used to investigate several dimensions of health-related quality of life: physical symptoms and complaints with Gießener Beschwerdebogen²³ (GBB, 24-item scale version), which has been standardized

TABLE 2. Comparison of Preoperative and Postoperative Complaints

Scale	Progression t ₁ -t ₂ -t ₃ , P*	Comparison t ₁ -t ₂ , P†	Comparison t ₁ -t ₃ , P†	Comparison t ₂ -t ₃ , P†
Exhaustion	(0.023)‡	(0.013)‡	ns (0.225)	ns (0.268)
Stomach	ns (0.177)	ns (0.344)	ns (0.435)	ns (0.102)
Muscle	(<0.0001)‡	(<0.0001)‡	(0.010)‡	ns (0.755)
Thorax	ns (0.272)	ns (0.027)	ns (0.211)	ns (0.841)
Total complaints	(0.004)‡	(<0.0001)‡	ns (0.024)	ns (0.241)

*Friedmann test for more than 2 paired non-normal distributed samples.

†Wilcoxon test for 2 paired non-normal distributed samples with α adjustment ($\alpha = 0.05$) after Bonferroni-Holm.

‡Significant: $P < \alpha$, $P < \alpha$ adjusted. ns, not significant.

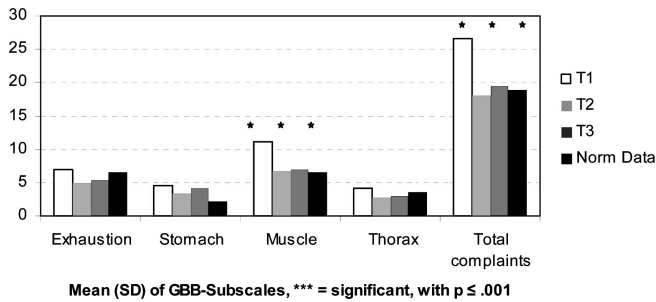


FIGURE 2. Comparison of preoperative and postoperative complaints (on the GBB with GBB norm data).

TABLE 3. Mean Values and Standard Deviation of Mood/Affect on BSF

Scale	t ₁ \bar{x} (s)	t ₂ \bar{x} (s)	t ₃ \bar{x} (s)
Tiredness	4.75 (3.40)	4.10 (2.54)	4.35 (3.02)
Indifference	1.80 (1.32)	1.45 (1.03)	1.75 (1.23)
Depression	4.95 (4.12)	3.45 (3.17)	3.65 (2.99)
Anger	3.15 (2.95)	2.45 (1.89)	2.55 (2.00)
Commitment	10.65 (4.15)	12.40 (5.25)	12.15 (4.43)
Euphoria	7.40 (4.02)	12.15 (4.89)	10.90 (4.18)

for the German population; psychologic well-being with the Berliner Stimmungsfragebogen²⁴ (BSF, 6-scale version per 5 items). As a measure for global satisfaction with life, a visual analogue scale was used (Anamnestic Comparative Self Assessment,²⁵ ACSA, 1 item), providing a mean score of satisfaction, ranging on a Likert-type scale from +5 (“best time in life”) to -5 (“worst time in life”). Other aspects of satisfaction with life were assessed with the Lebenszufriedenheitsinventar²⁶ (LZI, 15 items), which includes a sum score and 14 items relating to different dimensions of life: family/partnership, health, personal characteristics/skills. One of the subscales also assesses the global satisfaction of life (scale 1 = “very satisfied,” 5 = “very unsatisfied”). We chose this questionnaire because it belongs to the Health-Related Quality of Life questionnaires. Furthermore, the WHO Quality of Life Assessment²⁷ (WHOQOL-BREF, 26 items) was used. For the purpose of this study, a questionnaire was constructed to ascertain patients’ reasons and expectations concerning reduction mammoplasty and their assessment of surgery outcome.

