

Breast cancer survivor and body: Exploring self-defining memories in an intervention pilot study

Journal of Health Psychology

1–18

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DOI: 10.1177/13591053261435288

journals.sagepub.com/home/hpq



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Abstract

Breast cancer, as a traumatic experience, affects self-defining memories (SDM), including those concerning emotions about and perceptions of the body. Currently, there is a gap in the literature regarding psychological intervention focused on managing bodily memories after cancer. This pilot study investigated how self-defining memories might reflect the relationship between body image and well-being after breast cancer. Fourteen breast cancer survivors participated in an online psychological intervention consisting of six sessions, specifically targeted on self-defining memories related to the body. Standardized questionnaires were administered before and after the intervention, followed by quantitative and qualitative analyses. Quantitative findings revealed significant affective responses to self-defining memories of shame and embarrassment regarding others' judgment of their physical appearance, as well as fear and sadness stemming from subjective perceptions of illness. At the same time, qualitative findings revealed two main themes: the shock of diagnosis and the search for meanings related to cancer onset. This innovative psychological intervention could be considered an exploratory study about how to assist breast cancer survivors in gaining greater awareness of and better management of their self-defining memories related to their bodies. Potential applications of this approach in clinical treatment are discussed.

Keywords

self-defining memories, breast cancer survivors, psychological interventions, emotions, autobiographical memories

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Introduction

The role and functions of bodily memories after breast cancer

Diagnosis of breast cancer is considered a potential traumatic event associated with physical and psychological effects (Martino et al., 2019, 2021) that may also occur after the end of medical treatments (Cordova et al., 2007). On a physical level, mutilation of breast(s), and other bodily effects (e.g. hair loss, skin discoloration, and visible scars) during and after oncological treatments are often considerable, triggering feelings of shame, anxiety, and depression particularly (Hunter, 2015; Sebri et al., 2020). Accordingly, Body Image (BI), which is defined as an internal representation of one's own body and the related emotions and thoughts that accompany this bodily representation (Sebri et al., 2023), can be seriously impaired after cancer (Jabłoński et al., 2019). Perceiving lingering inner sensations often increase distress because they are associated with cancer symptoms, promoting the fear of cancer recurrence. Moreover, bodily impairments foster a negative experience of femininity and sexuality, due to the perception of sexual unattractiveness (Kneip Pelster et al., 2023). Women therefore may tend to perceive shame and embarrassment, as a complex of social emotions that involves a negative evaluation of the self (López-Castro et al., 2019).

The body is indeed a repository of sensations and thoughts, which can be characterized by high intensity and frequency after traumatic events. On a cognitive level, cancer-issues are also related to the intrusiveness of re-experiencing the traumatic experience in different ways, such as intrusive thoughts/images that mirror those experienced during diagnosis and treatment for breast cancer (Sebri et al., 2024a). Sometimes, specific traumatic memories are suppressed through defense mechanisms such as avoidance or denial of emotionally overwhelming events, which can lead to cognitive and emotional dysfunctions (e.g. intrusive thoughts, rumination, heightened anxiety). (Dalgleish and Yiend, 2006). This re-experiencing is often very

distressing and, in critical cases, becomes a psychiatric condition characterized by acute stress disorder and post-traumatic stress disorder (Dalgleish et al., 2008a). Survivors generally feel they have been transported back to the time of the trauma and the presence of nightmares; if they force themselves not to remember that aspect, the more they will reinforce their memory of the traumatic experience. At the same time, the suppression of traumatic memories may precipitate dysfunctional effects on the survivor's psychological health and cognitive re-evaluation (Samide and Ritchey, 2021). The repeated attempts to suppress a target memory appears to cause difficulty accessing specific details of the broader personal past. Research suggests that such extensive difficulties in accessing specific autobiographical memories are highly problematic. For example, reduced specificity is associated with both poorer social problem-solving and a reduced ability to predict how specific future events might occur, which impacts planning ability (Hauer et al., 2008; Moore and Zoellner, 2007; Williams et al., 2007).

On a cognitive level, re-experiencing the trauma could result in psychological benefits. The elaboration of traumatic events through intrusive memories can represent an attempt of the mind to construct a process of assimilation, integrating the event into autobiographical views of the world and self, such that any discrepancies in existential meaning are minimized. Until this assimilation occurs, the representation and re-experiencing of traumatic events is active and necessarily remains active, such that memories of the trauma intrude into consciousness starting from a minimal internal or external signal. The functional elaboration of traumatic events is a healthy and effective strategy for reducing distress and dysfunctional psychological mechanisms related to a critical event (Gross, 1998). This strategy involves reframing an ongoing event—online reappraisal—or a memory—retrospective reappraisal—by reinterpreting the experience (Ochsner et al., 2004; Wager et al., 2008), and focusing on a positive outcome (Baker et al., 2017) or finding a “silver lining” (Hermann

et al., 2014; Holland and Kensinger, 2013; Troy et al., 2010). Furthermore, some studies have found that retrospective reappraisal can be an effective way to reduce emotionality when recalling a negative event (Holland and Kensinger, 2013). Another distinctive aspect of the memories of survivors who have gone through critical and/or traumatic experiences is overgeneralizability (Williams et al., 2007), as the present event affects other life experiences. This aspect appears to be explainable through several interacting mechanisms and the one that has received the most attention is functional avoidance (Williams et al., 2007). Moreover, overgeneralizability is recruited to cope with the critical/traumatic event by blocking painful specific details of individuals' past. In contrast, self-defining memories (SDMs), as highly significant and extremely vivid memories, evoke intense emotions during narration, impacting the overgeneralizability of previous experiences (Blagov et al., 2022; Blagov and Singer, 2004; Conway et al., 2004). For this reason, addressing SDMs is crucial for supporting functional emotions in breast cancer survivors, which are helpful to support the overall well-being.

