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The Influence of Marital Status on Contemporary Patterns of Postmastectomy Breast Reconstruction

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Abstract *Background:* Marital status is known to influence quality of life, survival, and treatment decision-making after breast cancer diagnosis. We aimed to determine whether relationship status impacts contemporary patterns of immediate breast reconstruction.

Methods: Surveillance, Epidemiology, and End Results (SEER)-18 was used to identify females undergoing mastectomy for stage 0-III breast cancer from 1998 to 2014. Multivariate logistic regression was used to estimate the association of relationship status with the likelihood of postmastectomy reconstruction. Patients were grouped by diagnosis year to assess change in the reconstructed population with time. Among younger patients ≤ 45 years, a generalized logistic model was used to predict reconstruction subtype.

Results: Among 346,418 patients, reconstruction after mastectomy was more likely to occur in women with relationship support in the form of a marriage or partner [odds ratio (OR) 1.31; 95% confidence interval (CI), 1.28-1.34; $p < 0.001$]. Women who were separated (OR 0.76), single (OR 0.73), or widowed (OR 0.56) were significantly less likely than married women to undergo reconstruction (all $p < 0.001$). During the 17-year study period, change in reconstruction rates with time varied by relationship status (interaction $p = 0.02$), with reconstruction rates among divorced patients increasing more slowly than those among married and partnered women. Among younger women, subtype patterns varied by relationship status ($p = 0.004$), with divorced women less likely to receive autologous over implant reconstruction (OR 0.87; $p = 0.03$).

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Conclusion: Relationship status may influence decision-making regarding pursuit and type of postmastectomy reconstruction. Consideration of support networks of patients with breast cancer could facilitate tailored preoperative counseling by reconstructive surgeons.

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Introduction

Breast cancer treatment represents a period of high stress and emotional vulnerability during which patients rely heavily upon their social support networks.^{1,2} The presence of a spouse or intimate partner has been found to be associated with reduced inflammatory markers, less invasive disease, and prolonged survival after breast cancer diagnoses.²⁻⁵ Regarding primary breast cancer treatment, spouses have been shown to be key sources of emotional support and actively participate in joint decision-making regarding oncologic treatment.⁶ Furthermore, women in relationships or married women are more likely to pursue adjuvant chemotherapy, maintain adherence to endocrine therapy regimens, and pursue breast-conserving therapy over mastectomy, thus suggesting that marital or relationship status influences decision-making regarding oncologic components of breast cancer treatment.⁶⁻⁹

Relationship status may have unique and significant implications for decision-making concerning breast reconstruction, especially considering the elective nature, increased operative time, and prolonged recovery associated with postmastectomy reconstruction. The emotional and practical support from partners is often cited as critical in enabling women to pursue reconstruction throughout both decision-making and surgery.¹⁰ Furthermore, relationship status may uniquely influence decision-making regarding reconstruction subtype due to the positive influence of breast reconstruction on body image, perceived attractiveness, and partner intimacy.¹¹ Although a robust body of literature has characterized the patient- and system-level factors influencing breast reconstruction, little is known about the influence of relationship support on the pursuit of reconstruction or reconstructive subtype. Thus, we sought to determine the impact of relationship status on contemporary national patterns of breast reconstruction.

Methods

The National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER)-18 database was used for this study. SEER is a US population-based cancer registry that represents approximately 28% of the US population, and it contains patient demographics in addition to tumor and treatment data points from representative geographic regions. This study was exempt from institutional review board approval. Using the SEER-18, we identified all female patients diagnosed with stage 0-III breast cancer from 1973 to 2014. Patients under the age of 18 years; those with metastatic (M1) disease; and those who did not undergo surgery or who underwent surgery other than subcutaneous mastectomy, simple/complete mastectomy, modified radical mas-

tectomy, or radical mastectomy were excluded, as were patients with undefined or missing marital status. Surgery of the primary site was only available for patients diagnosed in 1998 and later; hence, all patients diagnosed before 1998 were also excluded.

Patients were categorized on the basis of relationship status and the type of reconstruction into the following subgroups: married, unmarried partnership, single, divorced, separated, or widowed at the time of diagnosis. Relationship support was defined as married or an unmarried partnership at the time of diagnosis, and no if a patient was single, divorced, separated, or widowed at the time of diagnosis. Demographic variables included patient age at diagnosis (hereafter, denoted as age), race/ethnicity, insurance status, year of diagnosis, and geographic location. Tumor characteristics included estrogen receptor (ER) status, progesterone receptor (PR) status, and human epidermal growth factor receptor 2 (HER2) status, grade, and T and N stages. Treatment characteristics included receipt of chemotherapy, radiation, and type of primary surgery. Patient demographic, clinical, and treatment characteristics were represented as N (%) for categorical variables and as median (interquartile range) for continuous variables for all patients and by reconstruction vs. no reconstruction. Differences were tested using the Chi-square test or t-test, as appropriate.

