



The Interplay Between Trait Resilience and Coping Self-efficacy in Patients with Breast Cancer: An International Study

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Abstract

The role of self-efficacy to cope with breast cancer as a mediator and/or moderator in the relationship of trait resilience to quality of life and psychological symptoms was examined in this study. Data from the BOUNCE Project (<https://www.bounce-project.eu/>) were used. Women diagnosed with and in treatment for breast cancer ($N=484$), from four countries, participated in the study. Trait resilience and coping self-efficacy were assessed at baseline (soon after the beginning of systemic treatment), and outcomes (quality of life, psychological symptoms) 3 months later. Hierarchical regression, mediation, moderation, and conditional (moderated) mediation and moderation analyses were performed to examine the study hypotheses. Coping self-efficacy mediated the impact of trait resilience. In addition, higher levels of resilience in combination with higher levels of coping self-efficacy were associated with better outcomes. Country of origin had no impact on these results. Overall, it seems that coping self-efficacy is a key factor that should be taken into account for research and intervention efforts in cancer.

Keywords Breast cancer · Resilience · Coping self-efficacy · Cultural differences · BOUNCE project

A cancer diagnosis often initiates a period of emotional, interpersonal, and practical challenges (e.g., Jim & Jacobsen, 2008), many of which persist over time (Mitchell et al., 2011). Especially regarding breast cancer, patients report a

range of negative emotional responses following diagnosis, such as fear, anger, sadness and hopelessness (e.g., Fatiregun et al., 2016; Mansano-Schlosser et al., 2017). In addition, many women suffer from significant adjustment difficulties,

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like depression (Pilevarzadeh et al., 2019). Breast cancer is the most prevalent type of cancer and the leading cause of death due to cancer among adult women worldwide (World Health Organization Global Cancer Observatory; <https://gco.iarc.fr/>). Thus, the identification of the factors which may facilitate adaptation to breast cancer is critical to prevent major psychological difficulties, such as depression or severe anxiety (Park et al., 2018; Pilevarzadeh et al., 2019). In this context, the aim of this study is to examine the relations of two major factors in adaptation to cancer, namely, self-efficacy to cope with cancer and trait resilience, to the quality of life and psychological symptoms of women with breast cancer. Moreover, this study aimed to examine the potential interactions between coping self-efficacy and trait resilience as far as their impact on quality of life and psychological symptoms is concerned.

Self-efficacy, in general, refers to the personal evaluation of own abilities to perform specific behaviors so as to overcome a taxing situation (Bandura, 1997). Self-efficacy is a major factor in self-regulation (e.g., it is related to a higher probability of achieving goals) and a significant predictor of physical and psychological health (Bandura, 1997). It also functions as a mediator between personality characteristics and well-being (Major et al., 1998; O'Shea et al., 2017; Yu & Luo, 2018). Self-efficacy is a significant determinant of behavior and well-being across cultures (e.g., Boyle et al., 2020).

Self-efficacy to cope with cancer, more specifically, refers to the perceived ability to perform behaviors that are important for successful dealing with relevant challenges (e.g., diagnosis, treatment; Chirico et al., 2017). Self-efficacy to cope with cancer is negatively related to symptoms of anxiety, depression, and fatigue, and positively to quality of life, across a variety of cancer diagnoses (e.g., Albrecht et al., 2013; Chirico et al., 2017; Heitzmann et al., 2011; Merluzzi & Martinez Sanchez, 1997; Philip et al., 2013), even after controlling for medical factors (e.g., Albrecht et al., 2013; Hamama-Raz et al., 2007). Especially in patients with breast cancer, lower self-efficacy to cope with cancer has been related to greater barriers to pain management (Mosher et al., 2010), distress symptoms (Henselmans et al., 2010), and fear of recurrence (McGinty et al., 2016). Furthermore, a systematic review of high-quality longitudinal studies showed that coping self-efficacy predicted quality of life and psychological distress over time (Brandão et al., 2017).

