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## Research Article

### Health literacy, decisional conflict, and body image in patients eligible for breast-conserving surgery: A comparison between mastectomy and breast-conserving surgery groups

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## ABSTRACT

**Objective:** The aim was to evaluate the relationship between health literacy, decision conflict, and body image in early-stage breast cancer patients eligible for breast-conserving surgery (BCS) who opted for either breast-conserving surgery or mastectomy.

**Methods:** This prospective, cross-sectional study included 60 female patients eligible for BCS (30 mastectomy, 30 BCS). Health literacy was assessed using the European Health Literacy Survey Questionnaire-6 (HLS-EU-Q6); decision conflict was evaluated using the SURE and the Decision Conflict Scale (DCS); and body image was assessed using the Body Image Scale. The groups were compared using appropriate statistical methods, and factors associated with decisional conflict were explored using logistic regression analysis.

**Results:** The groups were similar in terms of age, marital status, and education level ( $p > 0.05$ ). The level of health literacy was significantly higher in the mastectomy group compared to the BCS group (median 3.52 vs. 2.36;  $p < 0.001$ ). In contrast, body image satisfaction was higher in the BCS group (3.50 vs. 2.00;  $p < 0.001$ ), while body image-related anxiety was lower (2.00 vs. 4.00;  $p < 0.001$ ). While SURE scores were higher in the mastectomy group (4.00 vs. 2.00;  $p < 0.001$ ), the total DCS score was higher in the BCS group (47.65 vs. 14.66;  $p < 0.001$ ). In the multivariable analysis, age and health literacy were not found to be significant independent predictors of decision conflict ( $p > 0.05$ ).

**Conclusion:** Health literacy, decisional conflict, and body image differed significantly between patients who underwent mastectomy and those who underwent breast-conserving surgery. Because these variables were assessed after the surgical decision had already been finalized, these findings should be interpreted as associations rather than causal determinants of surgical choice; larger, longitudinal studies assessing these factors before the decision is made are needed to clarify their role in shared decision-making.

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## 1. Introduction

Breast cancer is the most common malignancy in women, and thanks to advances in diagnosis and treat-

ment, the rate of early-stage detection is steadily increasing. Long-term studies have demonstrated that breast-conserving surgery (BCS) followed by radiation therapy in early-stage breast cancer yields oncological

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outcomes equivalent to those of mastectomy; therefore, breast-conserving surgery is recommended as the standard treatment approach in current guidelines for appropriate patients [1,2].

Nevertheless, a significant proportion of patients who meet the criteria for breast-conserving surgery opt for mastectomy. In the literature, factors influencing this preference include tumor characteristics, educational level, socioeconomic status, the surgeon's recommendation, family influence, and, in particular, fear of recurrence. However, these variables alone are insufficient to explain patients' surgical preferences, and it is believed that psychosocial factors also play an important role in the decision-making process [3,4].

In recent years, with the widespread adoption of a patient-centered care approach, the concept of shared decision-making has gained importance in breast cancer surgery. The effectiveness of this process is closely related to the level of health literacy—which refers to patients' ability to access, understand, and evaluate health information. It has been reported that low health literacy makes it difficult to understand treatment options, increases uncertainty in the decision-making process, and leads to higher levels of decision conflict [5,6]. More recent evidence continues to underscore this relationship: qualitative syntheses have identified persistent barriers to fully shared decision-making in breast cancer surgical care [7]. Furthermore, a recent study found that, although health literacy was not independently associated with the choice between breast-conserving surgery and mastectomy, it was associated with the receipt of contralateral prophylactic mastectomy and breast reconstruction, as well as with survival outcomes in breast cancer [8].

The choice of surgical treatment directly affects not only clinical outcomes but also patients' quality of life and body image. It has been shown that breast-conserving surgery yields more positive outcomes in terms of body image, perception of femininity, and psychosocial well-being, whereas body image disturbances and psychological distress are more pronounced in patients who undergo mastectomy [9,10].

