Cogent Psychology

ISSN: 2331-1908 (Online) Journal homepage: www.tandfonline.com/journals/oaps20

Relating to a new body: understanding the influence of body compassion and metacognition on body image in breast cancer survivors

Valeria Sebri, Alba Jiménez-Díaz, Rocío Herrero, María José Galdón, Rosa Baños & Gabriella Pravettoni

To cite this article: Valeria Sebri, Alba Jiménez-Díaz, Rocío Herrero, María José Galdón, Rosa Baños & Gabriella Pravettoni (2025) Relating to a new body: understanding the influence of body compassion and metacognition on body image in breast cancer survivors, Cogent Psychology, 12:1, 2488461, DOI: 10.1080/23311908.2025.2488461

To link to this article: https://doi.org/10.1080/23311908.2025.2488461

COGENT PSYCHOLOGY
2025, VOL. 12, NO. 1, 2488461
https://doi.org/10.1080/23311908.2025.2488461

HEALTH PSYCHOLOGY | RESEARCH ARTICLE

OPEN ACCESS Check for updates

Relating to a new body: understanding the influence of body compassion and metacognition on body image in breast cancer survivors

Valeria Sebri[a], Alba Jiménez-Díaz[b,c], Rocío Herrero[c,d,e], María José Galdón[b], Rosa Baños[b,c,e] and Gabriella Pravettoni[b,f]

[a]Applied Research Division for Cognitive and Psychological Science, IEO, European Institute of Oncology IRCCS, Milan, Italy; [b]Department of Personality, Evaluation, and Psychological Treatments, University of València, Valencia, Spain; [c]Polibienestar Research Institute, University of Valencia, Valencia, Spain; [d]Department of Psychology and Sociology, University of Zaragoza, Teruel, Spain; [e]CIBER of Physiopathology of Obesity and Nutrition (CIBEROBN), Instituto de Salud Carlos III Madrid, Madrid, Spain; [f]Department of Oncology and Hemato-Oncology, University of Milan, Milan, Italy

ABSTRACT

Body compassion is a multidimensional construct related to body image and self-compassion and refers to one's dispositional attitude towards oneself. Although the overall protective role of body compassion on body image issues, there is a lack of understanding in the oncological field. This exploratory study assesses the impact of body compassion, and metacognition on body image in breast cancer survivors, and how it is affected by cognitive and emotional issues. 79 breast cancer survivors filled in socio-demographic data and standardized online questionnaires. Results evidenced that body compassion has a significant effect on body image. Defusion and acceptance subscales negatively impact body image distress, while negative beliefs about worry as metacognition subscales positively predict body image distress. Indeed, promoting body compassion and decreasing a metacognition tendency can be a therapeutic target to promote a better body image in breast cancer survivors.

ARTICLE HISTORY
Received 13 December 2024
Revised 26 March 2025
Accepted 28 March 2025

KEYWORDS
Breast cancer survivors; body compassion; body image; quality of life; metacognition

SUBJECTS
European Studies; Health Psychology; Psychological Science; Health & Society

Introduction

Breast cancer is one of the most common tumors among women worldwide (Andreis et al., 2018; Ferlay et al., 2015). However, thanks to the development of early detection techniques and treatments, the survival rates of breast cancer have increased, and nowadays survival rates have reached 92.9% in Italy (Mangone et al., 2021). Despite this fairly good prognosis, cancer diagnosis and treatment significatively impair breast cancer survivors' Quality of Life (QoL; Ahmad et al., 2015; Williams & Jeanetta, 2016), with significant decreases in physical, emotional, functional, and social well-being (Doege et al., 2019; Durosini et al., 2021, 2022).

The cognitive-behavioral model evidenced that life events can affect individuals' bodily self- representations (Cresswell, 2000). Among the consequences of the breast cancer experience, survivors often reframe their identity as that of a patient, with notable implications on self-management and everyday life activities (Sebri & Pravettoni, 2023). In this sense, the body is now perceived as a source of danger and fear, even some years after the oncological treatments have ended (Harris et al., 2017). Thus, interoceptive sensations and pain become salient and disruptive, since these symptoms might be related to cancer progression or recurrence, resulting in threats to one's life and safety (McGannon et al., 2016; Sebri, Durosini, Strika, et al., 2023). For example, women who have fought breast cancer could find themselves performing 'checking behaviors' (i.e., touching sensitive areas of their bodies and looking for nodules or anomalies) compulsively over a typical day (McGinty et al., 2016). Indeed, the evidence has shown that breast cancer survivors deal with body issues daily (Cresswell, 2000).

CONTACT Valeria Sebri valeria.sebri@ieo.it Applied Research Division for Cognitive and Psychological Science, IEO, European Institute of Oncology IRCCS, Milan, Italy

Supplemental data for this article can be accessed online at https://doi.org/10.1080/23311908.2025.2488461.

In addition, due to the undesirable appearance-related side effects of the treatments (such as loss or deformities in the breast(s), visible scarring, or hair loss), the perception of Body Image (BI) of breast cancer survivors is altered. BI is generally conceptualized as an 'internal representation of one's own outer appearance' (Thompson et al., 1999, p. 4). As a multidimensional construct, it involves the mental representation of one's body and related emotions within an overall sense of bodily self (Lewis-Smith et al., 2018). In the same way, BI also implies the individuals' evaluation in terms of the assessment of beliefs and body satisfaction (Cash & Smolak, 2011). Referring to aesthetical appearance, women constantly self-scrutinize themselves compared to cultural stereotypes (Triberti et al., 2019). In accordance with the Self Discrepancy Theory by Higgins (1987), the discrepancy between one's own current and desired self-representations lead to dissatisfaction and emotional distress. Moreover, following the theories of self-objectification, it increases habitual self-surveillance and evaluation, with a strong impact on emotional well-being (Fredrickson & Roberts, 1997). Moreover, discrepancies between individuals' internalized body-related ideas, their self- schemas, and perceptions of body characteristics impact BI assessment, impacting individuals' QoL to a certain extent (Cash & Smolak, 2011; Torres et al., 2020). Concerning the cancer experience and its treatment, mastectomy or breast conservative surgery, for example, may threaten overall self- satisfaction and evoke multiple changes in body perception mediated by sensations within the breasts and chest never experienced before (Paterson et al., 2016). At the same time, sexual dysfunctions (i.e., sexual arousal, dyspareunia, fatigue, and loss or decrease in sexual desire and pleasure) occur frequently, even beyond the acute phase of treatments. This, in turn, leads to dissatisfaction and a perception of sexual unattractiveness (Emilee et al., 2010). Sexual dysfunctions due to BI issues become one of the most problematic in the relationship with their partners, who are not often perceived as supportive (Male et al., 2016). All these BI alterations may contribute to developing emotional and cognitive issues (Fioretti et al., 2017; Yang et al., 2017).

As a result, breast cancer survivors may severely worry about physical appearance and develop the belief that others continually observe and evaluate their bodies (Hunter, 2015), which in turn, can affect survivors' social relationships too (Dua et al., 2017). Studies have evidenced that breast cancer issues can lead to behavioral challenges, which result in the avoidance of contexts where the body is assessed (i.e., visiting the physician) (Altman et al., 2017). Conversely, Tylka (2011) reported that women with a positive BI are likelier to engage in resilient health behaviors.

