Psychological, sociodemographic, and clinicopathological predictors of breast cancer patients’ decision to undergo breast reconstruction after mastectomy

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ABSTRACT

The objectives of this study were to examine the influence of socioeconomic factors, personality traits, and psychopathology on the decision to undergo breast reconstruction (BR) post-mastectomy.

Methods: In this cross-sectional study, adult female breast cancer (BC) patients who had undergone a mastectomy between January 2017 and 2019 were interviewed using a 46-item questionnaire at King Abdulaziz University Hospital, Jeddah, Saudi Arabia. The questionnaire was divided into 5 sections: demographic data, personality traits, the Narcissism Index (NI), and the Hospital Anxiety and Depression Scale (HADS).

Results: The sample (N=196; mean age: 48.44 ± 9.87 years, opted for BR: 60.2%, with chronic diseases: 36.7%, Saudi nationals: 43.9%) obtained means of 4.17 (± 2.81) on NI score, 7.72 (± 4.88) on anxiety score, and 5.78 (± 4.65) on depression score. Group differences in age, depression, lymph node involvement, and 2 personality traits emerged.

Conclusion: Age and depression significantly influenced the decision to undergo BR. Women who had opted for BR tended to be younger, less depressed, and characterized by lesser nodal involvement. Personality traits also influenced the decision to undergo BR. Diagnosing and treating depressed patients is an important component. A patient’s age should not deter physicians from counselling them about BR.

Keywords: anxiety, breast cancer, breast reconstruction, depression, mastectomy

Breast cancer is the most commonly occurring cancer among females, and it affects 2.1 million women worldwide each year.1 Among Saudi women, it is the most common cancer.2 The incidence of breast cancer in the United States (US) is 124 per 100000 women.3 In many cases of breast cancer, a mastectomy is indicated. Mastectomy significantly deprives women of their sense...
improves QOL. There are primarily 2 types of BR, namely, implant and autologous (flap) reconstruction, and each of these can be implemented through various approaches. For example, implants include saline and silicone. A flap of the latissimus dorsi or transverse rectus abdominis (TRAM) is used for autologous BR. The latissimus dorsi flap is swung from the back. It provides less fullness than TRAM, thus an implant or a fat graft is often used coupled with it. A TRAM flap is performed by rotating the rectus abdominis muscle or by removing a smaller part of the muscle with its skin (free flap). Free TRAM flaps provide more flexibility and lower risk of tissue necrosis when compared to pedicle TRAM flaps. It has been shown that autologous BR yields superior outcomes, when compared to implant BR. Nowadays, most BRs involve implants; in the late twentieth century, autologous implants were more popular. This change is partially attributable to surgeons’ efforts to provide the option of reconstruction to the high-risk postmastectomy population (namely, patients with other comorbidities and/or those older than 60 years).

Breast cancer patients experience psychological morbidities, primarily mood disorders, after receiving and when living with the diagnosis. The untreated anxiety and depression are important factors that render the QOL of these patients low, not merely the physical aspect of the patients’ presentation. These morbidities in women with breast cancer are often overlooked and left untreated because they can have unclear presentations.

According to the findings of a Polish study, deciding to undergo BR after breast removal is correlated with personality traits among women. Specifically, introverts rarely opted to undergo BR. Another important personality type is the narcissistic personality. Specifically, narcissists tend to demand perfectionism as it is a sentinel feature of their personality type; hence, they seek to have an extremely attractive body.

Despite recommendations to undergo BR, the rates at which the procedure is performed are low, ranging from 11% to less than 40% (in some tertiary care centers in the US). The decision to undergo BR is complicated by a variety of procedures. Women are asked to choose from an array of procedures, and the problem has become more strenuous with the development of the perforator flap technique, which minimizes the risk of hernia albeit requires longer operation time. Additionally, the burden that the surgical procedure places on the patient and her relatives makes the decision-making process even more difficult.

Only a small proportion of treated breast cancer patients decide to undergo BR. Therefore, it is important to examine which mood states and social aspects influence this decision-making process. In this study, we aimed to examine the influence of socioeconomic factors, anxiety, depression, and personality traits on the decision to undergo BR after a mastectomy in one center in Jeddah, Saudi Arabia.