However, in the current literature, there are very few studies that jointly assess health literacy, decision conflict, and body image perceptions in patients who opt for mastectomy even though they are eligible for BCS. Elucidating this relationship could contribute to a better understanding of the surgical decision-making process and the improvement of patient counseling, and may help generate hypotheses relevant to reducing potentially avoidable mastectomies that future interventional research could test. Therefore, the aim of this study was to evaluate the relationship between health literacy levels, decision conflict, and body image perceptions in patients eligible for breast-conserving surgery, comparing those who opted for breast-conserving surgery with those who opted for mastectomy.

## 2. Materials and Methods

### 2.1. Study design and patient selection

This study is a single-center, prospective, cross-sectional study evaluating the relationship between health

literacy, decision conflict, and body image in patients diagnosed with early-stage breast cancer who, despite being oncologically eligible for breast-conserving surgery (BCS), underwent either total mastectomy or breast-conserving surgery. The study was planned and reported in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines.

The study was conducted at the Breast Surgery Unit of the Department of General Surgery, Faculty of Medicine, Atatürk University. This study was approved by the Atatürk University Faculty of Medicine Clinical Research Ethics Committee (Date: 06.02.2026, Number:5/48). After patients were evaluated by a multidisciplinary breast council and a decision was made regarding their suitability for breast-conserving surgery, they were divided into groups according to their preference for mastectomy or breast-conserving surgery. Written informed consent was obtained from all participating patients prior to enrollment in the study.

### 2.2. Inclusion criteria

Patients meeting the following criteria were included in the study:

- Female patients aged 18 years or older,
- Having received a histopathological diagnosis of invasive breast carcinoma or ductal carcinoma in situ,
- Being deemed eligible for breast-conserving surgery according to current NCCN and ESMO guidelines [11,12]
- Having undergone primary total mastectomy or breast-conserving surgery as surgical treatment,
- Having fully completed the health literacy, decision conflict, and body image scales prior to surgical treatment,
- Voluntarily agreeing to participate in the study.

### 2.3. Eligibility criteria for breast-conserving surgery

Eligibility for breast-conserving surgery was evaluated by a multidisciplinary breast team based on the following criteria:

- Presence of a single-focus tumor,
- Prediction that negative surgical margins can be achieved,
- The possibility of an acceptable cosmetic outcome,
- No clinical conditions that would preclude the administration of radiation therapy,
- Absence of inflammatory breast cancer and widespread microcalcifications.

Both mastectomy and breast-conserving surgery were confirmed as oncologically feasible options for all included patients by a multidisciplinary breast tumor board comprising at least two breast surgeons and one radiologist. Within this framework, the treating surgeon discussed both options with the patient, and the final surgical procedure reflected the patient's informed preference between the two oncologically equivalent options rather than a clinical restriction or a board recommendation for one specific procedure.

### 2.4. Exclusion criteria

Patients with any of the following characteristics

were excluded from the study:

- Male breast cancer,
- Stage IV disease or the presence of distant metastases,
- Locally advanced inflammatory breast cancer,
- Prophylactic bilateral mastectomy due to BRCA1/BRCA2 or other high-penetrance hereditary mutations,
- A history of prior ipsilateral breast surgery or breast radiation therapy,
- Cases deemed unsuitable for breast-conserving surgery following neoadjuvant therapy,
- Patients unable to reliably complete questionnaires due to psychiatric illness or cognitive impairment,
- Patients with incomplete clinical data or missing scale forms.