Resilience is a multifaceted construct that involves personality traits, outcomes, and processes (for a review, Bonanno et al., 2015). Although there is no universally accepted definition, it has often been defined as the personal assets and resources that facilitate adaptation and “bouncing back” when dealing with an adversity (e.g., Windle, 2011), or as the dynamic ability to maintain good function in the face of a severe adversity or the ability to return to

normal function after the adversity (Johnston et al., 2015). Also, especially regarding cancer, Deshields et al. (2016) concluded that resilience is both a dynamic process and a positive outcome over the trajectory of illness. In this study, we focus on resilience as trait. That is, the general ability to adapt to a difficult situation and maintain good function despite the difficulty (Johnston et al., 2015; Windle, 2011). Although resilience is a universal characteristic, cultural and contextual differences may impact the processes that are involved in it (Ungar, 2010, 2013).

Resilience is common in patients with cancer (Deshields et al., 2016), and a significant predictor of quality of life and psychological distress (e.g., Harms et al., 2019; Min et al., 2013; Strauss et al., 2007). Although not many relevant studies have been conducted in breast cancer patients, there is evidence that resilience is also related to their well-being (Markovitz et al., 2015; Tu et al., 2020).

Resilience and self-efficacy are related concepts. Resilience has been described as an overarching set of characteristics which includes (Markovitz et al., 2015; Yi-Frazier et al., 2015) or is closely associated with the more situation-specific construct of self-efficacy (Bonanno et al., 2015), as also found in studies with chronic patients (e.g., patients with multiple sclerosis or cancer; Black & Dorstyn, 2015; Wang et al., 2016).

Although self-efficacy to cope with cancer and resilience are both important for adaptation to cancer, to our best knowledge, the potential interaction between the two (e.g., mediation or moderation effects) has not been examined before. The examination of their interaction is, however, important as it could promote our understanding of the processes that are involved in adaptation to breast cancer, as well as the development of even more successful intervention programs (e.g., by the identification of those conditions that may expose patients to a higher risk for a less successful adaptation).

Here, we examined the prospective association of self-efficacy to cope with cancer and trait resilience, assessed soon after surgery and the beginning of systemic therapy, with quality of life and psychological symptoms, assessed 3 months later, in a sample of women diagnosed with breast cancer. Given the positive impact of self-efficacy (Brandão et al., 2017; Kant et al., 2018) and trait resilience (Markovitz et al., 2015; Tu et al., 2020), our first hypothesis (*H1*) was that both factors will predict quality of life, in a positive way, and psychological symptoms, in a negative way. We expected these relationships to be significant even after controlling for disease-related factors, as also found in previous studies (e.g., Albrecht et al., 2013).

Also, given that trait resilience represents a broader personal characteristic, while self-efficacy to cope with cancer is a situation-specific factor, we sought to examine whether coping self-efficacy mediates the relation of trait resilience

to the outcomes (i.e., quality of life and psychological symptoms). Our hypothesis (*H2*) was that trait resilience would enhance a sense of efficacy to perform those behaviors that may lead to a successful adaptation to cancer. In turn, this would be related to better quality of life and less psychological symptoms (e.g., Albrecht et al., 2013). The examination of this relationship can provide us with further information about the potential pathways through which resilience affect patients' well-being.

We also sought to examine whether higher levels of trait resilience (as the general ability to overcome adversities; Johnson et al., 2015) together with greater self-efficacy to cope with cancer (as the specific ability to cope with this particular health condition; Chirico et al., 2017) advances patients' chances for a more successful adaptation. In this regard, we hypothesized (*H3*) that self-efficacy moderates the impact of resilience: higher levels of trait resilience in combination with higher levels of coping self-efficacy were expected to be linked to better outcomes.

Our study was conducted in a sample of patients coming from four countries (see Method), with a distinct economic and social-political history background. However, there is evidence that the cultural and healthcare background often plays a crucial role in adaptation to illness (e.g., Kleinman, 1980; Wender, 2020). In addition, the broader socio-economic and cultural background may impact the ways that the different aspects of self-regulation and adaptation to illness are related to and interact with each other (Leventhal et al., 2016). Hence, it is possible that the relations between trait resilience, self-efficacy to cope with cancer, and breast cancer patients' well-being, which are examined in this study, are dependent on the participants' country of origin (see, also, Fig. 1). Therefore, a final aim of this study was to examine the potential impact of patients' country of origin on the above-described relationships and, in this way, to provide a preliminary/exploratory test for the stability of these relationships across different cultural and healthcare contexts.