Methods. This cross-sectional study was conducted between March and July 2019, using an interview-based questionnaire. This interview was conducted among female patients who were diagnosed with breast cancer at King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia.

Women aged 18 years and older who had undergone mastectomy for breast cancer between January 2017 and 2019 were included. The exclusion criteria were as follows: a) undergone bilateral mastectomy, contralateral mastectomy for prophylactic purposes, or a reoperation and b) breast cancer recurrence. All contributors were knowledgeable before participation, and those who agreed to contribute were registered. Approximately 400 randomly chosen patients were identified from the hospital records, and 241 of them who met the study’s inclusion criteria were contacted; only 196 patients agreed to participate (Figure 1). Patients were divided into 2 subgroups: Group A, which consisted of women who had opted for BR and Group B, which consisted of women who chose to not undergo BR.

Study variables. We reviewed the literature and developed a valid questionnaire based on the findings of several published studies. The questionnaire consisted of 46 questions that were divided into 5 sections: demographic data, personality traits, the Narcissism Index (NI), and the Hospital Anxiety and Depression Scale (HADS). The NI is a reliable tool for predicting the degree of narcissism. The reliability and validity of HADS on similar populations (breast cancer patients) has been studied, and it has been...
shown to have a good predictive value. Furthermore, the Arabic translation used in this study has been shown to be both valid and reliable.\textsuperscript{31-33} The study was conducted after ethical approval was granted by the Research Ethics Committee at the King Abdulaziz University Hospital. Patients participated in this study on an entirely voluntary basis.

**Statistical analysis.** Data were checked for completeness, and errors were corrected. The normality of the distributions of continuous variables were checked by conducting the Shapiro-Wilk and Kolmogorov Smirnov tests. Their results indicated that all variables were none normally distributed. The sociodemographic variables and clinicopathological features (namely, tumor size, lymph node involvement, and metastasis-TNM) of the 2 participant groups were compared using the Chi-squared test. Respondents’ scores on the NI and HADS were calculated by counting the responses. The mean scores of the 2 participant groups were compared using the Mann-Whitney U test. The relationship between TNM and anxiety and depression scores were examined using the Kruskal-Wallis test. The extroversion/introversion personality continuum of the 2 participant groups were compared using Chi-squared and fisher exact tests. Binary logistic regression analysis was conducted to identify the predictors of the decision to undergo BR. The results have been presented using tables and figures.

All analyses were conducted using the Statistical Package for Social Sciences version 23.0 (IBM, Armonk, NY, USA), and 95% confidence intervals were computed to interpret the results.

**Results.** A total of 196 patients were interviewed, and 118 (60.2%) of them had opted for BR; the remaining 78 (39.8%) patients had not opted for BR. The mean age of the participants was 48.44 (± 9.87) years. Further, 86 (43.9%) patients were Saudi, the monthly income of 118 (60.2%) patients was <5000 Saudi Riyals (SR). One hundred and thirty (66.3%) patients were unemployed/housewives, 72 (36.7%) patients had chronic illnesses, and 76 (38.8%) patients had a family history of breast cancer (BC). Out of the 76 participants with a family history of BC, 71.1% had a relative who had BC and had undergone BR. The

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**Figure 1** - Flowchart depicting the inclusion and exclusion of the study participants.
Table 1 - Sociodemographic characteristics and clinicopathological features of the respondents split by participant group.

