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# A Dutch Cross-sectional Population Survey to Explore Satisfaction of Women with their Breasts

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**Background:** Little is known about how satisfied women are with their breasts and which factors influence breast satisfaction. Therefore, the aim of this study was to elucidate this by collecting data on breast satisfaction from the general population in relation to age, body mass index, lifestyle, psychological, and physical well-being.

**Method:** This study was a cross-sectional population survey performed in 2019 in the north of the Netherlands, among randomly selected women between 20 and 80 years. Breast satisfaction was measured in the 1334 participants with the preoperative reconstruction BREAST-Q module. Other applied questionnaires were the Hospital Anxiety and Depression Scale, Short Form Survey (SF-36), and a custom-made questionnaire on lifestyle and baseline characteristics. Representativeness was assessed by comparing the participants with Dutch normative data. Possible factors influencing “satisfaction with breasts” were analyzed using multivariate linear regression analyses.

**Results:** The median (IQR) BREAST-Q score for “satisfaction with breasts” was mediocre: 63 (58–79) on a 0–100 scale. Higher age and higher SF-36 scores had a positive effect on breast satisfaction ( $P < 0.001$  and  $P < 0.001$ , respectively) and a higher body mass index, smoking and anxiety score greater than 8 were negatively associated ( $P < 0.001$ ,  $P = 0.013$  and  $P < 0.001$  respectively, multivariate linear regression analyses).

**Conclusion:** These data are the first European normative data and can serve as a reference in future population and patient-based studies regarding breast satisfaction. (*Plast Reconstr Surg Glob Open* 2021;9:e4002; doi: [10.1097/GOX.0000000000004002](https://doi.org/10.1097/GOX.0000000000004002); Published online 23 December 2021.)

## INTRODUCTION

Women’s breasts are seen as an indicator for womanliness and sexual feminineness, but structured data on women’s opinion of their breasts are scarce.<sup>1</sup> The rise in cosmetic breast procedures throughout the past decades, such as breast augmentation and breast lift surgery, may actually indicate that many women are not satisfied with their breast appearance. In 2018, in the United States, 496,200 cosmetic breast procedures were performed, 5%

more than in 2017, which was 4% more than in 2016.<sup>2,3</sup> Due to the COVID-19 pandemic, numbers of performed procedures were lower in 2019 and 2020; however, the demand was higher than ever.<sup>2</sup> In a 2008 study by Frederick et al, it was found that 70% of women of the general population are dissatisfied with their breast size when this matter was assessed by just asking women one single question: “Are you satisfied with the size of your own breasts?”<sup>4</sup> Evaluation of the general population nonbreast-operated women’s opinion about their breast appearance is highly relevant to get insight into women’s opinion, the potential demand for cosmetic breast surgery, and to have a base value upon which results of breast surgery, either cosmetic or reconstructive, can be judged.

Worldwide, the BREAST-Q scale has become the gold standard to evaluate patients’ opinion (ie, Patient Reported Outcome Measure of their breast surgery in a reliable and valid way).<sup>5</sup> Thus far, normative BREAST-Q data of healthy

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nonbreast-operated women have only been evaluated in a general American population<sup>6-8</sup>; they found rather low BREAST-Q scores regarding satisfaction with the breast (mean  $58 \pm 18$ ,  $54 \pm 19$ ,  $57 \pm 16$ , on a scale of 0–100). However, a major disadvantage of these aforementioned studies is that evaluation of women's general health and psychological well-being is lacking.<sup>6-8</sup> This might hamper the use of these data as reference data, as satisfaction can be affected by many factors such as age and body mass index (BMI).<sup>9-10</sup> We hypothesize that with increasing age and BMI, satisfaction with breasts decreases due to changes in breast appearance. Besides that, we expect bad lifestyle (eg, smoking, lower psychological and physical well-being) to negatively affect satisfaction with breasts.

Therefore, this study was undertaken to collect normative data from the general population on breast satisfaction in relation to age, BMI, lifestyle, and psychological and physical well-being. By performing such a population survey, this study provides better insight on women's opinion about their breasts and can serve as a reference for studies evaluating patients' satisfaction after breast surgery.

