

## ORIGINAL ARTICLE

# Psychosocial and sexual well-being in breast cancer survivors undergoing immediate breast reconstruction: The mediating role of breast satisfaction

Paloma Gil-Olarte<sup>1,2,3</sup>  | M. Angeles Gil-Olarte<sup>4</sup> | Rocío Gómez-Molinero<sup>1,2,3</sup>  | Rocío Guil<sup>1,2,3</sup> 

<sup>1</sup>Department of Psychology, University of Cádiz, Cádiz, Spain

<sup>2</sup>Institute of Biomedical Research and Innovation of Cádiz (INIBICA), Cádiz, Spain

<sup>3</sup>University Institute for Sustainable Social Development of the University of Cádiz (INDESS), Cádiz, Spain

<sup>4</sup>Virgen Macarena University Hospital, Seville, Spain

## Correspondence

Paloma Gil-Olarte, Department of Psychology, University of Cádiz, Cádiz, Spain.

Email: [paloma.gilolarte@uca.es](mailto:paloma.gilolarte@uca.es)

M. Ángeles Gil-Olarte, Virgen Macarena University Hospital, Seville, Spain.

Email: [gil\\_angeles@hotmail.com](mailto:gil_angeles@hotmail.com)

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## Abstract

**Objective:** This study aimed to explore (1) the levels of quality of life (psychosocial, physical and sexual well-being) and breast satisfaction in breast cancer patients (BCP) after immediate reconstruction (IR), considering surgery reason and surgical technique, and (2) the explanatory and predictive capacity of psychosocial well-being on breast satisfaction, and of both on sexual well-being.

**Methods:** This prospective study included 36 BCP who underwent IR between June 2006 and December 2014.

**Results:** Highest levels of quality of life were found in psychosocial well-being and sexual well-being, with no statistically significant differences by surgery reason or surgical technique in any quality of life indicator or breast satisfaction. Psychosocial, physical well-being and breast satisfaction explained 56.16% of the variance in sexual well-being, where 44.67% was attributed to psychosocial well-being. In addition, breast satisfaction statistically significantly mediated the relationship between psychosocial and sexual well-being, independently of physical well-being.

**Conclusion:** Our findings highlight the importance of IR in reducing psychological morbidity and preserving the quality of life and breast satisfaction. Furthermore, this research indicated that psychosocial well-being should be considered a useful personal resource for improving the sexual well-being of BCP undergoing IR both through its direct effect and the mediated effect of breast satisfaction.

## KEYWORDS

breast cancer, immediate breast reconstruction, mediation analysis, psychosocial well-being, quality of life, sexual well-being

## 1 | INTRODUCTION

In Spain, breast neoplasia is the most frequently diagnosed cancer in women (SEOM, 2020), estimating that one in eight women suffer breast cancer in their lifetime (WHO, 2020), representing a major

public health problem (Yazdani-Charati et al., 2019). Despite this, mortality from the disease has decreased considerably in recent decades thanks to preventive programmes, early diagnosis campaigns and therapeutic advances. The 5-year net survival rate for women was 86% (de Munck et al., 2018; SEOM, 2020). In this sense, the interest in

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understanding and mitigating the impact of the diagnosis and treatments administered on the quality of life of women with breast cancer is growing and is becoming a priority (García-Solbas et al., 2021; Liu et al., 2018).

At present, the treatment of breast cancer is multidisciplinary, based on its different modalities according to tumour type, size, stage and grade, molecular profile, genetic predisposition and patient preferences. Despite improvements in preventive and diagnostic services, as well as advances in treatments, in most cases, curative intent requires breast surgery (conservative or mastectomy) with or without radiotherapy and/or systemic treatment (chemotherapy, immunotherapy and hormone therapy) (American Society of Clinical Oncology, 2019; Eltahir et al., 2020; Turrión Sanz et al., 2000).

Thus, breast cancer and the methods associated with its treatment have a very significant impact, not only on patients' health but also on their psychological and sexual environment, as well as their attitude toward their bodies (Lachowicz et al., 2021). Changes in sexual well-being can be one of the most disruptive aspects of life after breast cancer, remaining significant impacts for many years after treatment (Oberuggenberger et al., 2018; Ussher et al., 2012).

