As Strong as We Are United: Effects of Intrapersonal and Interpersonal Emotion Regulation on Quality of Life in Women with Breast Cancer

Rita Moura (✉ rsmaa@iscte-iul.pt)
  ISCTE-Instituto Universitário de Lisboa   https://orcid.org/0000-0002-9727-9479
Cristina Camilo
  ISCTE-Instituto Universitário de Lisboa
Sílvia Luís
  Centro de Administração e Políticas Públicas (CAPP), Instituto Superior de Ciências Sociais e Políticas, Universidade de Lisboa (ISCSP-UL)

Research

Abstract

Background: Women diagnosed with breast cancer are often subjected to negative emotions, resulting in higher levels of emotional burden and decreased levels of well-being and quality of life. The present study aims to compare the implementation of two regulatory levels, intrapersonal and interpersonal (as social sharing of emotions) and explore their impact on breast cancer patients' perception of quality of life.

Methods: Sixty-eight women previously diagnosed with the disease participated in this study, with a mean age of 63 years old (*SD* = 11.58). Data was collected through a self-report questionnaire to assess emotional experience, intrapersonal regulation, social sharing of emotions and breast cancer-related well-being and quality of life.

Results: Data yielded that most of the participants regulated their negative emotions within social interactions and used more antecedent-focused strategies to cognitively reformulate the emotional episode. Moreover, interpersonal regulation had a greater impact on well-being and quality of life than intrapersonal regulation. In particular, the occurrence of sharing episodes and social interactions played an important and beneficial role on patients' emotion regulation.

Conclusions: These findings suggest that social sharing of emotions is an efficient process to help breast cancer patients better cope with the psychological and emotional burden of the disease, thus positively influencing the way they perceive their well-being and quality of life.

Introduction

Breast cancer is the most common type of malignant tumor among women with 2.2 million cases worldwide, although mortality numbers have been declining in recent years. [1] This phenomenon can be explained by the increase in early diagnosis and treatment effectiveness, leading to higher survival rates. [2] The diagnosis, treatment, and following remission stages often result in disruptive experiences that threaten patients' mental health and increase their emotional vulnerability. [3] As such, patients face a wide range of persistent negative emotions, with anxiety and depression being the most frequent psychological reactions associated with breast cancer. [4] Other frequent emotional responses are fear (e.g., of dying, suffering or recurrence), anger, uncertainty (e.g., about the future), shock, despair, frustration, and sometimes guilt. Once emotional vulnerability becomes acute, it can increase psychological distress and disease severity, significantly impairing treatment outcomes, recovery time, and illness adaptation, even after being cancer-free. [3, 5] Hence, an adaptative regulation is crucial to reach emotional stability and ease women's overall experience with breast cancer.

When emotions are harmful, whether because they are the wrong type, intensity, duration or frequency for a certain situation, patients can – and often try to – regulate their emotions and change the emotion trajectory, [6] manipulating which emotions are felt, when and how they are experienced and expressed throughout the emotional event. [7] Emotion regulation episodes can occur on an intrapersonal or interpersonal level with different associated psychological outcomes. Research has been mostly focused

on intrapersonal regulating processes, even though recent studies highlight that regulatory episodes often occur in social contexts. [8] In fact, it is common for individuals to influence one another's emotions and co-regulate them, determining which strategies and outcomes arise from the social regulatory episodes. [9] Particularly, intrapersonal regulation refers to strategies that people use to deal with their emotional experiences by themselves, [6] while interpersonal regulation involves the presence of others to regulate one's emotions with or through them. [8] As a result, the effectiveness of the intrapersonal processes is strongly and exclusively linked to the individuals' inner capacity to regulate their emotions alone. In interpersonal processes, others' skills are also highly relevant for the success of the regulation, which can be most helpful when individuals do not know how to adequately reduce their negative emotions and rely on others to better select effective regulatory strategies. [9–10] Both regulatory levels exist on a continuum without a clear delimitation and can be used simultaneously or interchangeably during a single regulatory episode. [11]

On the intrapersonal level, the process model of emotion regulation is the most widely used conceptual framework to explain the emotional dynamics that influence the way individuals feel, think, and act, both immediately after the emotional event and over time. [6–7] According to the model, emotion regulation strategies can be distinguished between antecedent-focused and response-focused based on their primary impact during the regulation process. Antecedent-focused strategies act before the emotional response fully develops and alter the subsequent emotion trajectory, whereas response-focused strategies act after the emotional response has already begun and seek to modify external aspects, such as behavioral expression. [12] Cognitive reappraisal, an antecedent-focused strategy, and emotional suppression, a response-focused strategy, are two well-researched examples of intrapersonal regulation processes, frequently used to reduce the impact of negative emotions. Through reappraisal, individuals think about the situation from a different perspective as an attempt to change the emotional response (e.g., thinking that the disease can potentially be a positive personal growth experience), while suppression inhibits any verbal or nonverbal expression related to the emotion (e.g., try to hide from their loved ones the emotional impact of going through another round of chemotherapy). [6] Generally, an attempt to reappraise the emotional event is considered to be more effective than suppressing it, [13] successfully redirecting the individual back to neutral or positive feelings. [14] Contrarily, suppression involves a continuous and repetitive effort to deal with the lingering and unresolved emotion, [13] which might be counterproductive, intensifying the negative emotions or even repressing the positive emotions. [15]

