

Body Image, Life Satisfaction and Associated Factors Among Swedish Women with Breast Cancer After Mastectomy

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Abstract

Background Women having undergone mastectomy due to breast cancer have experiences which are very much individual and contextual. In order to facilitate efforts to understand the women and improve their quality of life, the aim of this study was to investigate body image, life satisfaction and associated factors among Swedish women with breast cancer after mastectomy.

Methods After mastectomy, four hundred and eighty-one Swedish women with breast cancer were enrolled in a descriptive cross-sectional study. Each participant completed a questionnaire comprising socio-demographic characteristics, sources of information, body image and life satisfaction. Multiple linear regression analyses were used to estimate relationships between socio-demographic characteristics, information support, sources of information, treatment variables, and outcome variables such as body image and life satisfaction.

Results Body image was associated with all dimensions of life satisfaction. Lower age, underlying disease, chemotherapy and breast reconstruction increased body image dissatisfaction, while treatment options were factors associated with life satisfaction. Sources of information was a factor that increased life satisfaction in the dimensions of physical symptoms, sickness impact and quality of close friend relationship.

Conclusion The findings highlight that some socio-demographic characteristics, treatment options and sources of information were associated with body image dissatisfaction and life dissatisfaction among the women with breast cancer after mastectomy. This can increase healthcare professionals' understanding of women with breast cancer after treatment. They should provide effective information, focus attention on the women's needs, and prepare intervention programs that make the women cope with their life situations during follow-up care.

Introduction

Breast cancer is a significant health issue for women all around the world. In Sweden, breast cancer is the most common type of cancer among women, accounting for 30% of all cancer diagnoses, and twenty Swedish women receive the diagnosis of breast cancer every day [1]. Surgery is currently an important part of their treatment [2], and therefore about 40% of women diagnosed with breast cancer undergo mastectomy [3]. Breasts are emphasized by society as a symbol of femininity, motherhood and sexuality [4]. Removal of one or both breasts of a woman is often associated with changes in mental image, anxiety, depression, reduced sexual attraction, feelings of hopelessness and recurrence, and suicidal tendencies. Changes in appearance is also a traumatizing and distressing experience that affects patients' daily living, social activities, relationships, and quality of life [5].

Quality of life refers to an individual's perceived quality of physical, psychological, social and existential functioning [6] and to satisfaction and well-being in life [7]. Body image is defined as the mental picture of one's body concerning physical self, appearance, state of health, wholeness, normal function, and

sexuality [8, 9]. Quality of life is associated directly with body image [10]. Women of lower age receiving mastectomy were associated with greater body image concerns [11–14]. After mastectomy, the options are to undergo a breast reconstruction, to wear a loose prosthesis, or to do nothing to make up for the loss of a breast. Women commonly choose breast reconstruction because they want to avoid the external prosthesis, feel whole again, regain femininity, and have fewer clothing limitations [15]. Socioeconomic status is significantly associated with altered appearance distress, body image, and quality of life in women with breast cancer [16]. Social support is important in helping women adjust to breast cancer. The perceived availability of social support improved the psychological and physiological functioning among women with low optimism after breast cancer treatment [17].

The experience of mastectomy due to breast cancer is very much individual and contextual. Losing a breast after mastectomy may be of minor or major importance. Life satisfaction has been used for evaluation of perceived quality of life [18]. It had the dimensions of physical health, satisfaction with the social situation including work, living conditions and finances, quality of the activities of daily life, quality of the relationship with close friends and family members, and satisfaction with the total life situation. The life satisfaction questionnaire (LSQ) was developed for use in a clinical controlled study aimed at comparing the outcome of two different types of cancer treatment for women with breast cancer [18]. Some studies [19, 20] found that life satisfaction reflects an individual's appraisal of life in an aspiration and is associated with age, educational level, work status, perceived health and sources of information.

Little research has been conducted concerning life satisfaction and associated factors among women after mastectomy. However, an investigation of life satisfaction among women in Sweden with breast cancer has been carried out recently [21]. By understanding factors associated with body image and life satisfaction after mastectomy, health care professionals can coordinate interventions to improve the quality of life of these women and provide specific and meaningful support in accord with their needs. Therefore, the aim of this study was to investigate body image, life satisfaction and associated factors among Swedish women with breast cancer after mastectomy.