Method

Participants and Procedure

To examine the relationships between resilience, self-efficacy to cope with cancer, quality of life and psychological symptoms, data from the first two phases (baseline and first follow-up) of the BOUNCE Project, an ongoing study conducted in four countries (namely, Finland, Israel, Italy, and Portugal), were used. The overall aim of BOUNCE is to examine resilience in women with breast cancer over a period of 1.5 years (for more info, <https://www.bounce-project.eu/>).

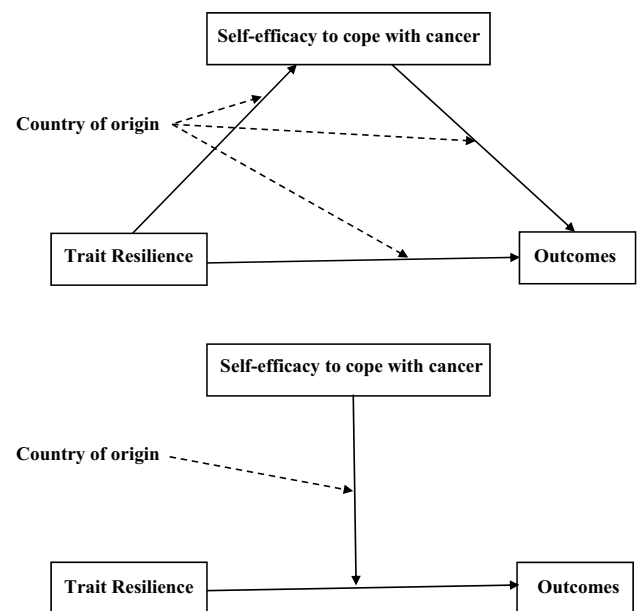


Fig. 1 A schematic representation of the examined relationships of trait resilience and self-efficacy to cope with cancer measured at baseline to the 3-month outcomes (upper panel: mediation effects; lower panel: moderation effects). The potential impact of country of origin on these relationships is shown by dotted lines (upper panel: conditional mediation; lower panel: conditional moderation). Model covariates (age and disease-related factors) are not shown for simplicity

Participants were diagnosed with breast cancer few weeks before enrollment in the study. At the time of the first (baseline) assessment, patients had undergone surgery and were scheduled for the appropriate set of treatments (chemotherapy, endocrine therapy, anti HER2 therapy and radiotherapy) based on their risk for recurrence and overall health. Inclusion criteria were 40–70 years of age; a recent diagnosis of a histologically confirmed invasive early or locally advanced operable breast cancer; tumor stage I to III; receiving any type of systemic treatment for breast cancer; ability to understand the study protocol, and provide informed consent. Exclusion criteria included distant metastases; history of another malignancy (including contralateral invasive breast cancer) within the last five years, with the exception of cured basal cell skin carcinoma or in situ carcinoma of the uterine cervix; a history of severe mental disorder, severe neurologic disorder, other chronic diseases; pregnancy or breastfeeding at the time of recruitment.

The hospital medical files were used at baseline to identify eligible participants and as a source of information for medical data and treatment status. The treating oncologist introduced the study to the patients at one of their visits and either the oncologist or a research assistant invited them to participate in the study. Those who agreed and signed the informed consent form, were guided by the research

assistant to fill in the study questionnaire online or in paper. The entire study was approved by the ethical committee of the European Institute of Oncology (Approval No. R868/18-IEO916) and the ethical committees of each participating hospital.

Sociodemographic data were self-reported at baseline. From a total of 689 participants who provided data at baseline and the 3-month follow-up, complete sociodemographic and medical information, as well as data on all variables included here, were available for 484 women (no missing data imputation was applied). Participants with incomplete data were more likely to not have received

radio- or chemotherapy ($p < .05$). Participants' sociodemographic and disease-related characteristics are presented in Table 1.

Measures

Resilience

Trait resilience was assessed at baseline with the 10-item version of the Connor-Davidson Resilience Scale (CD-RISC; Campbell-Sills & Stein, 2007; Connor & Davidson, 2003). Each item is rated on a 5-point Likert-type scale, ranging from 0 = Not true at all, to 4 = True nearly all the time. The answers to all items were combined into a single mean score (Cronbach $\alpha = .91$). Higher scores reflect greater resilience.

