Mediterranean Journal of Clinical Psychology

ISSN 2282-1619

MJCP

*Volume 12, n 2, 2024*

**Articles**

# Emotional traits, self-care and emotional regulation in young early-stage breast cancer women: an observational study on survivorship psychological adaptation

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## Abstract

*Background:* Cancer can be a chronic condition and breast cancer diagnosis may impact many aspects of life with significant reductions in emotional functioning and self-care behaviors. The aim of the study was to examines relationship among individual psychological dimensions, self-care and emotional regulation processes and investigate the mediating role of emotion regulation process for disease management in breast cancer.

*Methods:* An observational study was conducted. Thirty-eight breast cancer patients (M 45.2±sd 7.87) participated in the study. The sample was distributed in two groups by time from diagnosis (median 14,5 months): Early and Long groups. The psychological battery was administered during clinical follow-ups: Depression Anxiety Stress Sscale-21, Difficulties in Emotion Regulation Scale-20, Self-Care of Chronic Illness Inventory.

*Results:* Significant differences on psychological dimensions emerged by time from diagnosis. Long group experienced lower self-efficacy ($p = 0.002$), higher depression ($p = 0.014$) and lack of emotional clarity ($p = 0.004$). Controlling for time from diagnosis, negative correlations emerged between self-efficacy and depression ($p = 0.020$, $r = -0.382$), stress ($p = 0.033$, $r = -0.351$), lack of emotional clarity ($p = 0.040$, $r = -0.339$), also positive correlations emerged between emotion dysregulation and psychological distress indexes. Finally, mediation analysis showed the significant effect of lack of emotional clarity on self-efficacy ($\beta$=-0.192; SE=1.304; $p<0.021$; CI=-5.56– -0.45).

*Conclusions:* This evidence suggests that the relationship between time from diagnosis and self-efficacy is mediated by emotional dysregulation. Emotional regulation process seems to be a mediating factor in the management of breast cancer in long time. Limitations of the study include a small sample size, residual confounding variables, the lack of longitudinal data. Our findings highlighted that young breast cancer patients were emotionally challenged by ongoing clinical path and underscored the need in clinical practice to provide psychological screening of emotional regulation process in order to implement tailored psychological support to improve health outcomes and enhance women's well-being in survivorship. In clinical setting, the integrated approach could realistically allow early detection and treatment of psychological factors such as emotional dysregulation that could negatively interfere with long-term disease management impacting self-care abilities.

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**Keywords:**

Breast cancer; Clinical psychology; Chronic illness; Emotion regulation; Self-care.

**Received:** 4 June 2024

**Accepted:** 20 August 2024

**Published:** 30 August 2024

**Citation**: Guerra, F., Cilli, E., Cogodi, E., & Ranieri, J. (2024). Emotional traits, self-care and emotional regulation in young early-stage breast cancer women: an observational study on survivorship psychological adaptation. *Mediterranean Journal of Clinical Psychology 12*(2). https://doi.org/10.13129/2282-1619/mjcp-4225

## 1. Introduction

Breast cancer (BC) is a type of cancer that begins as a growth of cells in the breast tissue; it can start in one or both breasts. Cancer starts when cells begin to grow out of control. BC can start from different parts of the breast (i.e. lobules, ducts, nipple, stroma, blood vessels and lymph vessels, other tissues in the breast) and can spread when the cancer cells get into the blood or lymph system and then are carried to other parts of the body. There are many different types of breast cancer. The type is determined by the specific kind of cells in the breast that are affected. BC typically affects women, but it can also affect men (Barzaman et al., 2020).

BC is the most common cancer for european women. In Europe in 2022, there were 374,836 women newly diagnosed with BC and 95,829 BC deaths (European Commission, n.d.). However, early detection and more effective treatment mean that women are living longer with a history of BC and associated treatment. For many women, cancer survival now means living with a chronic condition.

BC survivors are burdened with ongoing complex medical regimens requiring self-care of health behaviors, including recommendations for monitoring, screening, and managing the potential late and long-term effects of treatment. In a sense, medical success has created new challenges. Self-care is the primary means of caring for a chronic condition such cancer. It is estimated that >99% of the day-to-day care for chronic illness is performed by the person who is ill and family caregivers (Riegel et al., 2018). When one has a chronic illness, self-care addresses the behavioural requirements to maintain stability and control symptoms. Specifically, Self-Care Maintenance refers to those behaviours used by persons with a chronic illness to maintain physical and emotional stability. These health promoting behaviours (e.g., smoking cessation, preparing healthy food) or illness-related behaviours (e.g., taking medication as prescribed) are used to maintain stability and prevent an exacerbation. Self-care Monitoring refers to the process of observing oneself for changes in signs and symptoms (e.g., body listening). These behaviours are needed for early detection of a health change. Self-Care Management is the response to signs and symptoms when they occur. These behaviours can be done autonomously or in consultation with a healthcare provider, depending on the messages given by the provider about independent modifications of therapies. Once a change in signs or symptoms is identified, self-care management is required to control the situation before it escalates and requires urgent or emergent care. Moreover, Self-efficacy refers to individuals' beliefs about their ability to achieve positive outcomes by performing a course of action, irrespective of the challenges and difficulties involved. Self-efficacy drives behavioural actions through increasing cognitive

understanding and control over the situation, upturning self-regulatory power, and reducing emotional reaction towards the difficulties encountered (Myles et al., 2020, 2021). As such, self-efficacy shapes one's level of commitment and persistence to manage a specific situation (Bandura, A., 1997). Self-efficacy is theoretically identified as a core antecedent of self-care, and in chronic illness, higher self-efficacy is associated with higher self-care.