As noted by the World Health Organization and the World Health Organization Quality of Life Group (WHOQOL, 1995), sexual well-being is part of people's quality of life. Furthermore, it is widely recognised that mastectomy is the surgical procedure with the greatest impact on body image and sexuality and that these effects can be alleviated by immediate reconstruction (Martins et al., 2021; van de Griff et al., 2020). Therefore, the study of post-surgical sexuality and breast well-being is relevant to health care planning, both for professionals and for public health policy (Martins et al., 2021). However, little attention has been paid to the sexual well-being of breast cancer survivors (Cruz et al., 2018; Salakari et al., 2020).

Due to the increasing number of breast cancer survivors, as well as the psychological impact caused by mastectomy, breast reconstruction has been proposed as a necessary part of the overall treatment of patients to preserve their quality of life (García-Solbas et al., 2021). In this regard, the demand for reconstructive breast surgery has increased considerably in recent years, encouraging the development of new oncoplastic and reconstructive techniques (Pirro et al., 2017). The reconstructive process can begin at the same time as the breast is removed (immediate reconstruction - IR) if it does not interfere with the administration of adjuvant treatment or sometime later (delayed reconstruction - DR). The most commonly used IR techniques are direct placement of the definitive prosthesis (if there is sufficient skin and muscle), use of expander prostheses (implant with an outer silicone chamber and an inner chamber that allows filling through a valve) or those known as two-stage reconstruction (placement of a tissue expander that is gradually filled and subsequent replacement, after adjuvant treatments, with a definitive prosthesis) (Acea Nebriil, 2018).

In this regard, breast surgery professional groups, such as the Spanish Association of Breast Surgeons, and specialised associations, such as the Spanish Association Against Cancer, recommend IR whenever possible. Although age, patient health conditions, comorbidities,

previous surgeries and other neoadjuvant treatments influence the surgical method of choice (Schmauss et al., 2016), IR is a relatively safe procedure that aims to restore breast appearance, allowing for superior aesthetic results, reducing the number of interventions and facilitating women's psychological recovery (Eltahir et al., 2013).

In this line, we found studies emphasising the benefits on body satisfaction and sexuality after breast reconstruction (Eltahir et al., 2013; Hart et al., 2015; Martins et al., 2021; van de Griff et al., 2020) and on perceived femininity and attractiveness (Lee & Shekter, 2018; Schmidt et al., 2017).

More precisely, some studies indicate that IR improves patients' quality of life (Fanakidou et al., 2018; Fontes et al., 2019), increasing both their levels of confidence and satisfaction (Paterson et al., 2016; Sinaei et al., 2017), reducing both short- and long-term psychosocial morbidities (Atisha et al., 2008; Heneghan et al., 2011) and improving sexuality (Teo et al., 2016; Yoon et al., 2018; Zhong et al., 2016). Specifically, recent studies with patients assessed with the BREAST-Q quality of life questionnaire agreed that women with IR, compared to non-reconstructed women, show higher levels of psychosocial well-being, breast satisfaction and sexual well-being (Beugels et al., 2018; Howes et al., 2016; van Bommel et al., 2020), as well as lower depressive symptoms and better levels of body image, also resulting in higher sexual function (Archangelo et al., 2019).

Finally, other studies confirm that, in general, breast cancer patients undergoing IR have a higher level of quality of life than mastectomised patients but experience more associated physical difficulties and report more physical distress (Fanakidou et al., 2018). In this regard, results regarding the impact of surgery on physical well-being are contradictory. In the study by van Bommel et al. (2020), IR women had significantly higher physical well-being scores than non-IR patients, while according to Beugels et al. (2018), physical well-being levels were lower. Concerning the age of women, Song et al. (2016), after evaluating 1809 reconstructed patients, found that older women had significantly higher breast satisfaction scores. Similarly, Paterson et al. (2016) indicate, in their systematic review, that body image, sexuality and breast satisfaction are a complex concern after treatment for breast cancer survivors, particularly younger women.