## MATERIAL AND METHODS

### Study Design and Participants

This study was a cross-sectional population survey performed in 2019 in the north of the Netherlands. All inhabitants in the Netherlands are registered in the municipal base administration. This enabled us to get a random sample of 4623 women of 20 years of age and older, stratified by age decades until the age of 80, from the municipality of Groningen.<sup>11</sup> A current or past breast cancer diagnosis, breast cancer treatment, or any form of surgery on the breast(s) were exclusion criteria for participating. Women fulfilling the exclusion criteria were asked to exclude themselves from the study, which was explained in a letter. The institutional review board of the University Medical Center Groningen granted a waiver for this study (METc 2018.677).

### Procedure

Questionnaires were sent by post to all randomly selected women from the municipal base administration with an accompanying letter, informing them about the way their address was retrieved, the methods employed to guarantee anonymity, the purpose of the study, and the exclusion criteria for participation. Finally, they were kindly asked to complete the questionnaires and return them in the envelope provided. The participants' addresses were immediately destroyed after the questionnaires had been sent to retain anonymity of the potential participants. As a result, no reminder letters could be sent to nonresponders. Media attention for the study was generated in an effort to maximize the response rate using local newspapers and interviews with the first author on local radio and television.

### Questionnaires and Scoring

In total, four questionnaires were used in this study: the preoperative BREAST-Q module, the Hospital Anxiety and Depression Scale (HADS), the Short Form Survey (SF-36), and a custom-made questionnaire asking for baseline characteristics.<sup>5,12,13</sup>

## Takeaways

**Question:** How satisfied are women from the general population with their breasts?

**Findings:** This cross-sectional population survey among an age-stratified random sample of the municipality of Groningen, the Netherlands, gives insight into how satisfied women are with their breasts and which factors influence breast satisfaction using the BREAST-Q questionnaire. These data are the first European normative BREAST-Q data and can serve as a reference in future population and patient-based studies.

**Meaning:** This study clearly reveals the moderate satisfaction of women with their breasts in a European general population and that breast satisfaction is strongly affected by BMI, with lower breast satisfaction in women with a higher BMI.

1. **BREAST-Q:** This questionnaire is designed to evaluate patients' satisfaction and health-related quality of life (QoL) before and after breast surgery. There are currently six modules: (1) augmentation, (2) reduction/mastopexy, (3) mastectomy, (4) reconstruction, (5) breast reconstruction expectations, (6) breast conserving therapy.<sup>5</sup> The BREAST-Q modules are psychometrically linked across the six modules and different patient treatment groups (eg, breast cancer patients and patients undergoing cosmetic breast surgery). Especially the preoperative BREAST-Q modules are almost identical amongst the six modules. Consequently, the modules can be used for comparison between different patient groups.<sup>5</sup> Each module is divided into multiple scales that can be used independently. The preoperative reconstruction BREAST-Q module has five scales: Satisfaction with breasts (four items), psychosocial well-being (10 items), sexual well-being (six items), physical well-being chest (16 items), and physical well-being abdomen (five items). Responses on each BREAST-Q subscale are summed and then transformed using the Q-score to a scale from 0 (worst) to 100 (best) (New York, N.Y.; <https://webcore.mskcc.org/breastq/scoring.html>).<sup>4</sup>
2. **HADS:** This aims to detect emotional disorders and gives some insight into psychological well-being in patients undergoing investigation or treatment in medical and surgical departments and consists of two scales: depression (seven items) and anxiety (seven items).<sup>12</sup> The total score per subscale is calculated as the sum of these scores and ranges from 0 to 21. Total scores for both items are defined as 0–7 (indicating normal), 8–10 (indicating symptoms of anxiety or depression), and 11–21 (indicating symptoms of severe anxiety or depression).<sup>12</sup>
3. **SF-36:** This is a questionnaire for assessing health-related QoL, including psychological and physical well-being, and consists of eight scales: physical functioning (10 items), role limitations due to physical health (four items), role limitations due to emotional problems (three items), energy/fatigue (four items), emotional well-being (five items), social functioning (two items), pain (two items), and general health

(five items).<sup>13</sup> Each item is scored on a 0 (worst) to 100 (best) range. In step 2, items in the same scale are averaged together to create the eight scale scores.<sup>13</sup>

4. *General characteristics:* Additionally, there were questions on lifestyle habits. These questions were derived from Lifelines, a population-based cohort study including 167,000 participants, performed in the same area.<sup>14</sup> The following characteristics were measured: age, BMI, smoking status, marital status, highest level of education, occupational status, and physical activity.