Long-term self-care for BC survivors can significantly impact women's physical, psychosocial, and emotional health and well-being (De Vincenzo et al., 2022; Di Giuseppe et al., 2020; King et al., 2024; Magalhães et al., 2023; Nasution & Afiyanti, 2024; Tolsa & Malas, 2022). Di Giacomo et al. (2019) showed unchanged high trend of psychological distress and depression for the three years following diagnosis, and higher levels of anger ($F(3.59)$; $p = 0.000$) and anxiety ($F(1.86)$; $p = 0.02$) in subsequent timepoints after diagnosis (Di Giacomo et al., 2019). Survivorship can be associated with significant psychological morbidity; in Europe the prevalence of anxiety is 38 % (95%CI 17–59 %, k = 9) and the prevalence of depression is 29 % (95%CI 24–35 %, k = 17) (Martinez-Calderon et al., 2024) in BC patients. Posttreatment, 94% of women have at least one emotional concern, such as fear of recurrence, feel grief, identity issues, or emotional distress, anxiety and depression, which may persist for up to 10 years following diagnosis (Carreira et al., 2018; Lovelace et al., 2019). Complex self-care of health behaviors place additional challenges on cognitive and emotional processing (Cannioto et al., 2023; Godfrey et al., 2010). The management of cancer survivorship is based on the self-care ability: acquiring specific skills and developing coping strategies to achieve healthy goals, to improve adaptive behaviors, and then to promote the self-efficacy (Abdollahi et al., 2022; Akıncı et al., 2021). Such demands deplete the resources needed for everyday self-care, contributing to poor regimen adherence (Neuman & Schumacher, 2023). Effective processing of emotional stimuli can minimize negative psychological symptoms, which reduce patients' ability to attend to self-care.

Emotion regulation has been conceptualized as a process by which individuals modulate emotions and how they experience and express them, consciously and unconsciously, to appropriately respond to stressors common in patients with chronic condition (Gross, 2002). Inability to effectively manage emotions triggered by a health event can diminish self-care activities and impact mental and physical health (De Ridder et al., 2008). Specifically, emotion regulation impacts determination of situations worth attending to, such as attending to self-management of disease. This selection of attention and the thoughts regarding stimuli impact subsequent behavioral changes. Differences in the regulations of emotions may partially explain difficulties with disease self-care and further poor health outcomes. Emotion regulation has

been shown to impact behaviors in healthy individuals; however, the few studies that measured emotion regulation in chronic illness limit understanding of behavioral responses to health stressors (Wierenga et al., 2017). Generally, greater difficulties in emotion regulation were associated with poorer self-management behaviors in chronic diseases (Kollin et al., 2024). Based on these studies, we hypothesise that cancer is also characterised by difficulties in self-care skills like other chronic diseases, with which it shares the characteristics of long survivorship and need for self-management. The empirical literature showing the impact of emotion regulation in BC population has not been previously investigated in depth maybe because cancer is now beginning to be considered a chronic disease thanks to medical and pharmacological successes that allow for greater treatment possibilities and longer survivorship, unlike other established chronic diseases such as cardiovascular diseases and diabetes, which have been extensively studied in the aspects of emotional regulation and self-care (Ahmad & Joshi, 2023; Coccaro et al., 2021; Riegel et al., 2017; Trudel-Fitzgerald et al., 2024).

The mediating effect of emotion regulation on the relationship between survivorship timing and self-care has yet to be studied; therefore, the present study examines the relationship among psychological functioning, self-care skills and emotional regulation processes and specifically the mediating role of emotion regulation process for disease management in young women with BC.

### 1.1 Study hypotheses

We hypothesised that:

- time from diagnosis may negatively influence psychological functioning and self-care;
- negative emotions and emotion dysregulation are negatively correlated to self-care skills;
- emotional regulation processes may influence self-care skills long after diagnosis in BC women in the survivorship.

## 2. Materials and Methods

### 2.1 Ethical Approval

This study was approved by the Institutional Review Board (IRB) of the University of L'Aquila (Code 49/2020-21). Signed informed consent, based on the Declaration of Helsinki (World Medical Association. WMA DECLARATION OF HELSINKI [Internet]. 2008.

Available from: Https://Www.Wma.Net/Policies-Post/Wma-Declaration-of-Helsinki-Ethical-Principles-for-Medical-Research-Involving-Human-Subjects/ , n.d.) was mandatory.

### 2.2 Participants

Participants were BC patients having mean age of 45.2 ± 7.87. We contacted 45 eligible patients, and 38 of them provided informed consent: 2 patients were not interested in participating, 3 of them claimed no time for participation, and then 2 were not appropriate for language (they didn't speak Italian).

Inclusion criteria were as follows: (a) age range = 18-55 years old, (b) diagnosis of breast cancer TNM stage I-III, (c) informed consent. Exclusion criteria were: (a) recurrent or metastatic cancer, (b) premorbid depression and/or anxiety, (c) alcohol or substance abuse, (d) psychiatric or neurological signs. The participants were recruited in ASL1 Abruzzo Healthcare system.

The demographic characteristics of the sample are presented in Table 1.

