Role of Breast Reconstructive Surgery in Physical and Emotional Outcomes Among Breast Cancer Survivors

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Background: **Tissue-sparing approaches to primary treatment and reconstructive options provide improved cosmetic outcomes for women with breast cancer. Earlier research has suggested that conservation or restitution of the breast might mitigate the negative effects of breast cancer on women's sexual well-being. Few studies, however, have compared psychosocial outcomes of women who underwent lumpectomy, mastectomy alone, or mastectomy with reconstruction. To address some of these issues, we examined women's adaptation to surgery in two large cohorts of breast cancer survivors.** ***Methods:*** **A total of 1957 breast cancer survivors (1–5 years after diagnosis) from two major metropolitan areas were assessed in two waves with the use of a self-report questionnaire that included a number of standardized measures of health-related quality of life, body image, and physical and sexual functioning. All *P* values are two-sided.** ***Results:*** **More than one half (57%) of the women underwent lumpectomy, 26% had mastectomy alone, and 17% had mastectomy with reconstruction. As in earlier studies, women in the mastectomy with reconstruction group were younger than those in the lumpectomy or mastectomy-alone groups (mean ages = 50.3, 55.9, and 58.9, respectively; *P* = .0001); they were also more likely to have a partner and to be college educated, affluent, and white. Women in both mastectomy groups complained of more physical symptoms related to their surgeries than women in the lumpectomy group. However, the groups did not differ in emotional, social, or role function. Of interest, women in the mastectomy with reconstruction group were most likely to report that breast cancer had had a negative impact on their sex lives (45.4% versus 29.8% for lumpectomy and 41.3% for mastectomy alone; *P* = .0001).** ***Conclusions:*** **The psychosocial impact of type of primary surgery for breast cancer occurs largely in areas of body image and feelings of attractiveness, with women receiving lumpectomy experiencing the most positive outcome. Beyond the first year after diagnosis, a woman's quality of life is more likely influenced by her age or exposure to adjuvant therapy than by her breast surgery. [J Natl Cancer Inst 2000;92:1422–9]**

Greater availability of newer reconstructive options in breast cancer treatment (e.g., tissue-sparing and borrowing approaches) provide improved cosmetic outcomes for breast cancer survivors (BCSs). However, studies examining the impact of these procedures on women's body image and sexual functioning are sparse. Past research documents the consistent benefits of breast conservation or lumpectomy over mastectomy alone in preserving women's body image and comfort with sexuality *(1–5).* However, only a few studies *(6–9)* have compared outcomes for women receiving mastectomy alone versus mastectomy with reconstruction. This discrepancy exists, despite the fact that breast reconstructive surgery has been in use since the late 1890s, far longer than breast-conserving procedures *(10).* Even fewer studies have compared outcomes for all three surgical groups: lumpectomy, mastectomy alone, and mastectomy with reconstruction. Furthermore, these studies have rarely examined quality of life and sexual functioning using standardized instruments.

In the few studies that we were able to find in which women undergoing each of the three different surgical options were identified *(11–17),* only two attempted to evaluate women undergoing reconstruction separately from those receiving mastectomy alone. One included a very small sample of women undergoing reconstruction (n = 8) *(15),* and the second, which examined only body image and self-esteem *(16),* found breast-conservation patients to have a more positive body image than either mastectomy or immediate reconstruction groups. No differences were seen between groups in self-esteem, which was uniformly high.

Three empiric studies have compared women receiving conserving surgery with those undergoing mastectomy with reconstruction. No between-group differences were seen in this research with respect to women's overall psychosocial adjustment to illness, fear of recurrence, body image, or satisfaction with relationships or sexual life *(17–19).* The few differences that were observed reflected changes in body image and sensation. Women who had breast reconstruction reported being more self-conscious about their appearance than those who had received breast-conserving surgery *(17).* They also experienced less frequent breast caressing and more loss of pleasure with this activity and tended to be less likely to achieve orgasm with noncoital sexual stimulation *(19).*

Given both the growing use of breast reconstruction and the fact that different surgical approaches to treating women with breast cancer may be associated with different psychosexual outcomes, more information is needed about expected performance in these functional areas to assist women and their physicians in the decision-making process. This study used questionnaire data from two large cohorts of contemporary BCSs, using standardized measures to examine 1) the characteristics of women undergoing lumpectomy, mastectomy with reconstruction, and mastectomy alone; and 2) the relationship of the different surgical treatments to specific aspects of health-related quality of life, body image, and physical and sexual functioning.