## 2.5. Data collection

Demographic and clinical data, including age, education level, marital status, and the surgical method performed, were recorded. Health literacy was assessed using the Turkish HLS-EU-Q6, a six-item instrument scored from 1 (very difficult) to 4 (very easy), with higher mean scores indicating higher health literacy [13]. Decisional conflict was assessed with the Turkish-adapted SURE test and the 16-item Decisional Conflict Scale (DCS) [14]. On the SURE test, each “yes” response scores 1 and each “no” response scores 0; total scores range from 0 to 4, and a score  $< 4$  screens positive for decisional conflict. In contrast, the DCS is transformed to a 0–100 scale, with higher scores indicating greater decisional conflict; scores  $> 37.5$  have been associated with clinically relevant decisional conflict. Body-image perceptions were assessed using the satisfaction and anxiety dimensions of the Turkish-validated body-image instrument used in the study [15]. All scales were administered to patients prior to surgical treatment, after the decision to undergo surgery had been finalized. Because assessment occurred after the surgical decision was already made, the scale scores reflect the psychological state of patients who had already chosen a given procedure; the study design therefore allows evaluation of associations between surgical group and these variables, but does not permit inference that these factors caused or determined the surgical choice, and reverse causality (e.g., the surgical decision itself shaping subsequent decisional-conflict or body-image responses) cannot be excluded.

## 2.6. Statistical analyses

Statistical analyses were performed using IBM SPSS Statistics 27.0 (IBM Corp., Armonk, NY, USA). The distribution of continuous variables was assessed using the Shapiro-Wilk test. Variables that did not follow a normal distribution were presented as the median and interquartile range (IQR), while categorical variables were presented as counts and percentages.

The Mann-Whitney  $U$  test was used to compare two independent groups, while the Pearson chi-square test or Fisher’s exact test was used for categorical variables. Multivariable logistic regression analysis was performed to identify factors associated with decisional conflict, and the results were reported as adjusted odds ratios

(OR) with 95% confidence intervals (CI). Because the surgical-group variable showed complete/quasi-complete separation with respect to decisional conflict, conventional maximum-likelihood logistic regression coefficients for this variable could not be reliably estimated; this limitation, and the resulting instability of the wider model, is addressed in the Discussion and Limitations. No a priori sample size or power calculation was performed for this study; statistical significance was set at a two-tailed  $p < 0.05$ .

## 3. Results

When the demographic characteristics of the patients participating in the study were examined, the median age was 51.00 (IQR: 41.25–61.00) in the mastectomy group, and 48.00 (IQR: 43.25–56.75) years in the breast-conserving surgery (BCS) group; no statistically significant difference was found between the two groups ( $p = 0.524$ ). The distributions of marital status ( $p = 0.671$ ) and educational levels ( $p = 0.056$ ) were similar between the groups. The health literacy score (HLS-EU-Q6) was statistically significantly higher in the mastectomy group (Median: 3.52) compared to the BCS group (Median: 2.36) ( $p < 0.001$ ). Basic patient characteristics are shown in Table 1.

Significant statistical differences were found between the surgical methods performed on patients and the body image and decision conflict parameters. Body Image: Satisfaction scores were significantly higher in the BCS group (Median 3.50 vs. 2.00,  $p < 0.001$ ), while Body Image: Anxiety scores were higher in the mastectomy group (Median 4.00 vs. 2.00,  $p < 0.001$ ).

When decision conflict was assessed, SURE scores were statistically significantly higher in the mastectomy group (Median: 4.00) compared to the BCS group (Median: 2.00) ( $p < 0.001$ ). In contrast, patients’ total DCS scores were found to be significantly higher in the BCS group (Median: 47.65) compared to the mastectomy group (Median: 14.66) ( $p < 0.001$ ). While the proportion of patients experiencing “Decisional Conflict” at the clinical level (using the  $\geq 37.5$  DCS threshold defined in Methods) was 13.3% ( $n = 4$ ) in the mastectomy group, decisional conflict was present in all patients (100.0%,  $n = 30$ ) in the BCS group ( $p < 0.001$ ). This complete separation between groups is an unusually large effect; data entry, scale scoring (including reverse-coded items), and the applied cutoff were rechecked, and the result is presented as observed.