### Outcomes

Our primary outcome was the score on the subscale, satisfaction with breasts of the preoperative BREAST-Q module. This scale measures body image in terms of a woman's satisfaction with her breasts, and asks questions regarding how comfortably bras fit and how satisfied women are with their breast area both clothed and unclothed.<sup>5</sup> Secondary outcomes were the remaining BREAST-Q subscales [ie, psychosocial well-being, physical well-being (chest and abdomen), and sexual well-being].

### Power Analysis

In a previous study performed in the same geographical area, the average satisfaction with breasts after breast reconstruction was  $70.2 \pm 17.2$ .<sup>15</sup> We expected the women selected from the general population to have a higher mean score of 73 or greater because they will have natural, not reconstructed breasts. Assuming an  $\alpha$  of 0.05 and a power of 0.80, we concluded that we needed at least 592 participants. Because the prevalence of breast cancer in the Netherlands is 1.5% and women with breast cancer had to exclude themselves from study, we needed 601 volunteers in total.<sup>16,17</sup> Previously performed comparable studies at our hospital with the same strategy of data collection had a response rate of 13%. Therefore, we decided to invite 4623 women, 770 per decade of age, to participate in this study to reach our target number of participants.

### Statistical Analyses

Baseline characteristics of the participants were described, and the response rate was calculated overall and for the age groups separately. To evaluate the representativeness of the participants, characteristics were compared with Dutch reference data.<sup>18,19</sup> The SF-36 scores were compared with those of a Dutch national sample<sup>20</sup> (summarized *T*-tests). The HADS scores were compared with those of a Dutch regional sample<sup>21</sup> studying sexual functioning amongst women for the groups scoring 8 or higher (possible disorder) and 11 or higher (probable disorder) (Chi-square test). The BREAST-Q scores per subscale were described and, due to non-normality, presented as medians and interquartile ranges (IQR). Univariate and multivariate associations were performed to establish the factors influencing satisfaction with breasts and the other remaining BREAST-Q subscales. In this way,  $\beta$  coefficients and 95% confidence intervals (95%-CIs) were estimated. Box plots were constructed for graphical representation of factors statistically significantly associated with the primary

outcome: satisfaction with breasts. All analyses were conducted with IBM SPSS statistics (version 23), and a *P* value of less than 0.05 was considered statistically significant.

## RESULTS

### Study Population: Response and Representativeness

In total, 1334 women filled out at least one of the questionnaires and returned them to us, yielding an overall response of 28% (1334/4623) ranging from 23.8% to 34.1%

**Table 1. Participant Baseline Characteristics versus Dutch Normative Data**

Characteristics	Study Group, N = 1334 (100%)	Dutch Central Agency for Statistics Dutch & Health Monitor 2018 (%)*
Age (y)	1327 (99.5)	
Age mean, SD	50.4 ± 17	—
Age 20–30	216 (16.3)	12.4
Age 31–40	200 (15.7)	12.0
Age 41–50	211 (15.9)	13.4
Age 51–60	254 (19.1)	14.3
Age 61–70	263 (19.8)	12.1
Age 71–80	183 (13.8)	14.4
BMI (kg <sup>2</sup> /m <sup>2</sup> )	1318 (98.9)	
BMI mean, SD	25 ± 4.69	—
BMI < 20	113 (8.5)	2.2
BMI 20.1–25	674 (51.2)	56.2
BMI 25.1–30	362 (27.5)	27
BMI > 30.1	169 (12.8)	14.7
Smoking	1329 (99.6)	
Yes	157 (12)	19.2
No	1046 (88)	80.8
Education	1316 (98.7)	
Low <sup>1,2,3,4</sup>	245 (18.6)	24
Middle <sup>5,6</sup>	361 (27.4)	37
High <sup>7,8</sup>	693 (53)	29
Other	17 (1.3)	
Employment	1307 (97.9)	
Paid work	723 (55.3)	61.9
Voluntary work	30 (2.3)	
Homemaker	59 (4.5)	
Student	126 (9.6)	5.4
Retired	288 (22.0)	18
Unable to work or disabled	31 (2.4)	7.3
Unemployed or seeking employment	50 (3.8)	3.6
Marital status	1322 (99.1)	
Married	596 (45.1)	46.5
Widowed	71 (5.4)	6.0
Divorced	80 (6.1)	9.2
Living with significant other	254 (19.2)	38.3
Living apart	82 (6.2)	
together		
Single, never married	210 (15.9)	
Other	29 (2.2)	
Physical Activity <sup>†</sup>	1329 (99.6)	
Fulfil recommendation <sup>‡</sup>	845 (64)	61.7

\*<https://opendata.cbs.nl/statline/#/CBS/nl/> (statistical comparison not possible).