TABLE 5. Mean Values and Standard Deviation of Life Satisfaction Scores on LZI

Scale	t ₁ \bar{x} (s)	t ₂ \bar{x} (s)	t ₃ \bar{x} (s)
Generally (LZ4–LZ10)	2.41 (0.66)	2.07 (0.79)	2.26 (0.70)
Health (LZ1–Z3)	2.41 (0.67)	2.27 (0.69)	2.15 (0.76)
Family (LZ11, LZ12, LZ14)	2.40 (1.13)	2.45 (1.13)	2.23 (1.15)

DBPT Approach

For the assessment of different aspects of body image, including satisfaction of the breasts, as well as other body parts, and the overall integrated assessment of the body image pre- and post mammoplasty, we developed the DBPT.²⁸

In this new approach, a digital photo of the patient is used instead of neutral female silhouettes (as in previous body image research); this leads to high emotional identification of the patients with the displayed image, implying construct validity of the test with respect to consecutive ratings on satisfaction with the body parts. This new approach combines methods like CAPT and self-assessment tests, for example the Body Cathexis Scale.²⁹ It is important to note another advantage of this new measurement because the images used for the test ratings were those obtained by the surgeons in the process of preparation for mammoplasty. After loading the digital photo to the computer, the photo is divided into the following body parts by a raster: shoulders, décolleté, breasts, chest, stomach, hips, waist, arms, hands, thighs, lower legs. The patient is then confronted with the image and asked to indicate with different computer colors how satisfied she is with each body part, using a scale from 1 to 5. Being confronted with one’s own picture leads to high emotional identification of the patients with the displayed image, implying construct validity of the test with respect to consecutive ratings on satisfaction with the body parts (Fig. 1). To analyze the data we calculate (1) an index of the whole body with the mean of the labels of all body parts (overall body index); (2) an index for the problematic body parts: breasts, stomach, hip, waist, thighs (problematic body part index); and (3) an index for the neutral body parts: shoulders, décolleté, arms, hands, lower legs (neutral body part index).

Statistical Analyses

Statistical analyses were performed using SPSS version 11.5 for windows and SAS 8.2. First, data were evaluated

TABLE 4. Comparison of Preoperative and Postoperative Mood/Affect

Scale	Progression t ₁ -t ₂ -t ₃ , P [‡]	Comparison t ₁ -t ₂ , P [†]	Comparison t ₁ -t ₃ , P [†]	Comparison t ₂ -t ₃ , P [†]
Tiredness	ns (0.792)	ns (0.454)	ns (0.935)	ns (0.144)
Indifference	ns (0.959)	ns (0.243)	ns (0.875)	ns (0.458)
Depression	ns (0.143)	(0.020) [‡]	ns (0.395)	ns (0.792)
Anger	ns (0.576)	ns (0.176)	ns (0.909)	ns (0.581)
Commitment	ns (0.455)	ns (0.029)	ns (0.136)	ns (0.838)
Euphoria	(0.001) [‡]	(<0.0001) [‡]	(0.004) [‡]	ns (0.270)

*Friedmann test for more than 2 paired non-normal distributed samples.
 †Wilcoxon test for 2 paired non-normal distributed samples with α adjustment ($\alpha = 0.05$) after Bonferroni-Holm.
 ‡Significant: $P < \alpha$, $P < \alpha$ adjusted.

TABLE 6. Comparison of Preoperative and Postoperative Life Satisfaction

Scale	Progression $t_1-t_2-t_3$, P^*	Comparison t_1-t_2 , P^\dagger	Comparison t_1-t_3 , P^\dagger	Comparison t_2-t_3 , P^\dagger
Generally (LZ4–LZ10)	(<0.0001) [‡]	ns (0.046)	(0.003) [‡]	ns (0.106)
Health (LZ1–Z3)	(<0.0001) [‡]	(<0.0001) [‡]	(0.001) [‡]	ns (0.962)
Family (LZ11, LZ12, LZ14)	ns (0.062)	ns (0.336)	ns (0.964)	ns (0.023)

*Friedmann test for more than 2 paired non-normal distributed samples.
 †Wilcoxon test for 2 paired non-normal distributed samples with α adjustment ($\alpha = 0.05$) after Bonferroni-Holm.
 ‡Significant: $P < \alpha$, $P < \alpha$ adjusted.

using paired t test. Subsequently, the Wilcoxon matched pairs signed-rank test was used for pre- and postoperative comparisons with α -adjustment because the data were not normally distributed. In addition, for the nonparametric comparison of the data the Kolmogorov-Smirnov test was used. Data of the DBPT were analyzed by 2-factor analysis of variance (ANOVA) with SAS 8.2 and an unpaired t test. To evaluate the validity of the new DBPT, Spearman rank order correlations are used for comparison the results of the DBPT and the CAPT and taken as external criteria (concurrent validity).