METHODS

Subjects and Procedures

The data for this research were drawn from a large-scale study of sexuality and intimacy in BCSs conducted in two independent cohorts recruited from two metropolitan areas, Los Angeles (CA) and

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See "Notes" following "References."

Washington (DC), and described elsewhere in greater detail *(20,21)*. From September 1994 through November 1995, a group of 863 eligible BCSs completed mailed questionnaires providing detailed information about their quality of life, sexuality, and intimacy concerns (cohort 1). During a second wave of recruitment conducted from January 1996 through June 1997, an additional 1094 eligible BCSs completed similar but somewhat shorter questionnaires (cohort 2). Women were eligible to participate if they 1) had a past diagnosis of breast cancer (stage 0, I, or II) *(22)*, 2) were from 1 through 5 years after diagnosis, 3) had completed local and/or systemic therapy a minimum of 3 months earlier (with the exception of tamoxifen), 4) were currently free of disease, 5) had no other history of cancer (with the exception of skin or early-stage cervical cancer), 6) could read and write English and provide informed consent, and 7) had no other major disabling medical or psychiatric condition that substantially impaired activities of daily living. To obtain as representative a sample as possible, women were identified through a variety of mechanisms, including local tumor registries, physician practices, and treatment clinic logs or charts. A total of 6364 potentially eligible women were identified by these means across the course of the study.

Once a woman was identified as a potential subject, a recruitment letter was sent. The letter explained the nature of the study and provided a response form with a postage-paid envelope. Women who mailed back a response indicating interest in the study were contacted by phone and screened for eligibility. Eligible participants were given further information about the study, including the personal nature of the questionnaire content. If she still wanted to participate, the woman was then mailed the questionnaire with consent forms. Institutional Review Board approval of this research was obtained at all participating institutions.

Overall, 57% of the BCSs responded to the mailed letter of invitation (n = 3619). Of those who responded to the study invitation, 83% were willing to consider participation. The final sample of 1957 subjects who completed questionnaires represents a yield of 54% of those who responded to the mailed letter of invitation.[1] To gain a better understanding of potential differences between our respondents and nonrespondents, we looked at the demographic characteristics of age, ethnicity, and marital status, to the extent that these were available, for women in cohort 1 *(20)*. At each phase of recruitment, older women were less likely to participate. In addition, those who were screened out as ineligible were also older than the final study participants. Nonwhite and unmarried women were less likely to respond to the initial study invitation; however, among those who returned the invitation response form, there were few differences between participants and nonparticipants on these characteristics. Among those BCSs who were sent the questionnaire booklet, there were no differences in ethnicity, marital status, or age for those who returned a questionnaire versus those who did not.

Instruments

The instruments used in the current analyses are described briefly below.

RAND 36-Item Health Survey (also known as the Medical Outcomes Study SF-36). The RAND instrument, a widely used, health-related, quality-of-life scale, consists of eight scales that assess physical functioning, role function—physical (assessing role limitations caused by physical factors), bodily pain, social functioning, emotional well-being, role function—emotional (assessing role limitations caused by emotional factors), energy/fatigue, and general health perceptions *(23,24)*. Each scale is scored from 0 to 100, higher scores reflecting better functioning.

Medical Outcomes Study Social Support Survey. A short form of the social support scale from the Medical Outcomes Study was also administered to all women *(25)*. The full measure contains 19 items and is scored from 0 to 100, with 100 indicating better social support. In consultation with the instrument's author (Sherbourne KD: personal communication), we used a 12-item form of the instrument, scored similarly to the longer version.