Regarding the type of technique used in breast reconstruction, Meshulam-Derazon et al. (2018) and Seth et al. (2021) concluded that there are no significant differences in levels of quality of life between women who underwent one-stage and two-stage breast reconstruction, except for satisfaction with information. However, Meshulam-Derazon et al. (2018) report higher scores in sexual well-being in women with more background diseases; higher levels of psychosocial well-being in married women; lower values in breast satisfaction in women treated with radiation and higher values among patients with bilateral reconstruction, with the latter subgroup also showing higher physical well-being. In the study by Negenborn et al. (2018), the authors demonstrated that single-stage IR with acellular dermal matrices was not associated with higher health-related quality of life or patient satisfaction compared to conventional two-stage expander or implant-based IR. In addition, patient-reported cosmetic outcomes were similar between the groups. Caputo et al. (2021) revealed no

significant differences in quality of life scores between patients who had undergone immediate replacement with prosthesis and acellular dermal matrix versus the two-stage submuscular approach. Thus, Qureshi et al. (2017) found no significant differences in all BREAST-Q domains between patients who underwent one-stage breast reconstruction and those who underwent two-stage implant reconstruction using tissue expanders. Finally, Srinivasa et al. (2017) found no significant differences in the quality of life of patients in both the direct implant and tissue expander groups, except in sexual well-being, where the direct implant group performed better.

Focusing on sexual satisfaction, previous studies have shown its association with individual variables such as psychological and physical health status. Thus, a higher level of psychological well-being is associated with greater sexual satisfaction (del Mar Sánchez-Fuentes et al., 2014; Dundon & Rellini, 2010).

In samples of cancer survivors, empirical evidence has reported that certain psychosocial factors are also predictive of satisfaction with breast appearance after IR. In this sense, Matthews et al. (2017) demonstrated in a study with 148 women that psychosocial well-being was a key predictor of breast satisfaction and overall outcome after IR. More recently, other studies have reported that psychosocial well-being explains 46% of sexual satisfaction and well-being in 88 breast cancer patients after IR (van de Grift et al., 2020).

Due to the importance of promoting the development of satisfactory sex life in breast cancer survivors, as well as the evidence on the positive impact of surgical interventions (both the reason for surgery and the surgical technique used) on psychosocial, physical and sexual well-being and satisfaction with the breast in mastectomised women undergoing reconstructive surgery, as well as the possible association between psychosocial well-being, satisfaction with the breast and sexual well-being, in this study, we propose the following aims:

1. to explore the levels of quality of life (psychosocial, sexual and physical well-being) and breast satisfaction of women undergoing immediate breast reconstruction surgery, as well as the possible relationship between psychosocial well-being, physical well-being and breast satisfaction concerning sexual well-being;
2. to examine the possible differences in quality of life (psychosocial, sexual and physical well-being) and satisfaction with the breast according to the reason for surgery (initial indication for mastectomy or as an enlargement of margins after conservative surgery) and the surgical technique used (definitive, prosthesis, expander prosthesis or two-stage reconstruction); and
3. to test the possible explanatory and predictive power of psychosocial well-being on breast satisfaction, and of both on sexual well-being, and to explore the process by which this influence is produced and controlling the effect of physical well-being.

More specifically, in this research, we propose three fundamental hypotheses.

**H1.** Women with IR will have adequate levels of quality of life (psychosocial, sexual and physical well-being) and

breast satisfaction, showing a positive relationship between psychosocial well-being, physical well-being, breast satisfaction and sexual well-being.

**H2.** Women in IR will have no statistically significant differences in quality of life (psychosocial, sexual and physical well-being) and satisfaction with the breast, considering the reason for surgery and the surgical technique used.

**H3.** Psychosocial well-being will predict breast satisfaction, with both influencing on sexual well-being of women undergoing breast reconstruction independently of physical well-being.

We consider that the results found will allow us to obtain empirical evidence on the relevance of designing and implementing psychological interventions to contribute to the improvement of psychosocial well-being, and by extensión, of satisfaction with the breast and sexual well-being, independently of physical well-being. It will also facilitate decision-making when choosing a surgery reason and surgical technique and, finally, will contribute to the development of psycho-oncology.