Self-defining memories

As illustrated in the Self Memory System (Conway 2005; Conway and Pleydell-Pearce, 2000), autobiographical memory is organized into a hierarchy of life periods, general events, and event-specific knowledge. The process of retrieving specific memories occurs from the top down and typically starts in one of the life periods or from a general level, which activates event-specific knowledge, and the retrieval of a specific memory. Event specific-knowledge and resulting episodic or specific autobiographical memories are strongly associated with intensive emotions due to their high level of detail and vividness (Conway et al., 2004; Conway and Pleydell-Pearce, 2000), and can result in SDMs. The content and themes of SDMs are often linked to unresolved conflicts and/or central themes of the individual's personality (Blagov and Singer, 2004). SDMs can,

therefore, integrate various common aspects of personal experiences, encouraging reflection, processing and attribution of meaning to one's memories through explanations, interpretations, insights and evaluations in relation to oneself or others—that is, meaning making—(Blagov et al., 2022; Blagov and Singer, 2004; Martino et al., 2024; Singer and Bluck, 2001).

In this regard, the association between memories and emotions is crucial. Emotional contents can impact the way in which a specific event is remembered by individuals across time. In other words, the subjective experience of specific emotions can influence the encoding, consolidation, and retrieval of autobiographical memories (Dalgleish et al., 2008b). For example, cancer patients experiencing depression and anxiety often focus on the moment of diagnosis, which is frequently accompanied by intrusive memories such as flashbacks and nightmares (Abd El Aleem et al., 2023). In this regard, the effects on autobiographical memories and the overall well-being are significant over time, considering anxiety and depression as affective disorders. Similarly, fear and sadness can significantly affect well-being, impacting both mental and physical health. For example, fear of cancer recurrence can make a disconnection with the body, which is perceived as an enemy. In this regard, a high level of sadness can predict more challenging coping with fear of cancer recurrence (Bentley et al., 2026), impacting autobiographical memories. Moreover, shame and embarrassment play a significant role in the cancer experience. Shame is defined as a self-conscious emotion with highly unpleasant feelings that can lead to a sense of immodesty and dishonor, impacting behaviors (Eyu et al., 2024). When shame and embarrassment are too high, they can prevent some women from accessing healthcare services and support (Phillips and Hanson, 2025). In contrast, some breast cancer survivors report a surprising discovery of strength and resilience by observing what their bodies endured when going through treatment, allowing for a new sense of confidence in their body (Thornton and Lewis-Smith, 2023).

Emotions can indeed impact the organization of narrative units in extended stories, with certain specific events (e.g. mammography) being particularly linked to distress and often marking turning point in the cancer care process (Sebri et al., 2024b). Therefore, a memory-focused training regimen can reduce cognitive and emotional symptoms by promoting memory specificity in a cost-effective manner (Roberts-Wolfe et al., 2021), underscoring the strong interplay among memories, their related emotions, and personal narratives. In this regard, a study by Fioretti and Smorti (2017) demonstrated that narrating dysfunctional emotions allows for the re-elaboration of illness, leading to a rehearsal of AM.

Moreover, emotions experienced at the time related to the autobiographical retrieval affect the information recalled, making some information most accessible and therefore most likely to be retrieved (Holland and Kensinger, 2010). For these reasons, the inability to emotionally process a traumatic event is a predictor of psychological issues, such as anxiety, depression, and distress. Cancer diagnosis and treatments can indeed lead to increased feelings of shame, sadness, and a persistent fear of cancer recurrence fear over the years (Martino et al., 2023).

Aim

Psychological programs for breast cancer survivors are helpful interventions to perceive social connections and support from peers, serving a valuable coping function to address ongoing bodily issues and overall well-being (Durosini et al., 2021). From a socio-constructivist perspective, traumatic events arise from the sudden and unexpected disruption of the fundamental structures that govern an individual's relationship with the external world (Janoff-Bulman, 2004; Joseph and Linley, 2005). Such events can also fracture temporal continuity, threatening the coherence of one's narrative identity (Brockmeier, 2000; Martino et al., 2026; Neimeyer, 2006). At the same time, the suffering associated with traumatic experiences—such as a cancer diagnosis—is multifaceted,

extending beyond the immediate effects of physical symptoms and treatment to encompass the individual's subjective interpretation of the event (Iskandar et al., 2021). Therefore, women not only report suffering from physical symptoms (e.g. hair loss and weight) and side effects, but also highlight the significant impact of negative emotions on their quality of life. Therefore, it is essential to develop interventions that address both the contextual dimensions, and the personal processes of meaning-making associated with such life events.

To the best of our knowledge, no previous research has evaluated the management of autobiographical memories and, particularly, SDMs that reference the body after cancer. The present research study aimed to explore the role of SDMs related to body image concerns during breast cancer journey, using a mixed analysis—both quantitative and qualitative. Particularly, our research questions were focused on the exploration of: **(RQ.1)** the association between SDMs and specific types of bodily emotions—*quantitative study*; and **(RQ.2)** the main themes related to SDMs—*qualitative study*.