A multivariable logistic regression model was constructed to explore factors associated with the presence of decisional conflict (“Decisional Conflict = Present”). Because 100% of patients in the BCS group had decisional conflict, the surgical-group variable produced complete/quasi-complete separation, making the resulting coefficients, odds ratios, and confidence intervals for that variable unstable and uninterpretable; this instability also affects the precision of the other coefficients estimated within the same model. Within this constrained model, Age (OR = 1.06, 95% CI: 0.98–1.15,  $p = 0.103$ ) and Health Literacy (OR = 0.36, 95% CI: 0.01–9.97,  $p = 0.551$ ) did not reach statistical significance, but given the sepa-

ration problem and the small sample size, this finding should be regarded as preliminary; a penalized-likelihood approach (e.g., Firth logistic regression) or a de-

scriptive/univariable-only analysis would be more appropriate and is recommended before this result is relied upon. The findings are summarized in Table 2.

**Table 1.** Demographic and clinical characteristics of patients by surgical group.

| Variables                                 | Total mastectomy ( <i>n</i> = 30) | Breast-conserving surgery ( <i>n</i> = 30) | <i>p</i> -value      |
|-------------------------------------------|-----------------------------------|--------------------------------------------|----------------------|
| Age (years), median (IQR)                 | 51.00 (41.25–61.00)               | 48.00 (43.25–56.75)                        | 0.524 <sup>a</sup>   |
| Educational status, <i>n</i> (%)          |                                   |                                            | 0.056 <sup>b</sup>   |
| - Elementary school and below             | 7 (23.3)                          | 16 (53.3)                                  |                      |
| - Middle school / high school             | 9 (30.0)                          | 5 (16.7)                                   |                      |
| - College and above                       | 14 (46.7)                         | 9 (30.0)                                   |                      |
| Marital status, <i>n</i> (%)              |                                   |                                            | 0.671 <sup>b</sup>   |
| - Married                                 | 26 (86.7)                         | 28 (93.3)                                  |                      |
| - Single / widowed / divorced             | 4 (13.3)                          | 2 (6.7)                                    |                      |
| Health literacy (HLS-EU-Q6), median (IQR) | 3.52 (3.35–3.90)                  | 2.36 (1.99–2.69)                           | < 0.001 <sup>a</sup> |
| Body image: satisfaction, median (IQR)    | 2.00 (1.00–2.00)                  | 3.50 (3.00–4.00)                           | < 0.001 <sup>a</sup> |
| Body image: anxiety, median (IQR)         | 4.00 (4.00–5.00)                  | 2.00 (2.00–2.00)                           | < 0.001 <sup>a</sup> |
| SURE score (IQR)                          | 4.00 (4.00–4.00)                  | 2.00 (2.00–2.75)                           | < 0.001 <sup>a</sup> |
| Total DCS, median (IQR)                   | 14.66 (10.06–24.84)               | 47.65 (42.21–51.20)                        | < 0.001 <sup>a</sup> |
| - Information-value clarity               | 25.00 (1.04–41.67)                | 8.33 (0.00–31.25)                          | 0.110 <sup>a</sup>   |
| - Support                                 | 0.00 (0.00–31.25)                 | 0.00 (0.00–25.00)                          | 0.955                |
| - Uncertainty                             | 0.00 (0.00–18.75)                 | 0.00 (0.00–37.50)                          | 0.216 <sup>a</sup>   |
| - Effective decision making               | 22.50 (15.00–35.00)               | 20.00 (10.00–33.75)                        | 0.887 <sup>a</sup>   |
| Decision conflict situation, <i>n</i> (%) |                                   |                                            | < 0.001 <sup>b</sup> |
| - No decision conflict                    | 26 (86.7)                         | 0 (0.0)                                    |                      |
| - Decision conflict present               | 4 (13.3)                          | 30 (100.0)                                 |                      |

Note: IQR: interquartile range (25th–75th percentile). Statistical significance: *p* < 0.05.

<sup>a</sup> Mann–Whitney *U* test; <sup>b</sup> chi-square / Fisher’s exact test.