Rates of reconstruction were calculated as the number of patients who underwent reconstruction out of the total number of patients who were treated in a given year by specified social status. Multivariate logistic regression was used to identify factors associated with receipt of reconstruction after adjustment for known covariates. To assess change in rates of reconstruction with time by relationship status, interaction terms of year*relationship status were added to subsequent adjusted logistic models.

Subgroup analyses were conducted using data from patients who underwent reconstruction and had known reconstruction type. Given the lack of comorbidity data reported in SEER, which may influence reconstruction subtype, this analysis was limited to women ≤ 45 years old. A generalized logistic model was used to identify factors associated with Implant + Tissue vs. Implant Only and Tissue Only (autologous) vs. Implant Only reconstruction.

Only patients with complete data were included in each model and sample sizes are included for each table/figure. No adjustments were made for multiple comparisons. All statistical analyses were conducted using SAS version 9.4 (SAS Institute, Cary, NC).

Results

Starting with the initial SEER population of 1,287,238 patients diagnosed with breast cancer between 1973 and 2014,

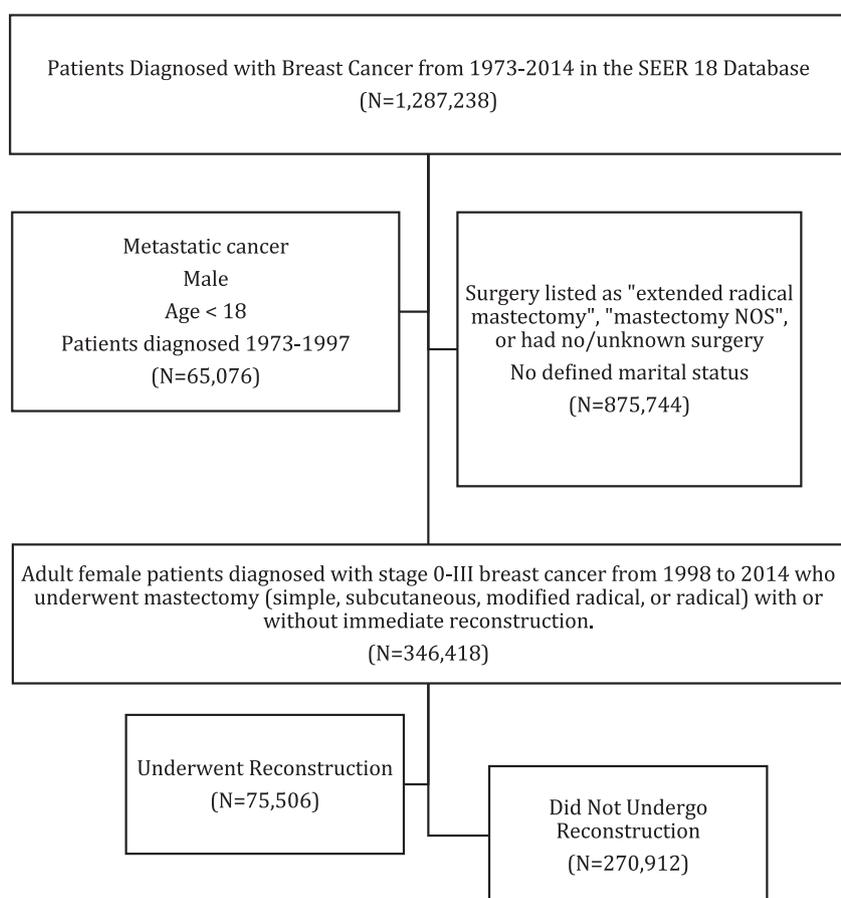


Figure 1 Consort Diagram for Patient Selection.