**Table 1.** Sociodemographic and clinical data of the sample

| **Sociodemographic indexes** | **Sample (N. 38)**<br>**M 45.2 sd± 7.78** |
|---|---|
| **Education (%)** | |
| *No high school* | 18,5 |
| *High school degree* | 42,1 |
| *Undergraduate degree* | 39,5 |
| **Occupation (%)** | |
| *Unemployed* | 26,3 |
| *Employed* | 42,1 |
| *Self-employed* | 31,6 |
| **Marital status (%)** | |
| *Married/with partner* | 78,9 |
| *Divorced* | 7,9 |
| *Single* | 13,2 |
| **Number of children (%)** | |
| *0* | 23,7 |
| *1* | 15,8 |
| *≥2* | 60,5 |
| **Clinical indexes** | |
| **Primary surgical treatment (%)** | |
| *Mastectomy* | 39,5 |
| *Lumpectomy* | 60,5 |

| | |
|---|---|
| **Pharmacological treatment* (%)** | |
| *Chemotherapy* | 47,1 |
| *Hormonal therapy* | 82,4 |
| *Radiotherapy* | 64,7 |
| **TNM stage (%)** | |
| *0* | 26,3 |
| *I* | 52,6 |
| *II* | 13,2 |
| *III* | 7,9 |
| **Histological subtype (%)** | |
| *NST* | 18,4 |
| *ILC* | 5,3 |
| *DCIS* | 10,5 |
| *IDC* | 65,8 |
| **Immunophenotype (%)** | |
| *Luminal A* | 40,0 |
| *Luminal B-* | 23,3 |
| *Luminal B+* | 16,7 |
| *HER2+- non-Luminal* | 10,0 |
| *TN* | 10,0 |

Note. * = drugs are not mutually excluding, TNM = tumor, nodes, metastases, NST = no special type, IDC = invasive ductal carcinoma, ILC = invasive lobular carcinoma, DCIS = ductal carcinoma in situ, TN = triple negative.

### 2.3 Measures

#### 2.3.1 Socio-demographic and clinical characteristics

Two types of participant information were collected. First, demographic and clinical variables were collected by medical records. Demographic data were marital status, having children, being employed, education. Clinical data were related to cancer stage, histological subtype, immunophenotype, pharmacological and surgical treatment. Second, psychological measurements have been conducted by digital testing by touch screen technological solution (tablet).

#### 2.3.2 Psychological measurement

Psychological battery was composed of standardized tests measuring emotional traits (depression, anxiety, stress), Self-care, and Emotion Regulation variables. Psychological

assessment was conducted during scheduled medical follow-up. All tests were applied by Italian population adaptation.

**2.3.2.1 Depression Anxiety Stress Scales 21 (DASS-21)** – Italian version (Bottesi et al., 2015)

The DASS-21 is a test that measures the degree of severity of n.3 emotional indexes: depression, anxiety, and stress over the previous week. The Depression subscale assesses symptoms such as dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia (item example: "I couldn't seem to experience any positive feeling at all"). The Anxiety subscale evaluates symptoms such as autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect (item example "I was worried about situations in which I might panic and make a fool of myself"). The Stress subscale measures symptoms related to difficulty relaxing, nervous arousal, and being easily upset/agitated, irritable/over-reactive, and impatience (item example "I found it difficult to relax"). It is composed of 21 items (each of the three DASS-21 scales contains 7 items) based on four-point Likert-type scale. Scores for depression, anxiety and stress are calculated by summing the scores for the relevant items. The original version was developed by Lovibond and Lovibond (1995) and its internal consistency reliability for the scale scores ranged from .82 to .97 in clinical and nonclinical samples. The Italian DASS-21 version has good internal consistency and validity.

**2.3.2.2 Self-Care of Chronic Illness Inventory (SC-CII)** – Italian version (De Maria et al., 2021)

The SC-CII is a 20-item questionnaire based on five-point Likert-type scale to assess the selfcare competence in chronic disease. The self-care is the decision-making process involving illness management related to the health promoting; the test is featured by 4 indexes: a) self-care maintenance, b) self-care monitoring, c) self-care management, and self-efficacy. Self-care maintenance reflects primarily health promoting and maintenance behaviours such as exercise and taking medication as prescribed (item example "Keep appointments for routine or regular health care?"). Self-care monitoring involves checking oneself for changes in signs and symptoms (item example "Monitor your health condition?"). Self-care management reflects the response to changes in signs or symptoms when and if they occur (e.g. adjusting diet or medication based on detection and interpretation of symptoms) (item example "Call your healthcare provider for guidance?"). Self-efficacy refers to an individual's belief in his or her capacity to execute behaviours necessary to produce specific performance attainments (item

example "Persist in following the treatment even when difficult?"). The scoring is based on sub-scale for each self-care indexes (cut-off is 70). The original version was developed by Riegel et al. (2018) and was adequate in reliability and validity. The Italian SC-CII has shown adequate validity and reliability across populations with supportive fit indices in confirmatory factor analysis (e.g., comparative fit index (CFI) ranged between 0.93 and 1.00 in the three scales) and reliability (reliability coefficients for all the three scales ranged from 0.67 to 0.86).

