Pathways for psychological adjustment in breast cancer: A longitudinal study on coping strategies and posttraumatic growth

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This longitudinal study examined the role of coping strategies and posttraumatic growth (PTG) on the psychological adjustment to breast cancer trajectory. The participants were 50 women assessed at the time of surgery (T1), during adjuvant treatment (T2) and six months after the end of treatment (T3). Women completed questionnaires assessing coping strategies, PTG and psychological adjustment (psychological quality of life, anxiety and depression). Results showed that the greatest impact of breast cancer on women’s adjustment occurred at T1, when patients were significantly more anxious than in the other phases of the disease. The type of surgery and adjuvant treatment did not account for the course of PTG and adjustment. Coping through seeking social support and using cognitive strategies at T1 were linked to psychological quality of life and depression at T3 via PTG dimension of personal resources and skills at T2. Findings emphasise the value of promoting adaptive coping strategies and PTG in order to improve psychological adjustment in breast cancer patients.

Keywords: breast cancer; posttraumatic growth; coping; quality of life; anxiety; depression

Introduction
Breast cancer (BC) diagnosis and treatment is considered a stressful life experience that can present major challenges to women’s basic values, beliefs and goals, threatening their sense of identity and psychological functioning (Cordova et al., 2007; Montazeri et al., 2008). The number of people diagnosed with cancer is increasing every year and BC is the most common form of cancer in women, remaining a life-threatening illness (Cordova et al., 2007; Ferlay et al., 2010).

The few longitudinal studies assessing women throughout the BC trajectory have generally found a resilient pattern of adjustment, as a high percentage of women maintain their levels of psychological adjustment over time (Knobf, 2007; Rowland & Baker, 2005). Nevertheless, the literature has suggested the existence of transitional periods characterised by increased distress, mainly after diagnosis, during the initial phase of treatment, and the period right after the end of treatment.
Breast cancer has its most profound impact on women’s adjustment immediately following diagnosis (Schou, Ekeberg, Sandvik, Hjermstad, & Ruland, 2005; Schroevers, Rancho, & Sanderman, 2006; Schwarz et al., 2008). Studies have found prevalence rates of anxiety, depression or both in 33% (Burgess et al., 2005; Zabora, Brintzenhofeszoc, Curbow, Hooker, & Piantadosi, 2001) to approximately 50% (Schwarz et al., 2008) of women with BC. Within the first 6 months after diagnosis, approximately 43% of women still report clinically significant levels of depression or anxiety (Gallagher, Parle, & Cairns, 2002). As women recover from the effects of treatment, usually during the first year after diagnosis, they are generally able to return to their previous level of emotional functioning (Costanzo et al., 2007; Danhauer, Crawford, Farmer, & Avis, 2009; King, Kenny, Shiell, Hall, & Boyages, 2000), showing levels of emotional adjustment comparable to that of women from the general population (Schou et al., 2005; Schwarz et al., 2008).

Breast cancer: An opportunity for growth?

Despite the dread, discomfort and dysfunction that may be associated with the diagnosis of BC, there has been a growing recognition that positive changes may arise as a result of coping with the disease (e.g. Cordova, Cunningham, Carlson, & Andrykowski, 2001) which has been acknowledged as ‘posttraumatic growth’ (PTG; Tedeschi & Calhoun, 2004). This experience of positive life changes or benefits is believed to occur in between 50% (Guner-Kucukkaya, 2009) to 83% of BC survivors (Sears, Stanton, & Danoff-Burg, 2003). However, this may not necessarily mean the absence of distress as PTG may co-occur with negative feelings, such as an increased awareness of physical limitations, uncertainty about the future or symptoms of posttraumatic stress (Cordova et al., 2001; Sears et al., 2003). However, PTG was also found to occur four months after the diagnosis of BC (Manne et al., 2004). A second issue is the scarcity of data on the longitudinal course of PTG. Exceptions are the studies of Manne et al. (2004) and Scrignaro, Barni, and Magrin (2011), but evidence from these studies are mixed: the first reported significant increases in PTG from the period of surgery to nine and 18 months...
afterwards; the second found no changes in levels of PTG from the time women were receiving treatment to six months later. Cross-sectional studies indicated that greater PTG is associated with a longer time since diagnosis, suggesting that PTG increases over time (Cordova et al., 2001; Sears et al., 2003). Moreover, the vast majority of the longitudinal research based their time point assessment on a temporal criterion, not considering the phase of disease (e.g. at three months following diagnosis, women may be undergoing surgery, having adjuvant treatment or be a disease-free survivor). A more sophisticated understanding of the process of PTG and its role on the adjustment to BC may be achieved by selecting samples based on the phase of their disease.