application of the defined inclusion and exclusion criteria resulted in the final study population of $N=346,418$ women (Figure 1), with 21.8% of patients (75,506) undergoing reconstruction. Median follow-up was 87 months (95% confidence interval (CI) 86-87). Patient characteristics by reconstruction status are summarized in Table 1. Throughout the 17-year time period included in this study, the proportion of patients undergoing reconstruction increased significantly (11.4% in 1998 to 38.3% in 2014; $p<0.001$). Women undergoing reconstruction were more likely to have social support (69.5% vs. 54.2%; $p<0.001$), and the majority of reconstructed women were married (69.3% vs. 54.1%; $p<0.001$). Women not undergoing reconstruction were more likely to be widowed (20.4% vs. 4.6%; $p<0.001$). Furthermore, women undergoing reconstruction were younger (median age 51 vs. 63 years; $p<0.001$) and were more likely to be insured (67.7% vs. 46.2%; $p<0.001$). Receipt of contralateral prophylactic mastectomy (CPM) was significantly higher in the reconstructed cohort than in the other cohort (39.1% vs. 11.2%, $p<0.001$).

Oncologic and treatment characteristics are summarized in Supplemental Digital Content, Table 1. Women undergoing reconstruction were more likely to have T1 (57% vs. 46%, $p<0.001$) and N0 (62.4% vs. 55.4%, $p<0.001$) stages, with median tumor size lower among those receiving reconstruction than among those not receiving reconstruction (1.8 cm, IQR (1-3) vs. 2.1 cm, IQR (1.3-3.5), $p<0.001$). Breast cancers in women receiving reconstruction were more likely

to be grades 1 or 2, ER+ (75.8% vs. 69.2%, $p<0.001$), PR+ (65.8% vs. 57%, $p<0.001$), HER2- (77.4% vs. 76.4%, $p<0.001$) than in those receiving mastectomy without immediate reconstruction. Regarding oncologic treatment, women undergoing reconstruction were more likely to undergo a simple/complete mastectomy (55.8% vs. 37.4%, $p<0.001$). While chemotherapy was more common in the reconstructed group (53.1% vs. 44.4%, $p<0.001$), women undergoing reconstruction were less likely to receive postmastectomy radiation therapy (20% vs. 22.3%, $p<0.001$).

Factors Associated with Immediate Reconstruction

After multivariate adjustment, reconstruction after mastectomy was more likely to occur in women with relationship support than in those without support [odds ratio (OR) 1.31; 95% CI, 1.28-1.34; $p<0.001$]. By relationship subtype, women who were separated (OR 0.76; 95% CI 0.69-0.83), single (OR 0.73; 95% CI 0.71-0.76), or widowed (OR 0.56; 95% CI 0.54-0.59) were significantly less likely than married women to undergo reconstruction (all $p<0.001$). There was no significant difference in reconstruction rates between married women and those who were divorced ($p=0.08$) or partnered ($p=0.05$). Women undergoing reconstruction were less likely to be non-Hispanic black (OR 0.71; 95% CI 0.69-0.74; $p<0.001$) or Hispanic (OR 0.63; 95% CI 0.61-0.65) race/ethnicity compared to non-Hispanic white, or lacking

Table 1 Patient Demographic Characteristics by Reconstruction Status.

	All Patients (N=346,418)	Underwent Reconstruction		P-Value
		No (N=270,912)	Yes (N=75,506)	
Relationship Support				<0.001
Yes	199,252 (57.5%)	146,776 (54.2%)	52,476 (69.5%)	
No	147,166 (42.5%)	124,136 (45.8%)	23,030 (30.5%)	
Marital Status				<0.001
Married (including common law)	198,931 (57.4%)	146,572 (54.1%)	52,359 (69.3%)	
Divorced	36,666 (10.6%)	28,312 (10.5%)	8,354 (11.1%)	
Separated	3,635 (1%)	2,875 (1.1%)	760 (1%)	
Single (never married)	48,031 (13.9%)	37,592 (13.9%)	10,439 (13.8%)	
Unmarried or Domestic Partner	321 (0.1%)	204 (0.1%)	117 (0.2%)	
Widowed	58,834 (17%)	55,357 (20.4%)	3,477 (4.6%)	
Race/Ethnicity				<0.001
Non-Hispanic White	246,040 (71%)	188,794 (69.7%)	57,246 (75.8%)	
Non-Hispanic Black	34,736 (10%)	28,109 (10.4%)	6,627 (8.8%)	
Hispanic	34,472 (10%)	28,038 (10.3%)	6,434 (8.5%)	
Other	30,276 (8.7%)	25,311 (9.3%)	4,965 (6.6%)	
Insurance Status				<0.001
Insured	176,300 (50.9%)	125,176 (46.2%)	51,124 (67.7%)	
Uninsured	3095 (0.9%)	2522 (0.9%)	573 (0.8%)	
Unknown - Diagnosed Before 2007	164,940 (47.6%)	141,673 (52.3%)	23,267 (30.8%)	
Patient Region				<0.001
Alaska	383 (0.1%)	354 (0.1%)	29 (0%)	
East	126,717 (36.6%)	93,489 (34.5%)	33,228 (44%)	
Northern Plains	36,161 (10.4%)	27,770 (10.3%)	8,391 (11.1%)	
Pacific Coast	167,269 (48.3%)	136,731 (50.5%)	30,538 (40.4%)	
Southwest	15,888 (4.6%)	12,568 (4.6%)	3,320 (4.4%)	
Contralateral Prophylactic	59988 (17.3%)	30436 (11.2%)	29552 (39.1%)	<0.001