**2.3.2.3 Difficulties in Emotion Regulation Scale-20 (DERS-20)** – Italian version (Lausi et al., 2020)

The DERS-20 is a test to assess individual differences in the ability to identify, accept and manage emotional experiences. The test is composed of 5 indexes: a) Nonacceptance of emotional responses (item example "When I'm upset, I feel ashamed with myself for feeling that way"); b) Difficulty engaging in goal-directed behaviour (item example "When I'm upset, I have difficulty getting work done"); c) Impulse control difficulties (item example "When I'm upset, I feel out of control"); d) Lack of emotional awareness (item example "I pay attention to how I feel"; e) Lack of emotional clarity (item example "I have no idea how I am feeling"). Participants are asked to indicate how often the items apply to themselves, with responses ranging from 1 to 5, where 1 is almost never (0–10%), 2 is sometimes (11–35%), 3 is about half the time (36–65%), 4 is most of the time (66–90%), and 5 is almost always (91–100%). Higher scores suggest greater problems with emotion regulation. The original version was developed by Gratz and Roemer (2008). The overall original DERS score had good test–retest reliability over a period ranging from 4 to 8 weeks ($\varrho I = .88$, $p < .01$). The test–retest reliability of the DERS subscales was adequate ($\varrho Is = .69$ for NONACCEPTANCE, .69 for GOALS, .57 for IMPULSE, .68 for AWARENESS, .89 for STRATEGIES, and .80 for CLARITY; all $ps < .01$). The Italian DERS-20 has a good internal consistency ($\alpha = 0.90$) and the five-factor scales also have a satisfactory consistency, with a value of $\alpha$ ranging between .84 and .92. The total scale's alpha has a value that is good, which means that the scale's reliability can be considered solid; the consistency of each factorial scale has alpha ranges from questionable to good.

**2.4 Procedures**

Medical staff in the Medical Oncology Division at San Salvatore Hospital – L'Aquila, Italy identified eligible patients, who were then enrolled during a scheduled follow-up by medical protocol. Eligible participants were offered participation in the study by medical staff during their follow-up visit. Participation in this study was voluntary, and the submission of a signed

informed consent form was mandatory. After signing the informed consent, participants were seated in a quiet dedicated room with trained psychologists who explained the psychological battery. Trained psychologists were blinded to the objectives of the study. The participants completed the tests independently, but the psychologist was always present in the room until completion for any clarification by participants. The participants took approximately 30 minutes to complete the psychology battery. Data were collected anonymously. Independent clinical psychologists scored the tests.

### 2.5 Statistical Analyses

We conducted the observational study to evaluate emotional characteristics, emotion regulation, and self-care process in young BC patients. All data were carefully double-checked for possible miscoding, distribution of values, and updating of missing values. Continuity variables were described using Median and SD (Medians, Standard Deviations). Categorical variables are described in percentages. Participants were divided into groups based on diagnosis timing (i.e., Early and Long groups). Descriptive statistics were conducted to analyze the emotional dimensions and behavioral characteristics. Non-parametric One-way analysis of variance (ANOVA) and partial correlation analysis were conducted using the emotional and behavioral data (dependent variables) and diagnosis timing (independent variable) collected from participants. Then, general mediation analysis was conducted to verify the relationship between time from diagnosis (independent variable) and self-efficacy (dependent variable) by emotional dysregulation (mediator variable). All statistical analyses were performed by Jamovi stat software (The Jamovi project, 2023). The level of significance adopted was $p < 0.05$.

## 3. Results

Participants were BC patients having mean age of 45.2 ± 7.87 years; most patients (52,6%) had a localized cancer (TNM I cancer stage), 65,8% of tumors were invasive ductal carcinoma, 40% were Luminal A molecular subtype. 60,5% of the patients undergone a lumpectomy surgical intervention, most patients (82,4%) were in hormonal therapy. Demographic and clinical data are reported in Table 1.

Descriptive analyses were conducted on emotional and behavioral data: Table 2 reported the mean values (and standard deviations) of the participants in psychological testing.

**Table 2**. Psychological characteristics of participants

| | Sample | | |
|---|---|---|---|
| **Test** | Early group (N.19) M ±sd | Long group (N.19) M ±sd | Total (N.38) M ±sd |
| **DASS-21** | | | |
| ***Depression*** | 5.68±6.71 | 13.47±11.13 | 9.58±9.89 |
| ***Anxiety*** | 6.95±7.81 | 13.68±12.49 | 10.32±10.83 |
| ***Stress*** | 12.11±9.01 | 18.32±10.92 | 15.21±10.36 |
| **SC-CII** | | | |
| ***Maintenance*** | 69.08±14.35 | 73.19±18.11 | 71.13±16.25 |
| ***Monitoring*** | 72.21±8.79 | 65.26±17.23 | 68.74±13.95 |
| ***Management*** | 66.95±11.14 | 57.26±22.83 | 62.11±18.38 |
| ***Self-Efficacy*** | 44.53±5.77 | 39.42±7.23 | 41.97±6.95 |
| **DERS-20** | | | |
| ***Non acceptance*** | 7.63±2.91 | 9.32±4.68 | 8.47±3.94 |
| ***Awareness*** | 9.11±3.57 | 8.68±3.93 | 8.89±3.71 |
| ***Goals*** | 8.74±4.49 | 9.79±3.57 | 9.26±4.04 |
| ***Clarity*** | 4.63±2.01 | 6.84±2.43 | 5.74±2.47 |
| ***Impulse*** | 6.32±3.80 | 6.63±3.39 | 6.47±3.55 |

First, our statistical analyses were focused on the emotional experience and self-care behaviors of patients in the time period after BC diagnosis. The participants were divided into two groups by diagnosis timing (median 14,5 months): Early (<14,5 months) and Long (>14,5 months). The non-parametric One-way ANOVA (Kruskal-Wallis) was performed comparing the behavioral (SC-CII) and emotional (DASS-21, DERS-20) data by Early and Long groups. Statistical analyses showed significant differences: Long group showed lower Self-efficacy (SC-CII) ($p = 0.022$), higher depression ($p = 0.018$) and higher difficulties in emotional clarity ($p = 0.006$) than Early group. In Table 3 and Figure 1 are represented detailed data.