In order to improve BI, studies evidenced the relevance of Body Compassion (BC) and Metacognition. Firstly, BC is conceptualized as a multidimensional construct that refers to one's dispositional attitude towards the physical self by involving cognitions, emotions, and behaviors (Altman et al., 2020). Therefore, self-kindness, common humanity, and mindfulness are applied with a shift from the overall self to the physical one (Neff, 2003). BC is a protective factor against the development of mental health issues, and it has been especially studied in the field of eating disorders (Van Niekerk et al., 2022). On a physical and psychological level, the literature showed relevant correlations with BC (Van Niekerk et al., 2022). A study by Matos et al. (2022) stated that BC is inversely associated with negative emotions related to BI. BC is strictly associated with individuals' relationship to their body and the related BI (Altman et al., 2017). More specifically, it incorporates Cash's (2000) concept of BI in terms of the individuals' attitudinal and evaluative dispositions toward the physical self on a cognitive and behavioral level. In the field of breast cancer survivors, BC can promote BI thanks to its characteristics of kindness, care, and the lack of judgment towards the body after cancer (Sebri et al., 2022).

At the same time, it is paramount to note the relevance of cognitions to promote overall well-being. Specifically, Metacognition is defined as a cognitive process based on assessing, monitoring, and controlling thought (Martinez, 2006; Mutlu et al., 2018). It is usually described as a conscious and deliberate mental activity based on information individuals have about inner sensations and their available coping strategies (Fisher & Wells, 2008; Rahmani et al., 2014). However, metacognition is often an automatic cognitive process carried out without much conscious deliberation (Martinez, 2006). This way, metacognition involves beliefs about individuals' thoughts, which can lead to maladaptive reaction patterns and emotional disorders (Gwilliam et al., 2004). Following the Self-Regulatory Executive function (S-REF) (Wells, 2002; Wells & Matthews, 1994, 1996), metacognitions play an important role in developing and maintaining psychological disorders. In particular, emotional disorders are related to dysfunctional beliefs about the need to ruminate and worry with a focus on danger and adverse events daily (Mutlu et al., 2018).

A traumatic event, such as breast cancer, can increase a maladaptive process of metacognition

(Mutlu et al., 2018; Roussis & Wells, 2006). Accordingly, treatments addressing metacognition generally lead to a decrease in the frequency of worry and rumination, as automatic and dysfunctional cognitive processes, enhancing individuals' changes and skills of acceptance in reference to specific issues, such as breast cancer and its related consequences (Fisher & Wells, 2008; Rahmani et al., 2014; Williams et al., 2006). Specifically, regarding breast cancer patients, a study by Mutlu et al. (2018) demonstrated that women exhibit higher negative metacognition in early cancer stages compared to in a metastatic phase. Similarly, Quattropani et al. (2017) evidenced that negative believes, which are involved in the metacognition process, are predictors of anxiety, depression, and distress in patients undergoing chemotherapy.

Objectives

Breast cancer survivors deal with a new and renovated BI related to survivorship after being a patient. Although the relevant and protective role of BC on BI issues in eating disorders, there is a lack of understanding regarding the oncological field. Consistently with the existing background, this study aims to assess the relationship between BCS, Metacognition, and emotional issues (i.e., anxiety and depression), and BI in breast cancer survivors. Additionally, we wanted to know whether the variables BCS, Metacognition, and emotional distress predict BI. For that, we formulated the following hypothesis:

(Hp1) BC, Metacognition, and emotional issues may be strongly linked to BI distress

(Hp2) BC, Metacognition, anxiety, and depression may impact BI significantly. In particular:

- (Hp2.1) higher level of BC may be associated with a lower BI distress level
- (Hp2.2) higher level of metacognition may be associated with higher BI distress
- (Hp2.3) higher levels of anxiety and depression may be associated with higher BI distress

Methods

Participants

A total of 79 female breast cancer survivors participated in the study. All of them have been diagnosed with breast cancer and have finished the primary treatment in the previous five years. Participants were excluded from the study if they: (a) were younger than 18, (b) had a history of serious mental illness or cognitive impairments, (c) did not complete all the questionnaires, and (d) were not fluent in Italian.

Measures

Sociodemographic information: age, marital status, highest educational level achieved, employment, place of residence, and if they received psychological treatment.

The Body Image Scale (BIS; Hopwood et al., 2001). The BIS consists of 10 items to assess BI distress in terms of physical appearance and the feelings related to changes caused by disease and treatments. The items are scored using a 4-point Likert scale (0 = *never* to 3 = *greatly*). The scores for all 10 items are summed up to produce an overall summary score for each participant. Higher summed scores indicate higher levels of distress related to BI. The BIS showed high internal reliability, one-dimensionality, and construct validity (Annunziata et al., 2020; Hopwood et al., 2001). It has been widely applied in oncological contexts thanks to its clinical validity and sensitivity to change (Przezdziecki et al., 2013). The Italian version's internal consistency was excellent (α = .92). In this study, the overall Cronbach's alpha was .89. Moreover, the sample of this study presented clinically relevant body image distress, in line with Chopra et al. (2021). The authors indeed suggested that a clinically relevant cut-off score of ≥ 10 could be associated with moderate depression, anxiety, and distress, informing health professionals about body image issues.

The Metacognitions Questionnaire (MCQ-30; Wells & Cartwright-Hatton, 2004). The MCQ-30 assesses a range of metacognitive beliefs and processes related to vulnerability and maintenance of emotional disorders through 30 items scored on a 4-point Likert scale (1= *do not agree* to 4= *completely agree*). This questionnaire consists of five subscales: (1) Cognitive Confidence (CC), which measures the degree of trust in one's attention and memory; (2) Cognitive Self-Consciousness (CSC), which measures the tendency to monitor one's focus attention inward and personal thoughts; (3) Positive beliefs about worry (POS) that assess the extent to which individuals consider perseverative thinking as useful; (4) Negative beliefs about worry concerning uncontrollability and danger (NEG), which assess the extent to which a person thinks that perseverative thinking is uncontrollable and dangerous; and (5) beliefs about the Need to Control thoughts, which assesses the extent to

which a person believes that certain types of thoughts need to be suppressed (NC). High scores on subscales are considered dysfunctional. In the Italian validation, the internal consistency was good (α = .87), while the subscales Cronbach's alpha ranged from .71 to .87. In this study, the overall internal consistency is good (α = .84). The Cronbach's alpha of each factor was good for CC (α = .89), POS (α =.80), NEG (α =.84), acceptable for NC (α =.67), and low for CSC (α = .54).

Hospital and Anxiety Depression Scale (HADS; Zigmond & Snaith, 1983; Costantini et al., 1999). HADS is a self-report questionnaire based on 14 items on a 4-point Likert scale (0 = *never* to 3 = *very often*). It measures emotional distress on two dimensions: anxiety and depression in patients who do not show psychiatric symptoms. The total score is the sum of the subscales scores. Scores higher than 10 points are clinically significant. HADS has been widely applied in healthy and chronic disease populations. In the Italian version of the scale, Cronbach's alpha ranged from .80 to .85. In this study, Cronbach's alpha is good for both anxiety subscale (α = .72) and depression subscale (α = .74). Additionally, in this study, the optimal cut-off values were > 9 units for the HADS-A and > 7 units for the HADS-D, as suggested by Annunziata et al. (2020).