†Physical activity such as cycling, sports, cleaning for at least 30 minutes a day.

‡30 minutes of moderate-intensity activity 5 days a week (29 Physical Activity Guidelines. World Health Organization. Available from <https://www.who.int/> Accessed June 19, 2019).

<sup>1</sup>No education, did not finish primary school.

<sup>2</sup>Primary education.

<sup>3</sup>Lower or preparatory secondary vocational education.

<sup>4</sup>Junior general secondary vocational education.

<sup>5</sup>Secondary vocational education or work-based learning pathway.

<sup>6</sup>Senior general secondary education, pre-university secondary education

<sup>7</sup>Higher vocational education.

<sup>8</sup>University education.

over the stratified age groups. (See table, Supplemental Digital Content 1, which displays the response rate per age category. <http://links.lww.com/PRSGO/B865>.)

The study group was representative for Dutch women, except that the women in this study had higher education (52% [CI 50%–55%] versus 29%)<sup>19</sup> and were more often students (9.4% [CI 8%–11%] versus 5.4%),<sup>16</sup> had less frequently paid work (55.4% [CI 53%–58%] versus 61.9%),<sup>19</sup> and smoked less (12% [CI 10%–14%] versus 19.2%) (Tables 1–2). The women in this study scored worse on the energy/fatigue and general health scales of the SF-36 (66 versus 69, summarized *T*-test, *P* < 0.001 and 69 versus 71 respectively, summarized *T*-test *P* = 0.007),<sup>19</sup> and had more symptoms of possible anxiety (HADS, anxiety score ≥ 8) (24.7% versus 19.1%,  $\chi^2 = 9.00$ , *P* = 0.007) compared with the women in the study on sexual functioning.<sup>21</sup>

**BREAST-Q**

Table 3 shows all BREAST-Q subscales with medians (IQR) ranging from 58 (48–67) to 83 (73–83) on a 0–100 scale. The median (IQR) of the BREAST-Q subscale “satisfaction with breasts” was 63 (58–79). In contrast to our hypothesis, breast satisfaction did not decrease with age (*P* < 0.001) (Table 4) (See table, Supplemental Digital Content 2, which displays the boxplots of BREAST-Q scores of the “satisfaction with breasts” subscale in relation to age, categorized per 10 years. <http://links.lww.com/PRSGO/B866>.)

Women who scored high on the SF-36, indicating higher psychological and physical health, scored higher on “satisfaction with breasts” (*P* < 0.001) when compared with average. (See figure, Supplemental Digital Content 3, which displays the boxplots of BREAST-Q scores of the “satisfaction with breasts” subscale in relation to total mean scores of the SF-36. Scores are categorized as mean score less than 40, 40–60, 60.1–80 and greater than 80. <http://links.lww.com/PRSGO/B867>.)

As hypothesized, with a higher BMI, a decrease in breast satisfaction was seen (*P* < 0.001). (See figure,

Supplemental Digital Content 4, which displays the boxplots of BREAST-Q scores of the “satisfaction with breasts” subscale in relation to body mass index. Body mass index is categorized as less than 20, 20–25, 25.1–30, 30.1–35, greater than 35. <http://links.lww.com/PRSGO/B868>.) Smokers appeared to be less satisfied (*P* = 0.013) and women with symptoms of anxiety (HADS anxiety score > 8) scored significantly lower (*P* < 0.001). (See figure, Supplemental Digital Content 5, which displays the boxplots of BREAST-Q scores of the “satisfaction with breasts” subscale in relation to smoking; satisfaction with breasts among smokers versus non-smokers. <http://links.lww.com/PRSGO/B869>.) (See figure, Supplemental Digital Content 6, which displays the boxplots of BREAST-Q scores of the “satisfaction with breasts” subscale in relation to symptoms of anxiety measured by the HADS. HADS anxiety scores are categorized as 0–7 [indicating normal], 8–10 [indicating symptoms of anxiety], and 11–21 [indicating symptoms of severe anxiety]. <http://links.lww.com/PRSGO/B870>.)