**Table 3.** One-Way ANOVA (Non-parametric) on emotional and behavioral dimensions in Early and Long groups.

Kruskal-Wallis

| | $\chi^2$ | df | p |
|---|---|---|---|
| **SC-CII** | | | |
| *Maintenance* | 1.053 | 1 | 0.305 |
| *Monitoring* | 1.433 | 1 | 0.231 |
| *Management* | 1.446 | 1 | 0.229 |
| *Self-efficacy* | 5.258 | 1 | 0.022* |
| *Self-Care Tot* | 0.292 | 1 | 0.589 |
| **DASS-21** | | | |
| *Depression* | 5.557 | 1 | 0.018* |
| *Anxiety* | 1.489 | 1 | 0.222 |
| *Stress* | 3.034 | 1 | 0.082 |
| **DERS-20** | | | |
| *Non acceptance* | 0.549 | 1 | 0.459 |
| *Awareness* | 0.249 | 1 | 0.618 |
| *Goals* | 2.511 | 1 | 0.113 |
| *Emotional clarity* | 7.593 | 1 | 0.006* |
| *Impulse* | 0.280 | 1 | 0.597 |

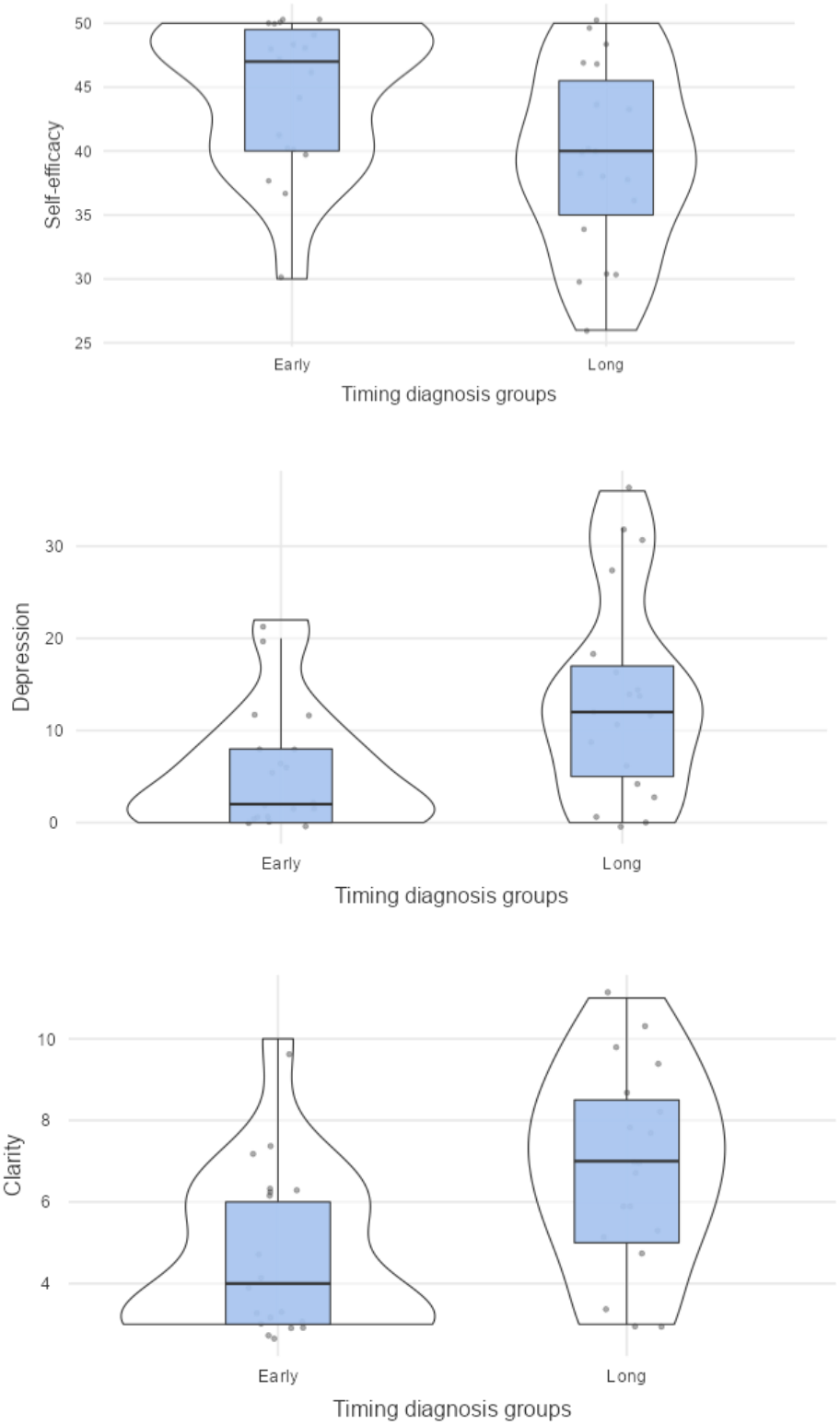


**Figure 1**. Violin Plots for SC-CII, DASS-21 and DERS-20 scoring in timing diagnosis groups

Suddenly, we wanted to analyze correlation between examined psychological dimensions (see Table 4).