Self-efficacy to Cope with Cancer

Self-efficacy to cope with cancer was assessed at baseline with the brief version of the Cancer Behaviour Inventory (CBI-B; Heitzmann et al., 2011). It consists of 12 items referring to patient's self-efficacy to cope with the diverse aspects of their experience with cancer (e.g., maintaining a positive attitude; asking physicians questions). Respondents used a 9-point Likert type scale, ranging from 1 = Not at all confident to 9 = Totally confident. An overall mean score was produced (Cronbach $\alpha = .89$). Higher scores indicate higher levels of coping self-efficacy.

Quality of Life

The Global Health Status scale from the European Organization for Research and Treatment of Cancer (EORTC) QLQ-C30 questionnaire (Aaronson et al., 1993) was used to assess overall quality of life at the 3-month follow-up. It consists of two items examining patients' overall evaluation of their health condition during the past week (e.g., How would you rate your overall quality of life; Cronbach's $\alpha = .86$). A seven-point Likert type scale (1 = Very poor to 7 = Excellent) was used to answer these questions. A linear transformation was used to standardize the raw scores, so as to range from 0 to 100, with higher scores indicating higher quality of life.

Psychological Symptoms

The Hospital Anxiety and Depression Scale (HADS, Zigmond & Snaith, 1983) was used to assess psychological symptoms at the follow-up. The scale consists of 14 items (e.g., I feel tense or 'wound up'; I still enjoy the things

Table 1 Participant sociodemographic and disease-related characteristics ($N = 484$)

Country of origin	
Israel	110 (22.7%)
Italy	129 (26.7%)
Finland	179 (37%)
Portugal	66 (13.6%)
Age	
Mean = 54.49 years; SD = 8.24. Range = 40–70 years	
Family status	
Married/living with partner	321 (66.3%)
Single or widowed	163 (33.7%)
Education level	
9 years mandatory or less	35 (7.2%)
High school	129 (26.66%)
Higher education degree/vocational diploma	320 (66.14%)
Income (as reported by the participants, and after adjusting to the GDP income level of each country)	
Average or high income	368 (76%)
Low/very low income	116 (25.4%)
Employment	
Fully or partially employed or self-employed	361 (74.6%)
Unemployed, housewife, retired	123 (25.4%)
Cancer stage at baseline	
Stage I	246 (50.8%)
Stage II	192 (39.7%)
Stage III	46 (9.5%)
Cancer grade at baseline	
Grade I	85 (17.6%)
Grade II	235 (48.5%)
Grade III	164 (33.9%)
Type of treatment (completed or still receiving at month 3)	
Lumpectomy	331 (68.4%)
Mastectomy	153 (31.6%)
Chemotherapy	234 (48.3%)
Radiotherapy	358 (74%)
Endocrine therapy	366 (75.6%)
Anti HER2 therapy	70 (14.5%)

I used to enjoy). To answer, respondents used a 4-point frequency Likert type scale with higher scores indicating more intense symptoms. Given the typically high correlation between anxiety and depression symptoms, answers to all items were added up (after appropriate reverse coding) to create an overall symptoms score (Cronbach's $\alpha = .89$).

The measures were already validated/translated in all countries (for more information and the relevant references, please contact the authors). Only CBI-B was translated in each country (using the standard procedure: translation and back-translation by independent bilingual clinicians; final language corrections) for the purposes of this study.

Analyses

To control for potential covariates, a MANOVA with trait resilience, self-efficacy to cope with cancer, quality of life and psychological symptoms, as the dependent variables, and the education level (i.e., 0–9 vs. > 9 years of education), employment (i.e., employed vs. non-employed/retired), income (i.e., very low/low vs. average/high, as reported by the participants, and after adjusting to the GDP income level of each country), marital status (i.e., married/living with partner vs. single/widowed), and the country of origin, as the independent variables, was performed. In addition, Pearson correlations were used to examine the association of age to all psychological variables included in the study.

Pearson correlations and hierarchical regression analyses were performed to examine the relation of trait resilience and coping self-efficacy to quality of life and psychological symptoms (Hypothesis 1). Moreover, to examine the interactions between resilience and coping self-efficacy, we used PROCESS, a freely available computational tool for SPSS and SAS (Hayes, 2013; see also, <http://www.procesmacro.org>). With respect to Hypothesis 2, the indirect effects of resilience (as the independent variable) on quality of life and psychological symptoms (as the dependent variables) through coping self-efficacy (as the mediator) were examined in two separate analyses (one for each outcome; PROCESS Model 4). PROCESS (Model 1) was also used to examine whether coping self-efficacy (as the moderator) affects the path from resilience (as the independent variable) to the outcomes (as the dependent variables; in two separate moderation analyses, one for each outcome – Hypothesis 3). This type of analysis determines whether the effects of the independent variable on the dependent vary at different levels of the moderator (by default, indirect effects are reported at M and ± 1 SD of the moderator). For this analysis, we also used the Johnson-Neyman technique (Johnson & Fay, 1950), which allows for the identification of the specific region of the moderator values where a significant relationship between the independent and the dependent variables exists.