*Only includes patients diagnosed in 2010 and later.
Percentages may not add up to 100 due to rounding or missing values.

insurance (OR 0.44; 95% CI 0.40-0.49; $p < 0.001$). Less invasive disease was associated with reconstruction status, with DCIS patients (T0) more likely to receive reconstruction than T1 patients (OR 1.25; 95% CI 1.01-1.55; $p = 0.04$), and higher tumor grades and nodal involvement were associated with decreased likelihood of reconstruction after mastectomy (all $p < 0.001$). Women receiving a CPM were significantly more likely to undergo reconstruction (OR 2.57; 95% CI 2.51-2.62; $p < 0.001$; [Table 2](#)).

Rates of Reconstruction with Time by Social Support

Regardless of the relationship status, rates of reconstruction increased significantly during the study period from 1998 to 2014 ([Figure 2](#)). On univariate analysis, there was an association between year of diagnosis and social support with regard to reconstruction status ([Table 3](#)). After multivariate adjustment, the interaction of year*relationship status was significant, thus indicating that after adjustment for known covariates including race, age, insurance status, geographic region, grade, t-stage, n-stage, surgery type, and contralateral prophylactic surgery, rates of reconstruction showed difference with time on the basis of relationship status (interaction $p = 0.02$), with the greatest increase per year among partnered women (OR 1.32; 95% CI 1.05-1.67)

and the lowest among divorced women (OR 1.07; 95% CI 1.06-1.07; [Table 4](#)).

Reconstruction Type and Social Support Among Young Women with Breast Cancer

Given the lack of BMI or comorbidities in SEER, we assessed reconstruction subtype among women ≤ 45 years as a proxy for overall good health and to facilitate comparison among a more homogeneous population. After multivariate analysis among women ≤ 45 years old, reconstructive subtype varied by relationship status ($p = 0.004$), with divorced patients less likely to pursue autologous over implant-based reconstruction (OR 0.86; 95% CI 0.76-0.98; $p = 0.03$). Among patients aged 18-45 years, patient age was also associated with reconstruction subtype, and increased age closer to 45 years was associated with pursuit of tissue-based reconstruction (OR 1.01; 95% CI 1.00-1.02; $p = 0.01$). Receipt of reconstruction in the East was associated with a greater likelihood of tissue over implant-based reconstruction than receipt of care in the Pacific Coast/Alaska (OR 1.59; 95% CI 1.47-1.72; $p < 0.001$). Women receiving CPM were significantly less likely to receive tissue-based (OR 0.72; 95% CI 0.67-0.77; $p < 0.001$) or combined tissue and implant-based (OR 0.73; 95% CI 0.66-0.80; $p < 0.001$) reconstruction over implant-based reconstruction ([Table 5](#)).

Table 2 Factors Associated with Reconstruction after Mastectomy (N=318,172).