*Body Compassion Scale (BCS***;** Altman et al., 2020; Policardo et al., 2021): BCS is a self-report questionnaire that evaluates the attitude of compassion towards one's body specifically. This scale consists of 23 items using a 5-point Likert Scale (1 = *Almost never* to 5= *Almost always*) distributed in three subscales: (1) Defusion, which addresses the attitude towards being mindful, rather than being over-identified with body limitations and inadequacies, (2) Common Humanity, covering abilities to deal with a negative BI as a part of the human experience, rather than adopting a shaming and isolated perspective, and (3) Acceptance, which measures the how individuals are judgmental towards their body-related painful thoughts and feelings (Altman et al., 2017; 2018). In the Italian validation, the overall BCS internal consistency reliability was good (α = .89), with a Cronbach's alpha ranging from .90 to .93 for the subscales (Policardo et al., 2021). In the present study, Cronbach's alpha is excellent for the complete scale (α = .91) as well as the subscales Defusion (α =.91), Common Humanity (α = .93), and Acceptance (α = .94), showing an acceptable internal consistency.

Procedure

An anonymous online survey with a completion time of about 20 min was designed to test the hypotheses. Participants were recruited online through a website link shared by email and online platforms (i.e., Facebook). The website first showed a cover letter, explaining the goal and procedure of the study, as well as the informed consent statement. Once the informed consent was provided, participants were asked to answer the survey questions. The online survey was available from 1 November to 31 December 2021. Participation was voluntary and no reward was given to promote the involvement. The current study was approved in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Data analysis

A descriptive analysis (frequencies and/or mean and standard deviation scores) was performed to explore socio-demographics and clinical scores of breast cancer survivors. Data processing identified 11 missing observations (0.9% of the total dataset), which were concentrated in five subjects. Given this limited occurrence, we opted to remove these subjects. Additionally, an outlier was identified that differed greatly from the sample in the main study variables. The outlier was eliminated for rigor in the conclusions drawn from this study. Thus, after removing the outlier, the dataset consisted of 73 data points.

Relating to Hp1, a correlation analysis was executed to identify which variables were related to BI distress. In order to verify the Hp2, three multiple regression analyses were run to test the predictive role of diverse variables on BI distress as an outcome. First, a multiple regression analysis tested the relationship between overall BC, metacognitions and emotional distress (anxiety and depression) as predictors of BI distress as an outcome. A second model tested the predictive character of BCS subscales on BIS. The third model evaluated the extent to which the MCQ-30 subscales predict BIS scores, except for the CSC subscale, which was not included due to its low internal consistency. To control potential confounders, we estimated two versions of each model. In the first version, sociodemographic variables (i.e., ongoing oncological treatment, psychotherapy, and education level) were entered in the first step of a hierarchical regression, followed by the

remaining variables. The second version excluded sociodemographic variables. We then calculated and compared the adjusted R^2 and Akaike Information Criterion (AIC) values to determine the optimal model fit.

We examined histograms, Q-Q plots, and Kolmogorov-Smirnoff tests to assess the normality distribution of the main variables and regression models' residuals. These analyses revealed that (i) the main variables included in our models do not follow a normal distribution, requiring a non-parametric correlation analysis, and (ii) residuals are normally distributed, justifying a regression model. For further information, please refer to Supplementary Materia1 1. Data analyses were performed using the statistical software analysis RStudio for OS, Version 2024.12.0+467). The Tolerance and Variance Inflation Factor (VIF) of the estimated linear regression models was checked for multicollinearity. No multicollinearity was found (Tolerance >.10 and VIF coefficients <4 in all models) (O'Brien, 2007). Please, refer to Supplementary Material 2 for further details.

A power analysis was conducted to ensure meaningful and statistically significant results (Cohen, 1988). Analyses were run with the software G*Power (Faul et al., 2007), with power (1 – *b*) set at 0.95, a medium effect size (one-tailed test), and a 5% level of significance. Data highlighted that we needed a total sample size of 74 participants to detect a large effect size. Our sample estimates were very close to our hypothetical suggestions, ensuring adequate levels of power for the detection of effect. A *p*-value of <0.05 was considered statistically significant.

Results

Descriptive statistics for sociodemographic and psychological measures

Table 1 shows all the sociodemographic characteristics of the sample and the self-reported psychological variables used to perform the correlation and multiple regression analyses. A total of 79 women filled in the battery of questionnaires. The participants' ages ranged from 37 to 69 years (*M*age = 52.63, *SD*age = 6.60).

Correlation analysis

Correlations examined the relationships between the control variables (BCS, MCQ-30, and HADS) and its subscales and the outcome (BIS). In this sample, some constructs were found to be significantly associated with BI distress (Table 2). BCS (r = –.62, $p < 0.001$), and its subscales, Defusion (r = –.55, $p < 0.001$) and Acceptance (r = –.62, $p < 0.001$), were negatively associated with BI distress. On the contrary, MCQ-30 scores were positively associated with BI distress (r = .51, $p < 0.001$), as well as the subscales NEG (r = .51, $p < 0.001$) and CC (r = .29, $p < 0.05$). Additionally, both anxiety and depression were positively associated with BI distress (r = .42, $p < 0.001$; r = .40, $p < 0.001$, respectively).

Multiple regression models

The comparison of adjusted R^2 and AIC values for each model pair showed that adding sociodemographic variables did not substantially improve the adjusted R^2, while the AIC values increased across all three models (Supplementary Material 3). Consequently, the most parsimonious models, where the sociodemographic variables are excluded, were selected.

Multiple regression model with BCS, MCQ-30 and HADS as predictors of BI distress

The regression model was significant, F (4, 68) = 10.76, $p < 0.001$, and explained 35% of the variance of the BI score. In particular, BCS predicted BI distress negatively while MCQ-30 predicted BI distress positively. However, neither anxiety nor depression predicted BI distress significantly (see Table 3).

Multiple regression model with BCS subscales as predictors of BI distress

BCS subscales (Defusion, Common Humanity, and Acceptance) significantly contributed to explain the variance of BI distress, F (3, 69) = 20.99, $p < 0.001$, R^2 adjusted = 45%. Defusion and Acceptance showed a negative relation on BIS scores. Conversely, the Common Humanity subscale showed a significantly positive prediction of BIS scores (see Table 4).

Multiple regression model with MCQ-30 subscales as predictors of BI distress

As shown in Table 5, only the NEG subscale positively contributed to explain the variance of the BI distress (F (5, 65) = 6.03, $p < 0.001$, R^2 adjusted = 26%).

Discussion

Over the years, several interventions have been proposed to promote BI in different fields of interest. For

Table 1. Sociodemographic and psychological characteristics of the participants.

	%	*n*	*Mean*	*SD*
Marital status				
Single	17.9	14		
Married/partnered	65.4	51		
Divorced/widowed	21.4	12		
Other	1.3	1		
Highest educational level				
Primary/Middle school	7.7	6		
High school/college	39.7	31		
University or post-graduate degree	34.6	27		
PhD/Master	14.1	11		
Other	3.8	3		
Employment				
Unemployed	5.1	4		
Blue-collar	11.5	9		
White-collar	83.3	65		
Receiving psychological treatment				
Yes	21.8	17		
No	78.2	61		
Place of residence				
Northern regions	69.2	54		
Southern regions	20.5	16		
Islands	10.3	8		
Children				
Yes	74.4	58		
No	25.6	20		
Ongoing oncological treatment				
Yes	57.7	45		
No	42.3	33		
Body Image Distress (BIS)			14.84	7.32
Body Compassion (BCS)			72.93	16.44
Defusion			31.73	8.32
Common Humanity			26.70	9.09
Acceptance			14.92	5.53
Metacognition (MCQ-30)			64.19	10.73
CC			14.24	4.59
CSC			15.86	2.52
POS			9.19	3.02
NEG			13.44	4.31
NC			11.46	3.01
Emotional distress (HADS)				
Anxiety			9.87	2.70
Depression			7.24	3.23

Note. BIS: Body Image Scale; BCS: Body Compassion Scale; MCQ-30: Metacognitions Questionnaire; CC: Cognitive confidence; CSC: Cognitive self–consciousness; POS: Positive beliefs; NEG: Negative beliefs about uncontrollability and danger; NC: Need to control thoughts; HADS: Hospital and Anxiety Depression Scale.

example, the literature showed the relevance of BC on BI in women with eating disorders (de Carvalho Barreto et al., 2020). Therefore, the present study provides evidence of the association between some variables (BC, anxiety and depression, and the metacognition process) and BI in breast cancer survivors.