On the interpersonal level, social sharing of emotions is one of the most frequent responses to an emotional event, considering that when people experience an emotion, they tend to feel a pressing need to talk about it, with 80–95% of the episodes being socially shared. [16] During these social encounters, people openly talk about the circumstances and emotions associated with the event. [17] The two-mode model states that even though verbalization is beneficial, it is not enough to effectively deal with an emotional event. It is also necessary to have in consideration the way people share their emotions. This model differentiates between two sharing modes: socio-affective sharing and cognitive-sharing. Socio-affective sharing involves a listener that gives a supportive response based on comfort, validation, and

empathy. For instance, letting them know that it is normal to feel upset for being diagnosed with breast cancer. This mode is usually more effective during the initial phase, leading to a temporary state of emotional relief. Conversely, cognitive sharing involves a listener that stimulates the other person to work towards reformulating or reassessing the meaning of the emotional event, considerably reducing its' negative impact. For example, helping one understand they are coping the best way possible given the circumstances. The premise of the model is that to achieve a positive and prolonged emotional recovery, both modes need to be implemented during the sharing episode. Thus, individuals not only feel supported by others, but also actively resolve the emotional stressor associated with the negative event. [16–17] For the purposes of the study, cognitive sharing is considered to have a focus on the antecedents of the emotion (i.e., thoughts) and socio-affective to be focused on the emotional response (i.e., emotional expression) to allow the comparison between intrapersonal and interpersonal regulation models.

Research demonstrates that both regulatory levels have been used among breast cancer patients. On the intrapersonal level, the use of suppression is linked to worse mental health outcomes (e.g., negative humor, anxiety, and psychological distress), whereas the use of reappraisal is strongly associated with better outcomes (e.g., emotional self-efficacy, benefit finding, and posttraumatic growth), referring to the notion that cognitive strategies are often more adaptative. [18–21] Despite the limited number of studies regarding interpersonal regulation, research indicates that the vast majority of cancer patients benefit from socially sharing their emotions (e.g., [22]). In particular for breast cancer, a higher level of sharing avoidance was correlated to higher levels of psychological distress and intrusive thoughts. [23] Ultimately, both levels of emotion regulation influence the way women diagnosed with breast cancer perceive their current situation, playing an important role on their perception of quality of life. Cella [24] defends that quality of life in patients diagnosed with chronic diseases involves two underlying components: multidimensionality and subjectivity. The first component refers to the multiple dimensions of well-being that constitute quality of life, namely physical well-being (e.g., symptoms, treatments' side effects), functional (e.g., physical capacity, mobility), emotional (e.g., negative feelings, concerns) and social (e.g., close relationships, social support). For breast cancer in particular, there is another dimension associated to the disease's specific concerns (e.g., feelings of femininity, swelling in the arms). The second component is related to the notion that quality of life is a subjective construct that can only be evaluated from the patient's perspective, through self-reporting. As such, the way breast cancer patients perceive their lives, illness and treatments, determines the way they perceive their quality of life. [24–25] Recent studies show that patients that use adaptative strategies, such as reappraisal and overall sharing, more frequently perceive their quality of life to be better in comparison to when they use strategies typically considered more dysfunctional, like suppression or sharing avoidance. [18, 26–27]

Current Study And Objectives

Few studies have compared intrapersonal and interpersonal emotion regulation processes and health outcomes, and to the best of our knowledge, none in the breast cancer field. Little is known about which

level of regulation presents a better impact in breast cancer patients, especially since the relation between social sharing of emotions and breast cancer is still in need of further research.

The present study contributes to this area by exploring the effects of two levels of emotion regulation - intrapersonal and interpersonal - on quality of life in women previously diagnosed with breast cancer. Recollection was used as a strategy to assess these constructs during the active phase of the disease, including the diagnosis and treatment stages. For each regulation level, two well-researched strategies were selected based on their primary focus during the regulation process. On the intrapersonal level, cognitive reappraisal (antecedent-focused) and emotional suppression (response-focused) were selected, while cognitive sharing (antecedent-focused) and socio-affective sharing (response-focused) were considered on the interpersonal level (see Table 1).

Table 1

Levels and strategies of emotion regulation

Emotion regulation level		
Type of strategy	*Intrapersonal*	*Interpersonal*
Antecedent-focused	Cognitive reappraisal	Cognitive sharing
Response-focused	Emotion suppression	Socio-affective sharing

First, we aim to explore which emotion regulation level - intrapersonal or interpersonal - and which type of regulatory strategy – antecedent-focused or response-focused - were most implemented by breast cancer patients to regulate their negative emotions. Likewise, we also assess the levels of consistency in using these strategies, that is, whether the same type of strategy – antecedent-focused or response-focused – was employed consistently through both regulatory levels. Secondly, we compare which level of regulation had a greater influencing role on patients' perception of quality of life and explore the direction of the relation between these processes.

Materials And Methods

Sample Determination

To determine the adequate sample size to test the first objective, that is, explore the regulatory level and type of strategy most implemented to regulate negative emotions, we first conducted a priori power analysis that indicated that the required minimum sample size for a two-way repeated measures ANOVA was between 36 and 16 participants, with 95% power to detect medium to large sized effects, for an alpha of .05. To test the second objective, that is, compare the influencing role of the regulatory level on patients' perception of quality of life, a priori power analysis indicated that the required minimum sample size for multiple regression analyses with five predictors was between 63 to 138 participants, with 95% power to detect a medium to large sized effects, for an alpha of .05 (GPower; [28]). Therefore, we defined that the minimum sample size would be 63.

Participants

Sixty-eight women previously diagnosed with breast cancer participated in this study, with ages ranging from 34 to 81 years old (M = 63.49, SD = 11.58). Participants were recruited with the collaboration of two breast cancer support associations that were able to accommodate our request to collect data in their headquarters.