Methods and materials

Institutional review board statement

This study was performed in line with the principles of the Declaration of Helsinki and approved by The Ethics Committee of the University of Milan (n45/23, 18th April, 2023).

Participants

Twenty women with a previous breast cancer diagnosis (on average, 10 years ago) voluntarily agreed to participate in the project. However, four of them were undergoing oncological treatments (i.e. chemotherapy or radiotherapy) during the project. Therefore, they were excluded from this exploratory study. Fourteen women participated in the project from start to finish. All women who began the psychological program completed all six sessions. There were no dropouts during the psychological intervention.

They met the inclusion criteria, which required them to: be 18 years or older, have a breast cancer diagnosis, not currently be undergoing oncological treatment, and understand and speak the Italian language. Exclusion criteria included cognitive impairment, inability to provide informed consent, and mental disorders that inhibited participation. Women who showed signs of metastasis were also excluded. Women completed self-administered and standardized questionnaires at the beginning, end, and 1 month after the intervention.

Procedure

The project was conducted from March to June 2023, starting from recruitment and ending in follow-up. To recruit participants for the research-intervention group project, an invitation was posted on social networks (e.g. Facebook) and sent via a commercial mailing list. Therefore, all women with a breast cancer diagnosis who were interested in participating in the present study could contact the researchers. There were no differences in participants' geographical location, given that the present intervention was online. Therefore, participants were first selected through self-selection. After receiving participants' interest via mail, the researcher selected women who met the inclusion and exclusion criteria. Eligible women received an email containing an information sheet detailing the contents of the psychological interventions, how the sessions were organized, and the request to respond to three open questions at three different times. They were also asked to sign a written consent form. The participants then took part in six online psychological sessions in a group, led by a psychologist with expertise in psycho-oncological issues. In this regard, psychologists were professionals who worked in an oncological setting for almost 5 years. A week before starting the psychological intervention, all participants were required to fill out online questionnaires on the Qualtrics platform. After the intervention, the participants responded to the same questions again at the end of the program and 1 month later. All personal

information was deleted to ensure anonymity. The textual answers were collected via a Qualtrics platform and analyzed by the research team involved in this study. No other people had access to the present data.

The following is a summary of the psychological intervention program that was conducted. The program consisted of six sessions, each lasting 2 hours and with a specific focus informed by the background described above. Specifically, the program aimed to facilitate the elaboration of emotions related to diagnosis and treatment, with the goal of fostering a new personal narrative. To achieve this, SDMs were explored with particular attention to the body, viewed as a repository of sensations and thoughts, as previously stated. Addressing the intensity and frequency of these bodily experiences can support the processing of traumatic memories. Each session involved the following contents:

- Session 1: The first session began with introductions and a brief "icebreaker" activity. The group then received a theoretical background on BI and discussed their own thoughts, emotions, and behaviors related to BI. The session ended with an exploration of individual expectations, where each participant defined their specific goals for the program.
- Session 2: Participants were asked to recall three self-defining memories related to their breast cancer journey. The psychologist guided them to elaborate on these memories and to recall specific events associated with their experience of breast cancer. The group was encouraged to engage in a reappraisal process of these self-defining memories and generate more positive perspectives on them. Additionally, emotions related to breast cancer memories were explored. Women were invited to share their memories and related emotions with the group.
- Session 3: The focus was on participants' own body perceptions before and after cancer. Each woman wrote about barriers and affirming factors in their daily relationship

with their body. Then, they shared their thoughts and emotions with the group, encouraging all participants to express what they felt. In particular, women were asked to express their emotions referring to past experiences as well as what they were currently feeling. Women were free to express their emotions, especially if related to fear of cancer and frustration. During this process, the psychologist helped participants regulate coping behaviors that actually worsen BI distress in the longer term. Specific behavioral strategies for improving positive perceptions of their body were provided.

- Session 4: Participants discussed how they perceive their own bodies while assessing others' points of view. They reflected on the relevant bodily attributes in their social and intimate relationships. The psycho-oncologist introduced functional coping behaviors and cognitive distortions in autobiographical memories, particularly, self-defining memories. Women were guided to identify dysfunctional BI-related schema (e.g. cognitive errors) and replace faulty self-talk with new positive self-expression. Additionally, the main relevant emotions and their expression was discussed as the present topic of interest;

- Session 5: Women re-presented the self-defining memories related to their own body after breast cancer that had emerged in the first meeting. They explored and defined new meanings related to these evolving autobiographic memories, starting from their emotions associated with those events. Each woman was free to manage their self-defining memories as she preferred, aiming at elaborating on traumatic events and defining new meanings related to breast cancer and its impact on the body. Women employed imagery techniques to reframe or reorient their experience of the memory narrative.

- Session 6: Women reviewed their goals before and at the end of the intervention and received feedback about attained outcomes. The psychologist promoted the integration

of autobiographical memories into the overall self to avoid self-fragmentation. Women were instructed to stay in contact with their inner sensations daily, incorporate memory restructuring exercises, and reinforce the emotional and behavioral positive consequences of these changes in their memory narratives.

Data analysis

A descriptive analysis (means and standard deviations) was performed to explore socio-demographic variables. Then, quantitative and qualitative analyses were conducted. To gain a more comprehensive and suitable understanding of the research topic under investigation, we adopted a mixed-methods approach, combining both quantitative and qualitative methods. First, correlations were conducted to identify associations between SDMs and bodily issues after breast cancer. Following a deductive approach, data were collected based on an established theoretical framework.