Lifestyle behavior (eg, smoking, psychological and physical well-being) are complex but important players in body image and breast satisfaction. Lower psychological well-being can cause lower physical well-being and vice versa. Moreover, people with lower psychological well-being are more likely to smoke, which results in a lower physical well-being. Other lifestyle factors, besides smoking, such as physical activity, work, and relationship status, were not related to the satisfaction with breasts subscale of the BREAST-Q.

For the remaining BREAST-Q subscales, multiple determinants for lower BREAST-Q scores were detected (Table 4). Higher BMI and lower SF-36 scores were statistically significantly negatively associated with all subscales of the BREAST-Q. Anxiety score greater than 8 of the HADS was statistically significantly negatively associated with all subscales, except for the sexual well-being subscale where instead of anxiety, depression score greater than 8 was statistically significantly negatively associated (*P* = 0.028) (Table 4).

**Table 2. Participants Hospital Anxiety and Depression Scores and 36-item Short-form Health Survey Scores versus Dutch Normative Data**

Hospital Anxiety and Depression Scale	Study Group, N = 1334 (100%)	Lammerink 2017 <sup>21</sup>	Statistics
Anxiety, n	1311 (98)	812	
Mean score	3.1	3.2	Summarized <i>T</i> -Tests; <i>P</i> = 0.483
Score ≥ 8, percentage	148 (11.3)	106 (13.1)	$\chi^2 = 1.55$ , <i>df</i> = 1, <i>P</i> = 0.213
Score ≥ 11, percentage	46 (3.5)	29 (3.6)	$\chi^2 = 0.015$ , <i>df</i> = 1, <i>P</i> = 0.903
Depression, n	1309 (98)	820	
Mean score	5.8	4.8	Summarized <i>T</i> -tests; <i>P</i> < 0.001
Score ≥ 8, percentage	323 (24.7)	157 (19.1)	$\chi^2 = 9.00$ , <i>df</i> = 1, <i>P</i> < 0.003
Score ≥ 11, percentage	135 (10.3)	75 (9.2)	$\chi^2 = 0.68$ , <i>df</i> = 1, <i>P</i> = 0.410
36-Item Short Form Health Survey (n)	1318 (99)	Aaronson 1998 (n = 1742) <sup>20</sup>	Summarized <i>T</i> -Tests
Physical functioning mean score	86	85	<i>P</i> = 0.208
Role limitations due to physical health mean score	81	80	<i>P</i> = 0.428
Role limitations due to emotional problems mean score	80	83	<i>P</i> = 0.015
Energy/fatigue mean score	66	69	<i>P</i> < 0.001
Emotional well-being mean score	76	76	<i>P</i> = 1.0
Social functioning mean score	84	85	<i>P</i> = 0.204
Pain mean score	82	81	<i>P</i> = 0.221
General health mean score	69	71	<i>P</i> = 0.007

N, number of participants.

**Table 3. BREAST-Q Scores**

BREAST-Q Subscale	Study Group
<b>Satisfaction with breasts (n)</b>	1332
Mean (SD)	68 (19)
25 – 50 -75 percentiles	58 – 63 - 79
<b>Psychosocial well-being (n)</b>	1324
Mean (SD)	72 (17)
25 – 50 -75 percentiles	60 – 72 - 82
<b>Physical well-being: Chest (n)</b>	1326
Mean (SD)	80 (14)
25 – 50 -75 percentiles	71 – 81 - 91
<b>Physical well-being: Abdomen (n)</b>	1325
Mean (SD)	79 (18)
25 – 50 -75 percentiles	72 – 83 - 83
<b>Sexual well-being (n)</b>	1238
Mean (SD)	58 (19)
25 – 50 -75 percentiles	48 – 57 - 67

(See table, Supplemental Digital Content 7, which displays the univariate linear regression analysis on all BREAST-Q subscales. <http://links.lww.com/PRSGO/B871>.)

## DISCUSSION

This is the first study to evaluate European normative data regarding nonbreast-operated women's satisfaction with their breast appearance in relation to age, BMI, lifestyle, psychological, and physical well-being. Main findings were that the median BREAST-Q score for "satisfaction with breasts" was mediocre. Higher age and higher SF-36 scores had after adjustment a statistically significant positive effect on breast satisfaction and a higher BMI, smoking and anxiety score >8 were statistically significant negatively associated.