Finally, PROCESS was used to examine whether all of the above-mentioned relationships depend on the participants' country of origin (see Fig. 1). PROCESS Model 59 was used to examine conditional (i.e., depended on the country of origin) mediation effects, and Model 3 to examine conditional moderation effects. In all analyses, PROCESS employs a multiple regression analyses framework and calculates the bootstrapped confidence intervals (CIs) for each effect. Both normal-theory tests and bias-corrected and accelerated bootstrapping ($N = 5000$) were employed to test these effects. All analyses were performed after controlling for disease-related factors (i.e., disease stage and grade, type of therapy as a series of dummy variables), given their well-known impact on quality of life and well-being (e.g., Ferreira et al., 2019; Ganz et al., 2004).

Results

Preliminary Results

No significant differences in resilience, self-efficacy to cope with cancer, quality of life and psychological symptoms across education levels, employment, income, and marital status were found, Wilks' $\lambda < 1.00$, $F_s(4, 438) < 1.99$, $p > .05$, partial $\eta^2 < .02$. However, a statistically significant effect of the country of origin was found, Wilks' $\lambda = .87$, $F_s(4, 438) = 5.08$, $p < .001$, partial $\eta^2 = .044$. Specifically, participants from Italy reported lower levels of resilience and self-efficacy, and higher levels of psychological symptoms than participants from the other three countries, $F_s(3, 441) = 7.13$, $p < .001$, partial $\eta^2 > .05$. Also, age was positively related to coping self-efficacy and global quality of life, and negatively to psychological symptoms (Pearson $r_s > |.11|$, $p < .05$). Thus, in addition to the disease-related factors, all analyses were performed after also controlling for age and country of origin (when not examined as a moderator).

The Relationship of Resilience and Coping Self-efficacy to the Outcomes (Hypothesis 1)

The correlations between all variables are presented in Table 2. Psychological symptoms at the 3-month follow-up were significantly associated with baseline resilience and self-efficacy to cope with cancer, in a negative way. Overall quality of life at follow-up was positively, but weaker, associated with resilience and self-efficacy to cope with cancer. In addition, resilience and coping self-efficacy were strongly related.

After controlling for age, country of origin, and disease-related variables, resilience and coping self-efficacy accounted for an additional 7% of variance in quality of life, $F_{\text{change}} = 20.07$, $p < .001$. Only coping self-efficacy was

Table 2 Descriptive statistics and intercorrelations of trait resilience, self-efficacy to cope with cancer, overall quality of life (QoL), and psychological symptoms ($N=484$)

	Mean	SD	Observed range (Possible range)	Correlations (Pearson's r)			
				1	2	3	4
1. Trait resilience	2.79	.68	.20–4 (0–4)	1.00			
2. Coping self-efficacy	7.11	1.29	3–9 (1–9)	.57*	1.00		
3. Overall QoL	68.46	20.88	0–100 (0–100)	.18*	.27*	1.00	
4. Psychol. symptoms	.70	.49	0.0–2.86 (0–3)	–.36*	–.43*	–.58*	1.00

* $p < .001$

significantly associated with quality of life ($\beta = .22$, $t = 4.35$, $p < .001$). Regarding psychological symptoms, resilience and coping with cancer self-efficacy accounted for an additional 15% of the variance, after controlling for covariates, $F_{\text{change}} = 46.10$, $p < .001$. Both resilience ($\beta = -.18$, $t = -3.43$, $p < .01$) and coping self-efficacy ($\beta = -.29$, $t = -5.85$, $p < .001$) were significant predictors of psychological symptoms.