In line with our Hp.1, correlation and regression analyses highlighted associations between Metacognition, BC, and depression and anxiety scores with BI. Overall, Metacognition is positively related to BI distress. Consistently with the literature (Golmohammadian et al., 2018), NEG subscales of MCQ-30 evidenced significant correlations with BI distress. For example, Cooper and Osman (2007) evidenced the patients' attempts to control, correct, appraise, and regulate thinking concerning their BI and illness-related thoughts. Similarly, Veale, (2004) suggested the relevant role of metacognitive processing in maintaining BI issues.

Moreover, the literature sustained the associations between BC and BI. Breines et al. (2014) evidenced that self-compassion and self-esteem, as at the core of the BC construct, affect BI positively. More specifically, a compassionate attitude supports the acceptance of physical imperfections as a part of the human being (Neff, 2003), avoiding negative judgments about one's appearance. Altman et al. (2020) claimed that BC is positively linked to BI flexibility. In line with this, Przezdziecki et al. (2013) emphasized that self-compassion decreases BI disturbance in breast cancer patients. In particular, approaches of Defusion and Acceptance towards the own body have relevant clinical implications to improve BI (Oliveira et al., 2018).

Finally, both depression and anxiety have been associated with BI distress in the literature. Rhondali et al. (2015) found that a BIS cut point could

Table 2. Correlations with confidence intervals.

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. BIS												
2. BCS Defusion	−.55** [−.69, −.36]											
3. BCS Common Humanity	.09 [−.15, .31]	.02 [−.21, .25]										
4. BCS Acceptance	−.62** [−.74, −.45]	.58** [.40, .71]	.25* [.17, .45]									
5. BCS Total	−.47** [−.63, −.27]	.73** [.60, .82]	.60** [.42, .73]	.78** [.67, .86]								
6. MCQ_CC	.29* [.06, .49]	−.10 [−.32, .14]	.03 [−.21, .25]	−.24* [−.45, −.01]	−.14 [−.36, .10]							
7. MCQ_POS	.20 [−.03, .41]	−.27* [−.47, −.04]	.23* [.00, .44]	−.06 [−.29, .17]	−.08 [−.30, .16]	.20 [−.02, .42]						
8. MCQ_CSC	.16 [−.08, .37]	−.06 [−.29, .17]	.32** [.09, .51]	−.01 [−.23, .23]	.12 [−.12, .34]	−.12 [−.34, .11]	.15 [−.08, .37]					
9. MCQ_NEG	.51** [.31, .66]	−.40** [−.58, −.19]	.00 [−.23, .23]	−.36** [−.54, −.14]	−.35** [−.53, −.13]	.22 [−.01, .43]	.25* [.02, .45]	.17 [−.06, .38]				
10. MCQ_NC	.22 [−.01, .43]	−.23 [−.43, .00]	.20 [−.04, .41]	−.10 [−.33, .13]	−.06 [−.28, .18]	.23 [−.00, .43]	.13 [−.11, .35]	.11 [−.12, .33]	.61** [.46, .74]			
11. MCQ	.51** [.32, .66]	−.38** [−.56, −.16]	.17 [−.06, .38]	−.29** [−.49, −.07]	−.24* [−.44, −.01]	.57** [.39, .71]	.55** [.37, .69]	.29** [.06, .48]	.80** [.70, .87]	.68** [.53, .79]		
12. HADS Anxiety	.42** [.21, .59]	−.44** [−.61, −.23]	−.18 [−.39, .05]	−.42** [−.59, −.21]	−.49** [−.65, −.30]	.20 [−.03, .41]	.31** [.08, .50]	.08 [−.15, .31]	.62** [.46, .75]	.32** [.10, .52]	.55** [.37, .70]	
13. HADS Depression	.40** [.19, .58]	−.51** [−.66, −.31]	−.12 [−.34, .11]	−.43** [−.60, −.22]	−.48** [−.63, −.28]	.08 [−.15, .31]	.19 [−.05, .40]	.03 [−.20, .26]	.48** [.28, .64]	.26* [.03, .46]	.36** [.14, .54]	.63** [.46, .74]

Note. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation.
*Indicates $p < .05$.
**indicates $p < .01$.
BIS: Body Image Scale; BCS: Body Compassion Scale; MCQ: Metacognitions Questionnaire; CC: Cognitive confidence; CSC: Cognitive self–consciousness; POS: Positive beliefs; NEG: Negative beliefs about uncontrollability and danger; NC: Need to control thoughts; HADS: Hospital and Anxiety Depression Scale.

Table 3. Multiple regression analysis between BCS, MCQ-30, HADS on BIS.

Effect	*B*	*SE*	95% CI *[LL,UL]*	*β*	*t*	*p*
Constant	7.17	6.21	[−5.22, 19.56]		1.16	.252
BCS	−.13	.05	[−.23, −.03]	−.30	−2.67	.009
MCQ-30	.22	.08	[.07, .37]	.33	2.94	.005
Anxiety	−.02	.38	[−.78, .75]	−.01	−.04	.967
Depression	.44	.29	[−.14, 1.02]	.20	1.51	.135

Note. CI: confidence interval; *LL:* lower limit; *UL:* upper limit; BIS: Body Image Scale; BCS: Body Compassion Scale; MCQ-30: Metacognitions Questionnaire.

Table 4. Multiple regression analysis between BCS subscales and BIS.

Effect	*B*	*SE*	95% CI *[LL,UL]*	*β*	*t*	*p*
Constant	27.64	2.99	[21.66, 33.63]		9.22	<.001
Defusion (BCS)	−.23	.09	[−.41, −.04]	−.27	−2.45	.017
Common Humanity (BCS)	.17	.07	[.02, .32]	.21	2.31	.024
Acceptance (BCS)	−.67	.15	[−.97, −.38]	−.52	−4.56	<.001

Note. CI: confidence interval; *LL:* lower limit; *UL:* upper limit; BIS: Body Image Scale; BCS: Body Compassion Scale.

differentiate cancer patients with lower anxiety and depression symptomatology from patients with higher levels. Chopra et al. (2021) replicated those results and found that BI distress was associated with depression and anxiety especially in younger female breast cancer patients. Although the correlation analyses of this study is aligned with the literature, the regression model that included depression and anxiety as predictors of BI distress did not show a significant association. We hypothesize that other variables might explain their effect, in line with Chen et al. (2012). In their study, authors evidenced that depression did not predict body image, although there was a significant and positive correlation between them. In conclusion, they affirmed that other factors than depression might impact body image. Moreover, they suggested that participants' emotions could be strongly associated with the type of oncological treatments as one of the main factors of interest. In line with this, a review by Thakur et al. (2022) reported the type of treatment, primarily modified radical mastectomy, and age as the main factors associated with a disturbed body image.

Secondly, in line with our Hp2.1, the regression model that includes the BCS subscales as predictors

Table 5. Multiple regression analysis between MCQ-30 subscales and BIS.