Methods

Study setting and design

A descriptive cross-sectional study using quantitative method was conducted. Data were collected in the three Swedish cities Falun, Gävle and Uppsala. They are the capitals of Dalarna, Gävleborg and Uppsala counties with populations of 280 000, 76 000 and 376 000, respectively, and with high mortality of women with breast cancer [22].

Participants

Women with breast cancer were selected by use of the registrations of the Regional Cancer Centres (RCCs) in Uppsala and Örebro. The RCCs were established to build up national cancer registers for notification, planned therapy and follow-up [23]. The criteria for selection were: women (1) with breast

cancer diagnosis since at least one year, (2) having undergone mastectomy, (3) of age at least 18 years, (4) living in Falun, Gävle or Uppsala, and (5) willing to participate in the study. In total 481 out of 975 eligible women participated in the study and returned their questionnaires.

Instruments

The questionnaire comprised four parts devoted to (1) socio-demographic characteristics, (2) sources of information, (3) body image, and (4) life satisfaction. The first two parts, developed by the authors for this study, are provided as Supplementary File 1.

The socio-demographic characteristics concerned age, civil status, educational level, religion, cultural/ethnic minority, underlying disease (chronic), duration of diagnosed breast cancer, types of treatment (mastectomy, chemotherapy, radiation therapy, Herceptin (HER-2), and hormone therapy), and breast reconstruction.

The sources of information concerned information support from physicians, nurses, internet, partner, family and friends, and other sources. It had 54 questions, nine for each source. This part was developed for this study by the investigators. Each question provided a score of zero or one. Therefore, the score ranged from zero to nine for each source of information, and the total score for sources of information ranged from zero to 54, a higher score indicating a larger number of sources of information. This part had Cronbach's alpha = 0.89.

Body image was evaluated by using the Body Image Scale (BIS) [24], a ten-item scale with four possible responses: 0 (not at all), 1 (a little), 2 (quite a bit), and 3 (very much). The range of possible scores was from zero to thirty, a higher score indicating more dissatisfaction with body image. This scale was translated forward-backward (i.e. from English to Swedish and from Swedish to English) and tested for validity by the investigators and rechecked by the two research experts (one was an oncology nurse and another was a psychologist). It had been tested for reliability by the authors on breast cancer patients not participating in this study with Cronbach's alpha = 0.93.

Life satisfaction was measured by using a life satisfaction questionnaire (LSQ) [18]. It was constructed to measure life satisfaction/quality of life in women with breast cancer. It had 34 items with six dimensions: physical symptoms, sickness impact, quality of everyday activities, socio-economic situation, quality of family relation, and quality of close- friend relationship. Each item had a 7-point scale, ranging from 1 to 7. An example of an item is "How much have you been troubled by tiredness during the last week?" Its scale is: 1 to a very high degree, 2 to a high degree, 3 to a fairly high degree, 4 to some degree, 5 to a low degree, 6 almost not at all, and 7 not at all, the last alternative representing the highest satisfaction. The raw scores of the items were added, divided by the highest point in that scale and multiplied by 100. This normalization makes it possible to compare factors with different numbers of items in their dimensions, and 100 represents the maximum quality of life in each dimension. A higher score indicated a better life satisfaction. The scale had been tested by the authors for reliability on breast cancer patients not participating in this study with a Cronbach's alpha ≥ 0.70 for each dimension.

Procedure

We created hypothetical Directed Acyclic Graphs (DAGs) based on reviewed literature [21, 25, 26] with the aim to demonstrate what possible factors are associated with body image (Fig. 1a) and with life satisfaction (Fig. 1b). A maximum of 30 participants per independent variable was considered suitable for test parameters with a power of 80% [27]. As there were 12 possible factors from the DAGs, the minimum number of participants was 360. To prevent missing data, data had been analysed from the women participating in the study.

After the heads of the clinics of surgery/oncology and plastic surgery in Falun, Gävle and Uppsala had been informed about the research project, they gave permission to conduct it. Also the nurses of the clinics were informed about the study in order to be able to answer questions from the participants. Written information about the study and its purpose, a consent letter and a questionnaire were sent to the selected women by post. They were assured anonymity and confidentiality and were told that they could drop out at any time. The ethical requirements of the Declaration of Helsinki-Ethical Principles for Medical Research Involving Human Subjects were fulfilled. Each questionnaire had a code number to facilitate reminders. The women interested to participate signed the consent letter, answered the questionnaire and returned these documents in a pre-stamped envelope, while those who did not want to participate returned the consent letter and the questionnaire without filling them out. A maximum of two postal reminders were sent after two weeks and one month if the women had not returned the envelopes.