The Interactions Between Self-efficacy to Cope with Cancer and Trait Resilience

With respect to Hypothesis 2, the analyses revealed a statistically significant mediation effect of coping self-efficacy on the relation of resilience to quality of life ($B = 3.86$, $SE(B) = 1.20$; 95% Confidence Intervals (CI) 1.65/6.41), after controlling for covariates. The mediation effect of self-efficacy on the relation of resilience to psychological symptoms was also significant ($B = -.12$, $SE(B) = .03$; 95% CI $-.18/-.06$).

Regarding Hypothesis 3, the moderation analyses showed that the relationship of resilience to quality of life was conditional on the values of coping self-efficacy ($B = 2.09$, $SE(B) = .90$, $t = 2.33$; 95% CI .33/3.86). The relationship of resilience to quality of life was not significant at the lower and medium levels of coping self-efficacy (i.e., at 1SD below the mean and at mean; see also Table 3 and Fig. 2). There was no impact of coping self-efficacy on the relationship

of resilience to psychological symptoms ($B = -.03$, $SE(B) = .02$, $t = -1.29$; 95% CI $-.07/.02$). However, according to the Johnson-Neyman technique, for those participants who reported very low levels of coping self-efficacy (i.e., scores lower than 5.49; almost 11% of participants) the relation of resilience to psychological symptoms was not statistically significant. In addition, the effects were stronger at the higher levels of self-efficacy (i.e., at mean and + 1SD in comparison to -1SD; see Table 3).

Potential Effects of the Country of Origin

The associations between resilience, self-efficacy to cope with cancer and outcomes did not vary significantly with country of origin (on either the pathway from the independent variable to the mediator or the pathway from the mediator to the dependent variable; $B_s < 3.90$, $SE_s > .25$, $t_s < 1.56$; 95% CI $-8.83/9.13$, for quality of life, and $B_s < .18$, $SE_s > .06$, $t_s < .69$; 95% CI $-.45/.68$, for psychological symptoms). This was also true for the direct effects of resilience on quality of life and psychological symptoms ($B_s < 8.22$, $SE_s > 5.49$, $t_s < 1.60$; 95% CI $-11.23/19.59$).

Moreover, no impact of the country of origin on the moderation effects of coping self-efficacy on the resilience—outcomes relationship was found ($B_s < 23.40$, $SE_s > 11.96$, $t_s < .84$; 95% CI $-51.58/80.83$, for quality of life, and $B_s < 0.20$, $SE_s > .09$, $t_s < .82$; 95% CI $-1.77/1.32$, for psychological symptoms).

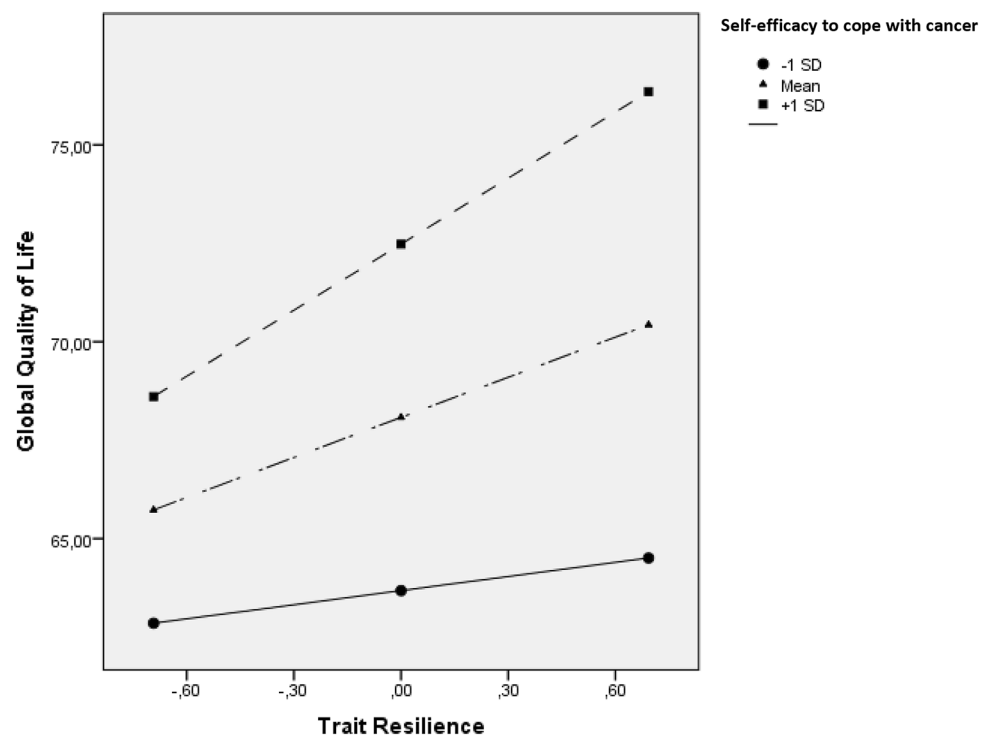
Table 3 Conditional effects (B values; SE in parentheses) of trait resilience on global quality of life and psychological symptoms at specific values of self-efficacy to cope with cancer, and confidence intervals