| Characteristics             | Attributes                        | Breast reconstruction (n=118) | No breast reconstruction (n=78) | Odds ratio (95% CI) | P-value |
|-----------------------------|-----------------------------------|-----------------------------|---------------------------------|---------------------|---------|
| Age (years)                 | Mean ± SD                         | 45.44 ± 8.66                | 52.97 ± 9.90                    | <0.001              |         |
|                             | Median                            | 45.0                        | 53.0                            |                     |         |
| Nationality                 | Saudi                             | 62 (52.5)                   | 24 (30.8)                       | 2.491 (1.365 - 4.546) | 0.003   |
|                             | Non-Saudi                         | 56 (47.5)                   | 54 (69.2)                       |                     |         |
| Marital status              | Single                            | 9 (7.6)                     | 9 (11.5)                        | 0.779               |         |
|                             | Married                           | 93 (78.8)                   | 57 (73.1)                       |                     |         |
|                             | Divorced                          | 8 (6.8)                     | 6 (7.7)                         |                     |         |
|                             | Widowed                           | 8 (6.8)                     | 6 (7.7)                         |                     |         |
| Educational level           | Below high school                 | 29 (24.6)                   | 19 (24.4)                       | 0.721               |         |
|                             | High school                       | 37 (31.4)                   | 29 (37.2)                       |                     |         |
|                             | Bachelor's degree                 | 41 (34.7)                   | 25 (32.1)                       |                     |         |
|                             | Master                            | 6 (5.1)                     | 4 (5.1)                         |                     |         |
|                             | PHD                               | 5 (4.2)                     | 1 (1.3)                         |                     |         |
| Monthly income (Saudi Riyals) | <5000                             | 68 (57.6)                   | 50 (64.1)                       | 0.506               |         |
|                             | 5000-10,000                       | 18 (15.3)                   | 14 (17.9)                       |                     |         |
|                             | 10,000-20,000                     | 24 (20.3)                   | 10 (12.8)                       |                     |         |
|                             | >20,000                           | 8 (6.8)                     | 4 (5.1)                         |                     |         |
| Occupation                  | Works in Jeddah                   | 26 (22.0)                   | 24 (30.8)                       | 0.041               |         |
|                             | Works outside Jeddah              | 14 (11.9)                   | 2 (2.6)                         |                     |         |
|                             | Unemployed                        | 78 (66.1)                   | 52 (66.7)                       |                     |         |
| Smoking                     | No                                | 104 (88.1)                  | 76 (97.4)                       | 0.195               | 0.015   |
|                             | Yes                               | 14 (11.9)                   | 2 (2.6)                         | (0.043 - 0.886)     |         |
| Chronic illness             | No                                | 88 (74.6)                   | 36 (46.2)                       | 3.422               | <0.001  |
|                             | Yes                               | 30 (25.4)                   | 42 (53.8)                       | (1.863 - 6.287)     |         |
| Family history of breast cancer | No                                | 70 (59.3)                   | 50 (64.1)                       | 0.817               | 0.501   |
|                             | Yes                               | 48 (40.7)                   | 28 (35.9)                       | (0.452 - 1.474)     |         |
| Family member underwent BR postmastectomy | No | 4 (8.3) | 8 (28.6) | 0.046 |         |
|                             | Yes                               | 36 (75)                     | 18 (64.3)                       |                     |         |
|                             | Don't know                        | 8 (16.7)                    | 2 (7.1)                         |                     |         |
| Tumor size                  | Ductal carcinoma in situ          | 27 (22.9)                   | 10 (12.8)                       | 0.241               |         |
|                             | Breast cancer T1a-c (<2cm)        | 35 (28.0)                   | 31 (39.7)                       |                     |         |
|                             | Breast cancer T2                  | 34 (28.8)                   | 23 (29.5)                       |                     |         |
|                             | Breast cancer T3                  | 10 (8.5)                    | 8 (10.3)                        |                     |         |
|                             | Breast cancer T4                  | 14 (11.9)                   | 6 (7.7)                         |                     |         |
| Lymph node involved         | N0                                | 56 (47.5)                   | 35 (44.9)                       | 0.013               |         |
|                             | N1                                | 25 (21.1)                   | 30 (38.5)                       |                     |         |
|                             | N2                                | 20 (16.8)                   | 10 (12.8)                       |                     |         |
|                             | N3                                | 17 (14.4)                   | 3 (3.8)                         |                     |         |
| Distant metastasis          | No                                | 110 (93.2)                  | 70 (89.7)                       | 0.636               | 0.430   |
|                             | Yes                               | 8 (6.8)                     | 8 (10.3)                        | (0.228 - 1.773)     |         |
| Adjuvant therapy            | None                              | 29 (24.6)                   | 7 (9.0)                         | 0.291               |         |
|                             | Chemotherapy                      | 54 (45.8)                   | 47 (60.3)                       |                     |         |
|                             | Chemo + endocrine therapy         | 6 (5.1)                     | 8 (10.3)                        |                     |         |
|                             | Chemo + radio therapy             | 16 (13.6)                   | 8 (10.3)                        |                     |         |
|                             | Chemo + radio + endocrine         | 13 (11.0)                   | 8 (10.3)                        |                     |         |

*odds ratio were presented for dichotomous sociodemographic variables. BR: breast reconstruction. 95% CI: 95% confidence interval.