**Table 4. Multivariate Linear Regression Analysis for Participant Characteristics in relation to BREAST-Q Scores**

BREAST-Q Subscale		Multivariate Linear Regression			
		$\beta$	95% CI Lower	95% CI Upper	P
Satisfaction with breasts	Intercept	67.1	57.8	76.4	<0.001
	Age <sup>1</sup>	0.18	0.13	0.24	<0.001
	BMI <sup>2</sup>	-0.94	-1.14	-0.73	<0.001
	Smoking <sup>3</sup>	-3.54	-6.32	-0.75	0.013
	Physical activity <sup>4</sup>	1.58	-0.40	3.57	0.118
	High education <sup>5</sup>	0.91	-1.05	2.87	0.362
	Depression $\geq 8$	-3.13	-6.62	0.36	0.078
	Anxiety $\geq 8$	-5.03	-7.67	-2.38	<0.001
	Total mean SF-36 score	0.20	0.13	0.27	<0.001
	Intercept	64.0	56.3	71.7	<0.001
Psychosocial well-being	BMI <sup>2</sup>	-0.53	-0.71	0.35	<0.001
	Smoking <sup>3</sup>	-2.69	-5.11	0.27	0.029
	Physical activity <sup>4</sup>	0.97	-0.75	2.70	0.268
	High education <sup>5</sup>	1.43	-0.25	3.12	0.096
	Depression $\geq 8$	-2.35	-5.39	0.69	0.130
	Anxiety $\geq 8$	-5.25	-7.54	-2.96	<0.001
	Total mean SF-36 score	0.28	0.22	0.34	<0.001
	Intercept	61.6	54.9	68.2	<0.001
	BMI <sup>2</sup>	-0.19	-0.35	-0.04	0.017
	Smoking <sup>3</sup>	-2.08	-4.21	0.05	0.056
Physical well-being: chest	Physical activity <sup>4</sup>	0.28	-1.26	1.81	0.722
	Paid work <sup>7</sup>	-0.62	-2.13	0.89	0.421
	Depression $\geq 8$	2.53	-0.15	5.21	0.064
	Anxiety $\geq 8$	-4.26	-6.27	-2.25	<0.001
	Total mean SF-36 score	0.31	0.26	0.37	<0.001
	Intercept	59.6	51.2	68.0	<0.001
	Age <sup>1</sup>	-0.05	-0.10	0.00	0.071
	BMI <sup>2</sup>	-0.52	-0.70	-0.33	<0.001
	Physical activity <sup>4</sup>	2.21	0.43	4.00	0.015
	High education <sup>5</sup>	0.23	-1.56	2.03	0.800
Physical well-being: abdomen	Paid work <sup>7</sup>	-1.25	-3.09	0.58	0.181
	Depression $\geq 8$	2.20	-0.92	5.33	0.167
	Anxiety $\geq 8$	-3.48	-5.86	-1.11	0.004
	Total mean SF-36 score	0.4	0.38	0.51	<0.001
	Intercept	46.4	37.2	55.6	<0.001
	Age <sup>1</sup>	-0.06	-0.12	0.00	0.060
	BMI <sup>2</sup>	-0.66	-0.86	-0.45	<0.001
	Physical activity <sup>4</sup>	1.34	-0.63	3.30	0.034
	High education <sup>5</sup>	-0.23	-2.21	1.76	0.822
	Relationship <sup>6</sup>	6.46	4.30	8.63	<0.001
Sexual well-being	Paid work <sup>7</sup>	-0.85	-2.88	1.18	0.411
	Depression $\geq 8$	-3.690	-7.38	-0.41	0.028
	Anxiety $\geq 8$	-2.45	-5.05	0.15	0.064
	Total mean SF-36 score	0.34	0.27	0.41	<0.001

<sup>1</sup>Age in years, continuous.

<sup>2</sup>Body mass index, continuous.

<sup>3</sup>Smoking (no = 0/yes = 1).

<sup>4</sup>Moderate physical activity for at least 30 min a day 5 days a week (no = 0/yes = 1).<sup>28</sup>

<sup>5</sup>High education: doctoral university education, Bachelor's, University education (no = 0/yes = 1).

<sup>6</sup>Relationship: married/partner/living apart together (no = 0/yes = 1).