## 2 | MATERIALS AND METHODS

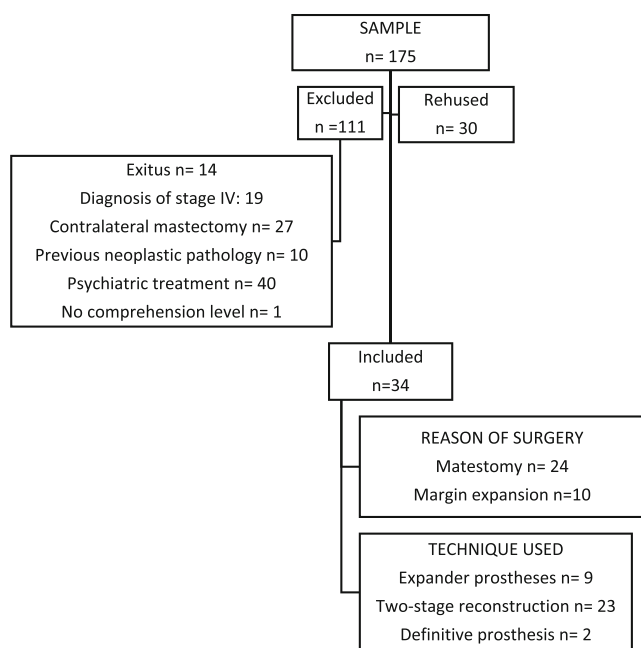
### 2.1 | Sample and procedure

During the study period, 175 women diagnosed with breast cancer underwent IR at the Oncoplastic Surgery Unit of the Hospital of Spain from June 2006 to December 2014. Of the sample, 30 women refused to participate in the study, and 111 women were excluded due to death or non-compliance with the inclusion/exclusion criteria. Specifically, 14 women died, 19 were diagnosed as stage IV, 27 had a history of contralateral mastectomy, 10 had a history of previous neoplastic pathology, 40 were under psychiatric/psychological treatment in recent years and 1 woman had reading and comprehension deficits (Figure 1).

Thus, the final sample was composed of 34 women with a mean age of 54.38 years (SD = 8.10; minimum = 40; maximum = 78) who received a telephone survey comprising all scales and variables included in the study. Informed consent was obtained from all individual participants included in the study.

A database of all reconstructed patients in the hospital has been made for this study. Clinical variables have been determined through the review of the patients' medical histories. After this review, a telephone survey was conducted on each of the patients to determine her current age and administer the BREAST-Q questionnaire.

Regarding the reason for the surgery, 24 women were directly subjected to mastectomy (70.6%) and 10 to margin expansion after conservative surgery (29.4%). Regarding the technique used, 9 had undergone implantation of expander prostheses (26.5%), 23 had a



**FIGURE 1** Flow chart illustrating patient selection.

two-stage reconstruction (67.6%) and 2 had definitive prosthesis implantation (5.6%).

The inclusion criteria were (1) being a woman over 18 years of age; (2) having undergone RI regardless of the reconstructive technique; (3) having a diagnosis of stage I, II, or III of BC and (4) being in a disease-free interval without a cancer recurrence or metastasis having been diagnosed after the intervention. The exclusion criteria were (1) having a history of previous neoplastic pathology; (2) having undergone a mastectomy, breast reconstruction due to previous breast cancer or having a history of contralateral mastectomy; (3) not having a level of understanding that would allow the completion of the different scales used; (4) having been in psychiatric or psychological treatment in the last 10 years, except for Lorazepam; (5) being on psychoactive medication at the time of the interview and (6) presenting no serious or disabling pathology at the time of the evaluation.