Center for Epidemiologic Studies Depression Scale. The Center for Epidemiologic Studies Depression Scale (CES-D) is a 20-item self-report scale that was designed for use in a general population to evaluate the presence of depressive symptoms during the past week *(26)*. This instrument has been used in a number of studies of women with or at risk of breast cancer *(27–30)*. Responses on each item are rated on a 4-point scale from 0 to 3, resulting in a range from 0 to 60 on the total score. Higher scores are associated with more symptoms, with scores of 16 or greater indicative of potentially clinically significant levels of depression *(26)*.

Revised Dyadic Adjustment Scale. The Revised Dyadic Adjustment Scale *(31)* is a shortened version of the Dyadic Adjustment Scale that assesses marital or partnership adjustment *(32)*. This 14-item instrument provides four factor subscales: dyadic consensus, satisfaction, cohesion, and affectional expression. The four subscales are added to generate a total adjustment score, which ranges from 0 to 69, with lower scores reflecting more distressed dyadic relationships. The developers of the shortened scale report mean values of 48.0 (standard deviation = 9.0).

Watts Sexual Function Questionnaire. The Watts Sexual Function Questionnaire (WSFQ) is a 17-item instrument that assesses the primary components of sexual function: desire, arousal, orgasm, and satisfaction *(33)*. Responses for each item are scored on a 5-point Likert-type scale ranging from 1 "never" to 5 "always." The total sexual function score ranges from 17 to 85, with high scores being associated with positive sexual function. The WSFQ has been used with a variety of chronically ill populations, including diabetic women, as well as with healthy postmenopausal women *(34)*. This instrument was completed by BCSs in cohort 1 of the study but was not administered to cohort 2.

Cancer Rehabilitation Evaluation System. The Cancer Rehabilitation Evaluation System (CARES) is a comprehensive survey instrument designed to assess the quality of life and rehabilitation needs of cancer survivors *(35,36)*. Extensive information is available on its use, particularly among women treated for breast cancer *(3,37,38)*. Specific scales of this instrument that were included here are the body image, clothing, and dating subscales and the sexual summary scale, which includes sexual interest and dysfunction subscales. Scores range from 0 to 4, with higher scores indicating more problems or worse states.

Several additional items, used in our research over the past two decades, were incorporated into the questionnaire booklets. These included items 1) for women who were partnered and sexually active, addressing comfort and pain with partner's touching the breast, pain during sexual activity, and clothing worn during sexual activity; and 2) for everyone, reflecting incidence of and amount of distress associated with specific physical problems (e.g., pain, numbness, and swelling), and fear of cancer recurrence. With the exception of the last set of questions where higher scores were reflective of more problems/worry, the items were designed in a 0–4 Likert-type format, where higher scores indicated fewer problems or greater satisfaction/comfort.

Statistical Considerations

Nearly all hypotheses tested for these analyses were with regard to the equality of specific measures across the three surgery categories. A few additional questions related to the statistical significance of differences between the two cohorts. Chi-square tests were used for comparisons of categorical measures, and a one-way analysis of variance was used to compare means of continuous measures across the groups. For the analyses that involved adjusting for covariates, logistic regression was used for dichotomous outcomes, and analysis of covariance was used for continuous outcomes, with the type of surgery reflected through the use of two indicator variables as predictors in the model.

Statistical testing was performed for a limited number of prespecified hypotheses. Fewer than 50 significance tests of *a priori* interest were performed in the context of the main analyses for this article. Therefore, *P* values of less than or equal to .001 can be viewed as satisfying the most rigorous standards in yielding an experiment-wide error rate of .05 or less. All significance tests were two-sided.

RESULTS

Subjects

Sociodemographic information and medical information for women in each of the three surgical groups are presented separately for cohorts 1 and 2 to permit an evaluation of the consistency of participant characteristics across cohorts and to examine possible trends in who undergoes these different surgeries over time.