**Table 2.** Multivariable logistic regression analysis of factors predicting the presence of decision conflict.

| Independent variables                | Adjusted OR (odds ratio) | 95% confidence interval (CI) | <i>p</i> -value |
|--------------------------------------|--------------------------|------------------------------|-----------------|
| Surgical group (BCS vs. mastectomy)* | –                        | –                            | –               |
| Age (years; continuous variable)     | 1.06                     | 0.98 – 1.15                  | 0.103           |
| Health literacy score                | 0.36                     | 0.01 – 9.97                  | 0.551           |

\*Note: As all 30 patients (100%) in the BCS group had decisional conflict (DCS > 37.5), the surgical group variable produced quasi-complete separation in the logistic regression model. Because this resulted in inflated and unstable estimates, the OR, 95% CI, and *p* value for this variable were not reported (–). *p* < 0.05 was considered statistically significant.

#### 4. Discussion

In this study, the relationship between surgical group (mastectomy vs. breast-conserving surgery) and health literacy, decisional conflict, and body image was evaluated in breast cancer patients eligible for breast-conserving surgery (BCS). The most notable finding of the study is that surgical group was associated not only with clinical characteristics but also with cognitive and psychosocial factors. Because health literacy, decisional conflict, and body image were all measured after the surgical decision had already been made, these associations cannot be interpreted as evidence that such factors influenced or predicted the decision; a measurement obtained after an outcome has occurred cannot function as

a predictor of that outcome. While the level of health literacy was found to be significantly higher in the mastectomy group compared to the BCS group (3.52 vs 2.36; *p* < 0.001), body image satisfaction was higher and body image-related anxiety was lower in the BCS group (*p* < 0.001). These findings suggest that treatment decisions in early-stage breast cancer cannot be explained solely by “having the right information,” but are also closely related to how patients interpret this information and perceive risks.

One of the notable findings in our study is that the level of health literacy was higher in the mastectomy group. At first glance, this result contradicts the expectation that as health literacy increases, patients would tend to opt for more conservative treatments. One possible

explanation is that while health literacy enables individuals to access information, it may also lead to a greater information load and an increased perception of risk. In particular, easy access to the internet, social media, and patient experiences might lead patients to perceive the likelihood of recurrence as higher than it actually is and to view more radical treatments as “safer.” However, as information load, perceived risk, and the interpretation of information were not measured in the present study, these explanations should be regarded as hypotheses to be tested in future research. Therefore, our findings suggest that high health literacy does not always translate into a preference for breast-conserving surgery, and that how information is interpreted may be at least as important as the level of knowledge itself [1].

Findings supporting this view are also present in the literature. In a prospective study by Li and colleagues involving 1,136 patients with early-stage breast cancer, the rate of breast-conserving surgery was found to be only 19.9%; the study showed that a strong recommendation from the surgeon increased the likelihood of breast-conserving surgery by 12.38 times, while high trust in the surgeon increased it by 2.94 times [3]. Similarly, Ephraim et al. reported that the proportion of patients who initially preferred breast-conserving surgery was 15.5%, but this proportion rose to 89.3% following structured counseling. The same study showed that the primary reason cited by 90% of patients who continued to prefer mastectomy was fear of recurrence [16]. When these studies are evaluated together, it becomes clear that the surgical decision is shaped not so much by the level of information as by how that information is perceived by the patient and the quality of patient-physician communication.

Our findings regarding decision conflict also support this approach. Patients diagnosed with breast cancer are forced to choose between two different surgical options with similar survival outcomes. The uncertainty experienced during this process can affect not only treatment selection but also long-term psychological adjustment and quality of life. The fact that our study found significant differences in decision conflict scales between the two surgical groups indicates that the surgical decision-making process imposes a significant psychological burden on patients. However, it is difficult to say that decision conflict stems solely from a lack of information. Patients’ personal values, family influence, concerns about cancer recurrence, and expectations regarding body image are also important components of this process.