Statistical analysis

We analyzed data using descriptive and inferential statistics. Descriptive statistics were used to summarize socio-demographic characteristics of the participants by, e.g., frequency and mean. Inferential statistics applied correlation and linear regression analyses. The level of statistical significance for all analyses was set at $p = 0.05$. Pearson's correlation was performed to determine the differences between BIS scores and LSQ scores from six dimensions.

Multiple linear regression analyses were used to estimate relationships between socio-demographic characteristics, each kind of information support, total sources of information, treatment variables and outcome variables (i.e. body image and life satisfaction). The outcome variables were continuous variables, where the BIS score represented the body image and the LSQ score represented the life satisfaction. The LSQ score had seven dimensions: physical symptoms, sickness impact, quality of everyday activities, socio-economic situation, family relation, close-friend relationship, and overall life satisfaction. Therefore, there were eight outcome variables. Assumptions were satisfied before the analyses (e.g., auto-correlation, multi-collinearity, homoscedasticity, linearity, and multivariate normality). Socio-demographic variables included age, time since diagnosis, underlying disease, culture/ethnic minority, civil status, education level, and treatment variables including chemotherapy, radiation therapy, hormone therapy, Herceptin, and breast reconstruction. Age, time since diagnosis, each information support and total sources of information were continuous variables. Dummy variables (categorization to zero and one) were underlying disease, culture/ethnic minority (no = 0, yes = 1), civil status (married/lived

together = 0, the others = 1), education level (high school or above = 0, secondary school/others = 1), and treatment variables (no = 0, yes = 1). First, we inserted each socio-demographic characteristic, each information support, total sources of information and treatment variable into simple linear regression for each outcome variable. Significant socio-demographic characteristic, information support and total sources of information and treatment variables from the simple regression retained in the multiple stepwise linear regression analyses. We adjusted the civil status and education level as confounders in the multiple regression for all outcome variables. We provided adjusted R^2 and a standardized partial regression coefficient (β) and 95% confidence interval (CI) to demonstrate the fitness and strength of association of each outcome variable.

Results

Many of the participants were 61–75 years old (41.6%), and about half of them were married (49.3%). About 90% of them were Christians, and 60% of them had an underlying disease. Mean and standard deviation scores from sources of information were 13.95 and 7.09, respectively. See Tables 1 and 2.

Table 1
Socio-demographic characteristics among participants (n = 481)

Characteristics	n	Percent
Age (years) ^a : Mean = 62.7, SD = 12.35, Min = 31, Max = 93		
31–45	37	7.9
46–60	166	35.5
61–75	195	41.6
Above 75	70	15.0
Civil status ^a		
Married	236	49.3
Live together	85	17.8
Widow	65	13.6
Single	42	8.8
Divorced	42	8.8
Others/Unidentified	8	1.7
Education level ^a		
Secondary school	106	22.2
High school	96	20.1
University	155	32.5
Others/Unidentified	120	25.2
Religion ^a		
Christian	422	90.4
Muslim/Buddhist	5	1.0
Others/Unidentified	40	8.6
Cultural/Ethnic minority ^a		
No	455	96.8
Yes	15	3.2
Underlying diseases affect daily life ^a		
^a obtained number < 481; SD = Standard Deviation		

Characteristics	n	Percent
No	277	59.3
Yes	190	40.7
Duration from diagnosis (year) ^a : Mean = 2.92, SD = 3.97, Min = 0.2, Max = 44		
2 or less	263	56.6
2-4	174	37.4
More than 4	28	6.0
^a obtained number < 481; SD = Standard Deviation		

Table 2
Treatment among participants (n = 481)

	n	Percent
Treatments		
Chemotherapy ^a		
Yes	234	49.6
No	238	50.4
Radiation therapy ^a		
Yes	227	52.6
No	252	47.4
Hormone therapy ^a		
Yes	293	62.7
No	174	37.3
Herceptin treatment ^a		
Yes	82	18.7
No	357	81.3
Breast reconstruction ^a		
Yes	93	19.7
No	380	80.3

Means (standard deviations) from the body image score and the life satisfaction – physical symptoms 100-percent score were 8.23 (5.94) and 86.91 (12.81), respectively. See Table 3.