Outcome	Levels of self-efficacy to cope with cancer		
	– 1 SD [CI (95%) [†]]	Mean [CI (95%) [†]]	+ 1 SD [CI (95%) [†]]
Quality of life	.73 (1.91) [– 3.03 to 4.48]	3.23 (1.69) [– .10 to 6.57]	5.74 (2.11)** [1.60 to 9.89]
Psychol. Symptoms	– .10 (.04)* [– .18 to – .02]	– .13 (.04)** [– .21 to – .06]	– .17 (.05)** [– .26 to – .07]

SD standard deviation; CI confidence intervals

[†]Bias corrected and accelerated* $p < .05$, ** $p < .01$

Fig. 2 A schematic representation of the impact of self-efficacy to cope with cancer (at three levels; -1 SD, mean, $+1$ SD) on the relationship of trait resilience to global quality of life



Discussion

The main aim of this prospective study was to examine the relations of trait resilience and self-efficacy to cope with cancer to the well-being of women recently diagnosed with and in treatment for breast cancer, as well as the potential interactions between these two factors. Trait resilience and coping self-efficacy have been associated with a more successful adaptation to breast cancer (e.g., Kant et al., 2018; Markovitz et al., 2015; McGinty et al., 2016).

The findings seem to provide substantial support to our hypotheses. Both factors were related to less psychological symptoms and higher levels of overall quality of life (as also found in previous studies; e.g., Chirico et al., 2017; Harms et al., 2019; Tu et al., 2020). Further analyses showed that, although both factors predicted psychological symptoms, only coping self-efficacy significantly predicted overall quality of life. Moreover, coping self-efficacy mediated and also moderated the impact of resilience on the outcomes. However, the findings also seem to go beyond our hypotheses and shed more light into the multifaceted processes of adaptation to cancer.

After controlling for various sociodemographic and disease-related variables, self-efficacy to cope with cancer mediated the relation of resilience to both quality of life and psychological symptoms. Several theorists and researchers have already underlined the fact that resilience is a set of characteristics which has a broad impact on several aspects of human behavior and the efforts to adapt to a difficult

situation (Bonanno et al., 2015; Deshields et al., 2016). Our findings indicate that trait resilience may be translated into a more situation-specific perception of being able to cope with cancer and, through this, to enhanced well-being. Given the strong relations of self-efficacy to several aspects of self-regulation (e.g., perceptions and behaviour; Boyle et al., 2020; Major et al., 1998), it is likely for self-efficacy to cope with cancer to serve as a proxy factor of trait resilience as far as adaptation to cancer is concerned. Of course, self-efficacy is probably not the only pathway between resilience and adaptation to cancer, as trait resilience may also work through other variables, such as emotion, emotion regulation strategies, and coping behaviours (e.g., Guimond et al., 2019).

However, the impact of coping self-efficacy on the relation of trait resilience to quality of life and psychological symptoms extends beyond mediation. According to the results, coping self-efficacy regulates the association between resilience and quality of life. In addition, although not in a statistically significant way, the results indicate a possible impact of coping self-efficacy on the relation of trait resilience to psychological symptoms.

These findings may lead to three considerations. First, it is suggestive of a synergy between trait resilience and self-efficacy to cope with cancer. It seems that the combination of these two factors represents an important personal resource which may protect against the detrimental impact of the diagnosis on well-being. Second, this finding can be put to practical use. The early assessment of resilience and self-efficacy to cope with cancer in women recently diagnosed

with breast cancer and the detection of low scores may trigger a rapid response from mental health professionals so as to prevent a severe well-being deterioration. Third, this finding is likely to suggest that trait resilience impacts adaptation only when combined with a feeling that the present challenges are indeed manageable (i.e., coping self-efficacy), which is based on the evaluation of several other factors, such as the features of the situation (Bandura, 1997). In this way, the general sense of resilience may not automatically be transformed into an unfounded perception of ability, which can cause difficulties in the long run, but into a sound supportive instrument for the patient.