Table 2 - Distribution of respondents’ mean NI score, anxiety score and depression score split by participant group.

| Scores                  | Breast reconstruction (n=118) | No breast reconstruction (n=78) | P-value |
|-------------------------|------------------------------|---------------------------------|---------|
| Narcissism Index Score  | 4.53 ± 2.84                  | 3.64 ± 2.70                     | 0.030   |
| Anxiety score           | 6.44 ± 4.31                  | 9.67 ± 5.07                     | <0.001  |
| Depression score        | 4.49 ± 3.97                  | 7.74 ± 4.90                     | <0.001  |

Values are presented as mean±SD.

*Mann-Whitney U test was carried out.

sociodemographic characteristics for each participant group are presented in Table 1.

The group of women who had opted for BR tended to have younger women (mean difference between the 2 groups was 7.53 years, \( p<0.001 \)), fewer nonsmokers \( (p=0.015) \), and more women without chronic illnesses \( (p<0.001) \). Unemployed participants were less likely to have opted for BR \( (p=0.041) \). With regard to the TNM classification, a lymph node involvement was
Predictors of breast reconstruction ... Marouf et al

less prominent among those who had opted for BR ($p=0.13$) (Table 1).

**Personality traits and mood status.** The mean depression score for all participants was 5.78 ($\pm 4.65$), anxiety score 7.72 ($\pm 4.88$), and NI 4.17 ($\pm 2.81$). Table 2 shows that anxiety (9.67 $\pm 5.07$ versus 6.44 $\pm 4.31$, $p<0.001$) and depression scores (7.74 $\pm 4.90$ versus 4.49 $\pm 3.97$, $p<0.001$) were significantly higher among participant who had opted to not undergo BR. However, scores on the NI were higher among those who had opted for BR ($p=0.030$) (Table 2).

The responses that the 2 participant groups provided to the extroversion/introversion personality questions (total: 5 questions) are summarized in Table 3. Group comparisons revealed that there was a statistically significant difference in the responses that were provided to questions 4 ($p=0.0002$) and 5 ($p<0.001$) (Table 3).

**Disease stage and mood status.** There was no statistically significant relationship between TNM classification and anxiety and depression scores ($p>0.050$).

**Binary logistic regression.** Binary logistic regression analysis was used to identify the predictors of the decision to undergo BR. Anxiety and depression scores, sociodemographic variables, TNM classification, and adjuvant treatment were included in the regression analysis. The results revealed that depression scores, age, and lymph node involvement were statistically significant predictors of BR decision. Other included variables were not statistically significant ($p>0.050$) (Table 4).

**Discussion.** Among breast cancer patients, undergoing mastectomy frequently has a negative impact on the QOL and psychological well-being. Undoubtedly, this body part entails important psychological implications. Consequently, patients who have undergone a mastectomy perceive a decline their sense of femininity and confidence levels. A mastectomy without BR can alter the mood and behaviors of patients in their workspaces. Further, it can strongly impact their roles as a family member. Therefore, BR after breast removal can tremendously improve QOL and perceived body image. Accordingly, we aimed to examine the relationship that the decision to undergo BR shares with different personality traits, depression, anxiety and sociodemographic variables among breast cancer patients.

The existing literature suggests that age is a very important determinant on BR. A similar result emerged in this study. This finding is attributable to surgeons' fear of postoperative complications, especially in a patient with other chronic illnesses. There was a significant difference in BR status between Saudis and non-Saudis. This finding may be attributable to group differences in access to healthcare or the relatively higher mean depression (6.47 $\pm 4.96$ versus 4.91 $\pm 4.04$, $p=0.035$) and anxiety scores (8.93 $\pm 5.18$ versus 6.19 $\pm 4.00$, $p<0.001$) that non-Saudi participants obtained (the regression analysis presented in Table 4 yielded no significant predictor).