Effect	*B*	*SE*	95% CI *[LL,UL]*	*β*	*t*	*p*
Constant	−2.24	5.71	[−13.63, 9.16]		−.39	.70
Cognitive Confidence (CC)	.32	.17	[−.02, .66]	.21	1.89	.06
Positive beliefs about worry (POS)	.14	.25	[−.36, .64]	.06	.57	.57
Cognitive Self-Consciousness (CSC)	.29	.31	[−.34, .91]	.10	.92	.36
Negative Beliefs about worry (NEG)	.87	.21	[.44, 1.29]	.53	4.07	<.001
Need to Control thoughts (NC)	−.44	.30	[−1.03, .16]	−.19	−1.47	.15

Note. CI: confidence interval; *LL:* lower limit; *UL:* upper limit; BIS: Body Image Scale; MCQ-30: Metacognitions Questionnaire.

explained the 35% variation of BI scores, resulting in a well-fitting model (Ferguson, 2009). Findings highlight that higher BC predicts decreases in BI distress (Halliwell, 2015). One probable reason is that BC may be a protective factor that promotes positive embodiment and protection against self- criticism and body shame (Burychka et al., 2021; de Carvalho Barreto et al., 2020). Particularly, the Defusion and Acceptance subscales have a relevant role in the improvements of BI. Cognitive Defusion is defined as the capability to experience the own body as an observer, from an external point of view. Therefore, a high level of Defusion is associated with a low tendency to BI evaluations, reducing the overall distress and emotional discomfort (Mandavia et al., 2015). At the same time, self-acceptance is essential to improve a positive BI (Tiggemann, 2019). Several studies evidenced that interventions based on self-acceptance (i.e., acceptance-based exposure therapy) can reduce dysfunctional BI issues successfully. Similarly, some studies showed the efficacy of self-acceptance in increasing BI satisfaction and flexibility (Givehki et al., 2018; Selby, 2011). The unexpected results regarding the Common Humanity subscale (no significant correlation to BIS and positive predictive role of BIS) raised a question that has yet to be answered. In the case study of Altman et al. (2017), this subscale did not improve as expected, due to various possible reasons (i.e., the items wording might not properly gather the construct of the connection to others to some subjects). We highlight the need to further investigate the mechanisms underlying these results.

In accordance with Hp2.2, Metacognition resulted statistically significant in the regression model by predicting a negative BI. However, the literature' debate regarding the impact of Metacognition on BI distress is still ongoing. Cooper and Osman (2007) suggest that self-reflection and metacognitive processive may recall negative memories, which lead to negative self-judgment due to the perception of being inferior and worthless. Another study by Muntsant et al. (2021) demonstrated that the lack of metacognition abilities leads to distress due to the individual's inability to manage thoughts and take actions. Additionally, Quattropani et al. (2016) demonstrated that Metacognition predicts distress in cancer patients. Regarding metacognition subscales, findings highlighted a positive prediction of NEG and CC of BI distress. Firstly, Cartwright-Hatton and Wells (1997) stated that compelling negative beliefs may lead individuals to attempt to avoid this distressful cognitive process. It could result from promoting universal features of beauty, which enhance negative beliefs about one's BI (Alsaidan et al., 2020). Propagating videos, photos, and comments about an ideal body can easily trigger and increase the belief that the body is deviated from average, especially if it is a body after oncological treatments (Alsaidan et al., 2020). In other words, we argue that having persistent and negative thinking about one's BI could promote the need to control worries and fear, maybe making a distance between one's emotions and the body's perception.

Clinical implications

Starting from the present results, clinical implication might consider whether there are differences in BI in reference to the type of cancer and the women's characteristics in terms of BC and Metacognition to tailor psychological interventions to breast cancer survivors' needs. In particular, the present findings would be helpful in designing future psychological interventions that could be even more personalized to breast cancer survivors' needs (Savioni et al., 2022). It is fundamental to propose appropriate strategies and approaches that strongly respond to women's desires and goals, obtaining effective results (Sebri et al., 2023; Wagoner et al., 2022). This is in line with the need of improving patients 'engagement in psychological interventions, involving their needs.

Study limitations

This study has some limitations, such as the small size and homogeneity of the data, which should be considered when interpreting the results. Future studies should include more participants, which is

fundamental to make the results more consistent and applicable to the cancer population. In addition, a larger sample size could be scored differently in BIS and HADS, and could include both genders and other cancer types, such as head and neck or colorectal cancer, which also impact BI of patients. Larger sample sizes would also enable structural equation modeling (SEM), which accounts for measurement errors. However, in this study, we chose simpler models (correlations and multiple regressions) due to the high reliability of our instruments (Cronbach's α = .94–.67), which minimizes the potential impact of measurement error. Moreover, with our current sample size, implementing SEM would require estimating many parameters, which could result in model instability and overfitting. Therefore, we deemed our chosen approach more parsimonious and better suited for the current dataset. Future studies with larger sample sizes could benefit from using SEM to better account for measurement errors and explore variable relationships more comprehensively. Moreover, the cross-sectional nature of the design does not allow concluding the causality of the relationships mentioned above. Longitudinal studies regarding these and other variables should address these questions in the future. Hence, longitudinal studies may be needed to further support these findings.

Furthermore, limitations of the present study could be related to the generalization of these results to other cancer populations due to the oncological intervention and treatments on specific parts of the body (i.e., breast(s)) that are strictly connected to femininity and body satisfaction. Moreover, other well-being activities (i.e., physical exercise) have to be explored to evaluate their impact on BI distress. Finally, the absence of a qualitative design could be a limitation of the present study. A mixed-method approach would be effective for future studies, leading to a more comprehensive exploration of this topic of interest.

Conclusions

The present study highlights that BC has a relevant role within the BI field. In particular, this study suggests addressing Defusion and acceptance attitudes as having a negative impact on BI. Otherwise, Cognitive Confidence and Negative Beliefs about worry can be involved in future interventions as positive predictors for BI. In conclusion, managing BC and metacognitive processing must involve psychological intervention to foster BI. Otherwise, our findings evidence the need to better explore emotional distress, anxiety, and depression in particular. Starting from these results, further research is required to shed sufficient light on this issue.

Acknowledgements

This work was partially supported by the Italian Ministry of Health with Ricerca Corrente and 5×1000 funds. Alba Jimenez-Diaz is a recipient of the Predoctoral Fellowship "Atracció de Talent" [UV-INV-PREDOC20-1361671] from the Research Grants Programme of the University of Valencia. CIBEROBN, an initiative of ISCIII (CB06/03/0052), has also supported this work. Finally, the authors express their extensive gratitude to Clàudia Llinares, for her advice on data processing and statistical analysis.

Author contributions

All authors contributed to the study conception and design. Material preparation, data collection, and first draft of manuscript were performed by Valeria Sebri. Alba Jiménez-Díaz supported the work regarding the materials and methods, data analysis, and interpretation of results, hence contributing to the corresponding sections of the manuscript. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript. Gabriella Pravettoni supervised the whole study.

Ethical approval

Please, note that this study was conducted in accordance with the Declaration of Helsinki. The nature of the data treated and described in the manuscript is not a sensitive case. Each participant received a detailed presentation of the research before collecting the data online. Participation was voluntary and anonymous. No children or vulnerable adults were involved. At each moment, the participants could withdraw their initial consent. The study was conducted for the public good and had no risk of adversely affecting the physical and mental of the subjects. For these reasons, ethics was self-assessed, and the Institutional Review Board approval was not required.

Informed consent

Informed consent was obtained from all individual participants included in the study.

Disclosure statement

No potential conflict of interest was reported by the author(s).

About the authors

Valeria Sebri is a researcher at the European Institute of Oncology IRCSS, Milan, with a specific expertise in psycho-oncology, cognitive and body image issues.