	Odds Ratio (95% CI)	P-Value	Overall P-Value
Relationship Support			<0.001
No	REF		
Yes	1.31 (1.28-1.34)	<0.001	
Relationship Type			<0.001
Married	REF		
Divorced	0.97 (0.94-1.00)	0.08	
Separated	0.76 (0.69-0.83)	<0.001	
Single	0.73 (0.71-0.76)	<0.001	
Partner	0.77 (0.59-1.00)	0.05	
Widowed	0.56 (0.54-0.59)	<0.001	
Race/Ethnicity			<0.001
Non-Hispanic White	REF		
Non-Hispanic Black	0.71 (0.69-0.74)	<0.001	
Hispanic	0.63 (0.61-0.65)	<0.001	
Other	0.56 (0.54-0.58)	<0.001	
Year of Diagnosis	1.08 (1.07-1.08)	<0.001	<0.001
Insurance Status			<0.001
Insured	REF		
Uninsured	0.44 (0.40-0.49)	<0.001	
Unknown - Diagnosed Before 2007	0.93 (0.89-0.96)	<0.001	
Patient Region			<0.001
Pacific Coast/Alaska	REF		
East	1.54 (1.51-1.58)	<0.001	
Northern Plains	1.70 (1.64-1.76)	<0.001	
Southwest	1.34 (1.28-1.40)	<0.001	
Grade			<0.001
1	REF		
2	0.94 (0.92-0.97)	<0.001	
3	0.77 (0.75-0.79)	<0.001	
T-Stage			<0.001
T1	REF		
T0/Tis	1.25 (1.01-1.55)	0.04	
T2	0.78 (0.76-0.80)	<0.001	
T3	0.67 (0.65-0.70)	<0.001	
T4	0.36 (0.34-0.39)	<0.001	
TX	0.72 (0.67-0.78)	<0.001	
N-Stage			<0.001
N0	REF		
N1	0.91 (0.89-0.94)	<0.001	
N2	0.75 (0.72-0.78)	<0.001	
N3	0.66 (0.62-0.70)	<0.001	
NX	0.80 (0.70-0.91)	<0.001	
Surgery Type			<0.001
Simple/Complete or Subcutaneous Mastectomy	REF		
Modified Radical Mastectomy	0.56 (0.55-0.57)	<0.001	
Radical Mastectomy	0.94 (0.85-1.05)	0.28	
Contralateral Prophylactic	2.57 (2.51-2.62)	<0.001	<0.001

Subcutaneous Mastectomy was grouped with Simple/Complete due to limited sample size of patients who underwent Subcutaneous Mastectomy, Alaska was grouped with Pacific Coast due to limited sample size of patients from Alaska, and ER/PR Borderline patients were grouped with ER-/PR- due to limited sample sizes of patients with ER/PR Borderline.

Discussion

This 17-year population-based study analyzes the impact of relationship status on patterns of postmastectomy breast

reconstruction. While the association between being married and patterns of postmastectomy breast reconstruction has been previously described,¹²⁻¹⁴ our study was the first to observe that positive relationship support, through either

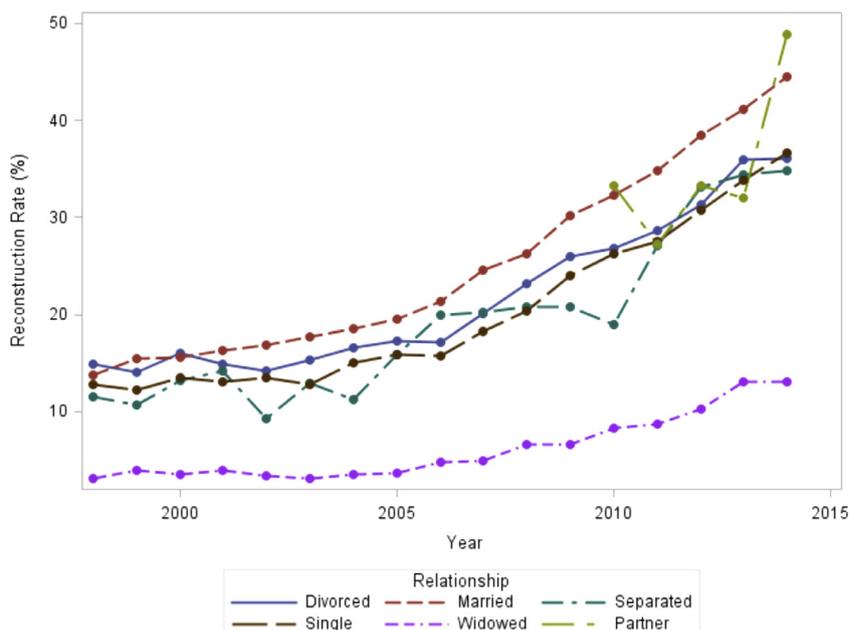


Figure 2 Rates of Reconstruction with Time by Relationship Status, 1998-2014.

Table 3 Rates of Reconstruction with Time by Relationship Type.