About 57.4% of the participants were married and 57.6% were retired. Regarding educational levels, 46.3% completed school up to the 9th grade, 23.9% graduated from high school and 29.8% earned an academic degree. On average, participants had been diagnosed for 118 months (SD = 89.19) and completed their treatments 90 months (SD = 90.49) prior to the study. Of the total, 89.7% of the cases were primary breast cancer cases. All participants underwent surgery, of which 66.2% were mastectomies and 33.8% were lumpectomies. Additionally, they also underwent radiation therapy (70.6%), chemotherapy (58.8%) and hormone therapy (55.9%). The vast majority did not have breast reconstruction surgery (78.5%). About 76.5% had no psychological follow-up and 77.9% did not participate in support groups sessions. Only 10 participants were still undergoing hormone therapy at the time they participated in the study.

Measures

Data was collected through a self-report paper questionnaire divided in three main sections. In the first section, participants were asked to recall an experience during their diagnosis or treatment phase in which they felt a strong negative emotion, and then completed the emotional experience, intrapersonal regulation and social sharing measures. In the second section, they assessed quality of life based on the time they were undergoing treatments. The third section included questions about their sociodemographic and clinical information. All items were adapted to be written in the past tense to redirect participants' answers towards the active phase of the disease.

Emotional Experience

The importance of the emotional experience was measured with one item (i.e., "to what extent do you believe the emotional experience was important to you), rated on a seven-point scale, ranging from 1 (Not very important) to 7 (Very much important). The emotional response was measured with The Self-Assessment Manikin (SAM) by Bradley and Lang. [29] SAM is a non-verbal pictorial scale with three items to assess the valence, arousal, and dominance associated with the reaction to an emotional experience. Responses are rated on a nine-point scale, ranging from a frowning figure to a smiling one in the valence dimension, from a sleepy figure to a wide-eyed one in the arousal dimension, and from a small figure to a big one in the dominance dimension. Overall, higher values indicate positive valence, higher levels of arousal and greater control over the situation.

Intrapersonal Emotion Regulation

Intrapersonal regulation was measured using the Portuguese version of the Emotion Regulation Questionnaire (ERQ), adapted to the oncological context by Brandão and collaborators, [18] originally by Gross and John. [15] ERQ is a self-report questionnaire with 10 items to assess two main regulatory strategies, cognitive reappraisal with six items (e.g., "I have controlled my emotions by changing the way I think about the situation I'm in"), and emotional suppression with four items (e.g., "I have controlled my emotions by not expressing them"). Responses are rated on a seven-point scale, ranging from 1 (Strongly disagree) to 7 (Strongly agree). Higher values indicate a greater use of the regulatory strategies. Internal consistency analyses revealed a good Cronbach α value of .81 for reappraisal and an acceptable Cronbach α value of .76 for suppression.

Social Sharing of Emotions

To measure social sharing of emotions, 14 items were adapted from key studies in the area (e.g., [16, 22, 30–31]) to assess the most relevant indicators of the regulatory process: need to share, sharing occurrence, and sharing benefits. The need to share with someone was evaluated with one item (i.e., "did you feel the need to share the emotion related to your experience"), and the benefits of sharing were measured with four items (e.g., "do you believe sharing was beneficial for you"). The benefits indicator also included two items to measure the sharing modes, socio-affective (i.e., "do you believe the person you shared your experience with tried to support you") and cognitive (i.e., "did the person you shared your experience with encouraged you to look at the situation from a different perspective"). Responses are rated on a seven-point scale, ranging from 1 (Not at all) to 7 (Very much). The remaining item assessed the sharing occurrence (i.e., "at the time, did you talk with someone about that experience and/or emotion"). Responses are rated on a seven-point scale, ranging from 1 (I did not share) to 7 (I shared a lot). In all items, higher values indicate greater social sharing indicators. Internal consistency analyses revealed a good Cronbach α value of .87 for the sharing benefits variable.

Breast Cancer-related Quality of Life

Quality of life was measured using the Portuguese version of Functional Assessment of Cancer Therapy – Breast (FACT-B) by Brady and collaborators, [25] translated and provided by FACIT. FACT-B is a self-report questionnaire with 37 items to assess quality of life in breast cancer patients from a

multidimensional perspective. This measure includes five subscales: physical well-being with seven items (e.g., "I had a lack of energy"), social and family well-being with seven items (e.g., "I felt close to my friends"), emotional well-being with six items (e.g., "I felt sad"), functional well-being with seven items (e.g., "I was able to work [including work at home]"), and additional concerns associated with breast cancer with 10 items (e.g., "I was short of breath"). Responses are rated on a five-point scale, ranging from 0 (Not at all) to 4 (Very much). Higher values indicate a better breast cancer-related quality of life. Internal consistency analyses revealed good Cronbach α values: .86 for physical well-being, .81 for social and family well-being, .79 for emotional well-being, .85 for functional well-being and .80 for additional concerns. Additionally, the overall scale revealed an acceptable Cronbach α value of .70.

Procedure

This study was approved by the Ethics Committee and the president of each breast cancer support association. Participants were invited to take part in a study about emotion regulation and quality of life in breast cancer. Each participant read and signed an informed consent form, guaranteeing the anonymity and confidentially of their responses. They were also informed that their participation was voluntary, and they were free to withdraw at any moment. Given the sensitive topic, participants were encouraged to contact the researchers if they needed psychological support following their participation. Paper-based questionnaires were completed individually at the associations' headquarters, in a single 20-minute session. When requested, participants had the assistance of a researcher to facilitate their understanding and completion of the questionnaire.

Results

Statistical analyses were performed using SPSS software, version 27, with a 95% confidence interval. Descriptive analysis demonstrated that recalled emotional experiences were perceived as important for the participants. The emotional response was neutral, and participants reported feeling moderately activated with the experience, with some control over it. The results are summarized in Table 2.