Sociodemographic characteristics. Table 1 provides the sociodemographic information for women in each cohort. Consistent with other studies, women in both samples pursuing reconstruction were statistically significantly younger than women undergoing either lumpectomy or mastectomy alone. The mean age for the combined cohorts was 50.3, 55.9, and 58.9 years for the lumpectomy, mastectomy with reconstruction, and mastectomy-alone groups, respectively (P = .0001). In addition to being the oldest group, the mastectomy-alone group also contained the largest proportion of minority women. In keeping with their younger

Table 1. Sociodemographic characteristics by surgical treatment group

Characteristic	Cohort 1 (recruited: 9/1994–11/1995)				Cohort 2 (recruited: 1/1996–6/1997)			
	Lumpectomy	Mastectomy with reconstruction	Mastectomy alone	Two-sided *P*	Lumpectomy	Mastectomy with reconstruction	Mastectomy alone	Two-sided *P*
No. of women (% of sample)	443 (51.3)	151 (17.5)	269 (31.2)		676 (61.8)	176 (16.0)	242 (22.1)	
Mean age in y (SD)*	55.9 (11.6)	49.4 (8.2)	59.3 (11.3)	.0001	55.9 (11.5)	51.1 (8.7)	58.4 (11.4)	.0001
Ethnicity, %†								
White	83.1	85.4	63.6	.001	84.5	83.5	70.3	.001
African-American	9.9	8.6	23.8		8.4	8.5	16.5	
Other	7.0	6.0	12.6		7.1	8.0	13.2	
Educational level, %†								
≤High school	13.4	9.3	19.4	.001	15.8	11.4	22.7	.070
Some college	37.6	28.7	40.3		36.2	35.8	31.4	
College graduate	12.7	18.0	13.4		14.8	18.8	14.9	
Postgraduate	36.3	44.0	26.9		33.1	34.1	31.0	
Married or in relationship, %†								
Yes	71.2	71.5	62.5	.035	72.3	85.2	69.4	.001
No	28.8	28.5	37.6		27.7	14.8	30.6	
Income, %†								
$30 000	17.9	9.7	25.0	.001	17.9	10.5	24.0	.001
$30 001–60 000	31.2	26.9	42.7		28.9	29.7	33.2	
$60 001–100 000	27.0	30.3	22.3		28.3	30.2	30.1	
>$100 000	23.8	33.1	10.0		24.9	29.7	12.7	

*P value based on analysis of variance. SD = standard deviation.

†P value based on chi-square test.

age, women in both the lumpectomy and mastectomy with reconstruction groups also were more often college educated, earned higher incomes, and were more likely to be in a partnered relationship than women in the mastectomy-alone group. Comparison between cohort 1 and cohort 2 participants revealed a statistically significant shift in the numbers of women undergoing lumpectomy across the course of the study. While 51.3% had a lumpectomy in cohort 1, almost 62% underwent lumpectomy in cohort 2 (P = .001, chi-square test). A consequence of this shift was that, while the overall percentage of women undergoing reconstruction remained the same (between 16% and 18%), the proportion of women having a mastectomy who then had reconstruction increased from 36% in cohort 1 to 42% in cohort 2. Women undergoing reconstruction were slightly more likely to be partnered in cohort 1; this difference became more pronounced in the second cohort. However, the difference in the proportion of women who graduated from college or had some postgraduate education among women undergoing reconstruction decreased between cohorts.