Second, according to the study aims, a Reflexive Thematic Analysis (RTA; Braun and Clarke, 2021) analyzed SDMs to highlight themes and subthemes. In this context, qualitative research was employed to gain a deeper understanding of the concepts under investigation through participants' experiences and reflections. Specifically, RTA—an interpretive method that is independent of other theoretical frameworks and firmly rooted within a qualitative paradigm (Braun and Clarke, 2019)—offers the opportunity to narratively explore participants' experiences, providing insights aligned with an inductive approach. RTA also allows for a flexible and comprehensive application of analytical processes. Adopting an inductive approach, we did not try to fit the data into a pre-existing frame. Starting from participants' words, the main themes emerged. Therefore, this study followed the main phases of qualitative thematic analysis using a bottom-up approach, as described by Braun and Clarke (2006). Twelve participants were sufficient to reach data saturation. Fewer patients would be

involved if saturation were reached before the 12th interview. Data saturation was reached when no new ideas or information emerged from the data collection. Initially, two researchers (MLM and VS) conducted the analysis collaboratively and reflectively, aiming to develop interpretations rich in meaning and grounded in the specific context of the survivors. The authors focused on themes emerging directly from the data, without attempting to fit them into a pre-existing coding framework (Boyatzis, 1998). This method seeks to achieve a consensus among the coders, allowing for discussion and resolution of disagreements. The analysis was conducted following this six-step process:

Phase 1: Familiarization and deep dive into the data and construction of preliminary notes.

Phase 2: Generation of initial codes, which were used to identify segments of the textual reports (semantic content). If one answer reported a single main motive or outcome, it was considered a single segment. This initial coding procedure was run with Microsoft Excel.

Phase 3. Theme generation, in which codes were grouped into main themes and sub-themes. Discrepancies between the raters were resolved through a discussion between the authors.

Phase 4. Review of Potential Themes by reviewing the thematic map created by authors.

Phase 5. Definition and naming of the themes. To further validate the thematic map, one author who did not take part in the previous phases of analysis (J.S.) reviewed the entire process and the identified themes.

Phase 6. Discussion of the results that emerged.

Questionnaires

Three questionnaires were administered before and after intervention, as follows:

Body Image After Breast Cancer Questionnaire (BIBCQ; Baxter et al., 2006): This is a self-report questionnaire to evaluate the impact of breast cancer on a woman's body image. It consists of 45 items divided into six scales: vulnerability (feelings of susceptibility to illness in the body); body stigma (feelings of self-consciousness and shyness about one's body after Breast Cancer); limitations (degree to which one feels physically competent and able bodied); body concerns (how satisfied one is with their body); transparency (feelings of being looked at after experiencing changes to one's body after surgery); and arm concerns (how one feels about the symptoms and appearance of their arms). The questionnaire is scored based on the total sum of the scores, and higher scores indicate greater disturbance to BI.

Talking About Life Experiences (TALE; Bluck and Alea, 2011): This is a brief questionnaire that measures how people use their autobiographical memories. The questionnaire comprises three subscales: Self-Function; Social Bonding and Function; and Directive Function. Each subscale has five items that are rated on a Likert scale from 1 (almost never) to 5 (very frequently).

Self-defining Memory Task (SDMT) and Self-defining Memory Rating Sheet (SDMRS): This questionnaire instructs participants to recall a self-defining memory with specific attributes, such as vividness, emotionality, repetitive recall, importance, connection to other memories, and linkage to an enduring conflict or theme in the individual's life. Participants were asked to write down two self-defining memories and rate their current affective responses to the memories on a set of 12 emotion adjectives (e.g. happy, sad, proud, ashamed, embarrassed, etc.). For the purpose of statistical analyses, memory ratings on each variable were summed and averaged across the two memories.

Given a falling off of memory responses and ratings over the subsequent time periods that

limited the number of participants to under 10, the following correlational analyses are based only on the initial 14 participants' responses at Time 1—the baseline before the group intervention took place.

Results

The sample consisted of fourteen breast cancer survivors (age range: 35–61; $M_{age}=48.64$; $SD_{age}=8.67$). The majority of participants had obtained a high school (35.71%) or a bachelor's degree (35.71%), lived in the North of Italy (57.14%), and worked as white-collar employees (92.86%). Additionally, most of the sample was currently receiving individual psychological therapy (35.71%) or received individual psychological therapy in the past (35.71%), had a partner (57.14%) and one or more children (57.14%).

Quantitative results

In order to explore the relationship of SDMs to survivors' enduring bodily concerns regarding their breast cancer experience, we first correlated the survivors' affective responses to their SDMs with the six BIBCQ subscales (please insert Table 1 here). We should note that some of the correlations that follow are of moderate strength, but the probability values do not reach significance due to the limited sample size affecting the power of the tests.

Correlations between the BIBCQ and emotions associated with recalling SDMs revealed statistically significant relationships between the Transparency Subscale and both Shame and Embarrassment ($r=0.53$, $p=0.05$; $r=0.55$, $p=0.05$, respectively). Transparency also showed a moderate correlation with Surprise as well ($r=0.50$, $p=0.06$), suggesting that individuals who expressed more awareness of others' perceptions of their changed bodies felt greater surprise or sense of shifted expectations in recalling their memories. At the same time, the moderate strength of the correlations may be due to small effect sizes, which could have prevented the statistical analyses from reaching significance.