**Table 4**. Partial Correlation Matrix (Pearson's r) of emotional dimensions of the sample

| | | Maintenance | Monitoring | Management | Self-efficacy | Depression | Anxiety | Stress | Non acceptance | Awareness | Goals | Clarity | Impulse |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maintenance | Pearson's r | — | | | | | | | | | | | |
| | p-value | — | | | | | | | | | | | |
| Monitoring | Pearson's r | 0.314 | — | | | | | | | | | | |
| | p-value | 0.058 | — | | | | | | | | | | |
| Management | Pearson's r | 0.069 | 0.157 | — | | | | | | | | | |
| | p-value | 0.685 | 0.353 | — | | | | | | | | | |
| Self-efficacy | Pearson's r | -0.024 | 0.338 * | -0.150 | — | | | | | | | | |
| | p-value | 0.889 | 0.041 | 0.374 | — | | | | | | | | |
| Depression | Pearson's r | 0.214 | -0.124 | 0.218 | -0.382 * | — | | | | | | | |
| | p-value | 0.204 | 0.465 | 0.194 | 0.020 | — | | | | | | | |
| Anxiety | Pearson's r | 0.139 | 0.017 | 0.129 | -0.232 | 0.817 *** | — | | | | | | |
| | p-value | 0.413 | 0.923 | 0.447 | 0.167 | < .001 | — | | | | | | |
| Stress | Pearson's r | 0.263 | -0.031 | 0.261 | -0.351 * | 0.770 *** | 0.709 *** | — | | | | | |
| | p-value | 0.116 | 0.856 | 0.118 | 0.033 | < .001 | < .001 | — | | | | | |
| Non acceptance | Pearson's r | 0.111 | 0.242 | 0.142 | -0.234 | 0.168 | 0.150 | 0.276 | — | | | | |
| | p-value | 0.514 | 0.150 | 0.401 | 0.163 | 0.320 | 0.375 | 0.098 | — | | | | |
| Awareness | Pearson's r | -0.452 ** | -0.076 | -0.002 | -0.251 | -0.036 | 0.009 | -0.028 | 0.187 | — | | | |
| | p-value | 0.005 | 0.655 | 0.991 | 0.134 | 0.834 | 0.957 | 0.870 | 0.268 | — | | | |

| | | Maintenance | Monitoring | Management | Self-efficacy | Depression | Anxiety | Stress | Non acceptance | Awareness | Goals | Clarity | Impulse |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goals | Pearson's r | 0.302 | 0.235 | -0.032 | 0.070 | 0.393 * | 0.466 ** | 0.372 * | 0.542 *** | -0.270 | — | | |
| | p-value | 0.069 | 0.161 | 0.850 | 0.680 | 0.016 | 0.004 | 0.023 | < .001 | 0.107 | — | | |
| Clarity | Pearson's r | -0.171 | -0.154 | 0.173 | -0.339 * | 0.399 * | 0.374 * | 0.268 | 0.341 * | 0.602 *** | 0.236 | — | |
| | p-value | 0.311 | 0.362 | 0.307 | 0.040 | 0.015 | 0.023 | 0.109 | 0.039 | < .001 | 0.159 | — | |
| Impulse | Pearson's r | 0.249 | 0.236 | -0.014 | -0.078 | 0.396 * | 0.397 * | 0.437 ** | 0.712 *** | -0.006 | 0.695 *** | 0.164 | — |
| | p-value | 0.137 | 0.159 | 0.932 | 0.648 | 0.015 | 0.015 | 0.007 | < .001 | 0.973 | < .001 | 0.331 | — |

Note. controlling for 'Diagnosis timing'

Note. * p < .05, ** p < .01, *** p < .001

Controlling for time from diagnosis, Pearson's test evidenced negative correlations between Self-efficacy and Depression ($p$ = 0.020, $r$ = -0.382), Stress ($p$ = 0.033, $r$ = -0.351) and lack of Emotional clarity ($p$ = 0.040, $r$ = -0.339); negative correlation emerged between Maintenance and Awareness ($p$ = 0.005, $r$ = -0.452); also positive correlations emerged between Goals and Depression ($p$ = 0.016, $r$ = 0.393), Anxiety ($p$ = 0.004, $r$ = 0.466), Stress ($p$ = 0.023, $r$ = 0.372); between Clarity and Depression ($p$ = 0.015, $r$ = 0.399), Anxiety ($p$ = 0.023, $r$ = 0.374); between Impulse and Depression ($p$ = 0.015, $r$ = 0.396), Anxiety ($p$ = 0.015, $r$ = 0.397), Stress ($p$ = 0.007, $r$ = 0.437).

Then, to assess the hypothesis that emotional dysregulation might influence self-efficacy through diagnosis timing, mediation analysis was performed. Figure 2 report the diagram model of statistical analyses. The outcome variable was self-efficacy and the mediator was emotional dysregulation indexes. To take the impact of diagnosis timing into account, it was added as independent variable in the model. The results showed the effect of lack of emotional clarity index on self-efficacy (β=-0.192; SE=1.304; $p$<0.021; CI=-5.56– -0.45). This evidence suggests that the relationship between time from diagnosis and self-efficacy is mediated by emotional dysregulation.