	Year of Diagnosis																	
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Divorced	15.0	14.0	16.1	14.9	14.3	15.3	16.5	17.3	17.2	20.1	23.2	26.0	26.8	28.7	31.4	36.0	36.1	
Married	13.7	15.4	15.6	16.3	16.9	17.7	18.5	19.5	21.3	24.5	26.3	30.2	32.4	34.9	38.4	41.2	44.5	
Separated	11.5	10.7	13.3	14.2	9.3	12.9	11.2	15.9	19.9	20.3	20.8	20.7	19.0	27.1	33.2	34.3	34.8	
Single	12.8	12.3	13.5	13.0	13.5	12.8	15.0	15.9	15.8	18.3	20.3	24.1	26.3	27.5	30.7	33.8	36.7	
Widowed	3.1	3.9	3.5	3.9	3.3	3.1	3.6	3.7	4.8	4.8	6.6	6.64	8.3	8.7	10.3	13.1	13.1	
Partnered	-	-	-	-	-	-	-	-	-	-	-	-	-	33.3	27.3	33.3	32.1	48.9
Total	11.4	12.6	12.8	13.1	13.4	14.0	14.9	15.9	17.2	19.8	21.9	25.1	27.1	29.3	32.6	35.7	38.3	

Data reported as % undergoing reconstruction of all patients diagnosed in a given year. No patients were reported, as they in an unmarried partnership during 1998-2009.

Table 4 Adjusted Interaction Effects for Relationship * Year - Odds of Reconstruction

Relationship	Year Odds Ratio (95% CI)	Interaction P-Value
Married	1.08 (1.07-1.08)	0.02
Divorced	1.07 (1.06-1.07)	
Separated	1.07 (1.05-1.10)	
Single	1.08 (1.07-1.09)	
Partner	1.32 (1.05-1.67)	
Widowed	1.08 (1.07-1.09)	

Odds Ratios are adjusted for age, race/ethnicity, insurance status, year of diagnosis, patient region, stage, and surgery type.

marriage or a domestic partnership, was associated with an increased likelihood of pursuing immediate breast reconstruction. Notably, although the rates of postmastectomy breast reconstruction increased overall, divorced women had slower increases in rates of reconstruction than married or partnered women and those in the youngest cohort were less likely to pursue autologous versus implant-based

reconstruction. Taken in conjunction with evidence that marital status and social support influence both quality of life and survival in primary breast cancer treatment,^{3,4,15,16} these findings identify women lacking partners, especially divorced patients, as a target population who might benefit from tailored preoperative counseling and additional resources to improve access to breast reconstruction.

Given the considerable esthetic, emotional, and financial considerations imposed by a diagnosis of breast cancer and need for mastectomy, decision-making regarding reconstruction is a highly personal decision known to be influenced by age, race, socioeconomic status, physical characteristics, comorbidities, and culturally informed preferences.¹⁷⁻¹⁹ Here, we describe a relatively understudied social determinant of health - relationship support - to be another significant influence in the pursuit of breast reconstruction. We find that the presence of support through either a partner or a spouse is significantly associated with the pursuit of postmastectomy reconstruction, with higher rates of reconstruction among married women than among single, separated, and particularly widowed women. The association between a positive relationship status and receipt

Table 5 Generalized Logistic Model Predicting Type of Reconstruction - Patients with Known Reconstruction Type Only - By Relationship Type (N=16,621) - Young Patients (≤ 45 Years).