Table 3
Mean, standard deviation, minimum and maximum of scores from body image and life satisfaction from six dimensions (n = 481)

Variables	Mean	Standard deviation	Minimum	Maximum
Body image score ^a	8.23	5.94	0	29
Life satisfaction (100-percent score ^a)				
- Physical symptoms	86.91	12.81	28.57	100
- Sickness impact	66.99	18.64	14.29	100
- Quality of everyday activities	67.85	16.25	14.29	100
- Socio-economic situation	77.59	13.67	25	100
- Quality of family relation	75.86	17.22	14.29	100
^a obtained number < 481				

The analyses of correlation showed that the BIS score significantly correlated with all dimensions of the LSQ score. The strongest correlation was sickness impact ($r = -0.474$, $p < 0.001$). See Table 4.

Table 4 Correlation between Body Image Scale (BIS) score and Life Satisfaction

Questionnaire (LSQ) scores from all dimensions

	Correlation values with BIS
LSQ score – Physical symptoms	– .338*
LSQ score – Sickness impact	– .474*
LSQ score – Quality of everyday activities	– .222*
LSQ score – Socio-economic situation	– .382*
LSQ score – Family relation	– .181*
LSQ score – Close friend relationship	– .171*
LSQ score – Total life satisfaction	– .407*
* All correlations were significant at 0.01 level	

The study revealed that lower age ($\beta = -0.194$, 95% CI -0.226, -0.172, $p < 0.001$), underlying disease ($\beta = 0.238$, 95% CI 0.188, 0.281, $p < 0.001$), chemotherapy ($\beta = 0.154$, 95% CI 0.083, 0.224, $p = 0.002$) and having breast reconstruction ($\beta = 0.108$, 95% CI 0.093, 0.123, $p = 0.024$) were associated with increased body image dissatisfaction.

The factor “no underlying diseases” was independently associated with increased life satisfaction – physical symptoms ($\beta = -0.334$, 95% CI -0.342, -0.325, $p < 0.001$), with increased life satisfaction – sickness impact ($\beta = -0.447$, 95% CI -0.538, -0.330, $p < 0.001$), with increased life satisfaction – quality of everyday activities ($\beta = -0.270$, 95% CI -0.311, -0.235, $p < 0.001$), with increased life satisfaction – socio-economic situation ($\beta = -0.296$, 95% CI -0.324, -0.265, $p < 0.001$), with increased life satisfaction – quality of family relation ($\beta = -0.166$, 95% CI -0.199, -0.134, $p < 0.001$), with increased life satisfaction – quality of close friend relationship ($\beta = -0.170$, 95% CI -0.123, -0.144, $p = 0.001$), and with increased total life satisfaction ($\beta = -0.380$, 95% CI -0.395, -0.326, $p < 0.001$). See Table 5.

Table 5

Multivariate linear regression analysis results of the scores of body image and life satisfaction for all dimensions

Variables	Unstandardized Coefficients			Standardized Coefficients		
	B	Standard error	95% CI	Beta (Descending)	t	p
Body image^a						
Constant	12.638	2.030	8.648, 16.628		6.226	< .001*
Age	-0.112	.030	-.170, -.054	-0.194	-3.782	< .001*
Having an underlying disease	3.406	.678	2.074, 4.738	0.238	5.027	< .001*
Chemotherapy	2.157	.693	.794, 3.519	0.154	3.111	.002*
Breast reconstruction	1.890	.837	.245, 3.535	0.108	2.258	.024*
Life satisfaction – physical symptoms						
Constant	95.856	1.466	92.975, 98.737		65.398	< .001*
Having an underlying disease	-8.762	1.190	-11.102, -6.422	-0.334	-7.361	< .001*
Chemotherapy	-3.095	1.183	-5.421, -.769	-0.120	-2.616	.009*
Total sources of information	.264	.083	.101, .407	0.145	3.180	.002*
Being culture/ethnic minority	-7.635	3.492	-14.500, -.771	-0.099	-2.186	.029*
Life satisfaction – sickness impact^b						
Constant	83.100	2.071	79.028, 87.172		40.116	< .001*
Having an underlying disease	-17.144	1.644	-20.377, -13.912	-0.447	-10.426	< .001*
Chemotherapy	-3.874	1.864	-7.539, -.210	-0.103	-2.078	.038*
Radiation	-4.821	1.845	-8.447, -1.195	-0.128	-2.614	.009*