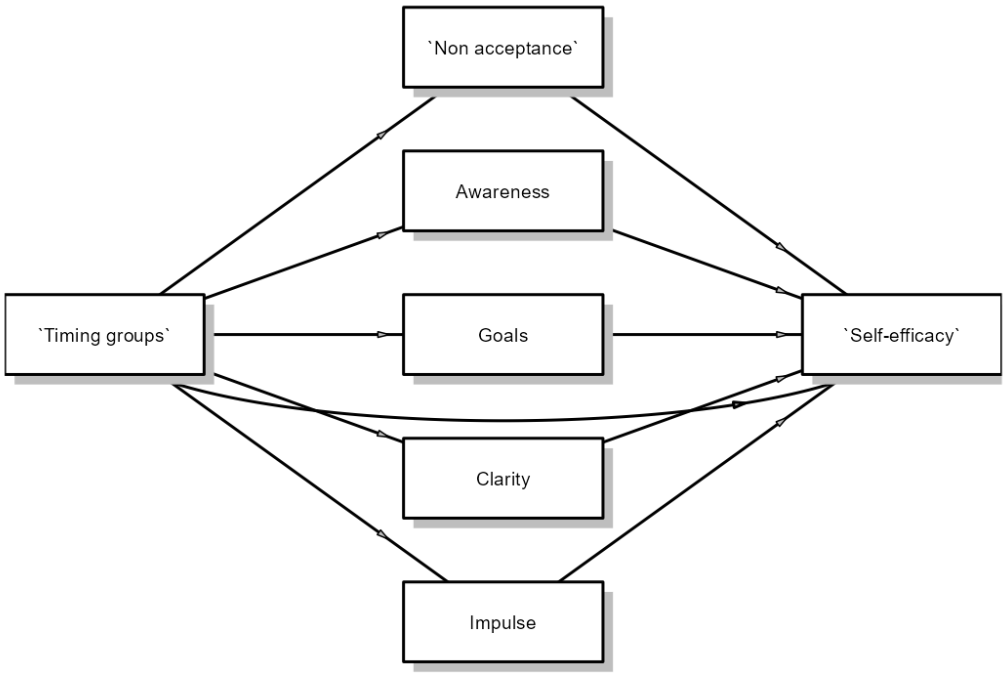


**Figure 2**. Path model: model diagram and indirect and total effects of the mediation analyses

Indirect and Total Effects

| | | | | 95% C.I. (a) | | | | |
|---|---|---|---|---|---|---|---|---|
| **Type** | **Effect** | **Estimate** | **SE** | **Lower** | **Upper** | **β** | **z** | **p** |
| Indirect | Timing groups1 ⇒ Non acceptance ⇒ Self-efficacy | -0.9071 | 0.767 | -2.4096 | 0.5954 | -0.05806 | -1.183 | 0.237 |
| | Timing groups1 ⇒ Awareness ⇒ Self-efficacy | -0.1579 | 0.456 | -1.0512 | 0.7354 | -0.01010 | -0.346 | 0.729 |
| | Timing groups1 ⇒ Goals ⇒ Self-efficacy | 0.8541 | 1.065 | -1.2336 | 2.9418 | 0.05466 | 0.802 | 0.423 |
| | Timing groups1 ⇒ Clarity ⇒ Self-efficacy | -3.0111 | 1.304 | -5.5672 | -0.4550 | -0.19272 | -2.309 | 0.021 |
| | Timing groups1 ⇒ Impulse ⇒ Self-efficacy | -0.0831 | 0.309 | -0.6894 | 0.5231 | -0.00532 | -0.269 | 0.788 |
| Component | Timing groups1 ⇒ Non acceptance | 1.6842 | 1.230 | -0.7274 | 4.0958 | 0.21677 | 1.369 | 0.171 |
| | Non acceptance ⇒ Self-efficacy | -0.5386 | 0.229 | -0.9870 | -0.0902 | -0.26784 | -2.354 | 0.019 |
| | Timing groups1 ⇒ Awareness | -0.4211 | 1.186 | -2.7459 | 1.9036 | -0.05750 | -0.355 | 0.723 |
| | Awareness ⇒ Self-efficacy | 0.3749 | 0.237 | -0.0902 | 0.8400 | 0.17573 | 1.580 | 0.114 |
| | Timing groups1 ⇒ Goals | 1.0526 | 1.281 | -1.4590 | 3.5643 | 0.13209 | 0.821 | 0.411 |
| | Goals ⇒ Self-efficacy | 0.8114 | 0.220 | 0.3809 | 1.2419 | 0.41386 | 3.694 | < .001 |
| | Timing groups1 ⇒ Clarity | 2.2105 | 0.704 | 0.8306 | 3.5905 | 0.45385 | 3.140 | 0.002 |
| | Clarity ⇒ Self-efficacy | -1.3622 | 0.400 | -2.1458 | -0.5786 | -0.42463 | -3.407 | < .001 |
| | Timing groups1 ⇒ Impulse | 0.3158 | 1.137 | -1.9123 | 2.5439 | 0.04501 | 0.278 | 0.781 |
| | Impulse ⇒ Self-efficacy | -0.2633 | 0.248 | -0.7486 | 0.2220 | -0.11820 | -1.063 | 0.288 |
| Direct | Timing groups1 ⇒ Self-efficacy | -1.8001 | 2.003 | -5.7249 | 2.1247 | -0.11521 | -0.899 | 0.369 |
| Total | Timing groups1 ⇒ Self-efficacy | -5.1053 | 2.093 | -9.2069 | -1.0036 | -0.37224 | -2.440 | 0.015 |

Note. Confidence intervals computed with method: Standard (Delta method)

Note. Betas are completely standardized effect sizes

## 4. Discussion

Aim of the study was to examine the relationship among individual psychological dimensions, self-care and emotional regulation processes and investigate the mediating role of emotion regulation process for disease management in young women with BC.