Table 2 *Descriptive Statistics for the Emotional Variables and Quality of Life*

Variables	Minimum	Maximum	Mean	Std. error
Emotional experience				
Importance	1	7	5.52	1.59
Valence	1	9	4.60	2.32
Arousal	1	9	5.25	2.34
Dominance	1	9	5.93	2.68
Intrapersonal regulation				
Cognitive reappraisal	1	7	5.08	1.30
Emotional suppression	1	7	3.94	1.64
Interpersonal regulation				
Need to share	1	7	4.60	1.94
Sharing occurrence	1	7	4.82	1.80
Sharing benefits	1	7	5.25	1.72
Cognitive sharing mode	1	7	5.16	2.11
Socio-affective sharing mode	1	7	5.64	1.87
Quality of life				
Physical well-being	0	4	2.27	1.05
Social and family well-being	0	4	2.96	0.80
Emotional well-being	0	4	2.64	0.82
Functional well-being	0	4	2.41	0.81
Additional concerns	0	4	2.39	0.76
Breast cancer-related quality of life	0	20	12.66	2.89

Regarding intrapersonal emotion regulation, participants used more cognitive reappraisal to deal with the emotional burden than emotional suppression. As for the interpersonal regulation, not only participants reported feeling the need to moderately share their experiences, but they actively shared them with other people. The sharing benefits indicator revealed a higher score, suggesting that participants found the

sharing process to be a positive and beneficial regulatory process. Socio-affective sharing was used more frequently than cognitive sharing. Overall, participants perceived their quality of life to be average during the time they were undergoing breast cancer treatments. Social and family well-being and emotional well-being were perceived to be better than physical well-being, functional well-being, and additional concerns specific to breast cancer.

Comparisons Between Regulatory Levels And Strategies

The first aim of the study was to explore which regulatory level and type of strategy were most implemented during the active phase of the disease and analyze the consistency of strategy implementation in each regulatory level. A two-way repeated measures ANOVA was conducted to examine the effects of the regulatory level (intrapersonal versus interpersonal) and type of strategy (antecedent-focused versus response-focused) on emotion regulation. Both factors were within-subject.

The results yielded a significant main effect of regulatory level, $F_{(1, 66)} = 12.49$, $p = .001$, $\eta^2_p = .16$. Scheffe post hoc comparisons indicated that participants regulated their negative emotions more within their social interactions ($M = 5.40$, $SD = 1.90$) than individually ($M = 4.54$, $SD = 1.73$). Results also revealed a significant main effect of type of strategy, $F_{(1, 66)} = 5.34$, $p = .024$, $\eta^2_p = .08$. Post hoc tests using Scheffe correction demonstrated that participants preferred using more antecedent-focused strategies ($M = 5.14$; $DP = 1.38$) to cognitively reformulate the emotional experience than response-focused strategies ($M = 4.81$; $DP = 1.23$). There was a significant interaction effect between regulatory level and type of strategy, $F_{(1, 66)} = 34.15$, $p < .001$, $\eta^2_p = .34$. Results can be observed in Fig. 1.

The degree of implementation of antecedent-focused strategies was relatively constant across regulatory levels, suggesting that participants tended to implement this type of strategy, such as reappraisal and cognitive sharing, regardless of the regulatory level they were using at the time. The oppositive effect can be observed for response-focused strategies, namely suppression and socio-affective sharing. When women had a stronger preference to implement suppression on an intrapersonal level to cope with their negative emotions, they would not engage in a socio-affective sharing with other people and vice-versa.

Effects of Emotion Regulation on Breast Cancer-related Quality of Life

The second aim was to explore the relationship between the levels of emotion regulation and breast cancer-related quality of life. Multiple linear regressions were conducted to predict quality of life based on intrapersonal regulation and social sharing of emotions. Bootstrapping was used in the regression analyses, as it has a relatively higher power for detecting smaller effects. All models were statistically significant, meaning that the emotion regulation variables contributed to explain the variation of these dimensions. Analysis results are summarized in Table 3.

Table 3 *Regression Analyses for Quality of Life Measures*

	B	SE B	t	p
Physical well-being				
Constant	2.26	.90	3.09	.014
Cognitive reappraisal	0.13	.12	1.20	.240
Emotional suppression	-0.01	.10	-0.10	.935
Need to share	-0.32	.11	-3.25	.005
Sharing occurrence	0.22	.13	2.08	.074
Sharing benefits	-0.04	.07	-0.48	.516

$R^2 = 0.16$; $R^2_{adjusted} = 0.09$; $F_{(5,61)} = 2.37$; $p = .050$

	B	SE B	t	p
Social and family well-being				
Constant	0.93	.57	1.76	.108
Cognitive reappraisal	0.14	.10	1.80	.139
Emotional suppression	0.08	.07	1.35	.226
Need to share	-0.02	.08	-0.22	.837
Sharing occurrence	0.05	.08	0.64	.528
Sharing benefits	0.15	.09	2.48	.103

$R^2 = 0.25$; $R^2_{adjusted} = 0.18$; $F_{(5,61)} = 3.98$; $p = .003$

	B	SE B	t	p
Emotional well-being				
Constant	2.62	.59	4.85	.001
Cognitive reappraisal	0.03	.09	0.41	.736
Emotional suppression	0.02	.06	0.34	.717
Need to share	-0.31	.08	-4.23	.002
Sharing occurrence	0.22	.08	2.80	.016
Sharing benefits	0.03	.08	0.39	.739

$R^2 = 0.25$; $R^2_{adjusted} = 0.19$; $F_{(5,61)} = 4.02$; $p = .003$

	B	SE B	t	p
Functional well-being				
Constant	0.73	.62	1.35	.271
Cognitive reappraisal	0.10	.09	1.20	.294