Additionally, the Vulnerability Scale and Interest showed a strong negative effect, indicating less engagement in aspects of their memories that reflect further susceptibility to illness ($r=-0.57$, $p=0.03$). Shame and Embarrassment combined showed an even stronger positive correlation with the Transparency Scale ($r=0.73$, $p=0.005$), which would appear to be largely associated with social components of the illness. Particularly, the more someone was concerned with managing their appearance, how they fit into the world with their illness, and how they appear to others, the more likely they were to have memories incorporating shame and embarrassment within them.

Conversely, the second dimension we discovered is that sadness and fear had an inverse relationship to the Transparency Scale ($r=-0.38$, $p=0.19$; $r=-0.35$, $p=0.21$, respectively). Further, fear and sadness had a significant inter-correlation ($r=0.59$, $p=0.03$). The combination of these two increased the inverse correlation with the Transparency Scale ($r=-0.41$, $p=0.15$). It seems that women who feel sadness and fear about their tumor are less likely to focus on the social components of breast cancer, specifically how they appear to others.

These two dimensions show different sides of recovery after breast cancer treatment. To explore this further, we looked at how participants connected the function of their autobiographical memories with their emotional responses to these memories. The TALE showed a moderate negative relationship between shame and embarrassment coupled together with the Social Bonding Scale ($r=-0.49$, $p=0.09$). Shame and embarrassment are social emotions and the more a participant's autobiographical memory displays shame and embarrassment, the less likely they are to use their autobiographical memories as a vehicle to strengthen relationships. No relationship was found between the combination of fear and sadness and the Social Bonding Scale.

Qualitative results

To examine this finding further, contents of these memories and their relations with emotions were

Table 1. Correlations of BIBCQ subscales and SDM emotions for baseline breast cancer patients.

Themes	Contents of intervention	Vulnerability scale	Body stigma scale	Limitations scale	Transparency scale	Body concerns scale	Arms concerns scale
Anger	Pearson Correlation Sig. (two-tailed)	-0.17 0.56	-0.15 0.61	0.27 0.35	-0.03 0.99	0.25 0.38	0.28 0.33
Happiness	Pearson Correlation Sig. (two-tailed)	0.28 0.32	-0.01 0.95	-0.18 0.54	-0.08 0.79	0.25 0.39	-0.19 0.51
Sadness	Pearson Correlation Sig. (two-tailed)	0.04 0.88	0.01 0.96	0.32 0.27	-0.38 0.19	0.06 0.83	0.34 0.24
Fear	Pearson Correlation Sig. (two-tailed)	-0.02 0.94	-0.27 0.35	0.01 0.99	-0.35 0.21	0.02 0.95	0.37 0.19
Surprise	Pearson Correlation Sig. (two-tailed)	-0.26 0.37	-0.06 0.84	-0.11 0.70	0.50 0.06	-0.01 0.98	-0.14 0.63
Shame	Pearson Correlation Sig. (two-tailed)	-0.01 0.97	0.19 0.53	-0.040 0.891	0.53* 0.05	-0.08 0.79	-0.08 0.79
Guilt	Pearson Correlation Sig. (two-tailed)	0.32 0.28	0.54 0.06	0.346 0.247	0.225 0.459	-0.7 0.83	-0.18 0.57
Interest	Pearson Correlation Sig. (two-tailed)	-0.57* 0.03	0.01 0.99	0.35 0.22	0.08 0.98	-0.04 0.89	0.28 0.32
Embarrassment	Pearson Correlation Sig. (two-tailed)	-0.30 0.32	-0.09 0.78	0.02 0.95	0.57* 0.04	-0.90 0.77	-0.30 0.32
Contempt	Pearson Correlation Sig. (two-tailed)	-0.03 0.90	0.07 0.82	0.32 0.26	0.37 0.19	0.04 0.89	0.10 0.73
Pride	Pearson Correlation Sig. (two-tailed)	0.19 0.97	0.01 0.98	0.43 0.14	-0.28 0.36	-0.24 0.43	0.29 0.33

*Correlation is significant at the 0.05 level (two-tailed).

Table 2. Main themes and their related subthemes.

The onset of diagnosis	A search for meaning: why me?
The unexpected bad news: the intense fear and anxiety triggered by illness that is beyond one's control	The hereditary history: understand the onset of breast cancer within a family history context
An accidental discovery: the impact of memories related to the discovering breast cancer risk	The subjective explanations: identifying reasons for cancer's onset
The urgency of surgery: memories related to the need for immediate surgery as a choice for survival	The sense of bodily loss: being impotent and without contacts with one's body

examined. Specifically, we grouped the three baseline memories with scores of 3 on sadness and 1 on embarrassment. The results showed a pattern in which the memories high on sadness focused on fear and loss with regard to the diagnosis and surgery but showed little attention to one's later appearance and social interaction. Specifically, the qualitative analysis shows two themes and six subthemes (please insert here Table 2).