	Tissue + Implant vs. Implant		Tissue-Based Vs. Implant		Overall P-Value
	Odds Ratio (95% CI)	P-Value	Odds Ratio (95% CI)	P-Value	
Relationship type					0.004
Married	REF		REF		
Divorced	1.26 (1.08-1.48)	0.004	0.86 (0.76-0.98)	0.03	
Separated	1.06 (0.68-1.65)	0.79	1.11 (0.81-1.52)	0.53	
Single	1.02 (0.90-1.16)	0.80	0.99 (0.91-1.09)	0.86	
Partner	1.33 (0.42-4.22)	0.62	1.25 (0.51-3.07)	0.62	
Widowed	1.89 (1.10-3.26)	0.02	1.28 (0.81-2.02)	0.29	
Age (Years)	1.01 (1.00-1.02)	0.24	1.01 (1.00-1.02)	0.01	0.04
Race/Ethnicity					<0.001
Non-Hispanic white	REF		REF		
Non-Hispanic black	1.01 (0.86-1.20)	0.87	1.58 (1.41-1.78)	<0.001	
Hispanic	1.00 (0.85-1.17)	0.96	1.33 (1.19-1.48)	<0.001	
Other	0.89 (0.74-1.06)	0.20	1.07 (0.94-1.21)	0.32	
Year of Diagnosis					
Insurance Status					0.001
Insured	REF		REF		
Uninsured	1.15 (0.71-1.85)	0.58	1.43 (1.02-2.01)	0.04	
Unknown - Diagnosed Before 2007	1.38 (1.14-1.67)	0.001	1.21 (1.06-1.40)	0.007	
Patient Region					<0.001
Pacific Coast/Alaska	REF		REF		
East	1.33 (1.19-1.48)	<0.001	1.59 (1.47-1.72)	<0.001	
Northern Plains	1.34 (1.16-1.55)	<0.001	0.92 (0.82-1.03)	0.15	
Southwest	0.72 (0.55-0.94)	0.02	1.10 (0.92-1.30)	0.30	
Grade					0.86
1	REF		REF		
2	0.98 (0.84-1.14)	0.80	0.98 (0.87-1.09)	0.65	
3	1.04 (0.89-1.21)	0.64	1.00 (0.89-1.11)	0.95	
T-Stage					0.03
T1	REF		REF		
T0/Tis	1.23 (0.51-2.98)	0.65	0.69 (0.33-1.48)	0.34	
T2	0.99 (0.89-1.11)	0.91	1.04 (0.96-1.12)	0.37	
T3	1.18 (0.99-1.41)	0.07	1.13 (0.99-1.29)	0.07	
T4	1.37 (0.93-2.03)	0.11	1.55 (1.16-2.06)	0.003	
TX	0.93 (0.62-1.39)	0.72	1.31 (1.00-1.71)	0.05	
N-Stage					0.18
N0	REF		REF		
N1	0.97 (0.87-1.08)	0.60	1.00 (0.93-1.08)	0.99	
N2	0.78 (0.64-0.96)	0.02	1.05 (0.91-1.21)	0.51	
N3	0.79 (0.59-1.06)	0.12	0.92 (0.75-1.14)	0.45	
NX	0.96 (0.49-1.90)	0.91	0.73 (0.44-1.20)	0.22	
Surgery Type					<0.001
Simple/Complete Mastectomy					
Modified Radical Mastectomy	1.05 (0.94-1.17)	0.38	1.03 (0.95-1.11)	0.47	
Radical Mastectomy	4.27 (2.72-6.69)	<0.001	2.30 (1.53-3.46)	<0.001	
Contralateral Prophylactic	0.73 (0.66-0.80)	<0.001	0.72 (0.67-0.77)	<0.001	<0.001

of reconstruction is complex and likely reflects a combination of the added practical, financial, and emotional support provided by partners. The additional practical support provided by spouses or partners is likely one of the most substantial contributors to our findings: women without partners available to drive them to appointments or take care of home life may be less likely to pursue an additional and complex reconstructive surgery that requires more preoperative appointments, planning, and longer recovery peri-

ods.¹⁰ Reconstruction can also impose a significant financial burden requiring additional time off work on top of an already expensive and long breast cancer treatment.²⁰ Thus, the presence of a working partner can mitigate this financial barrier, thus making reconstruction more economically viable for patients. Moreover, a partners' emotional support throughout the decision-making process likely increases a women's likelihood to pursue reconstruction. Kwiat et al. found that women undergoing postmastectomy

reconstruction identified their partners as more influential on surgical choices than women undergoing lumpectomy or mastectomy alone.²¹ Furthermore, using interviews and questionnaires, Fasse et al.¹⁰ and Ananian et al.²² found that women depended on their partners for emotional support and joint decision-making when choosing reconstruction, a role that some women described could be filled only by their partner but by no other family member or friend.¹⁰

The unique interplay between receipt of breast reconstruction, body image after mastectomy, and partner intimacy may also explain our reported higher rates of reconstruction among women with partners. Breast reconstruction has been associated with improved sexual well-being and sense of attractiveness to partners when compared to mastectomy alone.²³⁻²⁵ Accordingly, women's anticipation of the effects of mastectomy on their personal attractiveness and relations with their partners, as well as partners encouraging reconstruction, could lead to higher rates of reconstruction among women in relationships. In a survey analyzing motivations for reconstruction, Duggal et al. found that nearly 25% of women felt that "the satisfaction of my partner or spouse with my body was an important factor" influencing reconstructive decisions, with 18.7% reporting that their partner or spouse urged them to have reconstruction.²⁶ Similarly, in a questionnaire study, Flitcroft et al. reported that while desires to feel whole again, regain femininity, and wear normal clothing were the most commonly selected reasons for pursuing immediate reconstruction, other selected answers included "my partner wants me to have reconstruction" and "I want to improve relations with my partner."²⁷