Emotional suppression	0.12	.06	2.01	.049
Need to share	-0.22	.08	-3.02	.010
Sharing occurrence	0.28	.10	3.58	.009
Sharing benefits	0.07	.07	1.09	.359
$R^2 = 0.23$; $R^2_{adjusted} = 0.17$; $F_{(5,61)} = 3.70$; $p = .005$				
Breast cancer-related additional concerns				
Constant	2.17	.54	4.15	.001
Cognitive reappraisal	0.04	.08	0.56	.582
Emotional suppression	0.03	.06	0.49	.627
Need to share	-0.23	.07	-3.32	.002
Sharing occurrence	0.23	.08	2.98	.011
Sharing benefits	-0.02	.07	-0.39	.746
$R^2 = 0.18$; $R^2_{adjusted} = 0.12$; $F_{(5,61)} = 2.75$; $p = .026$				
Breast cancer-related quality of life				
Constant	8.71	2.18	4.61	.002
Cognitive reappraisal	0.45	.30	1.58	.135
Emotional suppression	0.25	.23	1.15	.274
Need to share	-1.10	.27	-4.31	.001
Sharing occurrence	0.10	.33	3.63	.010
Sharing benefits	0.18	.28	0.82	.512
$R^2 = 0.26$; $R^2_{adjusted} = 0.20$; $F_{(5,61)} = 4.28$; $p = .002$				

The physical well-being model ($F_{(5,61)} = 2.37$, $p = .050$) explained 9%, the social and family well-being model ($F_{(5,61)} = 3.98$, $p = .003$) explained 18%, the emotional well-being model ($F_{(5,61)} = 4.02$, $p = .003$) explained 19%, the functional well-being model ($F_{(5,61)} = 3.70$, $p = .005$) explained 17%, the additional breast cancer-related concerns model ($F_{(5,61)} = 2.75$, $p = .026$) explained 12%, and the breast cancer-related quality of life model ($F_{(5,61)} = 4.28$, $p = .002$) explained 20% of the total variance of the dimension. The analysis shows that the need to share was a negative and significant predictor in all models, with the exception of social and family well-being model, meaning that higher levels of need to share are associated with worse physical, emotional, and functional well-being, as well as worse breast-cancer related concerns and quality of life. By contrast, sharing occurrence was a positive and significant

predictor, that is, the more the emotional episode was shared with other people, the better was the physical, emotional, and functional well-being, and the perception of breast-cancer related concerns and quality of life. Moreover, suppression was a positive and significant predictor of functional well-being, which means that the more patients suppressed their feelings, the better was their functional well-being. Overall, these results suggest that interpersonal regulation had a greater impact on breast cancer patients than intrapersonal regulation.

Discussion

Breast cancer is an invasive disease that carries profound implications for the well-being and quality of life of the affected population. Women diagnosed with this disease repeatedly have to learn how to adapt and effectively deal with its' negative impact, relying on different regulation processes. This study focuses on the established relationship between emotion regulation and quality of life in breast cancer patients.

The first objective was to compare the implementation of intrapersonal and interpersonal regulatory levels and antecedent-focused and response-focused type of strategies. The results yielded significant emotion regulation patterns. For instance, participants actively chose to engage more in social sharing episodes, suggesting that when the opportunity is given, they rather seek others' help to assist them than regulate their negative emotions in isolation. In crisis situations, people often face a discrepancy between the difficulty of the problem and the resources they have available to cope with it. [32] Hence, if breast cancer patients do not believe they have sufficient resources to deal with the emotional burden and vulnerabilities associated with the disease, they might find intrapersonal regulation to be particularly difficult to implement. Interpersonal regulation works as an extra source of support and abilities that go beyond the personal regulatory skills, allowing them to overcome such obstacles (e.g., [10]). Likewise, the greater need to share might be associated with how patients perceive their emotion regulation self-efficacy. If they believe to be lower when dealing with emotions on their own, they might feel more confident regulating them with others, thus preferring to use interpersonal regulation strategies.

Participants also used antecedent-focused strategies more than response-focused strategies. Since cognitive strategies tend to be more effective, resulting in better emotional outcomes, [13] it is possible that women are able to recognize its' benefits and seek to implement them more often as a way to significantly reduce the levels of arousal and negative impact in the short and long-term. Moreover, the use of these strategies was consistent across regulatory levels. Given that reappraisal and cognitive sharing are based on the same premise, that is, to effectively deal with an emotional event, one needs to engage in cognitive reformulation processes to alter the experience's subjective meaning, [15–16] these strategies can be considered equivalent, operating at different regulatory levels. These results suggest that it is likely for patients to implement the same type of strategy, as long as it is consistent with the established regulation goal, with the regulatory level representing only a means through which the goal is achieved. However, the opposite pattern emerged for response-focused strategies, possibly because they are based on different theoretical assumptions. Suppression actively seeks to not express what is being

felt, [15] whereas socio-affective sharing implies that the person freely displays their feelings to others. [16] Thus, when one is being employed, the other is automatically rejected as a potential strategy to use.

The second objective was to explore the relationship between intrapersonal and interpersonal regulatory processes and quality of life in breast cancer patients during the active phase of the disease. The results show that emotion regulation significantly contributed to explain differences in the perception of social and family well-being, emotional well-being, and breast cancer-related quality of life. Considering the previous results, the implementation of interpersonal regulation might improve the perception of social and family well-being, and the use of cognitive strategies can promote emotional well-being. Therefore, this result supports the notion that social sharing strengthens the social and positive ties between the people involved in the regulatory process. [33]

When comparing the two regulatory levels under study, the analysis confirmed that interpersonal regulation, particularly the social sharing indicators, had a greater impact on the perception of quality of life and the social and emotional dimensions than intrapersonal regulation. On the interpersonal level, data shows that sharing occurrence positively contributed to the perception of physical, emotional, and functional well-being, and to breast-cancer related concerns and quality of life. Despite the notion that verbalization is not sufficient, this finding indicates that, with the exception of social and family well-being, most social sharing indicators become irrelevant since the mere occurrence of sharing is sufficient to promote the perception of quality of life. As such, the most important factor is the social interactions through which women can actively share their feelings and resolve them, regardless if the sharing mode employed is socio-affective, cognitive, or mixed. Data also yielded a negative relation between need to share and physical, emotional and functional well-being, as well as additional concerns and quality of life. Higher levels of need to share might be counterproductive, especially if patients feel that their urge to talk has not been satisfied, which leads to a lower satisfaction with the sharing event or even with the listeners, resulting in a poorer perception of quality of life. This result is similar to the one found in Boinon and collaborators' [34] study, where patients who were not satisfied with listeners' reactions during sharing episodes presented more negative emotions.