Variables	Unstandardized Coefficients			Standardized Coefficients		
Total sources of information	.370	.114	.145, .594	0.140	3.239	.001*
Being culture/ethnic minority	-15.044	4.967	-24.809, -5.279	-0.130	-3.029	.003*
Life satisfaction – quality of everyday activities						
Constant	73.734	1.132	71.509, 75.959		65.137	< .001*
Having an underlying disease	-8.961	1.511	-11.931, -5.992	-0.270	-5.931	< .001*
Life satisfaction – socioeconomic situation						
Constant	83.348	0.861	81.656, 85.040		96.830	< .001*
Having an underlying disease	-8.143	1.259	-10.617, -5.668	-0.296	-6.469	< .001*
Civil status	-5.916	1.348	-8.567, -3.265	-0.202	-4.387	< .001*
Being culture/ethnic minority	-10.419	3.793	-17.876, -2.963	-0.125	-2.747	< .001*
Life satisfaction – quality of family relation						
Constant	90.865	3.904	83.191, 98.540		23.272	< .001*
Having an underlying disease	-5.357	1.522	-8.348, -2.366	-0.166	-3.520	< .001*
Age	-0.207	0.066	-0.337, -0.076	-0.159	-3.121	.002*
Life satisfaction – quality of close friend relationship^c						
Constant	87.488	4.951	77.756, 97.221		17.672	< .001*
Having an underlying disease	-5.491	1.570	-8.578, -2.403	-0.170	-3.496	.001*
Age	-0.228	0.068	-0.362, -0.095	-0.174	-3.366	.001*
Being culture/ethnic minority	-10.418	4.634	-19.529, -1.307	-0.107	-2.248	.025*

Variables	Unstandardized Coefficients			Standardized Coefficients		
Total sources of information	.230	.112	.010, .450	0.103	2.052	.041*
Life satisfaction – total satisfaction						
Constant	80.134	0.788	78.585, 81.682		101.745	< .001*
Having an underlying disease	-8.882	1.054	-10.975, -6.790	-0.380	-8.344	< .001*
* A level of significance of 0.05						
a Source of information was significant only in univariate analyses for Body image.						
b Hormone therapy was significant only in univariate analysis for Life satisfaction – sickness impact.						
c Being culture/ethnic minority was significant only in univariate analyses for Life satisfaction – quality of close friend relationship.						
Body image, F = 14.643, p = < .001, Adjusted R ² = 0.116						
Life satisfaction – physical symptoms, F = 19.623, p = < .001, Adjusted R ² = 0.151						
Life satisfaction – sickness impact, F = 29.752, p = < .001, Adjusted R ² = 0.260						
Life satisfaction – quality of everyday activities, F = 24.576, p = < .001, Adjusted R ² = 0.096						
Life satisfaction – socioeconomic situation, F = 27.584, p = < .001, Adjusted R ² = 0.164						
Life satisfaction – quality of family relation, F = 14.726, p = < .001, Adjusted R ² = 0.087						
Life satisfaction – quality of close friend relationship, F = 11.931, p = < .001, Adjusted R ² = 0.097						
Life satisfaction – total life satisfaction, F = 42.468, p = < .001, Adjusted R ² = 0.170						

Discussion

This study revealed that the body image after mastectomy of the participating women correlated with all dimensions of life satisfaction. It seems that mastectomy influenced the physical, psychological and social aspects of the women and negatively affected the women's body image. They had to deal with the trauma of disfigurement and with fear of loss of femininity. Some studies showed that body image was associated with quality of life in women with breast cancer [4, 8, 10, 12], and the type of surgery had impact on the appearance satisfaction [10, 27]. The participating women's body image was associated with life satisfaction in the dimensions of sickness impact and quality of everyday activities. The reason may be that after mastectomy the women felt dissatisfaction with their appearance and with surgical

scars. The body image depends on the states of health and physical functioning [11, 31], and negative body image may reduce patients' ability to cope with breast cancer after surgery [14, 15]. This study highlights that the body is a key aspect of the women's life satisfaction after mastectomy. Therefore, healthcare professionals should be aware of the changes experienced by the women after mastectomy and provide specific information, psychosocial support and follow-up care. In addition, it is necessary to determine which intervention would minimize negative body-related self-perceptions, cognition, emotions and behaviors, and enhance women's physical and psychosocial health and well-being.