Alba Jiménez-Díaz is a pre doctoral researcher at the University of Valencia who focuses on the effects of digital interventions in psycho-oncology.

Rocío Herrero is an Assistant Professor at the University of Zaragoza, with expertise in the use of technology in clinical psychology.

María José Galdón is Full Professor at University of Valencia, with extensive expertise in psychopathology and psychooncology.

Rosa Baños is Full Professor at the University of Valencia, with extensive expertise in clinical psychology, positive psychology interventions, and the use of digital interventions in the clinical setting.

Gabriella Pravettoni is Full Professor at the University of Milan and the Head of the psycho-oncological department at the European Institute of Oncology IRCCS, with expertise in cognitive process and psycho-oncology.

References

Ahmad, S., Fergus, K., & McCarthy, M. (2015). Psychosocial issues experienced by young women with breast cancer: The minority group with the majority of need. *Current Opinion in Supportive and Palliative Care*, *9*(3), 271–278. https://doi.org/10.1097/SPC.0000000000000162

Alsaidan, M. S., Altayar, N. S., Alshmmari, S. H., Alshammari, M. M., Alqahtani, F. T., & Mohajer, K. A. (2020). The prevalence and determinants of body dysmorphic disorder among young social media users: A cross-sectional study. *Dermatology Reports*, *12*(3), 8774. https://doi.org/10.4081/dr.2020.8774

Altman, J. K., Linfield, K., Salmon, P. G., & Beacham, A. O. (2020). The body compassion scale: Development and initial validation. *Journal of Health Psychology*, *25*(4), 439–449. https://doi.org/10.1177/1359105317718924

Altman, J. K., Zimmaro, L. A., & Woodruff-Borden, J. (2017). Targeting body compassion in the treatment of body dissatisfaction: A case study. *Clinical Case Studies*, *16*(6), 431–445. https://doi.org/10.1177/1534650117731155

Andreis, F., Meriggi, F., Codignola, C., Frigoli, I., Prochilo, T., Mutti, S., Huscher, A., Libertini, M., Di Biasi, B., Abeni, C., Ogliosi, C., Noventa, S., Rota, L., Pedrali, C., & Zaniboni, A. (2018). Impact of a psycho-educational team in early breast cancer patients' coping strategies: The Venere project. *Reviews on Recent Clinical Trials*, *13*(4), 274–280. https://doi.org/10.2174/1574887113666180409152025

Annunziata, M. A., Muzzatti, B., Bidoli, E., Flaiban, C., Bomben, F., Piccinin, M., Gipponi, K. M., Mariutti, G., Busato, S., & Mella, S. (2020). Hospital Anxiety and Depression Scale (HADS) accuracy in cancer patients. *Supportive Care in Cancer: official Journal of the Multinational Association of Supportive Care in Cancer*, *28*(8), 3921–3926. https://doi.org/10.1007/s00520-019-05244-8

Breines, J., Toole, A., Tu, C., & Chen, S. (2014). Self-compassion, body image, and self-reported disordered eating. *Self and Identity*, *13*(4), 432–448. https://doi.org/10.1080/15298868.2013.838992

Burychka, D., Miragall, M., & Baños, R. M. (2021). Towards a comprehensive understanding of body image: Integrating positive body image, embodiment and self-compassion. *Psychologica Belgica*, *61*(1), 248–261. https://doi.org/10.5334/pb.1057

Cartwright-Hatton, S., & Wells, A. (1997). Beliefs about worry and intrusions: The metacognitions questionnaire and its correlates. *Journal of Anxiety Disorders*, *11*(3), 279–296. https://doi.org/10.1016/s0887-6185(97)00011-x

Cash, T. F. (2000). *The multidimensional body-self relations questionnaire users' manual*. www. body-images. com

Cash, T. F., and Smolak, L. (Eds.). (2011). *Body image: A handbook of science, practice, and prevention*. Guilford Press.

Chen, C. L., Liao, M. N., Chen, S. C., Chan, P. L., & Chen, S. C. (2012). Body image and its predictors in breast cancer patients receiving surgery. *Cancer Nursing*, *35*(5), E10–E16. https://doi.org/10.1097/NCC.0b013e3182336f8b

Chopra, D., De La Garza, R., & Lacourt, T. E. (2021). Clinical relevance of a Body Image Scale cut point of 10 as an indicator of psychological distress in cancer patients: Results from a psychiatric oncology clinic. *Supportive Care in Cancer: Official Journal of the Multinational Association of Supportive Care in Cancer*, *29*(1), 231–237. https://doi.org/10.1007/s00520-020-05491-0

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Taylor & Francis.

Cooper, M., & Osman, S. (2007). Metacognition in body dysmorphic disorder—a preliminary exploration. *Journal of Cognitive Psychotherapy*, *21*(2), 148–155. https://doi.org/10.1891/088983907780851568

Costantini, M., Musso, M., Viterbori, P., Bonci, F., Del Mastro, L., Garrone, O., Venturini, M., & Morasso, G. (1999). Detecting psychological distress in cancer patients: Validity of the Italian version of the Hospital Anxiety and Depression Scale. *Supportive Care in Cancer: Official Journal of the Multinational Association of Supportive Care in Cancer*, *7*(3), 121–127. https://doi.org/10.1007/s005200050241

Cresswell, C. (2000). *Self-esteem, coping and attribution in chronic fatigue syndrome*. University of London, University College London.

de Carvalho Barreto, M., Ferreira, C., Marta-Simões, J., & Mendes, A. L. (2020). Exploring the paths between self-compassionate attributes and actions, body compassion and disordered eating. *Eating and Weight Disorders: EWD*, *25*(2), 291–297. https://doi.org/10.1007/s40519-018-0581-3

Doege, D., Thong, M. S., Koch-Gallenkamp, L., Bertram, H., Eberle, A., Holleczek, B., Pritzkuleit, R., Waldeyer-Sauerland, M., Waldmann, A., Zeissig, S. R., Jansen, L., Brenner, H., & Arndt, V. (2019). Health-related quality of life in long-term disease-free breast cancer survivors versus female population controls in Germany. *Breast Cancer Research and Treatment*, *175*(2), 499–510. https://doi.org/10.1007/s10549-019-05188-x

Dua, P., Heiland, M. F., Kracen, A. C., & Deshields, T. L. (2017). Cancer-related hair loss: A selective review of the alopecia research literature. *Psycho-oncology*, *26*(4), 438–443. https://doi.org/10.1002/pon.4039

Durosini, I., Triberti, S., Savioni, L., Sebri, V., & Pravettoni, G. (2022). The role of emotion-related abilities in the quality of life of breast cancer survivors: A systematic review. *International Journal of Environmental Research and Public Health*, *19*(19), 12704. https://doi.org/10.3390/ijerph191912704

Durosini, I., Triberti, S., Sebri, V., Giudice, A. V., Guiddi, P., & Pravettoni, G. (2021). Psychological benefits of a sport-based program for female cancer survivors: The role of social connections. *Frontiers in Psychology*, *12*, 751077. https://doi.org/10.3389/fpsyg.2021.751077

Emilee, G., Ussher, J. M., & Perz, J. (2010). Sexuality after breast cancer: A review. *Maturitas*, *66*(4), 397–407. https://doi.org/10.1016/j.maturitas.2010.03.027

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). GPower 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/bf03193146

Ferguson, C. J. (2009). An effect size primer: A guide for clinicians and researchers. *Professional Psychology: Research and Practice*, *40*(5), 532–538. https://doi.org/10.1037/a0015808