On the intrapersonal level, recent studies have been showing that cognitive reappraisal is associated with better quality of life, while emotional suppression presents an inverse relation (e.g., [18, 27]). However, this pattern was not observed in the present study. First, reappraisal did not have an impact on quality of life or its social and emotional dimensions. Secondly, suppression had an opposite effect to the one generally found in the literature. The more participants suppressed their feelings, the better was their perception of functional well-being. When experiencing or recalling breast cancer experiences, there is a higher risk for strong emotion-eliciting episodes, which might discourage patients to actively try to deal with the negative emotions. It is possible that they feel that by inhibiting thoughts and repressing their feelings, they can continue to work, function properly (e.g., better mobility and sleep), or even enjoy life. Hence, the option to suppress represents a way to avoid the negative consequences that can arise from the emotion regulation process. This result is congruent with Rimé and collaborators' [35] study, where victims of terrorist attacks felt that sharing reactivated and prolonged the emotional negative impact.

The results should be interpreted with caution. As a correlational study, causality relations cannot be established between variables. Additionally, most of the women who resorted to the breast cancer associations had already finished their treatment cycle prior to the study. As such, given the retrospective nature of the study, it is also possible that participants were at risk of a recall bias. It could be interesting for future studies to compare the intrapersonal and interpersonal emotion regulation processes during the active and remission phase of breast cancer, and further explore the individual and social factors that have an impact on the efficacy of each regulatory level and type of strategy. Furthermore, only negative emotions were considered in the study given its' persistent nature in this context, but future research should consider the role of positive emotions in each regulatory level and assess its' potential as a protection factor against the disease.

Conclusions

Our results can be groundbreaking. As previously mentioned, studies focused on the role of interpersonal regulation, and comparative studies between intrapersonal and interpersonal regulation are limited in the oncological context, contrary to the vast majority of studies on the role of intrapersonal regulation. This study recognizes the importance of taking into consideration different levels of emotion regulation when adapting to the disease in order to enhance one's quality of life. Since interpersonal regulation revealed a greater and more positive impact, it might be particularly helpful for breast cancer patients to engage in regulatory processes with their most immediate social relationships (e.g., family and close friends), as long as they are willing to get involved in the sharing process. Similarly, and in line with recent research (e.g., [36]), group intervention, support groups, or even online forums also represent powerful emotion regulation tools as they provide a safe environment where breast cancer patients can express their feelings, share their thoughts and disease-related concerns, trade useful information, and learn new techniques to better manage their condition. In return, these women feel more empowered, and get the support they need to cope with the disease from people that are in similar situations. In sum, interpersonal regulation has the potential to help breast cancer patients better respond to the disease, ultimately helping them lead a more adaptive and positive live.

Declarations

Ethics approval and consent to participate

This study was approved *a priori* by the ISCTE-IUL's Ethics Committee (Parecer 11/2018) and the president of each breast cancer support association. Each participant read and signed an informed consent form.

Consent for publication

Not applicable.

Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy and ethical restrictions.

Competing interests

The authors declare that they have no competing interests.

Funding

Authors' contributions

Conceptualization: Rita Moura, Cristina Camilo, and Sílvia Luís; Investigation: Rita Moura; Methodology: Rita Moura and Cristina Camilo; Formal Analysis: Cristina Camilo and Sílvia Luís; Visualization and Data Presentation: Rita Moura and Sílvia Luís; Writing – original draft and Writing – review & editing: Rita Moura, Cristina Camilo and Sílvia Luís.

Acknowledgments

References

1. Global Cancer Observatory. Estimated number of incident cases and deaths worldwide, females, all ages [Internet]. GCO: International Agency for Research on Cancer; 2020 [cited 2020, Dec 18] Available from: https://gco.iarc.fr/today/home.
2. American Cancer Society. Cancer Facts &. Figs. 2020. Atlanta, Georgia: American Cancer Society; 2020. 76 p. Report No.: 500820-Rev 6/20.
3. Ng CG, Mohamed S, Kaur K, Sulaiman AH, Zainal NZ, Taib NA. Perceived distress and its association with depression and anxiety in breast cancer patients. PLoS ONE. 2017 Mar 15;12(3). https://doi.org/10.1371/journal.pone.0172975.
4. Maass SW, Roorda C, Berendsen AJ, Verhaak PF, de Bock GH. The prevalence of long-term symptoms of depression and anxiety after breast cancer treatment: A systematic review. Maturitas 2015 Apr. 2015;29(1):100–8. https://doi.org/10.1016/j.maturitas.2015.04.010. 82) .
5. Brandão T, Schulz MS, Matos PM. (2016). Psychological adjustment after breast cancer: A systematic review of longitudinal studies. Psychooncology. 2017 Jul 20;26(7):917 – 26. https://doi.org/10.1002/pon.4230.
6. Gross JJ. Emotion regulation: Current status and future prospects. Psychol Inq. 2015 Mar 9;26(1):1–26. https://doi.org/10.1080/1047840X.2014.940781.