RESULTS

Study Cohort and Demographics

From January to December 2002, all 40 patients accepted for breast reduction surgery at the Department of Reconstructive Plastic Surgery/Park Hospital in Berlin were asked if they wanted to participate in the study. All 40 patients gave their formal written consent to participate and all patients were interviewed on the day prior to surgery. With the exception of 6 patients who moved away, the remaining 34 (85%) patients were interviewed again after 3 months and after 6 months postoperatively. The age of patients ranged from 17 to 67 years, with a mean age of 41 (± 13.4) years. Fifty-seven percent of the women were married, 25% were singles, 15% were divorced, and 2% were widowed. Sixty percent of the respondents were employed at the time of the survey. The mean duration between the request for a reduction mammoplasty and surgery was 4.6 years. Most of patients (37 of 40) expected to have more comfortable feelings about their bodies and less pain postoperatively.

Comparison of Pre- and Postoperative Complaints

Prior to the operation, macromastia patients scored significantly higher on the GBB subscales compared with an age- and gender-matched group of German women (Tables 1 and 2). The main complaint of patients was muscle pain. Three and 6 months after surgery, the patients scored lower and a comparison between the preoperative and 3- and 6-month postoperative scores showed a significant reduction of muscle pain and an overall increase of physical well-being. The improvement was of such a magnitude that the scores of the mammoplasty patients after the surgical procedure and the scores for the age- and gender-matched GBB group were almost similar, indicating not only improvement but also

normalization (see Fig. 2). Interestingly, the patients indicated less exhaustion than the age- and gender-matched group after surgery.

Comparison of Preoperative and Postoperative Moods

The scores for depression on BSF decreased significantly after surgery (see Tables 3 and 4), whereas the scores for euphoria improved at the same time.

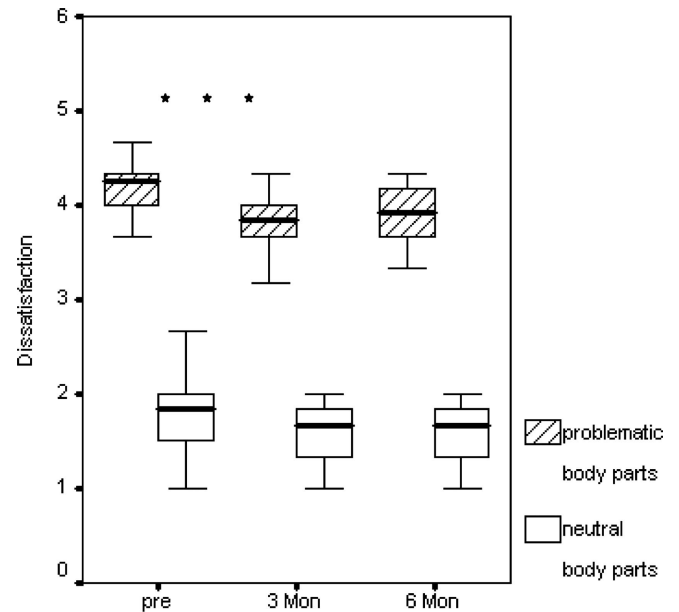


FIGURE 3. Comparison of preoperative and postoperative body dissatisfaction scores [comparison of problematic body part index and neutral body part index using a 2-factor analysis of variance (ANOVA)]. Mean (SD) of body part score. Mean (SD) of body part score, *** = significant, with $P \leq 0.001$.

TABLE 7. Mean Values and Standard Deviation of Quality-of-Life Scores on WHOQOL-BREF

Scale	$t_1 \bar{x}$ (s)	$t_2 \bar{x}$ (s)	$t_3 \bar{x}$ (s)
Physical well-being	15.19 (3.00)	15.85 (3.21)	16.25 (2.59)
Psychological well-being	13.78 (3.29)	15.12 (3.16)	15.53 (2.54)
Relationship	14.17 (3.52)	14.31 (3.64)	14.44 (3.96)
Environment	14.74 (2.31)	15.49 (2.74)	15.38 (2.64)