Key study findings were the significant differences on psychological dimensions by time from diagnosis. Long group experienced lower self-efficacy, higher depression and lack of emotional clarity. Moreover, controlling for time from diagnosis, negative correlations emerged between self-efficacy and depression, stress, lack of emotional clarity, also positive correlations emerged between emotion dysregulation and psychological distress indexes. Finally, mediation analysis showed the significant effect of lack of emotional clarity on self-efficacy.

In accordance with literature and in line with our hypothesis, analizing the impact of diagnosis timing on psychological functioning and self-care, our findings evidenced that women who have been diagnosed for longer showed higher depression signs, higher difficulties in emotion regulation (specifically in clearly understand what emotion they are experiencing) than women with shorter diagnosis timing (Carreira et al., 2018; Lovelace et al., 2019; Wierenga et al., 2017) maybe due to the increased psycho-emotional disease burden over time. Women have to learn about adjusting to physical and emotional changes after cancer treatment and coping with fear of recurrence as a cancer survivor; also, they have to cope with family problems and issues that often occur after treatment. In addition, our study also highlighted a lower self-efficacy ability in the longer diagnosis timing group. Follow-up medical care for patients who have completed cancer treatment, getting a wellness plan, and guidelines for a healthy lifestyle are demanding and may became a reminder of disease. These trends represent a clinical need in order to improve adaptation to cancer over time.

Moreover, in line with our hypothesis, mild to strong correlations emerged between self-care and emotional traits: women with high psychological distress and lack of clarity about own feelings are at high risk of low women' beliefs about own ability in carrying out specific self-care behaviours; women with low awareness about own mental and physical conditions are at high risk of low ability in maintain physical and emotional stability that can have an impact on health care decision making. Difficulties regulating emotions may thus undermine patients' abilities to effectively navigate complex and onerous self-care plan. Also, correlation between emotion regulation process and psychological factors emerged: women with no well-defined disease-oriented goals, lack of clarity about own feelings, and difficulties in maintaining control when feeling negative emotions, presented high psychological distress. The emotion

dysregulation model of distress posits that sustained negative emotions can promote a cascade of maladaptive emotion regulation strategies (Mennin et al., 2005). Within this framework, a failure to regulate distress or using maladaptive emotion regulation strategies perpetuates negative emotions. In accordance with literature (Tsujimoto et al., 2024), these negative correlations could interfere with patients' adaptation to survivorship, health and well-being. Negative emotionality promotes physiological activation when people use contextually maladaptive emotion regulation strategies, which can then ultimately impair long-term health. Within this framework, emotion regulation serves as a mediator between negative emotionality and inflammation (Renna, 2021).

Finally, although there are few studies on the role of emotional regulation on self-care in patients with chronic diseases (Kollin et al., 2024; Wierenga et al., 2017), our results extend the literature data on the relationship between emotional dysregulation and self-care skills in cancer survivors' target. Psychological dimensions seem have an important role into BC disease management from patient side: lack of clarity about own feelings emerged significant factor for self-efficacy (negatively) mediating the BC physical and health management. Emotional dysregulation can mediate the patient's beliefs about their ability to manage their chronic condition over time and consequently can impact on the proper cancer management. Medical actions and health management strategies might involve women into complex process of patient engagement; behavioural activation can be used to aid self-efficacy (Myles & Merlo, 2022).

Strengths and limitations

Evidencing the role of emotion dysregulation on self-care skills and psychological outcomes, and specifically highlighting the impact of emotion dysregulation on self-efficacy, our findings could inform the development and implementation of psychological interventions aimed at promoting psychological well-being and healthy behaviour by focusing on the promotion of emotion regulation strategies, to reduce the risk for co-morbidity.

Our study also has several limitations. First, it includes a small sample size that may not be representative and may limit the power to detect significant differences. Second, although we controlled for several sociodemographic and clinical variables, residual confounding cannot be ruled out. Third, the lack of longitudinal data to verify the trend of performance as well the ability of patients to manage the own mental health. Our study is ongoing, and we are going to overcome those limits making our primary data consolidated outcome for solid clinical practice.

## 5. Conclusions

In clinical practice psychological screening of emotion regulation process can be an effective tool for detecting mediating factors in the management of the BC patient's health and adherence to medical treatments and follow-up procedures in long time: the screening of emotional regulation factors for allowing a good clinical condition management and a self-care empowerment aimed at increasing psychological well-being and the health outcomes by providing tailored psychological support to those who are in the survivorship. The recognition and understanding of the role of emotion regulation in illness management is essential to making gains in improving behavioural outcomes for patients with BC. The identification and the empowerment of these factors might contribute positively to clinical benefits: for instance, poor adherence to BC ongoing treatment could be addressed by identifying the emotional regulation process and self-care processes of patients who are or may be at risk of non-persistence in the survivorship.

## Ethical approval

The study was conducted in accordance with the guidelines of the Declaration of Helsinki and was approved by the Institutional Review Board of the University of L'Aquila (Prot. No. 49/2020-21 date 27.10.2020).

## Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

## Data Availability Statement

The data presented in this study are available upon request from the corresponding author.

## Conflict of interest statement

The authors declare that the research was conducted in the absence of any potential conflict of interest.

## Authors' Contribution

The study was conceived and designed by JR. The data were collected and analyzed by EC (second Author) and EC (third Author). JR and FG conducted the formal analyses. FG and EC (second Author) prepared the original draft of the manuscript. All authors contributed to the article and approved the submitted version. The work reported in the paper has been performed by the authors, unless clearly specified in the text.

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**DOI**: 10.13129/2282-1619/mjcp-4225