Another interesting finding was that the patients who were willing to undergo BR were healthier and did not have any chronic illnesses or comorbidities, when compared to the other group. Being healthy is closely related to happiness, and deciding to undergo such a procedure can tremendously improves a patient's

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**Table 3** - Extroversion/introversion personality continuum in the 2 study groups.

| Personality questions/answers | Breast reconstruction (n=118) | No breast reconstruction (n=78) | $P$-value |
|-------------------------------|-----------------------------|-------------------------------|-----------|
| 1) Do you seek success in life? |                             |                               | 0.254†    |
| Definitely yes                | 100 (84.7)                  | 68 (87.2)                     |           |
| Rather yes                    | 10 (10.2)                   | 4 (5.1)                       |           |
| Hard to say                   | 4 (3.4)                     | 6 (7.7)                       |           |
| Rather no                     | 2 (1.7)                     | 0 (0.0)                       |           |
| Definitely no                 | 0 (0.0)                     | 0 (0.0)                       |           |
| 2) Do you have the ability to motivate other people? |                             |                               | 0.216†    |
| Definitely yes                | 80 (67.8)                   | 50 (64.1)                     |           |
| Rather yes                    | 26 (22.0)                   | 20 (25.6)                     |           |
| Hard to say                   | 8 (6.8)                     | 6 (7.7)                       |           |
| Rather no                     | 4 (3.4)                     | 0 (0.0)                       |           |
| Definitely no                 | 0 (0.0)                     | 2 (2.6)                       |           |
| 3) Are you open to other people? |                             |                               | 0.119†    |
| Definitely yes                | 74 (62.7)                   | 50 (64.1)                     |           |
| Rather yes                    | 30 (25.4)                   | 12 (15.4)                     |           |
| Hard to say                   | 10 (8.5)                    | 8 (10.3)                      |           |
| Rather no                     | 4 (3.4)                     | 8 (10.3)                      |           |
| Definitely no                 | 0 (0.0)                     | 0 (0.0)                       |           |
| 4) Does belonging to a social group have an impact of your feeling of safety? |                             |                               | 0.002*    |
| Definitely yes                | 52 (44.1)                   | 40 (51.3)                     |           |
| Rather yes                    | 22 (18.6)                   | 16 (20.5)                     |           |
| Hard to say                   | 4 (3.4)                     | 14 (17.9)                     |           |
| Rather no                     | 20 (16.9)                   | 6 (7.7)                       |           |
| Definitely no                 | 20 (16.9)                   | 2 (2.6)                       |           |
| 5) Is the opinion of other people about you important for you? |                             |                               | <0.001†   |
| Definitely yes                | 38 (32.2)                   | 36 (46.2)                     |           |
| Rather yes                    | 30 (25.4)                   | 20 (25.6)                     |           |
| Hard to say                   | 8 (6.8)                     | 8 (10.3)                      |           |
| Rather no                     | 12 (10.2)                   | 12 (15.4)                     |           |
| Definitely no                 | 30 (25.4)                   | 2 (2.6)                       |           |

†Fisher-Freemen-Halton test. *Chi-square test
Predictors of breast reconstruction... Marouf et al

Table 4 - Logistic regression of the predictors of the decision to undergo breast reconstruction postmastectomy.