<sup>7</sup>Paid work (no = 0/yes = 1). SF-36 = Short Form Health Survey, mean total score, continuous.

When compared with the normative BREAST-Q data studies among American women, Dutch women appear to be more satisfied with their breasts appearance (mean (SD) of  $68 \pm 19$  versus to  $58 \pm 18$ , summarized *T*-Test,  $P < 0.001$ ). The difference in breast satisfaction between the American study population and our Dutch study population could be due to cultural differences but also due to selection bias in the American study; all American participants were members of the Army of Women, an online community aiming to encourage breast cancer research.<sup>6</sup> Moreover, the difference between the American study population and our Dutch study population might also be explained by the fact that the Dutch women in the study were on average younger ( $50 \pm 17$  versus  $54 \pm 13$ ) and thinner (BMI  $25 \pm 5$  versus to BMI  $26 \pm 6$ ).<sup>6</sup>

The trend of the ideal breast has changed throughout the decades from the “flat look” in the 1920s, to the “bosom mania” in the 1960s. Nowadays, the preferred look seems to be that of the “natural” shape, where the breasts have an upper-to-lower pole ratio of 45:55, like in the ancient Greek statue by Alexandros of Antioch “Venus de Milo.”<sup>22–24</sup> Breast ptosis is a natural result of both gravity and aging causing changes in the upper-to-lower pole ratio. The onset and degree of ptosis varies widely among women. Factors aggravating breast ptosis are smoking, pregnancy, significant weight change, and higher BMI.<sup>25</sup> The lower degree of breast satisfaction among women with higher BMI and smokers could partly be explained by the aforementioned factors.

In contrast to our hypothesis, breast satisfaction statistically slightly increased over the years; although this is not what one would expect regarding the ongoing influence of gravity and aging. Research on the relation between age and BMI on BREAST-Q scores following reduction mammoplasty found similar results and concluded that breast satisfaction decreased with higher BMI and was higher among older women.<sup>26</sup> This could indicate that younger women are more insecure and more occupied with the appearance of their breasts in relation to finding a partner and/or settling with a family whereas older women already have acquired this situation and now have other aspects to be more bothered about, such as their facial appearance.

### Limitations and Strengths

Bias could have been caused by the fact that women who feel comfortable enough to discuss the breast appearance topic, or who are especially (un)satisfied just participate to express these aspects. Due to that, it might be that in reality breast satisfaction is slightly higher or lower than the breast satisfaction as measured in this study. However, it is impossible to prevent such response bias in voluntary surveys. Besides that, this study lacks data on (former) pregnancy lactation and whether women are considering cosmetic breast surgery such as augmentation. These factors might be of relevance in the evaluation of breast satisfaction. Lastly, a limitation of this study was that women had to include or exclude themselves based upon provided criteria, which could not be checked by the researchers. As a consequence, some participants still might have had breast surgery in the past.

One of the major strengths of this study lies in the rather large study population ( $n = 1334$ ) consisting of a randomly selected sample from the general Dutch population, limiting selection bias. Although the study population was representative for the national Dutch population, many women were students, and on average higher educated. This can be explained by the geographical region (University Town) in which the study was performed: the municipality of Groningen holds two large universities, University of Groningen and the Hanze University of Applied Sciences.<sup>27</sup> The questionnaires were personally addressed and sent by post, which together with the regional media attention, has probably led to our relatively high overall response rate (28%) for this type of research.<sup>28</sup>

### CONCLUSIONS

This study clearly reveals the moderate satisfaction of women with their breasts in a European general population. Breast satisfaction is strongly affected by BMI, with lower breast satisfaction in women with higher BMI. Besides, scores are lower when more symptoms of anxiety are present and in women who smoke. Breast satisfaction increases with higher general health (SF-36 scores), and unexpectedly slightly increases with age. Future prospective research in women undergoing breast surgery can take this normative data into consideration and use it as a reference. Physicians can use this data in informing women when opting for different kinds of breast surgery. Concluding, women are in general moderately satisfied with their breasts and one of the most important influences of breast satisfaction seems to be BMI. Future prospective, preferably longitudinal, research definitely is warranted to elucidate some intriguing aspects of this study, such as the slight increase in breast satisfaction with increase of age. It is recommended that these studies also take a more extensive (gynecologic) patient history to look at the effects of, for example, pregnancy on breast satisfaction.

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