Medical characteristics. With respect to their medical characteristics, women in the mastectomy groups, with or without reconstruction, were more likely to have had chemotherapy than women in the lumpectomy group (Table 2). Consonant with their younger age, women in the

Table 2. Medical characteristics by surgical treatment group

Characteristic	Cohort 1 (recruited: 9/1994–11/1995)				Cohort 2 (recruited: 1/1996–6/1997)			
	Lumpectomy	Mastectomy with reconstruction	Mastectomy alone	Two-sided *P*	Lumpectomy	Mastectomy with reconstruction	Mastectomy alone	Two-sided *P*
Mean years since diagnosis (SD)*	2.81 (1.26)	3.14 (1.31)	3.24 (1.22)	.0001	2.74 (1.08)	3.01 (1.14)	2.94 (1.14)	.003
Had chemotherapy, %†								
Yes	31.5	45.0	44.4	.001	38.5	51.7	50.0	.001
No	68.5	55.0	55.6		61.5	48.3	50.0	
Used tamoxifen, %†								
Currently	47.4	37.8	51.7	.007	45.7	46.6	57.9	.014
In the past	7.0	9.3	11.5		10.5	13.1	9.9	
Never	45.6	53.0	36.8		43.8	40.3	32.2	
Menstrual status, %†								
Menses	20.4	37.1	10.0	.001	19.2	29.5	9.9	.001
No menses	79.6	62.9	90.0		80.8	70.5	90.1	
Hormone replacement therapy, %†								
Ever	38.2	33.1	38.3	.495	40.1	35.4	41.9	.391
Never	61.8	66.9	61.7		59.9	64.6	58.1	

*P value based on analysis of variance. SD = standard deviation.

†P value based on chi-square test.

mastectomy with reconstruction group were less likely, in general, to be taking tamoxifen and more likely to still be menstruating. No differences were observed among surgical groups on past use of hormone replacement therapy. The trend, over time, toward increased use of adjuvant therapy, chemotherapy and/or tamoxifen, is reflected in the growing percentage of women exposed to these therapies from cohort 1 (72%) to cohort 2 (76%) ($P = .039$, chi-square test). In both study cohorts, women in the lumpectomy group were closest in time to their diagnosis.

Because the cohorts were drawn from overlapping time periods and few differences were seen for women participating in each, the cohorts were collapsed to better examine women's response to surgery. Lumpectomy was performed in 1119 women (57%), with 95.1% receiving radiation therapy, 511 (26 %) had a mastectomy alone, and 327 (17%) had a mastectomy with reconstruction. Thus, among women receiving mastectomy (n = 838), 39% went on to have reconstructive surgery. Because of the observed differences in demographic and medical characteristics among women in each of the three surgical groups, subsequent analyses on the outcome variables of interest were controlled for age, ethnicity, educational level, partnership status, time since diagnosis, chemotherapy exposure, and tamoxifen use. No adjustment was made for differences in income or menstrual status, since these are highly associated with educational level, age, and chemotherapy in this study population.

Outcomes

Health-related quality of life. On the health-related quality-of-life measures (Table 3), no differences were seen among surgical groups on levels of depression as measured by the CES-D, on reported degree of social support, or with respect to physical, social, and emotional