Another aspect that has not been thoroughly examined in previous research refers to the impact of treatment options on the course of psychological adjustment and PTG. Cancer treatments are known to induce physical and psychological symptoms, including fatigue, hair loss, early menopause, lymphoedema, decreased libido and difficulties in sexual intercourse and body image acceptance (Montazeri et al., 2008). These symptoms may persist over time, triggering significant implications on subsequent adjustment. In a review of 40 studies, Moyer (1997) found that breast-conserving surgery predicted better outcomes than mastectomy on measures of body image, psychological and social adjustment, sexual functioning and fear of cancer recurrence but not on global adjustment. Mols, Vingerhoets, Coebergh, and van de Poll-Franse (2005), in a review of the literature on the quality of life among long-term BC survivors, found that chemotherapy emerged as a negative predictor for women’s quality of life. Despite this, few studies have analysed the possible moderating role of the type of treatment in the course of the adjustment and PTG. King et al. (2000) assessing the quality of life of 291 women, three months and one year after surgery for early BC, found that chemotherapy interacted with time in predicting the evolution of symptoms such as nausea and vomiting. However, the improvements in quality of life over time did not differ according to the type of surgery (Ganz, Schag, Lee, Polinsky, & Tan, 1992; King et al., 2000).

Regarding PTG, studies have shown that receiving more aggressive treatments, such as chemotherapy, is associated with higher reports of positive life changes (Bower et al., 2005; Lelorain, Bonnaud-Antignac, & Florin, 2010), whereas no significant results have been found for type of surgery (for a review, see Stanton, Bower, & Low, 2006). Nevertheless, as far as we know, no studies have used covariate analysis to determine whether the evolution of PTG is influenced by treatment characteristics. Thus, more studies are needed to further understand the role of these moderators on women’s adjustment and PTG across the BC trajectory.

Links between coping, posttraumatic growth and adjustment

One aspect that is consistently mentioned as central to the adjustment of cancer patients is coping strategies, defined as the ‘constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person’ (Folkman & Lazarus, 1980).

In line with more general stress-coping theories (Schaefer & Moos, 1998), Tedeschi and Calhoun (2004) posited that some early success in coping is a precursor to later PTG. Thus, the individual differences in coping skills set some people on a
maladaptive trajectory, whereas others proceed on an adaptive trajectory. According to the model proposed by these authors, for PTG to emerge, a persistent cognitive processing of the situation is needed in order to disengage, or give up, certain goals and basic assumptions and, at the same time, to build new schemas, goals and meanings. Thus, the degree to which the person is cognitively involved in processing the information related to the event appears to be an essential element in the process of PTG.

Some coping strategies may be used in order to foster the cognitive processing and so facilitate PTG. Some of these efforts may be trying to cognitively accept and plan how to deal with the stressful experience (Tedeschi & Calhoun, 2004). In the process of cognitive restructuring, trying to reappraise the stressful situation to see it in a more positive light (positive reframing) may also be an important path to PTG. It allows women to make sense of the experience and to find a positive meaning or some benefit (Davis, Nolen-Hoeksema, & Larson, 1998; Manne et al., 2004). In previous research, this coping strategy was found to foster PTG (Bussell & Naus, 2010; Morris, Shakespeare-Finch, & Scott, 2007; Schroevers & Teo, 2008; Thornton & Perez, 2006; Urcuyo, Boyers, Carver, & Antoni, 2005) as well as emotional adjustment (Bussell & Naus, 2010; Dunkel-Schetter, Feinstein, Taylor, & Falke, 1992). Another factor associated with the cognitive and emotional processing of the adverse situation is relying on humour, which is known to predict reduced distress (Carver et al., 1993) and PTG (Scrignaro et al., 2011). Although it may be confounded with a form of denial, humour is a means by which emotional responses may be softened and individuals alter or reframe their perceptions of the situation which would otherwise be overwhelming (Lefcourt, 2005).

Another important way of promoting the development of PTG is self-disclosure in supportive social environments (Tedeschi & Calhoun, 2004). Supportive others may help to alter perceptions about the changes that have occurred by offering perspectives that can be integrated into schema change. Thus, it may be that the effort of getting the support of significant others to whom individuals may express their inner feelings and fears, and getting some help dealing with the modified life conditions, may facilitate the cognitive processing of emotional material in trauma survivors, essential to the emergence of PTG (Bussell & Naus, 2010; Morris et al., 2007; Thornton & Perez, 2006). It is also important for a reduction in emotional distress (e.g. Dunkel-Schetter et al., 1992).

While the link between coping and psychological adjustment is theoretical and empirically supported (Carver et al., 1993; Danhauer et al., 2009; Dunkel-Schetter et al., 1992), it is also important to identify factors mediating this association. Given the association between coping strategies and PTG, it is likely that this relationship may influence psychological adjustment. In fact, some studies have shown that initial PTG enhances later adjustment (Carver & Antoni, 2004) and that changes in PTG predict subsequent well-being (Schwarzer, Luszczynska, Boehmer, Taubert, & Knoll, 2006). However, other studies have found that benefit finding at roughly four months post-diagnosis predicted greater distress after nine months among BC patients (Tomich & Helgeson, 2004). Other studies have found no significant association between early benefit finding and later adjustment (Bower et al., 2005; Sears et al., 2003) or non-linear (U-shaped) relationships, i.e. women with low or high PTG were better adjusted than those with moderate levels of PTG (Lechner, Carver, Antoni, Weaver, & Phillips, 2006).
In a meta-analytic review, Helgeson, Reynolds, and Tomich (2006) discussed the association between PTG and psychological adjustment and suggested three possible hypotheses: first, the changes underlying the experience of PTG are positive, and thus, they contribute to improved well-being; second, the experience of making life changes is stressful and so may coexist with disruption or negative outcomes, especially if the life changes are still ongoing; and third, PTG may be a coping mechanism used to manage distress and it is the extent of its success that explains the links between PTG and positive adjustment. In the light of this assertion, if PTG predicts other psychological outcomes such as emotional well-being and quality of life in the earlier phases of the stressful situation, PTG may reflect a process that the individual goes through in the aftermath of the traumatic event that can facilitate positive adjustment (Helgeson et al., 2006).