7. Gross JJ. The emerging field of emotion regulation: An integrative review. Rev Gen Psychol. 1998 Sep;1(3):271–99. https://doi.org/10.1037/1089-2680.2.3.271. 2) .

8. Barthel A, Hay A, Doan SN, Hofmann SG. Interpersonal emotion regulation: A review of social and developmental components. Behav Change. 2018 Oct 18;35(4):203 – 16. https://doi.org/10.1017/bec.2018.19.

9. Marroquín B, Tennen H, Stanton AL. Coping, emotion regulation, and well-being: Intrapersonal and interpersonal processes. In: Robinson MD, Eid M, editors. The happy mind: Cognitive contributions to well-being. Switzerland: Springer International Publishing; 2017. pp. 253–74.

10. Levy-Gigi E, Shamay-Tsoory SG. Help me if you can: Evaluating the effectiveness of interpersonal compared to intrapersonal emotion regulation in reducing distress. J Behav Ther Exp Psychiatry. 2017 Jun;55:33–40. https://doi.org/10.1016/j.jbtep.2016.11.008.

11. Williams WC, Morelli SA, Ong DC, Zaki J. Interpersonal emotion regulation: Implications for affiliation, perceived Support, relationships, and well-being. J Pers Soc Psychol. 2018;115(2):224–54. https://doi.org/10.1037/pspi0000132.

12. Gross JJ. Antecedent- and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. J Pers Soc Psychol. 1998;74(1):224–37. https://doi.org/10.1037/0022-3514.74.1.224.

13. Webb TL, Miles E, Sheeran P. Dealing with feeling: A meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation. Psychol Bull. 2012;138(4):775–808. https://doi.org/10.1037/a0027600.

14. McRae K. Cognitive emotion regulation: A review of theory and scientific findings. Curr Opin Behav Sci 2016 Aug;10:119 – 24. https://doi.org/10.1016/j.cobeha.2016.06.004.

15. Gross JJ, John OP. Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. J Pers Soc Psychol. 2003;85(2):348–62. https://doi.org/10.1037/0022-3514.85.2.348.

16. Brans K, Mechelen IV, Rimé B, Verduyn P. The relation between social sharing and the duration of emotional experience. Cogn Emot. 2013 Jan 30;27(6):1023-41. https://doi.org/10.1080/02699931.2012.762758.

17. Rimé B. Emotion elicits the social sharing of emotion: Theory and empirical review. Emot Rev. 2009 Jan 1;1(1):60–85. https://doi.org/10.1177/1754073908097189.

18. Brandão T, Schulz MS, Gross JJ, Matos PM. The Emotion Regulation Questionnaire in women with cancer: A psychometric evaluation and an item response theory analysis. Psychooncology. 2017 Dec 23;26(10):1647-53. https://doi.org/10.1002/pon.4356.

19. Guimond A, Ivers H, Savard J. Is emotion regulation associated with cancer-related psychological symptoms?. Psychol Health. 2018, Dec 5;34(1):44–63. https://doi.org/10.1080/08870446.2018.1514462.

20. Nakatani Y, Iwamitsu Y, Kuranami M, Okazaki S, Shikanai H, Yamamoto K, et al. The relationship between emotional suppression and psychological distress in breast cancer patients after surgery.

Jpn J Clin Oncol. 2014 Jul 15;44(9):818–25. https://doi.org/10.1093/jjco/hyu089.

21. Sears SR, Stanton AL, Danoff-Burg S. The yellow brick road and the emerald city: Benefit finding, positive reappraisal coping and posttraumatic growth in women with early-stage breast cancer. Health Psychol. 2003;22(5):487–97. https://doi.org/10.1037/0278-6133.22.5.487.

22. Cantisano N, Rimé B, Muñoz-Sastre MT. The social sharing of emotions in HIV/ AIDS: A comparative study of HIV/AIDS, diabetes and cancer. J Health Psychol. 2012 Nov 5;18(10):1255–67. https://doi.org/10.1177/1359105312462436.

23. Boinon D, Sultan S, Charles C, Stulz A, Guillemeau C, Delaloge S, Dauchy S. Changes in psychological adjustment over the course of treatment for breast cancer: The predictive role of social sharing and social support. Psychooncology. 2013 Oct 10;23(3):291 – 98. https://doi.org/10.1002/pon.3420.

24. Cella DF. Quality of life: Concepts and definition. Pain Symptom J Manage. 1994 Apr 3;9(3):186 – 92. https://doi.org/10.1016/0885-3924(94)90129-5.

25. Brady MJ, Cella DF, Mo F, Bonomi AE, Tulsky DS, Lloyd SR, et al. Reliability and validity of the Functional Assessment of Cancer Therapy-Breast quality-of-life instrument. J Clin Oncol. 1997;15(3):974–86. https://doi.org/10.1200/JCO.1997.15.3.974.

26. Lai C, Borrelli B, Ciurluini P, Aceto P. Sharing information about cancer with one's family is associated with improved quality of life. Psychooncology. 2016 Dec 9;26(10):1569-75. https://doi.org/10.1002/pon.4334.

27. Lu Q, Tsai W, Chu Q, Xie J. Is expressive suppression harmful for Chinese American breast cancer survivors?. J Psychosom Res. 2018 Jun;109:51–6. https://doi.org/10.1016/j.jpsychores.2018.03.171.

28. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behav Res Methods. 2007 Sep;10:39:175–91. https://doi.org/10.3758/bf03193146.

29. Bradley MM, Lang PJ. Measuring emotion: The Self-Assessment Manikin and the semantic differential. J Behav Ther Exp Psychiatry. 1994 Mar;25(1):49–59. https://doi.org/10.1016/0005-7916(94)90063-9.