Lower age, underlying disease, chemotherapy and breast reconstruction increased the body image dissatisfaction among the participating women after mastectomy. The body image of young women after loss of a breast with resulting scars and physical changes [6] due to mastectomy may have an impact on the overall quality of life and their partner relationships [10]. Age and type of treatment had the greatest impact on younger women [16] who had a more negative body image after treatment than elder women [32, 33]. In addition, chemotherapy results in physical symptoms such as hair loss, weight gain and menopausal symptoms that distress young women [34, 35]. One option after mastectomy is to undergo a breast reconstruction. Women choose this option because they want to get rid of the external prosthesis, feel whole again, regain femininity, and have fewer clothing limitations [18]. However, younger women with mastectomy and reconstruction as treatment for breast cancer report negative body image [36, 37]. Therefore, healthcare professionals should understand factors that may lead to physical and psychological distress of women after mastectomy.

The study reflects factors such as total sources of information and treatment options that are associated with life satisfaction among women having undergone mastectomy. Total sources of information increased life satisfaction in the dimensions of physical symptoms, sickness impact, and quality of close-friend relationship. This may explain that the women went through the treatment leading to different physical symptoms and distress that affected their daily activities and role functioning. The women needed support from their friends to cope with their life situations. Sources of information are main factors for life satisfaction related to physical and psychological aspects of the women after mastectomy. Lack of sources of information was associated with poorer health related to long-term quality of life [38]. Support from family and friends was characterized by reassurance, comfort, and help with problem-solving during the period after diagnosis [39]. Effective support comes from family, friends, colleagues, or healthcare professionals [40, 41]. The results of this study may enhance healthcare professionals' awareness of the highly individual needs of support by women who may be encouraged to express what they actually want regarding sources of information from their social networks. In this way psychosocial support can be offered to the women so that they can cope with physical changes and emotional distress, and pursue their daily activities.

Change in appearance after mastectomy is a traumatizing and distressing experience that affects the women's daily lives, social activities, relationships, and quality of life [6]. Treatment options such as chemotherapy and radiation therapy were factors influencing life satisfaction in the dimensions of physical symptoms and sickness impact. They may explain that the women experienced side effects of

the treatments associated with physical symptoms. Women having side effects are often confronted with a range of challenges in their daily activities such as work, nutrition, sleep and social activities [42]. It is evident from the results of this study that healthcare professionals can increase their understanding of women during and after treatment and of which factors may affect the women's body image and life satisfaction.

Strengths and limitations

DAGs for body image dissatisfaction and life satisfaction from reviewed literature demonstrated what confounding factors could be expected and assisted the data analysis. Multiple linear regression presented strengths of association and adjusted confounders. Data analyses using real scores from questionnaires maximized estimates of findings [43]. In addition, all instruments used in this study had been tested with good validity and reliability scores.

The cross-sectional study was not ideal for study of cause-effect relationship. Therefore, a longitudinal study might better explain factors associated with body image dissatisfaction and life satisfaction. Also, this study relied on self-report, which could give rise to information biases. Although data came from a national registry [25] and the number of participants was high (n = 481), the response rate was only about 50%. This could affect sub-group analyses, e.g. with respect to religion.

Conclusion

This study revealed that the body image of women after mastectomy correlated with all dimensions of life satisfaction. Low age, underlying disease, chemotherapy and breast reconstruction increased body image dissatisfaction. Treatment options were factors associated with life satisfaction in the dimensions of physical symptoms and sickness impact. In addition, total sources of information was a factor that increased life satisfaction with respect to physical symptoms, sickness impact and quality of close-friend relation. This study highlights that women with breast cancer having factors associated with body image dissatisfaction and life dissatisfaction were population-at-risk for physical and mental health impact. Therefore, the results of this study can give healthcare professionals increased understanding of women after mastectomy and of what factors are associated with their body image and life satisfaction. Healthcare professionals should provide effective information and support focusing on the women's needs. In addition, healthcare professionals should prepare and develop an intervention program with aim to help women cope with their life situations after mastectomy and during follow-up care.

Declarations

Funding This study was supported financially by the Breast Cancer Association in Sweden.