## 2.2 | Measures and instruments

Quality of life was evaluated through the BREAST-Q questionnaire (Pusic et al., 2009), a self-report instrument that assesses the quality of life related to the health and satisfaction of patients who have undergone breast surgery. This scale is composed of two blocks: (1) patient satisfaction (including breast, final result and health-care satisfaction) and (2) health-related quality of life (composed of physical, psychosocial and sexual well-being). Due to the objective of this study, only the quality of life domain and the breast satisfaction dimension were administered. The responses were collected through a 4-point Likert-type questionnaire where 1 is *very dissatisfied* and 4 is *very satisfied*. For its interpretation, the items were added and transformed into a scale from 0 to 100, with higher values representing a

more favourable result. The psychometric evaluation of the scale has shown high levels of consistency and internal test-retest reliability (Cronbach's alpha: 0.96; intraclass correlation coefficient, 0.96).

Clinical variables were obtained from the clinical history of the patients, including surgery reason (mastectomy or margin expansion), age at the time of surgery and at the evaluation time, and surgical technique (definitive prosthesis, expander prosthesis or reconstruction in two stages).

## 2.3 | Statistical analysis

The statistical analysis of the data was completed using the IBM SPSS Statistics version 20 program.

Descriptive statistical analyses were performed to explore the levels of quality of life (psychosocial, sexual and physical well-being) and breast satisfaction of women undergoing immediate breast reconstruction surgery. Pearson's correlation was used to determine the relationship between psychosocial well-being, physical well-being and breast satisfaction concerning sexual well-being. A correlation coefficient between 0.10 and 0.30 is usually considered a small effect size, between 0.30 and 0.50 is considered a medium effect size, and if it is greater than 0.50 a large effect size (Rosenthal, 1991).

Besides, we performed analyses of variance (ANOVA) to know if there were statistically significant differences in the levels of the dimensions of quality of life and breast satisfaction depending on the surgery reason and the surgical technique used. To explore the influence of psychosocial well-being on breast satisfaction, and both on sexual well-being in our sample, SPSS macro PROCESS model 4 (Hayes, 2017) was used, including psychosocial well-being as an independent variable, sexual well-being as a dependent variable, breast satisfaction as a mediating variable and physical well-being as a covariate. This analysis runs a bootstrapping (5000 samples) to test the significance of the indirect effect by calculating 95% confidence intervals. Mediation effect size was calculated using the package 'MBESS' of R software. Particularly, we assessed  $\kappa^2$ , interpreted as the proportion of the maximum possible indirect effect that could have occurred (Preacher & Kelley, 2011).

## 3 | RESULTS

Descriptive statistics, Pearson's correlations and reliability coefficients of all the variables assessed were performed to answer our first two objectives and confirm our first hypothesis (see Table 1). Concerning the quality of life levels of IR sample women, the highest levels of well-being were found in the psychosocial well-being and sexual well-being, all of them higher than the mean values of the scale. Regarding the variable breast satisfaction and physical well-being, the sample showed slightly lower levels than the mean values provided by the scale. Based on the correlations and the value of the coefficients, our results confirmed our first hypothesis and indicated that patients' sexual well-being is strongly and positively associated with psychosocial

**TABLE 1** Statistical descriptive, Pearson correlations and reliability coefficients for all study variables

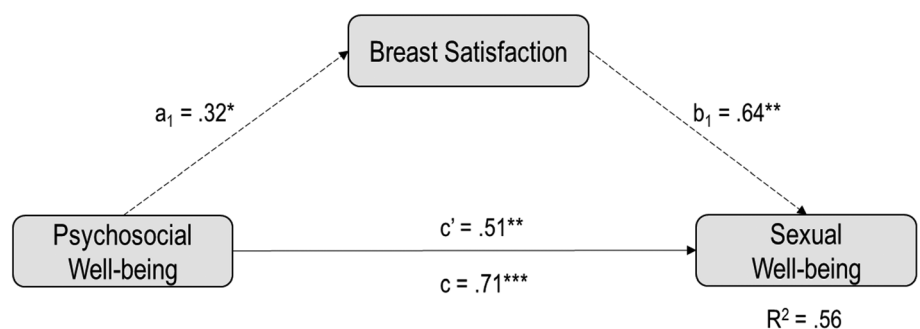
	Range	M	SD	1	2	3	4	5	6	7	8	$\alpha$
S. Technique				-								
S. Reason				-0.13	-							
S. Age	31-69	47.88	7.76	0.27	-15	-						
Current age	40-78	54.39	8.10	0.11	-19	0.96**	-					
SW	0-100	63.06	25.44	0.08	0.09	-0.08	-0.13-	-				0.95
BS	16-85	48.35	15.12	0.25	0.03	-0.15	0.17	0.58**	-			0.94
PSW	33-100	78.71	19.18	0.15	0.22	0.05	-0.04	0.63**	0.42 <sup>†</sup>	-		0.95
PW	33-100	71.38	20.16	-0.05	-18	-17	0.11	0.45**	0.20	0.38 <sup>†</sup>	-	0.95