30. Duprez C, Christophe V, Rimé B, Congard A, Antoine P. Motives for the social sharing of an emotional experience. J Soc Pers Relat. 2014 Sep 10;32(6):757–87. https://doi.org/10.1177/0265407514548393.

31. Nils F, Rimé B. Beyond the myth of venting: Social sharing modes determine the benefits of emotional disclosure. Eur J Soc Psychol. 2012 Apr 17;42(6):672 – 81. https://doi.org/10.1002/ejsp.1880.

32. Caplan G. Principles of preventive psychiatry. New York: Basic Books; 1964. 304p.

33. Rimé B. Comment. Social integration and health: Contributions of the social sharing of emotion at the individual, the interpersonal, and the collective level. Emot Rev. 2018 Jan 25;10(1):67–70. https://doi.org/10.1177/1754073917719330.

34. Boinon D, Sultan S, Charles C, Rosberger Z, Delaloge S, Dauchy S. How social sharing and social support explain distress in breast cancer after surgery: The role of alexithymia. J Psychosoc Oncol. 2012 Sep 10;30(5):573 – 92. https://doi.org/10.1080/07347332.2012.703769.

35. Rimé B, Páez D, Basabe N, Martínez F. Social sharing of emotion, post-traumatic growth, and emotional climate: Follow-up of Spanish citizen's response to the collective trauma of March 11th terrorist attacks in Madrid. Eur J Soc Psychol. 2010 Sep 9;40(6):1029-45. https://doi.org/10.1002/ejsp.700.

36. Hamama-Raz Y, Pat-Horenczyk R, Perry S, Ziv Y, Bar-Levav R, Stemmer SM. The effectiveness of group intervention on enhancing cognitive emotion regulation strategies in breast cancer patients: A 2-year follow-up. Integr Cancer Ther. 2015 Sep 29;15(2):175 – 82. https://doi.org/10.1177/1534735415607318.
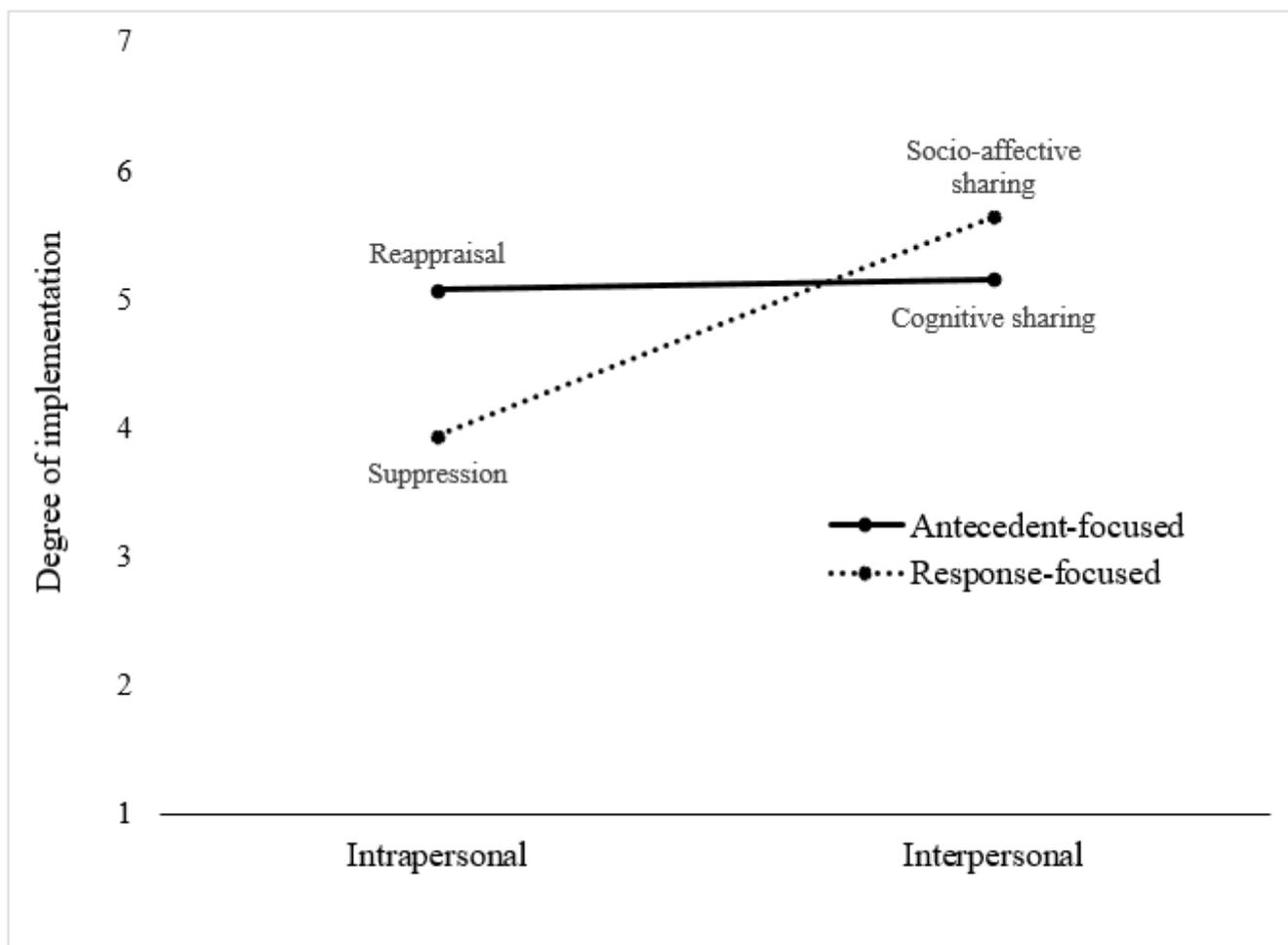
Figures

Figure 1

Interaction effect between regulatory level and type of strategy