This observation is also supported by the current literature. In a multicenter study by Zhuang et al. covering the survival outcomes of 448 breast cancer patients, 79% of the patients underwent mastectomy, while only 21% underwent breast-conserving surgery. It was demonstrated that decision conflict ( $p = 0.015$ – $0.028$ ) and decision regret ( $p = 0.013$ ;  $p < 0.001$ ) were significantly higher in patients who underwent mastectomy compared to the BCS group, and that there was a moderate negative correlation between decision conflict and quality of life ( $r = -0.430$ ) [17]. In contrast, a randomized controlled trial by Lin et al. involving 151 patients reported that patient decision-aid tools alone did not reduce decision conflict [18]. These findings suggest that

decision conflict cannot be resolved through information alone; rather, effective communication, a shared decision-making approach, and consideration of individual psychosocial needs are more critical. The findings of our study also support this view, demonstrating that patient-centered counseling should be an integral part of the standard preoperative evaluation in breast cancer surgery.

Another important finding of our study is that body image satisfaction was significantly higher, and body image-related anxiety was markedly lower, in patients who had chosen breast-conserving surgery compared with those who had chosen mastectomy ( $p < 0.001$ ). Because these scales were administered before surgery, this finding reflects preoperative differences in body-image perceptions and expectations between the two groups rather than a postoperative effect of either procedure; the study did not measure how body image actually changed after surgery. It is plausible that anticipated body-image concerns preceded and were associated with the surgical choice, or alternatively that patients with more favorable baseline body-image perceptions were more inclined toward breast-conserving surgery; the cross-sectional, preoperative design cannot distinguish between these possibilities. Postoperative studies in the literature, discussed below, provide contextual support for the general association between mastectomy and body-image concerns, but they should not be read as directly confirming the present, preoperative findings.

Our preoperative findings are broadly in line with the direction reported in postoperative literature, although the two are not directly comparable given the difference in assessment timing. In a case-matched study by Kelsall et al. involving 567 patients, body image scores after surgery were significantly better in patients who underwent oncoplastic BCS compared with those who underwent mastectomy and simultaneous reconstruction ( $p = 0.002$ ) [19]. Similarly, Latifee and colleagues identified impaired body image in 66% of 159 patients evaluated after mastectomy, an impairment strongly associated with a diminished sense of attractiveness, avoidance of looking in the mirror, and changes in intimate relationships ( $p < 0.001$ ) [10]. Taken together, these postoperative studies and our preoperative findings raise the hypothesis that breast-conserving surgery may be associated with more favorable body-image outcomes across the treatment course, but confirming this would require a longitudinal design that follows the same patients from before to after surgery.

One of the notable aspects of our study is the joint assessment of health literacy, decision conflict, and body image. These three variables are not independent of one another; rather, they are components of an interrelated decision-making process. A patient with high health literacy having access to more information does not necessarily mean they will experience less decision conflict. Similarly, as the importance placed on body image increases, deciding between surgical options can become more complex. Therefore, the surgical decision-making process should not be reduced to mere information transfer; the patient’s anxieties, expectations, and individual values must also be assessed. The findings of our study suggest that incorporating psychosocial counseling into the standard patient assessment in multidisciplinary

nary breast cancer boards may be beneficial. This is consistent with a recent study using the Capability-Opportunity-Motivation-Behavior (COM-B) model, which found that shared decision-making behavior in breast cancer surgery was associated with multiple participatory and psychosocial factors, including participation competence, perceived social support, and self-care self-efficacy, rather than with any single determinant. Notably, according to the published correction of that study, perceived social support was not uniformly protective and was associated with greater decisional hesitation in one patient subgroup, possibly owing to family and social considerations [20]. These findings support the joint assessment approach used in the present study.

This approach is also supported by the current literature. Li and colleagues demonstrated that high trust in the surgeon increased the likelihood of breast-conserving surgery by approximately 3-fold, while a strong recommendation from the surgeon increased it by 12-fold [3]. Similarly, Ephraim et al. reported that the preference rate for breast-conserving surgery rose from 15.5% to 89.3% following repeated counseling sessions [16]. These results suggest that patient education is not merely about providing information; rather, effective communication and a shared decision-making approach appear to be important components of surgical preference in the cited literature. Our cross-sectional findings are consistent with this broader picture, though our data cannot themselves demonstrate that patient-centered counseling reduces mastectomy rates; this remains a hypothesis for future interventional research rather than a conclusion of the present study.