The first main theme is the **onset of diagnosis**. It concerns excerpts of SDMs connected to the discovery of BC diagnosis from which their illness story begins, which has remained strongly imprinted in their memories many years later. Particularly, the *unexpected bad news* strongly concerned negative emotion, such as a sense of terror and fear connected to an unexpected illness beyond one's control: "At that moment I booked the ultrasound with a positive attitude because it seemed paradoxical to me that it could happen at the same time as my sister" (ID8). Second, the *accidental discovery* concerns memories in which the discovery of the risk of BC during the daily life activities remains imprinted: "It was June 4, 2020 when I accidentally scratched my right breast and felt a ball" (ID3) and "... And while I was working in front of the PC, I felt my right breast sting. Touching my breasts, I felt a hard peanut" (ID14). Moreover, the *urgency of surgery* concerns fragments of memories in which the woman is thrown into a time horizon characterized by the urgency of surgical intervention, as a struggle, to increase the odds for her survival. This moment was associated with the

fear of sharing their emotions and, in particular, the fear of cancer, with their loved ones: "Before the holidays: I was alone, I didn't want to postpone judgment. I asked: are you really sure? Couldn't it be a false positive? No, ma'am, there's no doubt about it, surgery is needed, as soon as possible" (ID2) and "On October 1, 2020 I entered the operating room for bilateral quadrantectomy and left axillary lymph node surgery. It was the first time I was hospitalized (except when I gave birth, but it was a joyous event) and I had to do everything alone. The restrictions for Covid-19 were coming back in a heavy way, so I was forced to manage everything alone, neither my husband, nor my sister, nor my children could come in with me to share the fear or simply to understand better" (ID10).

The second main theme that emerged we labeled **a search for meaning: why me?**, which concerns excerpt of SDMs connected to the search for a subjective meaning regarding the onset of breast cancer in one's life, while simultaneously experiencing an interruption to one's self-continuity with relevant consequences on emotions. The search for an answer to the question of why me allows the woman to find meaning in the discovery of breast cancer by activating a way to make it more manageable. Subthemes reported different contents, starting from concerns and worries about a *hereditary history*, which lead women to find the explanation of the onset of breast cancer within familiar trajectory. This increases fear and worries particularly, highlighting participants' emotions: "History proved me right; I discovered the familial

mutation in myself and in other family members, actually the majority. It gave meaning to my aunt's death and I feared that I would end up the same way. Even today this fear has not left me, but I try to chase it away with arguments based on objective facts" (ID5). Second, women reported their *subjective explanations* aimed at generating reasons for the cancer's onset. In this regard, women expressed their perception of distress, referring to their perceived lack of control: "The body rebels: I was going through a stressful period of work that was affecting my well-being, I couldn't manage the work pressures and role changes I was facing in the company and I didn't have a manager who could manage the staff correctly" (ID12). Lastly, participants reported a *sense of bodily loss*, which concerns the perception of impotence and the lack of physical contact with their body: "After the surgery I didn't look at myself naked in the mirror for months, in fact I don't have any mirrors in my house except in the bathroom" (ID13), "I still don't look at myself naked in the mirror and I try to touch my operated on breasts as little as possible" (ID1), and "Who am I today? I don't know, maybe a bunch of medicine . . ." (ID4).

Discussion

The present exploratory study involved fourteen breast cancer survivors in a psychological research-intervention group aimed at managing SDMs related to cancer and the body. On a clinical level, the present psychological intervention supports deep reflection on one's own body, maintaining and improving bodily contact with inner sensations. As supported by the obtained results, women perceived their body more clearly, exploring related emotions and opinions as observed, and direct effects of the intervention. Accordingly, findings highlighted interesting outcomes related to the participants' and autobiographical memories' relationships, with a specific focus of interest in their body and its related emotions after cancer.

Quantitative analyses revealed the role of emotions, shame and embarrassment and fear and sadness particularly (Hp.1). There was a

positive association of these emotions with transparency on the BI scale, defined as concerns about the obviousness of cancer-related changes to appearance. The present results could highlight that women tend to remain focused on their BI even several years after treatment with accompanying emotional consequences. As known, oncological treatments considerably affect BI, which in turn is highly associated with shame (Trindade et al., 2018). The findings suggested that chronic illness-related shame could be a possible mediator between BI dissatisfaction and depressed mood. When we combined shame and embarrassment into a single variable, the relationship with bodily transparency tended to become markedly stronger. This finding suggests that, even years after the acute breast cancer treatment, women in recovery may still harbor powerful memories that reflect a social self-consciousness and discomfort with their appearance. In this regard, shame and embarrassment may foster a dysfunctional relationship with the body, becoming part of the experience of negative bodily memories. Uncovering this connection is crucial because their discomfort extends to both managing how they appear to others and their effort to fit into the world, despite their sense of bodily change, especially in the chest area. Therefore, emotions such as embarrassment and shame should be addressed through psychological interventions specifically targeting BI. In order to do this, it would be important to consider the role of the socio-cultural theory of BI (Thompson et al., 1999), highlighting three main factors: family, peers, and media. Specifically, the present model points out the influence of cultural and social factors on the development of "body ideals" (Schaefer et al., 2021; Wu et al., 2023). Therefore, the standard of "body ideal" has been widely disseminated by social media, leading to increased body dissatisfaction and its related dysfunctional emotions, such as shame, which can be gradually internalized by women (Evens et al., 2021) and stored in their enduring self-defining memories. These findings, coming from a pilot study, underscore the importance of further investigating the predictors of negative emotions associated with BI,