Finally, it is interesting to note that our participants' country of origin had no impact on the relationships between resilience, coping self-efficacy, and the outcomes, despite the fact that it had a small impact on the mean levels of these variables. Given that cultural differences may impact the processes involved in resilience (Ungar, 2010, 2013), as well as that the cultural and healthcare systems are significant determinants of adaptation to illness (Kleinman, 1980; Wender, 2020), a country-dependent differentiation in the type or strength of the relationships examined here, was likely. None of the examined moderation effects of the country of origin, however, reached statistical significance. There are at least two possible explanations for this finding. First, it is possible that the processes involved in adaptation to a breast cancer diagnosis are indeed constant across populations. It is possible that, soon after the diagnosis and the beginning of treatment, patients' reactions are determined mainly by their personal resources (e.g., personality, skills) and the personal self-regulation system than broader factors which might be more important later, as the condition becomes more chronic (Leventhal et al., 2016). A second explanation might be that the country of origin is a too broad variable which may not accurately reflect particular contextual factors, such as culture, ethnicity, or the healthcare system, as intended here. Thus, its use may have missed or blurred the actual impact of these factors. In any case, further research is needed to examine this intriguing issue over time.

The findings of this study should be considered in light of certain limitations. Despite the fact that it is a prospective study, the time interval between baseline and follow-up was short (i.e., 3 months). Adaptation to a severe illness is dynamic and the associations between its particular aspects may change over time (Leventhal et al., 2016). In this regard, the current findings are a reflection of participants' status only for the short period of time after diagnosis and the beginning of treatment. Also, self-report measures were used to assess the variables, with all the limitations this entails. Other significant aspects of well-being, such as the actual physical health, were not assessed. The size of the sample coming from certain countries was rather moderate. This

might have an impact on the results. Finally, participants' ethnicity, which might be different from the country of origin, or other country-related contextual factors (e.g., special cultural characteristics) were not obtained and thus their possible impact was not examined.

Despite these limitations, our findings bear some significant implications for theory and practice in psychosocial oncology. The findings of this study reconfirmed the importance of trait resilience and self-efficacy to cope with cancer, and highlighted the significance of their interaction as far as their impact on adaptation to breast cancer is concerned. There are already several clinical studies which have shown that self-efficacy and resilience can be improved in patients with breast cancer (e.g., Loprinzi et al., 2011; Merluzzi et al., 2019). Thus, further research efforts to enhance these efforts and also demonstrate the importance of trait resilience and coping self-efficacy for adaptation to cancer are needed. In addition, the findings indicated that self-efficacy to cope with cancer is a key variable for successful adaptation as it may function as a "gate mechanism" regarding the impact of personal resilience on well-being. In this regard, it is a factor that should be taken into account in future research and intervention efforts. Finally, the lack of a substantial impact of the country of origin on the relationships examined here indicate that the processes employed by breast cancer patients to adapt to the situation, at least as far as the short period after diagnosis is concerned, may be similar across different cultural and health-care systems. Still, this is an issue that should be further examined over the trajectory of illness in future studies.

Author Contributions All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by all authors. The first draft of the manuscript was written by ECK and PS and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Data Availability Available upon reasonable requests.

Code Availability Not applicable.

Declarations

Conflict of interest E. C. Karademas, P. Simos, R. Pat-Horenczyk, I. Roziner, K. Mazzocco, B. Sousa, G. Stamatakis, G. Tsakou, F. Cardoso, D. Frاسquilho, E. Kolokotroni, C. Marzorati, J. Mattson, A. J. Oliveira-Maia, K. Perakis, G. Pettini, L. Vehmanen and, P. Poikonen-Saksela have no relevant financial or non-financial interests to disclose. In addition, the authors have no conflicts of interest to declare that are relevant to the content of this article.

Ethical Approval The entire study was approved by the European Institute of Oncology, Applied Research Division for Cognitive and Psychological Science (Approval No R868/18 – IEO 916) and the ethical committees of each participating hospital. The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments.

Human and Animal Rights The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments in 2000 and 2008.

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

Consent for Publication Not applicable.

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