TABLE 8. Comparison of Preoperative and Postoperative Quality of Life

Scale	Progression $t_1-t_2-t_3$, P^*	Comparison t_1-t_2 , P^\dagger	Comparison t_1-t_3 , P^\dagger	Comparison t_2-t_3 , P^\dagger
Physical well-being	ns (0.383)	ns (0.247)	ns (0.508)	ns (0.925)
Psychological well-being	(0.017) [‡]	(0.002) [‡]	(0.003) [‡]	ns (0.762)
Relationship	ns (0.870)	ns (0.693)	ns (0.618)	ns (0.707)
Environment	(0.019) [‡]	ns (0.046)	ns (0.112)	ns (0.885)

*Friedmann test for more than 2 paired non-normal distributed samples.
 †Wilcoxon test for 2 paired non-normal distributed samples with α adjustment ($\alpha = 0.05$) after Bonferroni-Holm.
 ‡Significant: $P < \alpha$, $P < \alpha$ adjusted.

Comparison of Preoperative and Postoperative Life Satisfaction

Patients scored significantly higher on 2 of 3 subscales of the LZI-Questionnaire following surgery, indicating improvement (see Tables 5 and 6). These subscales were health-related quality of life and general satisfaction with life. The mean score for health-related satisfaction was the most increased compared with general satisfaction with life.

Comparison of Preoperative and Postoperative Quality of Life

Patients scored significant higher on 2 of 4 subscales of the WHOQOL-BREF after surgery. These subscales were psychologic well-being and “environment,” which includes activity level, as well as physical and psychologic well-being (see Tables 7 and 8).

Comparison of Preoperative and Postoperative Global Life Satisfaction

The patients rated their current global life satisfaction on the visual analogue scale as significantly increased over the preoperative level, suggesting that there was an improvement across many important aspects of their quality of life (see Tables 9 and 10).

Motivation and Reasons for Having Reduction Mammoplasty

Asked about the main reasons for having reduction mammoplasty, the answers fell into 10 categories as follows: 87% highlighted the improvement of body acceptance and of physical and psychologic well-being as an important reason for undergoing mammoplasty surgery, 86% wanted to be relieved of pain, 58% to improve their self-confidence, 34% to improve the fit of their clothes, 23% to improve physical activity. For 21%, increased physical attractiveness was also an important motivation when requesting reduction mammoplasty; 20% complained about a lack of femininity as a reason for requesting surgery. For 11%, less inhibition in social situations and in sexual relations was an important reason for undergoing mammoplasty. Many patients provided answers that fell into more than 1 category. The reasons for having reduction were condensed into 3 main categories: (1) motivation to relieve pain or other medical reasons, 63%; (2) to improve body acceptance, self-image and body image, and physical attractiveness, 76%; and (3) to feel less inhibition in social situations and sexually, 26%.

Expectations

After 6 months, we asked, “Which expectations have been fulfilled up to now (presenting the 10 categories patients reported prior to surgery)?” Seventy-six percent reported that they felt an improvement of general well-being and increased body acceptance, 72% reported less pain, and 60% referred to more self-confidence following the operation. Twenty-five percent indicated more physical activity, 41% felt more feminine than prior to the operation, and 36% felt more physically attractive than before. Fifteen percent stated that they felt less inhibited in social situations and in their sexuality, and 29% considered that clothes suited them better.

TABLE 9. Mean Values and Standard Deviation of Global Life Satisfaction on ASCA

$t_1 \bar{x}$ (s)	$t_2 \bar{x}$ (s)	$t_3 \bar{x}$ (s)
6.37 (2.50)	7.59 (2.12)	7.72 (2.33)

0, Worst time in life; 10, best time in life.

TABLE 10. Comparison of Preoperative and Postoperative Global Life Satisfaction

Scale	Progression $t_1-t_2-t_3$, P^*	Comparison t_1-t_2 , P^\dagger	Comparison t_1-t_3 , P^\dagger	Comparison t_2-t_3 , P^\dagger
	(<0.0001) [‡]	(0.001) [‡]	(0.001) [‡]	ns (0.116)

*Friedmann test for more than 2 paired non-normal distributed samples.
 †Wilcoxon test for 2 paired non-normal distributed samples with α adjustment ($\alpha = 0.05$) after Bonferroni-Holm.
 ‡Significant: $P < \alpha$, $P < \alpha$ adjusted.