Despite the well-described effects of breast reconstruction on partner intimacy and self-image, it has yet to be described if marital status impacts receipt of autologous versus implant-based reconstruction. Considering the evidence that many partners actively participate in the reconstructive decision-making process,^{26,27} we hypothesized that there might be a difference in reconstruction subtype between women with and without social support. Given the lack of comorbidities in SEER, which are known to influence reconstruction subtype, we assessed reconstruction subtype among women ≤ 45 years as a proxy for overall good health and to facilitate comparison among a more homogeneous population. Within this group, we found that divorced women were significantly less likely to receive autologous reconstruction than married women. This finding may be attributable in part to social support networks: autologous reconstruction is more invasive and associated with a longer recovery time than implant-based reconstruction, including the burden of an inpatient hospital stay as opposed to implant-based reconstruction usually performed in an outpatient ambulatory setting. In the postoperative setting, partners were observed to have reduced anxiety and improved outcomes during inpatient hospital stays;²⁸ thus, divorced women may be less likely to consider autologous options given their lack of relationship support to facilitate this recovery period. While receipt of tissue-based reconstruction did not show difference between any other type of relationship status in our study, the idea that nonpartnered patients may feel less inclined to pursue autologous reconstruction could be an important consideration for reconstructive surgeons during joint decision-making, thus en-

abling personalized counseling about optimum reconstruction subtype tailored to both patients' physical characteristics and social networks.

Ultimately, social connectedness through positive relationship support plays a significant role across various aspects of breast cancer treatment extending from perceived distress and mental health after initial diagnosis,^{29,30} body image, and survival after primary resection^{3,15,31} and, as we describe, decision-making regarding reconstruction. During our 17-year period, although reconstruction rates increased among all relationship subgroups, the fastest increase was seen among women with partners and the slowest among divorced women. These findings prompt clinicians to consider relationship status and patients' social support networks during preoperative counseling for reconstruction. Given the important role partners have been demonstrated to play in the reconstruction decision-making process,²¹ involving partners in preoperative counseling about reconstruction may be beneficial to facilitate shared decision-making.

In addition, our study illustrates the need for further availability of resources for patients with breast cancer who lack relationship support, especially among divorced women. During the past decade, the popularity of online support groups in the breast cancer community has taken off.³² Online support groups are intended to provide a readily usable platform of peer support to aid with the psychological distress associated with breast cancer diagnoses.³³ The population of patients with breast cancer who participate in these groups are often younger and more educated.³² Further, social network size may also be a contributing factor to participation in these online groups. In studies of computer-mediated social support groups for patients with breast cancer, women with smaller social and/or family networks have been found to more often utilize and form interpersonal relationships through online support groups.³⁴ Put in the context of our study, cognizance of the potential benefit of online support groups for women lacking relationship support, especially divorced women, could help reconstructive surgeons provide nonpartnered women with tailored resources to aid both with support through their breast cancer treatment, as well as decision-making regarding reconstruction. These groups could assist patients in overcoming the practical and emotional barriers, which may be affecting their pursuit of reconstruction with time and decisions about subtype.

Strengths of this study's lie in its large sample size, long time period, and granularity of marital status reported in SEER, which is otherwise unavailable in most national cancer databases and makes this type of large analysis unique. However, it also has limitations, most of which are inherent in its retrospective design including the potential for coding errors. As a large database series, we were limited by available data. In particular, the lack of available information about delayed reconstruction, BMI, or other comorbidities in the SEER database limits our conclusions regarding associations with reconstruction subtype. Further, although we associated relationship support with the presence of a spouse or domestic partner, perceived support for many patients may not correlate with documented relationship status. Despite these limitations, this study identifies an association between relationship status with rates of reconstruction

and subtype. We aim for this finding to improve the understanding of social factors, influencing reconstructive decision-making, to enable more tailored physician counseling and increased availability of resources for patients with breast cancer lacking partners and, ultimately, improved access to reconstruction among all women regardless of social context. Future directions should include qualitative interviews or focus groups to better understand how relationship support influences reconstruction decision-making.

Conclusion

Women lacking relationship support through a spouse or a partner are less likely to receive postmastectomy reconstruction, and rates of reconstruction among divorced women are increasing more slowly than partnered women. Among younger patients, divorced women are less likely to receive autologous reconstruction. Consideration of social support networks of patients with breast cancer may improve preoperative shared decision-making regarding reconstructive options.

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