Table 3. Health-related quality of life by surgical treatment group*

	Lumpectomy	Mastectomy with reconstruction	Mastectomy alone	Two-sided P†
CES-D‡				
Mean (SD)	10.7 (9.4)	10.9 (10.7)	10.6 (9.3)	.963
CI	10.2–11.3	9.8–12.1	9.8–11.4	
CES-D ⩾16, §				
%	25.0	24.3	25.1	.719
CI	22.4–27.5	19.6–29.0	21.3–28.9	
MOS 12-item social support‡				
Mean (SD)	75.8 (21.6)	76.9 (22.4)	77.3 (22.1)	.380
CI	74.5–77.0	74.5–79.3	75.4–79.2	
RAND physical functioning‡				
Mean (SD)	81.5 (20.8)	84.4 (18.9)	75.8 (23.3)	.120
CI	80.1–82.7	82.4–86.5	73.8–77.8	
RAND role limits, physical‡				
Mean (SD)	76.4 (34.1)	77.6 (34.5)	73.4 (35.7)	.662
CI	74.4–78.4	73.9–81.4	70.3–76.5	
RAND role limits, emotional‡				
Mean (SD)	77.4 (34.6)	76.5 (35.1)	78.4 (34.4)	.908
CI	75.4–79.4	72.7–80.3	75.4–81.4	
RAND energy/fatigue‡				
Mean (SD)	60.0 (20.6)	59.4 (22.6)	60.3 (20.3)	.998
CI	58.8–61.2	56.9–61.8	58.6–62.1	
RAND pain‡				
Mean (SD)	79.6 (20.1)	78.7 (21.3)	76.4 (21.6)	.091
CI	78.5–80.8	76.3–81.0	74.5–78.3	
RAND general health‡				
Mean (SD)	73.8 (19.9)	73.5 (20.2)	70.2 (20.0)	.192
CI	72.6–75.0	71.3–75.7	68.5–72.0	
RAND emotional well-being‡				
Mean (SD)	75.2 (17.0)	73.5 (19.6)	76.2 (17.3)	.907
CI	74.2–76.2	71.4–75.7	74.7–77.7	
RAND social functioning‡				
Mean (SD)	86.2 (20.0)	85.5 (20.8)	85.6 (21.2)	.900
CI	85.1–87.4	83.2–87.7	83.8–87.4	
Worry about cancer returning, %§				
Not at all/a little	55.1	56.3	58.2	.199
Fair amount/very much	44.9	43.7	41.8	
CI	41.9–47.8	38.3–49.1	37.6–46.1	

*CES-D = Center for Epidemiologic Studies–Depression scale (range, 0–60, where higher scores indicate more depressive symptoms) *(26);* SD = standard deviation; CI = 95% confidence interval for raw mean score or worse outcome percentage; MOS = Medical Outcomes Study Social Support Scale (range, 0–100, where higher scores indicate better support) *(24);* RAND = RAND 36-Item Health Survey 1.0 (also known as the Medical Outcomes Study Short-Form 36) (range, 0–100, where higher scores indicate better functioning) *(22,23).*

†Significance tests are adjusted for age, time since diagnosis, ethnicity, partnership status, educational level, tamoxifen use, and chemotherapy.

‡P value based on analysis of covariance.

§P value based on logistic regression.

role functioning and well-being as measured by the RAND SF-36. Moreover, no differences were seen by group in fear of recurrence, which more than 40% of women endorsed as a continued concern, regardless of the type of surgery received.

Body image, sexuality, and partnership. As expected, women in the lumpectomy group reported statistically significantly fewer problems with their body image and feelings of sexual attractiveness than women in either the mastectomy with reconstruction or the mastectomy-alone groups (Table 4). However, the benefit to body image of reconstruction for women undergoing mastectomy was less than expected. Scores on the CARES body-image scale for the mastectomy with reconstruction group were more similar to those for the mastectomy-alone group than scores for the lumpectomy group. Of interest, there was no difference among surgical groups in feeling unattractive to a partner. While fewer than 30% of the women undergoing breast conservation felt that their cancer had a negative impact on their sex life, more than 40% of the women exposed to mastectomy, with or without reconstruction, reported a negative impact. Surprisingly, women undergoing reconstruction were the most likely to feel that breast cancer had had a negative impact on their sex lives.

Differences in specific aspects of sexual functioning between groups, however, appeared to be minimal, as reflected in scores on the CARES and Watts sexual functioning instruments (data not shown). On the CARES, while there was a trend ($P = .04$) for women in the mastectomy-alone group to be less interested in sex, no differences were seen in the sexual dysfunction or overall sexual summary scores. Furthermore, no differences were observed by surgical group in cohort 1 in women's assessment of their desire, arousal, orgasm, or sexual satisfaction as measured by the WSFQ.