This study has several important limitations. First, it was conducted at a single center and included only 60 patients, which limits statistical power and generalizability; the small sample size, combined with the complete separation observed for the surgical-group variable, also limits how many variables can reasonably be included in a multivariable model, and the reported multivariable results should be regarded as preliminary (see Methods and Results). Second, because of the cross-sectional design and because all scales were administered after the surgical decision had already been finalized, the study cannot establish causal or temporal relationships among the variables; the findings represent associations between surgical group and health literacy, decisional conflict, and body image, and reverse causality cannot be excluded. Third, several clinically and psychosocially relevant confounders were not collected and could not be adjusted for, including tumor size and stage, tumor-to-breast volume ratio, genetic risk, access to radiotherapy, reconstruction preferences, socioeconomic status, fear of recurrence, anxiety, depression, family influence, and the surgeon's specific recommendation for each patient; because these factors may independently affect both surgical choice and psychosocial outcomes, their absence limits how confidently the observed group differences can be attributed to health literacy, decisional conflict, or body image alone. Fourth, this study did not assess information overload, internet or social media exposure, recurrence-risk perception, patient satisfaction, decision regret, postoperative quality of life, or the effect of any shared decision-making intervention; any statements

regarding these constructs in this manuscript should be read as hypotheses for future research rather than as conclusions supported by the present data. Nevertheless, the study's strongest aspect is its joint, preoperative examination of health literacy, decisional conflict, and body image within the same cohort, which can inform the design of future longitudinal studies.

## 5. Conclusions

In conclusion, in this cohort of patients eligible for BCS, health literacy, decisional conflict, and body image differed significantly between patients who underwent mastectomy and those who underwent breast-conserving surgery. Because these variables were assessed after the surgical decision had already been made, these findings should be interpreted as associations rather than evidence that these factors determined or caused the surgical choice. Systematically evaluating health literacy, decisional conflict, and body image earlier in the decision-making process—before the surgical decision is finalized—may be a valuable focus for shared decision-making interventions, and whether doing so improves patient satisfaction or reduces potentially avoidable mastectomies remains an open question for future research. Larger, multicenter, prospective, longitudinal studies that assess these factors before the surgical decision is made, account for the clinical and psychosocial confounders noted above, and use regression methods appropriate for small or separated samples (e.g., Firth penalized logistic regression) are needed to clarify the role of these factors in patient-centered surgical decision-making.

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### Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this manuscript.

### Data Availability

The datasets generated and/or analyzed during the current study are not publicly available but are available from the corresponding author upon reasonable request.

### AI Assistance

During the preparation of this manuscript, ChatGPT was used exclusively for language editing and stylistic refinement. The authors take full responsibility for the content, interpretation, and conclusions of the published article.

### Ethics Approval and Consent to Participate

The study was conducted at the Breast Surgery Unit of the Department of General Surgery, Faculty of Medicine, Atatürk University. This study was approved by the Atatürk University Faculty of Medicine Clinical Research Ethics Committee (Date: 06.02.2026, Number:5/48). All procedures were conducted in accordance with relevant guidelines and regulations.

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### Author Contributions

**İdeal Beraa Yilmaz Kartal:** conceptualization, data curation, formal analysis, investigation, methodology, project administration, resources, supervision, validation, visualization, writing – original draft, writing – review and editing.

**Furkan Şakiroğlu:** investigation, methodology, writing – original draft, writing – review and editing.

**Mehmet Akif Nas:** conceptualization, data curation, formal analysis, investigation, methodology.

**Furkan Bingöl:** conceptualization, data curation, formal analysis, investigation, methodology.

**Murat Kartal:** validation, visualization, writing – original draft, writing – review and editing.

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