with particular attention to social factors. In contrast, sadness and fear responses to SDMs showed possible inverse relationships to the Transparency Scale. This suggests that memories focused on sad and fearful responses to the breast cancer experience tend to be less inclined to reflect concerns about social appearance and interaction. As a consequence, fear and sadness could be more related to other phases of cancer experiences, for example more immediately after diagnosis. The present findings could confirm the need to address shame and embarrassment as the primary enduring cancer-related emotions associated with BI, rather than sadness. Bodily changes may evoke discomfort in breast cancer survivors who wish to start a new life and to feel less affected by the cancer experience. However, visible bodily signs may continue to represent a disruption of the body, heightening feelings of shame related to unaesthetic changes, which are maintained in the related self-defining memories. Additionally, they may have already faced fear and sadness related to BI in earlier stages of their cancer journey, possibly at the time of diagnosis or during initial treatment. As we know, patients tend to be strongly focused on the severity and threat of cancer (Hopman and Rijken, 2015). Specifically referring to survivors, Zhang et al. (2016) reported that illness perceptions were consistent across cancer types. Higher physical symptom distress and lower optimism were linked to more negative illness perceptions. That is, the more focused one is on the immediate dangers of the cancer, the less attention one is likely to pay initially to the social consequences of the illness. It would appear that fear and sadness yield to shame and embarrassment as one moves from diagnosis and treatment to the realities of recovery. One might see the former emotions related to “subjective illness perception.” Following the Leventhal’s self-regulation theory (1984), illness perception has a fundamental impact on cognitive representations and behavioral responses, affecting the management of psychological distress (Hagger et al., 2017). However, Hopman and Rijken (2015) demonstrated the benefits obtained by alleviating dysfunctional perceptions of illness through

strengthened control beliefs. Additionally, tailoring information to patients’ needs can enhance their functional illness perceptions, leading to a more coherent understanding of their condition and potentially improving their health-related quality of life (Husson et al., 2013). Interestingly, survivors’ affective responses to SDM, as measured by the BIBCQ subscales, are not consistently strong. Beyond the limitations related to sample size, it is possible that participants may lack sufficient awareness of the connection between body and mind (Casadei, 2021). As is well established, individuals vary in their ability to recognize and interpret their emotions and thoughts. Moreover, training may be necessary to help individuals perceive and cultivate body–mind integration, enabling them to fully experience and work with this connection (Jankauskiene and Baceviciene, 2024).

Qualitative analysis highlighted two main themes of interest (Hp.2): the onset of diagnosis and the search for a meaning related to cancer onset. Cancer onset is indeed a shock that breaks up daily lives, leading to traumatic treatments, difficult medical decisions, and relevant bodily changes. In this regard, women tend to perceive their bodies as objectified due to the impact of oncological therapies. These findings underscore the importance of this project by illustrating participants’ focus on cancer-related experiences. In such cases, establishing a degree of psychological distance from the body may serve as an adaptive strategy to manage the illness, particularly in response to the initial shock, which foster fear and anxiety. In a study by Osypiuk et al. (2020), women reported the feeling of being betrayed by their body after cancer diagnosis, leading to a disconnection between body and mind. For this reason, experiencing a sense of self that is temporarily narrowed to the illness can be beneficial (Slatman et al., 2016; Trusson et al., 2016). Participation in psychological intervention focused on managing bodily issues can support the sense of body-and-mind connection, which is fundamental to assuming a holistic approach to care and the promotion of overall well-being (Haller et al., 2021). Accordingly, some current psychological interventions propose

the implementation of virtual reality to address bodily and emotional issues. To foster the body-and-mind interconnection, a protocol study showed the benefits of virtual reality improving individuals' awareness of inner sensations and feelings, which enhance the management of bodily symptoms (Blinded).

Searching for a meaning, the second macro-theme emerging in the qualitative study, is a key component for psychological well-being (Fischer et al., 2021; Fusar-Poli et al., 2020). These findings underscore the relevance of facilitating meaning-making for women who have undergone a profound rupture in their life trajectories. Specifically, it is essential for them to construct a coherent understanding of cancer as a traumatic event to be integrated into their personal narrative. Breast cancer diagnosis triggers the need to understand individuals' existence, opening up an opportunity to define what is significant and purposeful in one's life (Frankl, 1984). Diagnosis and oncological treatments, along with the subsequent awareness of mortality, can evoke negative emotions, such as distress and anxiety, due to a damaged perception about the arbitrary nature of life that can undermine one's sense of justice and ultimate meaning (Carreno and Eisenbeck, 2022; Winger et al., 2016). This can have a strong impact on illness adjustment, coping strategies, and emotions (Gravier et al., 2020; Miao and Gan, 2020). Therefore, it is fundamental to restore or rebuild individuals' meaning systems by integrating their cancer illness (situation meaning) into their overall understanding of what it means to be alive and to exist in a larger universe (see the *meaning-making model*, Almeida et al., 2022; Park, 2010).

In conclusion, the present pilot study offers in a preliminary manner a more comprehensive understanding of breast cancer survivors' sensations, perceptions, and reflections on bodily emotions and shared decision-making, combining a both quantitative and qualitative approach. On the one hand, the quantitative analysis offers potential, specific insights into emotional aspects; on the other hand, the qualitative analysis confirms and enriches these findings by exploring overlapping thoughts and life events

that are particularly relevant to women's experiences in this field. In this case, it revealed themes related to the onset of diagnosis and the subsequent search for meaning. Therefore, the combination of quantitative and qualitative findings enabled a deeper exploration of this topic, highlighting the relevance of emotions in women's experience. Specifically, results suggest that shame, embarrassment, and fear need to be addressed from the diagnosis, but that memories linked to shame and embarrassment may endure years after treatment has ended.