Abbreviations: S. Technique = surgical technique; S. reason = surgical reason; S. age = age at surgery; SW = sexual well-being; BS = breast satisfaction; PSW = psychosocial well-being; PW = physical well-being.

\* $p < 0.05$ . \*\* $p < 0.001$ .

**FIGURE 2** Simple mediation model.

In this model, breast satisfaction mediates the relationship between psychosocial well-being and sexual well-being.  $a_1$ ,  $b_1$ ,  $c$ , and  $c'$  = non-standardised regression coefficients.  $R^2$  = coefficient of determination. \* $p < 0.05$ . \*\* $p < 0.01$ . \*\*\* $p < 0.001$ .



and physical well-being, as well as breast satisfaction. We also found a strong, statistically significant and positive correlation between psychosocial well-being and breast satisfaction and a moderate one with physical well-being. Finally, physical well-being did not correlate with breast satisfaction. Although it was not the focus of our study, it should be noted that neither current age nor age at surgery correlated with any of the variables assessed.

Concerning our second objective and hypothesis, and in order to test if there were differences between the level of quality of life and breast satisfaction depending on surgery reason and surgical technique, different analyses of variance (ANOVA) were performed. The results of the different ANOVAs showed that there are no statistically significant differences according to the surgery reason or the surgical technique used with sexual well-being [ $F(1, 32) = 0.27$ ;  $p > 0.05$ ;  $F(1, 33) = 0.10$ ;  $p > 0.05$ ], psychosocial [ $F(1, 32) = 1.60$ ;  $p > 0.05$ ;  $F(1, 33) = 1.01$ ;  $p > 0.05$ ], physical [ $F(1, 32) = 1.01$ ;  $p > 0.05$ ;  $F(1, 33) = 0.5$ ;  $p > 0.05$ ] and satisfaction with breasts [ $F(1, 32) = 0.3$ ;  $p > 0.05$ ;  $F(1, 33) = 1.04$ ;  $p > 0.05$ ].

Finally, to verify the possible explanatory and predictive power of psychosocial well-being on breast satisfaction and both on sexual well-being, to explore the process by which this influence occurs, controlling the effect of physical well-being (objective c), and test our third hypothesis, we perform a mediation analysis including psychosocial well-being as an independent variable, sexual well-being as a dependent variable and breast satisfaction as a mediating variable through the macro PROCESS Model 4 (Hayes, 2017). Also, based on

the correlations obtained, physical well-being was included in this model as a covariate. The main direct and mediated effects are included in Figure 2. The results of the mediation analyses allow us to confirm our third hypothesis. Specifically, they showed that psychosocial well-being explained 44.5% ( $R^2 = 0.45$ ) of the variance of sexual well-being, showing a positive and statistically significant influence on it [ $c$ :  $B = 0.71$ ; bootstrap  $SE = 0.19$ ;  $p < 0.001$ ; BootCI 95% (0.32, 1.10)] independently of physical well-being, which was not statistically significant. When breast satisfaction was included as a mediating variable in the model, the explanatory capacity of the whole model increased to 56% ( $R^2 = 0.56$ ), again positively and statistically significant [ $c'$ :  $B = 0.51$ ; bootstrap  $SE = 0.18$ ;  $p < 0.05$ ; BootCI 95% (0.13, 0.90)] and independently of the possible influence of physical well-being.