Physical symptoms related to surgery. In addition to the standardized assessments, women in the different surgical groups in cohort 1 were also asked about their experience and distress associated with a number of physical symptoms consequent to surgery. No differences were seen between surgical groups in levels of pain, skin sensitivity, swelling at the surgical site, or in related problems in finding suitable clothes. However, mastectomy patients, with or without reconstruction, experienced more physical symptoms and more discomfort around the surgical site than women who had a lumpectomy. These symptoms included the sensation of pins and needles (reported as often in 13% of mastectomy-alone women) and numbness (a common problem for 52% of the women who underwent breast reconstruction). Almost twice as many mastectomy-alone (46.6%), as lumpectomy (24.0%), or mastectomy with reconstruction (25.8%) group members reported problems with arm swelling. In almost one quarter of the mastectomy-alone group (22%), women reported being bothered a fair amount to very much by lymphedema compared with only 10% of lumpectomy patients and 9% of women who had reconstruction ($P = .001$). In addition, the sight of their surgical scars was a major concern for almost 40% of the women undergoing mastectomy alone versus 30% of the women receiving reconstruction and only 10% of the women with a lumpectomy ($P = .001$).

Discussion

The data presented confirm that the type of primary surgery a woman receives

Table 4. Impact on body image and sex life by surgical treatment group*

	Lumpectomy	Mastectomy with reconstruction	Mastectomy alone	Two-sided P†
CARES body image				
Mean (SD)‡	0.65 (0.92)	1.24 (1.25)	1.37 (1.32)	.0001
CI	0.59–0.70	1.11–1.38	1.25–1.48	
Uncomfortable with changes in body, %§				
Not at all/a little	78.5	64.4	64.6	.0001
Fair amount to very much	21.5	35.6	35.4	
CI	19.2–23.9	30.4–40.8	31.2–35.5	
Don't feel sexually attractive, %§				
Not at all/a little	73.5	65.9	60.6	.0001
Fair amount to very much	26.5	34.1	39.4	
CI	23.9–29.1	28.9–39.2	35.2–43.7	
Unattractive to partner, %§				
Not at all/a little	85.2	82.3	79.8	.034
Fair amount to very much				
Mean (SD)	14.8	17.7	20.2	
CI	12.7–16.9	13.5–21.9	16.7–23.7	
14-item RDAS (for partnered only)				
Mean (SD)‡	49.8 (8.7)	49.1 (9.5)	50.4 (8.8)	.302
CI	49.2–50.4	47.9–50.2	49.5–51.4	
Impact of breast cancer on sex life, %§				
None/positive	70.2	54.6	58.7	.0001
Negative	29.8	45.4	41.3	
CI	27.1–32.5	39.9–50.9	36.9–45.6	

*CARES = Cancer Rehabilitation and Evaluation System (range, 0–4, where high scores indicate more problems/worse states) *(35,36);* SD = standard deviation; CI = 95% confidence interval for raw mean score or worse outcome percentage; RDAS = Revised Dyadic Adjustment Scale (range, 0–69, where higher scores indicate better relationship) *(31,32).*

†Significance tests are adjusted for age, time since diagnosis, ethnicity, partnership status, educational level, tamoxifen use, and chemotherapy.

‡*P* value based on analysis of covariance.

§*P* value based on logistic regression.

for her breast cancer continues to play an important role in her body image and feelings of attractiveness, with women undergoing lumpectomy experiencing more positive outcomes than women undergoing mastectomy, with or without reconstruction. Women in the mastectomy groups also reported experiencing more physical problems related to their surgery. Beyond these areas, however, few differences could be found among surgical groups related to other health-related physical, social, or emotional outcomes. More important, no pattern of differences could be found between surgical groups in sexual functioning by use of standardized instruments. In addition, type of surgery did not appear to differentially affect the interpersonal relationship of women who were partnered.