Conclusions

This study has provided an initial window into some of breast cancer survivors' memories' themes and the relationship of their memory affect to their enduring BI. It has highlighted how the trauma of sudden diagnosis and the break-down in meaning structures linger in narrative identity for many years after the initial surgery and recovery. Additionally, it highlights that shame, embarrassment, fear, and sadness continue to be associated with how the women experience their bodies, albeit in different ways. Our findings coming from a pilot study suggest a possible sequence of affective responses with fear and sadness associated with the cancer's initial assault on the body, followed by the emergence of social emotions of shame and embarrassment, as the survivors adjust to their changed appearance and its possible reception by others.

Future studies of this group intervention that achieve higher sustained participation in memory retrieval and ratings can provide more quantitative information about the effectiveness of the intervention and the possibility of re-framing memory narratives in more positive directions. The current preliminary findings reported here point to the importance of working with breast cancer survivors to create clinical environments where they can bring forward these memories in an atmosphere of safety and empathy with their fellow survivors. This prospect raises the possibility of greater acceptance and integration of the breast cancer experience in long-term survival through a focus on modifying important SDMs related to the oncological experience. Moreover,

this pilot project highlights how autobiographical memories can generate valuable insights into women's functioning, their coping mechanisms, and overall styles of illness adaptation. Therefore, we believe that addressing and managing autobiographical memories is fundamental not only over the long-term survival period, but from an early stage of the disease in order to support a functional sense of coherence and positive meanings. Additionally, this contribution highlights the relevance of a protected context in which women are able to explicate aspects of themselves related to their bodies and feelings. In some cases, participants incorporated other points of views held by their peers and the facilitator, which was helpful in defining their emotions and behaviors in a more constructive way. Similarly, it enabled them to normalize their understandable fragilities, recognizing the same fears and feelings in other women's stories. Lastly, the participation of all women from the beginning to the end of the study helped avoid attrition bias. At the same time, it is important to highlight the potential influence of social desirability in group-based psychological interventions. Social desirability refers to a systematic bias in which participants provide responses they perceive as more socially acceptable, rather than expressing their true thoughts or behaviors. This bias can significantly affect qualitative research, potentially leading to distorted conclusions about the phenomenon under study (Bispo Júnior, 2022). In group settings, this dynamic may inhibit emotional expression, particularly among participants who fear judgment from others (De Cristofano et al., 2024). However, the literature also emphasizes the benefits of social connection in groups, especially among individuals who share similar experiences, such as a cancer diagnosis. In these contexts, group interventions can foster a sense of understanding and cohesion, encouraging self-expression. Peer influence, therefore, can serve as a valuable source of psychological support, contributing to a positive experiential quality of the intervention (Durosini et al., 2021).

We recognize numerous limitations in this initial report. There was a low number of participants, no matched control group, lack of a

double-blind design, and no independent behavioral indices to verify participants' self-reports. In particular, the small sample size may increase the risk of a Type II error, highlighting the need for future research with a larger cohort. In this regard, sample size is too small for conclusive quantitative inference. Accordingly, involving larger samples would enhance the generalizability of the findings and improve statistical power. Further, too many participants did not follow through in providing memories at the subsequent time periods after the first period. One factor that the clinician noted is that some participants may have avoided dwelling on their memories due a learned coping strategy of blocking their retrieval. This possibility needs to be explored in more depth as future interventions are planned. Additionally, future studies could strengthen the present findings by implementing and assessing this program in multi-center institutions, which could provide information regarding obtained results in different contexts. In this regard, it would be interesting to integrate innovative tools that incorporate artificial intelligence into psychological interventions, potentially enhancing the personalization of treatment. Yet, despite these significant concerns, we see the promising findings that have emerged as setting the stage for necessary and more robust studies to follow. The memories that our participants shared tell us that there is much work to be done in continuing the healing process of their narrative identities. Lastly, future studies could assess changes in SDMs over time, particularly in terms of participants' tone and the affective valence of their memories. Accordingly, the implementation of a more integrative approach, combining both quantitative and qualitative methods, is recommended. It could offer valuable insights into the role of SDMs in the long-term wellbeing of breast cancer survivors, especially in follow-up assessments.

Acknowledgments

This work was partially supported by the Italian Ministry of Health with Ricerca Corrente and 5x1000 funds

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Ethical considerations

The studies involving humans were approved by this study was performed in line with the principles of the Declaration of Helsinki and approved by the Ethics Committee of University of Milan (n45/23, 18th April, 2023). The studies were conducted in accordance with the local legislation and institutional requirements.

Consent to participate

The participants provided their written informed consent to participate in this study. All involved participants provided their consent to take part in the study online, by ticking a box.

Consent to publication

All involved participants in the study provided to be used in a journal publication.

Author contributions

VS: Conceptualization, Formal analysis, Methodology, Project administration, Writing – original draft. MM: Data curation, Project administration, Writing – review & editing. JS: Writing – review & editing, Methodology, Supervision, Validation. KM: Writing – review & editing, Resources. AG: Writing – review & editing, Investigation. MF: Writing – review & editing, Supervision. GP: Writing – review & editing, Supervision.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Declaration of conflicting interests

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

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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