Regarding the direct effects, we found positive predictive associations of psychosocial well-being on breast satisfaction [ $a$ :  $B = 0.32$ ; BootSE = 0.13;  $p < 0.05$ ; BootCI 95% (0.03, 0.60)] and breast satisfaction on sexual well-being [ $b$ :  $B = 0.64$ ; BootSE = 0.20;  $p < 0.001$ ; BootCI 95% (0.17, 1.09)]. Our results suggest that levels of psychosocial well-being influence breast satisfaction, and in turn, breast satisfaction will determine the sexual well-being of women undergoing IR. Finally, the indirect effect showed a statistically significant positive effect of psychosocial well-being on sexual well-being through the effect of breast satisfaction [ $ab$ :  $B = 0.20$ ; BootSE = 0.13; BootCI 95% (0.02, 0.50)]. Hence, IR women with higher levels of psychosocial well-being will show greater breast satisfaction that, in turn, will lead

to greater sexual well-being, independently of physical well-being. Effect size estimation showed that the proportion of the maximum observed indirect effect that was observed is  $\kappa^2 = 0.15$  with CI BCa (95%) of [0.01–0.29].

## 4 | DISCUSSION

This research aimed to assess the levels of psychosocial, physical, sexual well-being and breast satisfaction of women who underwent IR, to verify the existing relationships between them, to verify possible differences in their evaluations due to the reason for the surgery and the technique used, as well as to verify the possible explanatory and predictive capacity of psychosocial well-being on breast satisfaction, and of both on sexual well-being, exploring the process by which this influence is produced, controlling the effect of physical well-being. Although there is an increasing number of studies focused on assessing the quality of life of cancer survivors (García-Solbas et al., 2021; Liu et al., 2018), this is the first study to assess the mechanism through which breast satisfaction after an IR influences the quality of life and specifically the relationship between psychological and sexual well-being.

Descriptive results of this study indicated that our sample of women presented slightly higher than average levels of psychosocial and sexual well-being. In this sense, our findings seem to highlight the importance of IR preserving and/or increasing levels of quality of life in patients who have undergone a mastectomy after breast cancer (Beugels et al., 2018; Fontes et al., 2019; García-Solbas et al., 2021; Heneghan et al., 2011; Teo et al., 2016; Yoon et al., 2018). Furthermore, these results confirm previous studies indicating that IR has a positive impact on protecting the psychosocial well-being of breast cancer patients, specifically by reducing their psychological stress and increasing their perception of body image and sexual well-being (Zhong et al., 2016). They would also support breast reconstruction as a necessary intervention to restore patients' confidence and maintain psychological well-being (Sinaei et al., 2017).

Our results also revealed that our sample had slightly lower levels of physical well-being and breast satisfaction compared to average levels. These findings would support previous studies indicating that, after reconstruction, patients tend to experience more physical difficulties related to their mobility and performance of activities of daily living (Fanakidou et al., 2018) thus compromising their physical well-being (Beugels et al., 2018). However, because all women in the sample had undergone IR and were not previously assessed, we have no indicators to compare whether breast satisfaction was higher than before IR or whether it would be higher for other women without IR.

On correlation analysis, the results confirmed that psychosocial well-being and breast satisfaction are strongly and positively associated with sexual well-being, not correlating with any of the other variables examined (physical well-being, surgery reason, technique used, current age and age at surgery). In this sense, these results are consistent with studies that highlighted the relationship between psychosocial well-being and breast satisfaction, and sexual well-being

(Matthews et al., 2017; van de Grift et al., 2020). Although age was not a central focus of our study, our findings indicated that breast satisfaction is important for women regardless of their current age and/or surgical age, which would not support the results of previous studies reporting different values according to age range (Paterson et al., 2016; Song et al., 2016).