Ferlay, J., Soerjomataram, I., Dikshit, R., Eser, S., Mathers, C., Rebelo, M., Parkin, D. M., Forman, D., & Bray, F. (2015). Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012. *International Journal of Cancer*, *136*(5), E359–E386. https://doi.org/10.1002/ijc.29210

Fioretti, C., Mazzocco, K., & Pravettoni, G. (2017). Psychological support in breast cancer patients: a personalized approach. In U. Veronesi, A. Goldhirsch, P. Veronesi, O. D. Gentilini, & M. C. Leonardi (Eds.), *Breast cancer* (pp. 841–847). Springer. https://doi.org/10.1007/978-3-319-48848-6_73

Fisher, P. L., & Wells, A. (2008). Metacognitive therapy for obsessive–compulsive disorder: A case series. *Journal of Behavior Therapy and Experimental Psychiatry*, *39*(2), 117–132. https://doi.org/10.1016/j.jbtep.2006.12.001

Fredrickson, B. L., & Roberts, T. A. (1997). Objectification theory: Toward understanding women's lived experiences and mental health risks. *Psychology of Women Quarterly*, *21*(2), 173–206. https://doi.org/10.1111/j.1471-6402.1997.tb00108.x

Givehki, R., Afshar, H., Goli, F., Scheidt, C. E., Omidi, A., & Davoudi, M. (2018). Effect of acceptance and commitment therapy on body image flexibility and body awareness in patients with psychosomatic disorders: A randomized clinical trial. *Electronic Physician*, *10*(7), 7008–7016. https://doi.org/10.19082/7008

Golmohammadian, M., Morovati, F., & Rashidi, A. (2018). To predict the concern of body image based on mindfulness, experiential avoidance and metacognition beliefs in high school students. *Iran Journal of Health Education and Health Promotion*, *6*(2), 168–178.

Gwilliam, P., Wells, A., & Cartwright-Hatton, S. (2004). Dose meta-cognition or responsibility predict obsessive–compulsive symptoms: A test of the metacognitive model. *Clinical Psychology & Psychotherapy*, *11*(2), 137–144. https://doi.org/10.1002/cpp.402

Halliwell, E. (2015). Future directions for positive body image research. *Body Image*, *14*, 177–189. https://doi.org/10.1016/j.bodyim.2015.03.003

Harris, R. E., Ichesco, E., Cummiford, C., Hampson, J. P., Chenevert, T. L., Basu, N., & Zick, S. M. (2017). Brain connectivity patterns dissociate action of specific acupressure treatments in fatigued breast cancer survivors. *Frontiers in Neurology*, *8*, 298. https://doi.org/10.3389/fneur.2017.00298

Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review*, *94*(3), 319–340. https://doi.org/10.1037/0033-295X.94.3.319

Hopwood, P., Fletcher, I., Lee, A., & Al Ghazal, S. (2001). A body image scale for use with cancer patients. *European Journal of Cancer*, *37*(2), 189–197. https://doi.org/10.1016/S0959-8049(00)00353-1

Hunter, R. (2015). *Changes in body image and sexuality in rural breast cancer survivors during a weight loss and weight maintenance intervention* [Ph.D. dissertation]. University of Kansas.

Lewis-Smith, H., Diedrichs, P. C., & Harcourt, D. (2018). A pilot study of a body image intervention for breast cancer survivors. *Body Image*, *27*, 21–31. https://doi.org/10.1016/j.bodyim.2018.08.006

Male, D. A., Fergus, K. D., & Cullen, K. (2016). Sexual identity after breast cancer: Sexuality, body image, and relationship repercussions. *Current Opinion in Supportive and Palliative Care*, *10*(1), 66–74. https://doi.org/10.1097/SPC.0000000000000184

Mandavia, A., Masuda, A., Moore, M., Mendoza, H., Donati, M. R., & Cohen, L. L. (2015). The application of a cognitive defusion technique to negative body image thoughts: A preliminary analogue investigation. *Journal of Contextual Behavioral Science*, *4*(2), 86–95. https://doi.org/10.1016/j.jcbs.2015.02.003

Mangone, L., Mancuso, P., Bisceglia, I., Braghiroli, B., Ferrari, F., Vicentini, M., & Giorgi Rossi, P. (2021). Five-year relative survival by stage of breast and colon cancers in Italy. *Tumori*, *107*(4), 318–324. https://doi.org/10.1177/0300891620964565

Martinez, M. E. (2006). What is metacognition? *Phi Delta Kappan*, *87*(9), 696–699. https://doi.org/10.1177/003172170608700916

Matos, M., McEwan, K., Kanovský, M., Halamová, J., Steindl, S. R., Ferreira, N., Linharelhos, M., Rijo, D., Asano, K., Márquez, M. G., Gregório, S., Vilas, S. P., Brito-Pons, G., Lucena-Santos, P., da Silva Oliveira, M., de Souza, E. L., Llobenes, L., Gumiy, N., Costa, M. I., … Gilbert, P. (2022). Compassion protects mental health and social safeness during the COVID-19 pandemic across 21 countries. *Mindfulness*, *13*(4), 863–880. https://doi.org/10.1080/21642850.2021.1993229

McGannon, K. R., Berry, T. R., Rodgers, W. M., & Spence, J. C. (2016). Breast cancer representations in Canadian news media: A critical discourse analysis of meanings and the implications for identity. *Qualitative Research in Psychology*, *13*(2), 188–207. https://doi.org/10.1080/14780887.2016.1145774

McGinty, H. L., Small, B. J., Laronga, C., & Jacobsen, P. B. (2016). Predictors and patterns of fear of cancer recurrence in breast cancer survivors. *Health Psychology: official Journal of the Division of Health Psychology, American Psychological Association*, *35*(1), 1–9. https://doi.org/10.1037/hea0000238

Muntsant, A., Ramírez-Boix, P., Leal-Campanario, R., Alcaín, F. J., & Giménez-Llort, L. (2021). The Spanish Intergenerational Study: Beliefs, stereotypes, and metacognition about older people and grandparents to tackle ageism. *Geriatrics*, *6*(3), 87. https://doi.org/10.3390/geriatrics6030087

Mutlu, H. H., Bilican, F. I., Mutlu, H. H., & Gumus, M. (2018). A comparison of metacognitive factors among patients

with cancer and the control group. *Psycho-oncology*, *27*(4), 1277–1283. https://doi.org/10.1002/pon.4667

Neff, K. (2003). Self-compassion: An alternative conceptualization of a healthy attitude toward oneself. *Self and Identity*, *2*(2), 85–101. https://doi.org/10.1080/15298860309032

Neff, K. D. (2003). Development and validation of a scale to measure self-compassion. *Self and Identity*, *2*(3), 223–250. https://doi.org/10.1080/15298860309027

O'brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity, 41*, 673–690.

Oliveira, S., Trindade, I., & Ferreira, C. (2018). The buffer effect of body compassion on the association between shame and body and eating difficulties. *Appetite*, *125*, 118–123. https://doi.org/10.1016/j.appet.2018.01.031

Paterson, C. L., Lengacher, C. A., Donovan, K. A., Kip, K. E., & Tofthagen, C. S. (2016). Body image in younger breast cancer survivors: A systematic review. *Cancer Nursing*, *39*(1), E39–58. https://doi.org/10.1097/NCC.0000000000000251

Policardo, G. R., Nerini, A., Di Gesto, C., & Matera, C. (2021). Body Compassion Scale: A validation study in the Italian context. *European Journal of Health Psychology, 29*, N2. https://doi.org/10.1027/2512-8442/a000088

Przezdziecki, A., Sherman, K. A., Baillie, A., Taylor, A., Foley, E., & Stalgis-Bilinski, K. (2013). My changed body: Breast cancer, body image, distress and self-compassion. *Psycho-oncology*, *22*(8), 1872–1879. https://doi.org/10.1002/pon.3230

Quattropani, M. C., Lenzo, V., & Filastro, A. (2017). Predictive factors of anxiety and depression symptoms in patients with breast cancer undergoing chemotherapy. An explorative study based on metacognitions. *Journal of Psychopathology*, *23*(2), 67–73.