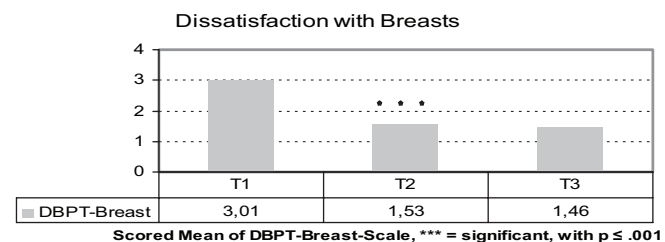


FIGURE 4. Comparison of preoperative and postoperative breast dissatisfaction scores on the Digital-Body-Photo-Test.

TABLE 11. Comparison of Preoperative and Postoperative Problematic Body Part Index and Neutral Body Part Index (ANOVA-Type Statistic)

	QF	DF	P
T	57.395	1.4414	≤0.00001
C	481.72	1.0000	≤0.00001
TC	12.291	1.2545	≤0.00014

C, group (Problematic Body Part Index and neutral Body Part Index); T, time; TC, interaction of group and time; QF, critical value for F-distribution; DF, estimated degree of freedom.

Final Overall Assessment of Reduction Mammoplasty

Patients were asked if they would have reduction mammoplasty again and if they would recommend this surgery to others. Most of patients (97%) stated that they would have mammoplasty again, and only 3% were not sure. Ninety-three percent would recommend mammoplasty to another woman with macromastia, 5% did not know, and 2% would not recommend reduction mammoplasty to others.

Comparison of Preoperative and Postoperative Body Image Satisfaction

Satisfaction With Different Body Areas

Preoperatively, the patients revealed in DBPT and in CAPT greater dissatisfaction (high scores) with the so-called female problematic body areas: breasts, stomach, hips, waist, and thighs. Postoperatively, patients scored in both tests significantly lower, indicating higher satisfaction with these body parts ($P < 0.0001$). Interestingly, there was not only an improvement in the ratings of the problematic body part index in DBPT and CAPT but it was also noticeable that the indices of the neutral body parts like shoulders, décolleté, arms, hands, and lower legs significantly changed ($P < 0.002$) towards higher satisfaction with the neutral body parts. Comparing the pre- and postoperative DBPT and CAPT scores for problematic body parts, excluding breasts, patients' scores for dissatisfaction were again significantly lower following surgery (DBPT mean score: preoperative 4.06, postoperative 3.95, $P < 0.049$) (see Fig. 3).

Spearman rank correlation of the DBPT/CAPT test was greater than 0.7, indicating concurrent validity of the DBPT with the CAPT (Table 11).

Comparison of Preoperative and Postoperative Satisfaction Scores With Breasts

Prior to surgery, the patients indicated in DBPT, as well as in CAPT, a great dissatisfaction with their breasts. Three and 6 months after surgery, satisfaction with their breasts was significantly ($P < 0.0001$) increased in both tests. Spearman rank correlation of the DBPT/CAPT test greater than 0.8 demonstrates the concurrent validity of the DBPT with the CAPT (Fig. 4).

DISCUSSION

Consistent with results of previous studies,^{1,4,6,10,14,18–21} we found a significant improvement of body image satisfaction

(especially of dissatisfaction with breasts and overall appearance) and health-related quality of life in patients following reduction mammoplasty. The data of our study provide further evidence that reduction mammoplasty has a positive effect on patients' physical and emotional health. The results obtained with the new body image assessment tool (DBPT) suggest that the body image of the breasts is fully incorporated into an integrated body image after surgery. This is important as it implies that the reorganization of the body image experienced by women who underwent reduction mammoplasty was not only a normalizing effect restricted to the problem areas but also enabled them to develop higher satisfaction with all body areas.

Despite the fact that the sample size was rather small, the strong positive association between the DBPT and the well-validated CAPT scores indicates that DBPT is an innovative and promisingly new tool for measuring body image changes for both patients' evaluations of their average satisfaction with specific body parts or areas and their overall appearance acceptance. A possible weakness of the study design is that only the concurrent validity of the DBPT has been assessed yet. However, further studies are necessary to replicate the findings obtained with the DBPT in larger samples and controls and to evaluate the instrument in other plastic surgery methods. Those studies should also aim to identify predictors of positive and negative body-image changes.

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