| Variables                  | Odds ratio | 95% CI       | P-value |
|----------------------------|------------|--------------|---------|
| Anxiety score              | 0.897      | 0.786 - 1.024| 0.108   |
| Depression score           | 0.794      | 0.695 - 0.907| 0.001   |
| Age (years)                | 0.870      | 0.813 - 0.930| 0.001   |
| Nationality                |            |              |         |
| Saudi                      | Ref.       |              |         |
| Non-Saudi                  | 2.082      | 0.722 - 6.005| 0.175   |
| Occupation                 |            |              |         |
| Unemployed                 | Ref.       |              |         |
| Works outside Jeddah       | 0.006      | 0.000032 - 1.138| 0.056 |
| Works in Jeddah            | 0.101      | 0.0000435 - 23.453| 0.410     |
| Monthly income (SR)        |            |              |         |
| <5000                      | Ref.       |              |         |
| 5000-10000                 | 0.514      | 0.057 - 4.607| 0.552   |
| 10000-20000                | 0.355      | 0.033 - 3.816| 0.392   |
| >20000                     | 1.030      | 0.104 - 10.243| 0.980   |
| Educational level          |            |              |         |
| PHD                        | Ref.       |              |         |
| Master                     | 0.643      | 0.076 - 5.491| 0.687   |
| Bachelor degree            | 0.880      | 0.104 - 7.450| 0.907   |
| High school                | 1.567      | 0.044 - 55.619| 0.805  |
| Below high school          | 0.520      | 0.058 - 4.676| 0.560   |
| Marital status             |            |              |         |
| Married                    | Ref.       |              |         |
| Single                     | 0.731      | 0.068 - 7.903| 0.797   |
| Divorced                   | 0.918      | 0.166 - 5.084| 0.922   |
| Widowed                    | 0.349      | 0.041 - 2.929| 0.332   |
| Smoking                    |            |              |         |
| No                         | Ref.       |              |         |
| Yes                        | 7.045      | 0.085 - 582.244| 0.386 |
| Chronic illness            |            |              |         |
| No                         | Ref.       |              |         |
| Yes                        | 0.983      | 0.342 - 2.826| 0.975   |
| Tumor size                 |            |              |         |
| Ductal carcinoma in situ   | Ref.       |              |         |
| Breast cancer T1a-c        | 1.776      | 0.298 - 10.595| 0.528 |
| Breast cancer T2           | 0.632      | 0.121 - 3.304| 0.587   |
| Breast cancer T3           | 2.461      | 0.421 - 14.399| 0.318 |
| Breast cancer T4           | 1.309      | 0.156 - 10.955| 0.804 |
| Lymph node involved        |            |              |         |
| N0                         | Ref.       |              |         |
| N1                         | 0.217      | 0.021 - 2.255| 0.201   |
| N2                         | 0.041      | 0.003 - 0.540| 0.015   |
| N3                         | 0.090      | 0.007 - 1.156| 0.064   |
| Distal metastasis          |            |              |         |
| No                         | Ref.       |              |         |
| Yes                        | 0.756      | 0.165 - 3.464| 0.719   |
| Adjuvant treatment         |            |              |         |
| None                       | Ref.       |              |         |
| Chemotherapy               | 2.475      | 0.221 - 27.750| 0.462 |
| Chemotherapy + endocrine    | 0.657      | 0.086 - 5.088| 0.685   |
| Chemotherapy + radiotherapy | 2.711      | 0.149 - 49.222| 0.500 |
| Chemotherapy + radio+endocrine | 1.424      | 0.129 - 15.732| 0.773 |
| Family history of BR       |            |              |         |
| Yes                        | Ref.       |              | 0.063   |
| No                         | 0.194      | 0.034 - 1.095|         |

Ref.: reference, SR: Saudi Riyals, BR: breast reconstruction

Table 3 - Comparison of the NI scores between the BR and non-BR groups (Table 3 using Chi-squared and fisher exact tests). Interestingly, 2 questions for which significant group differences had emerged in the original study had also evidenced significant group differences in the current study. In both the studies, patients who had opted for BR were more likely to be extroverted, as extrovert individuals are mainly outgoing and like to be with others. In the present study, the NI scores were higher among those who had opted for BR.

Study limitations. Although our sample size was moderate, and the study’s objectives were addressed, the study has a few limitations. First, our article was

Recurrence with anxiety and depression being vaguely...
cross-sectional, the participants may not have been representative of the entire population of Saudi Arabia. Second, this study was conducted in a single center, thereby limiting the generalizability of the results. Third, the reliability of the 5 personality questions has not been studied. In the future, studies must include a larger number of hospitals that represent different regions within the country. This study offers insights into the prevalence of depression and anxiety among breast cancer patients after mastectomy. It also uncovers the variability in personality traits within this population. More importantly, it indicates that depression single handedly plays a significant role in the decision to not undergo BR, after potential confounds are controlled for. It is important to screen and detect undiagnosed depression and anxiety among patients who have undergone a mastectomy. This is necessary to effectively treat these conditions through prompt referral to a psychiatrist, improve their QOL, restore at least a moderate level of functioning, and provide assistance during this difficult postmastectomy decision-making period. Patients of all ages should receive counseling about BR after a mastectomy.

In conclusion, undergoing BR is a difficult, yet important decision for a woman who survived BC to make. Age and depression significantly influenced this decision among our study participants. Women who opted to undergo BR tend to be younger, report lower levels of depression, and were characterized by less nodal involvement. Certain personality traits can also influence the decision to undergo BR. Diagnosing and treating depressed patients is an important aspect of caring for BC patients. A patient’s age should not deter physicians from counseling patients about BR.

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Predictors of breast reconstruction ... Marouf et al

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