Quattropani, M. C., Lenzo, V., Mucciardi, M., & Toffle, M. E. (2016). Metacognition as predictor of emotional distress in cancer patients. *Life Span and Disability*, *19*(2), 221–239.

Rahmani, S., Talepasand, S., & Ghanbary-Motlagh, A. (2014). Comparison of effectiveness of the metacognition treatment and the mindfulness-based stress reduction treatment on global and specific life quality of women with breast cancer. *Iranian Journal of Cancer Prevention*, *7*(4), 184–196.

Rhondali, W., Chisholm, G. B., Filbet, M., Kang, D. H., Hui, D., Cororve Fingeret, M., & Bruera, E. (2015). Screening for body image dissatisfaction in patients with advanced cancer: A pilot study. *Journal of Palliative Medicine*, *18*(2), 151–156. https://doi.org/10.1089/jpm.2013.0588

Roussis, P., & Wells, A. (2006). Post-traumatic stress symptoms: Tests of relationships with thought control strategies and beliefs as predicted by the metacognitive model. *Personality and Individual Differences*, *40*(1), 111–122. https://doi.org/10.1016/j.paid.2005.06.019

Savioni, L., Triberti, S., Durosini, I., Sebri, V., & Pravettoni, G. (2022). Cancer patients' participation and commitment to psychological interventions: A scoping review. *Psychology & Health*, *37*(8), 1022–1055. https://doi.org/10.1080/08870446.2021.1916494

Sebri, V., Durosini, I., Mazzoni, D., & Pravettoni, G. (2022). Breast cancer survivors' motivation to participate in a tailored physical and psychological intervention: A qualitative thematic analysis. *Behavioral Sciences*, *12*(8), 271. https://doi.org/10.3390/bs12080271

Sebri, V., Durosini, I., & Pravettoni, G. (2023a). How to address the body after breast cancer? A proposal for a psychological intervention focused on body compassion. *Frontiers in Psychology*, *13*, 1085837. https://doi.org/10.3389/fpsyg.2022.1085837

Sebri, V., Durosini, I., Strika, M., Pizzoli, S. F. M., Mazzocco, K., & Pravettoni, G. (2023b). Virtual reality for the promotion of interoception awareness and body image in breast cancer survivors: A study protocol. *Frontiers in Psychology*, *14*, 1165905. https://doi.org/10.3389/fpsyg.2023.1165905

Sebri, V., & Pravettoni, G. (2023c). Tailored psychological interventions to manage body image: An opinion study on breast cancer survivors. *International Journal of Environmental Research and Public Health*, *20*(4), 2991. https://doi.org/10.3390/ijerph20042991

Selby, C. L. (2011). *Acceptance and commitment therapy for body image dissatisfaction: A practitioner's guide to using mindfulness, acceptance and values-based behavior change strategies* (A. N. Pearson, M. Heffner, & V. M. Follette, Eds.). New Harbinger Publications, 216 p. https://doi.org/10.1080/10640266.2011.584816

Thakur, M., Sharma, R., Mishra, A. K., & Gupta, B. (2022). Body image disturbances among breast cancer survivors: A narrative review of prevalence and correlates. *Cancer Research, Statistics, and Treatment*, *5*(1), 90–96. https://doi.org/10.4103/crst.crst_170_21

Thompson, J. K., Heinberg, L. J., Altabe, M., & Tantleff-Dunn, S. (1999). *Exacting beauty: Theory, assessment, and treatment of body image disturbance*. American Psychological Association. https://doi.org/10.1037/10312-000

Tiggemann, M. (2019). Relationships that cultivate positive body image through body acceptance. In *Handbook of positive body image and embodiment: Constructs, protective factors, and interventions* (pp. 214–222). Oxford University Press.

Torres, S., Sales, C., Guerra, M. P., Simões, M. P., Pinto, M., & Vieira, F. M. (2020). Emotion- focused cognitive behavioral therapy in comorbid obesity with binge eating disorder: A Pilot study of feasibility and long-term outcomes. *Frontiers in Psychology*, *11*, 343. https://doi.org/10.3389/fpsyg.2020.00343

Triberti, S., Gorini, A., Savioni, L., Sebri, V., & Pravettoni, G. (2019). Avatars and the disease: Digital customization as a resource for self-perception assessment in breast cancer patients. *Cyberpsychology, Behavior and Social Networking*, *22*(8), 558–564. https://doi.org/10.1089/cyber.2018.0461

Tylka, T. L. (2011). Positive psychology perspectives on body image. In T. F. Cash & L. Smolak (Eds.), *Body image: A handbook of science, practice, and prevention* (2nd ed., pp. 56–64). The Guilford Press.

Van Niekerk, L. M., Bromfield, H., & Matthewson, M. (2022). Physical and psychological correlates of self and body compassion in women with polycystic ovary syndrome. *Journal of Health Psychology*, *27*(11), 2566–2580. 13591053211059390. https://doi.org/10.1177/13591053211059390

Veale, D. (2004). Advances in a cognitive behavioural model of body dysmorphic disorder. *Body Image*, *1*(1), 113–125. https://doi.org/10.1016/S1740-1445(03)00009-3

Wagoner, C. W., Capozzi, L. C., & Culos-Reed, S. N. (2022). Tailoring the evidence for exercise oncology within breast cancer care. *Current Oncology (Toronto, Ont.)*, *29*(7), 4827–4841. https://doi.org/10.3390/curroncol29070383

Wells, A. (2002). *Emotional disorders and metacognition: Innovative cognitive therapy*. John Wiley & Sons.

Wells, A., & Cartwright-Hatton, S. (2004). A short form of the metacognitions questionnaire: Properties of the MCQ-30. *Elsevier Behavour Research and Therapy*, *43*(2004), 385–396.

Wells, A., & Matthews, G. (1994). *Attention and emotion: A clinical perspective*. Erlbaum.

Wells, A., & Matthews, G. (1996). Modelling cognition in emotional disorder: The S-REF Model. *Behaviour Research and Therapy*, *34*(11-12), 881–888. https://doi.org/10.1016/S0005-7967(96)00050-2

Williams, J. M. G., Duggan, D. S., Crane, C., & Fennell, M. J. (2006). Mindfulness-Based cognitive therapy for prevention of recurrence of suicidal behavior. *Journal of Clinical Psychology*, *62*(2), 201–210. https://doi.org/10.1002/jclp.20223

Williams, F., & Jeanetta, S. C. (2016). Lived experiences of breast cancer survivors after diagnosis, treatment and beyond: Qualitative study. *Health Expectations: An International Journal of Public Participation in Health Care and Health Policy*, *19*(3), 631–642. https://doi.org/10.1111/hex.12372

Yang, Y., Wen, Y., Bedi, C., & Humphris, G. (2017). The relationship between cancer patient's fear of recurrence and chemotherapy: A systematic review and meta-analysis. *Journal of Psychosomatic Research*, *98*, 55–63. https://doi.org/10.1016/j.jpsychores.2017.05.002

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*, *67*(6), 361–370. https://doi.org/10.1111/j.1600-0447.1983.tb09716.x