Our results show no statistically significant differences in the levels of quality of life evaluated according to surgery reason or surgical technique. In this way, our findings are consistent with studies indicating that patients undergoing IR increase their quality of life levels compared to those who have not been reconstructed, regardless of the reason and type of surgery (Beugels et al., 2018; Fanakidou et al., 2018; Howes et al., 2016; van Bommel et al., 2020). Besides, these results are consistent with studies concluding that quality of life scores are similar in groups of women with one-stage and two-stage breast reconstruction (Meshulam-Derazon et al., 2018; Seth et al., 2021); one-stage and two-stage breast reconstruction using tissue expanders (Qureshi et al., 2017); one-stage reconstruction with acellular dermal matrices versus conventional two-stage expander or implant use (Negenborn et al., 2018; Srinivasa et al., 2017); and IR with prosthesis and acellular dermal matrix versus two-stage submuscular approach (Caputo et al., 2021).

However, our results should be interpreted carefully given the small sample size included in this study. Therefore, it would be desirable that women with breast cancer receive sufficient preoperative information to enable them to make shared and informed decisions about IR. It would also be beneficial to inform patients about all available surgical options relevant to their personal characteristics, including their advantages and disadvantages, allowing the patient to make their own informed decision.

The results of the mediation analysis highlighted that both psychosocial well-being and breast satisfaction explained and predicted 56.16% of the variance in patients' sexual well-being after IR, with 44.67% attributed to psychosocial well-being. In addition, we found that patients with higher psychosocial well-being had higher breast satisfaction, with no significant effect of physical well-being in the proposed model. Again, these results are consistent with recent studies reporting psychosocial well-being as a predictor of breast satisfaction and sexual well-being (Matthews et al., 2017; van de Grift et al., 2020). Finally, our findings pointed to the mediating role of breast satisfaction, showing that sample women with higher levels of psychosocial well-being report higher levels of breast satisfaction, leading to better sexual well-being (del Mar Sánchez-Fuentes et al., 2014; Dundon & Rellini, 2010). Although we have not found studies exploring the relationships presented, these findings seem to be consistent with studies indicating that, for many women, reconstruction is associated with greater psychological well-being, satisfaction with body image and self-esteem, which certainly appears to strengthen couples' affective and sexual relationships (Archangelo et al., 2019; van de Grift et al., 2020). Thus, we also found studies suggesting breast reconstruction as one of the most important predictors of long-term health and well-being among breast cancer survivors (Atisha et al., 2008).

In summary, this study highlights the importance of IR as a determining factor in the recovery and quality of life of breast cancer patients. Considering its effect on reducing psychological morbidity and increasing the psychosocial and sexual well-being of patients, it emphasises its importance as a priority in the care offered by the Public Health Service in Spain. In addition, because breast cancer is considered a chronic disease with increasing survival rates, it is necessary to design and implement psychological intervention programmes aimed at increasing levels of quality of life, psychosocial well-being, breast satisfaction and sexual well-being (Karsten et al., 2022). Therefore, according to the results of this study, these programmes should focus primarily on increasing levels of psychosocial well-being as, in addition to its inherent interest, it would have a positive effect, directly and mediated through breast satisfaction after IR, on patients' sexual well-being.

This study has some limitations that reduce its ability to generalise the results. Firstly, the cross-sectional nature of this study does not allow us to demonstrate causality of effects, so longitudinal studies are needed to corroborate the results obtained. Secondly, due to the small sample size, these results may not be generalisable to other groups of IR women. However, the effects found in the mediation analysis have been confirmed through the bootstrapping simulation technique and Sobel's test. Moreover, clinical and/or psychosocial variables, such as possible comorbidities and/or postoperative complications, perceived social support, or emotional regulation capacity, which may have influenced the results, have not been evaluated. In future studies, we propose to extend the sample of women undergoing IR and incorporate non-reconstructed mastectomized women, as well as psychosocial variables linked to a better quality of life, in order to design and implement psychological interventions to improve women's well-being.

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## CONFLICTS OF INTEREST

The authors declare that there is no conflicts of interest.

## DATA AVAILABILITY STATEMENT

Research data are not shared.

## ORCID

Paloma Gil-Olarte  <https://orcid.org/0000-0001-7903-7487>

Rocío Gómez-Molinero  <https://orcid.org/0000-0003-3727-8615>

Rocío Guil  <https://orcid.org/0000-0003-4425-2800>

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