Statistically significant differences by surgical group with respect to demographic characteristics were observed and remained relatively constant across study cohorts. Specifically, women undergoing mastectomy with breast reconstruction are younger than those receiving lumpectomy or mastectomy alone; they are also more likely to be partnered, college educated, affluent, and white. Medical characteristics of the surgical groups also differed consonant, in part, with their respective differences by demographic status. Women in both of the mastectomy groups were more likely to have received chemotherapy than women in the lumpectomy group. That so few differences could be found in psychosocial or health-related outcomes among the surgical groups 1 year or more after diagnosis suggests that a woman's primary surgery may be less important in determining her subsequent quality of life after breast cancer than other factors, such as age, exposure to adjuvant therapies, and other health problems *(21,39–43).*

In addition to these summary findings, a number of other study observations are of note. First, the finding that the majority of BCSs in this study underwent surgery to preserve or reconstruct their breast(s) (69% in cohort 1 and 77% in cohort 2; 74% study-wide) emphasizes the importance to women of preserving body image as part of their care. While it is not known how many women were offered a choice of treatments, the general pattern of care suggests that options for women diagnosed with breast cancer have expanded and that, when possible, women are receiving treatments that will leave them intact. Second, the rate of reconstruction performed among the mastectomy patients in our samples study-wide (39%) is higher than has been reported previously, possibly reflecting temporal changes in the two metropolitan area. As with other types of breast cancer surgery *(44,45),* national rates for postmastectomy breast reconstruction likely vary widely by geographic region. Third, the demographic characteristics of women receiving reconstruction (identifying them as largely young, white, well educated, and partnered) have been relatively constant for a number of years *(7).* Despite their higher rates of mastectomy, the fact that about one half as many African-American women undergo reconstruction as white women raises questions about differences in access to (because of insurance limitations, location of physicians, and recommendation by physicians) and interest in this surgery across ethnic groups. Interview data from our project suggest that African-American women may experience the impact of breast cancer on their sexual functioning as less negative than white women in spite of more extensive surgery *(46).* These differences among African-American women may contribute to less interest in reconstruction when this option is presented, which needs to be explored in future studies. Possible concerns about increased risks of disfiguring keloids and scarring following surgery may be a barrier to women's pursuit of reconstruction *(47,48).* One study found that African-American women may even be at risk for worse cosmetic outcomes with breast conservation than white women *(49).*

Similar to many published studies, our sample was drawn from a predominantly white, moderately affluent sample of women treated in urban settings. The generalizability of study findings is likely limited to similar groups of BCSs. Furthermore, as noted earlier, participants in this study represented only about one third of those approached for entry. We know that nonwhite, older, and unmarried women were less likely to respond to our invitation to participate *(20).* It is also possible that women who were doing more poorly chose not to participate and that the pattern of refusal may have influenced the observed outcomes.

The results of this study have several clinical ramifications. Most important, the majority of BCSs do well following their illness, regardless of the nature of their surgery *(20).* Younger age and exposure to adjuvant therapy may be more important risk factors for distress and sexual dysfunction, respectively, than the type of surgery received *(21,28, 50–52).* However, women undergoing breast reconstruction may experience more distress and sense of disfigurement than reported previously in the literature. This may reflect, in part, the possibility that a subset of these women likely hoped for lumpectomy but, for medical reasons, were deemed poor candidates for a breast-sparing approach to their cancer. It is important to note that women who are not offered or must give up the option of breast conservation may be at greater risk for problems coping later than women who actively choose mastectomy with or without reconstruction over lumpectomy *(15).* Finally, on the basis of our findings, women's experience of lymphedema warrants and is beginning to receive greater attention within the BCS community *(53–55).* As interest in long-term cancer survivorship grows, studies such as this can provide a benchmark against which to measure our continued progress toward improving not just women's survival from, but importantly, their quality of life after breast cancer.

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NOTES

[1]Because some women, based on their date of diagnosis, were potentially eligible for participation in both study cohorts, the names of these individuals were held and randomly assigned between the two recruitment waves. Despite efforts to eliminate duplication, in combining sets for the present analyses, it was discovered that this had occurred in five cases. In cohort 1, one woman completed two questionnaires under slightly different names. Her later questionnaire was deleted from the final dataset. In cohort 2, four women were found to have completed questionnaires for cohort 1. Their data were thus deleted from the cohort 2 set. These duplications account for the small discrepancy between the current sample sizes for each cohort and those reported previously *(20,21)*.

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