Conflict of interest The authors declare that they have no competing interests.

Availability of data and material The data collected and generated in the study are available from the author upon reasonable request provided that there is no conflict with confidentiality.

Authors' contributions PL designed the study and collected the data. NP analyzed and interpreted the data. PL and NP prepared and approved the manuscript.

Ethics approval The Ethics Committee at Uppsala-Örebro, Sweden, approved the study (dnr 2012/385).

Consent to participate All participants had been fully informed about the purpose of the study. They were assured of anonymity and confidentiality and were told that they could drop out at any time. Informed written consent was obtained from all participants in the study.

Consent for publication Not applicable.

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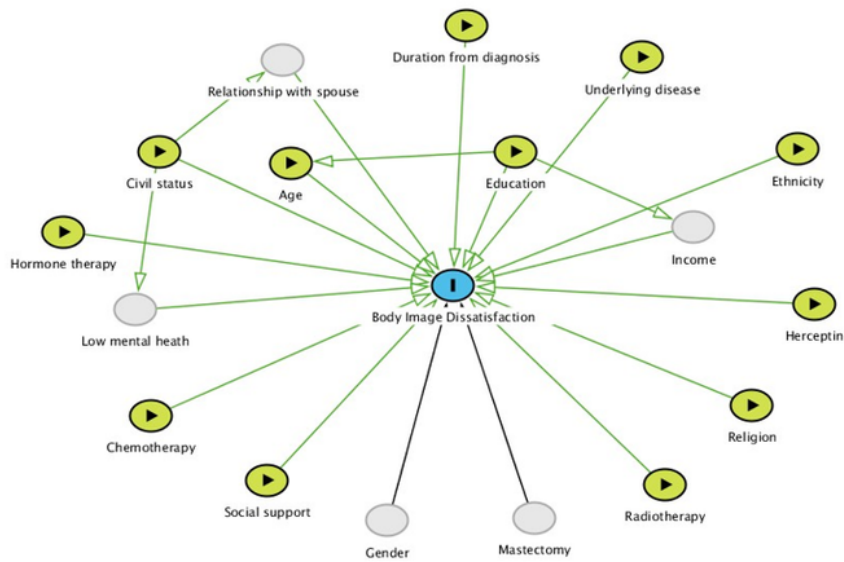
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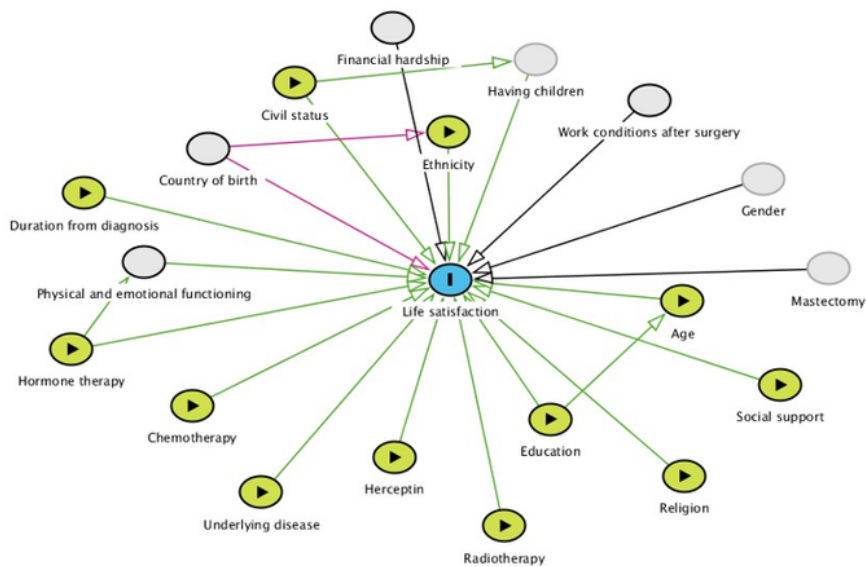
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Figures



(a)



(b)

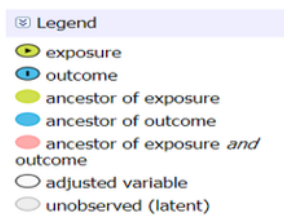


Figure 1

Hypothetical directed acyclic graphs (DAG) for possible factors associated with (a) body image dissatisfaction and (b) life satisfaction among breast cancer women