To date, research has not yet tried to understand the relationship between coping, PTG and adjustment, especially whether finding positive benefits in cancer experience may account for (i.e. mediate) the effects of coping on psychological adjustment. Longitudinal research tracking change in cancer patients from the time of the beginning of the treatment to survival is needed to understand the links between the aforementioned variables. It would further clarify the conceptualisation of PTG as a process or an outcome.

This study: Aims and hypotheses

In order to develop psychosocial interventions more suited to the patients’ needs, it is essential to direct research efforts towards the examination of the psychological processes involved in the adjustment to BC. Addressing some limitations of previous research, this longitudinal study included women assessed throughout three phases of the BC trajectory (at the time of BC surgery – T1; during adjuvant treatment – T2 and during initial survival – T3).

The first aim of this study was to examine the longitudinal course of women’s PTG and psychological adjustment, considering type of surgery and type of adjuvant treatment as moderators. The following hypotheses were formulated: while women were receiving treatment they would report PTG (Hypothesis 1); PTG would increase over time (i.e. from treatment to survival) (Hypothesis 2) and psychological adjustment would improve from the period of surgery to treatment and from treatment to survival (Hypothesis 3). As previous studies are scarce and have found inconsistent results regarding the impact of clinical variables on the course of adjustment and PTG, no specific hypotheses were formulated.

The second aim of the study was to test the longitudinal relationship between coping strategies (T1), PTG (T2) and psychological adjustment (T3). It was expected that women with a stronger social support seeking approach and who engage more in cognitive strategies either by planning their actions, accepting life-circumstances, attempting to reframe BC in order to see it in a more positive light or having an humorous approach, would show better psychological quality of life, lower levels of depression and anxiety, as well as higher levels of PTG (Hypothesis 4). Also, it was expected that PTG would be associated with reduced levels of psychological distress and enhanced quality of life (Hypothesis 5). Finally, it was predicted that the relationship between coping and adjustment would be mediated by PTG. More precisely, we predicted that coping either through social support seeking or using
cognitive strategies, would induce a change in the way a woman perceives herself, her relationships and life in general (PTG), which would subsequently lead to better psychological quality of life, and lower levels of depression and anxiety (Hypothesis 6). This mediation hypothesis is depicted in Figure 1.

Method

Participants and procedures

The sample consisted of 50 women diagnosed with BC recruited at the Gynaecology Department of Coimbra University Hospitals (CUH), Portugal. Eligibility criteria for inclusion in the study were: (1) having been newly diagnosed with non-metastatic BC; (2) being indicated for BC surgery (mastectomy or lumpectomy) as the primary treatment (women indicated for or receiving neo-adjuvant treatment were excluded); (3) having no other major disabling medical or psychiatric condition; (4) being able to read and write Portuguese and (5) being at least 18 years old. The study was approved and carried out in compliance with ethical standards from the CUH Research Ethics Committee and all participants signed an informed consent prior to the completion of the questionnaires.

Women were invited to participate during their hospitalisation, one day before breast surgery – Time 1 (T1). This time was on average 1.36 months (SD = 0.63) after the diagnosis. After being briefed about the main objectives of the study and assured about confidentiality, participants took part in a 30 min structured interview and completed several pencil and paper self-report measures, including those used in this study. Psychological measures were completed again during the time of the adjuvant treatment, approximately six months after diagnosis or five months after T1 – Time 2 (T2). Due to differences in treatment protocols, women undergoing chemotherapy (60%) completed the survey at cycle 4 of 6 and women receiving six to seven weeks of radiotherapy (40%) were assessed during the third week of treatment. About six months later (approximately one year after the diagnosis, when medical follow-up

![Figure 1. Model depicting the hypothesised mediating role of PTG on the links between coping and psychological adjustment.](image-url)
visits usually take place, $M = 12.8$ months; $SD = 2.6$) women were again contacted by phone and invited to participate – Time 3 (T3). The questionnaires were sent and returned in a postage-paid, pre-addressed envelope.

Initially, 87 women participated in the study but 26 dropped out (some women reported lack of time and loss of interest, but most provided no reason for discontinuing) and then 11 additional cases were excluded because they had not received any adjuvant treatment, apart from surgery. No patients developed metastasis, a disease recurrence or died during the study. There were no differences with regard to sociodemographic and clinical data among the women who completed the entire study and the women who dropped out.

The mean age of the sample was 52.1 years old ($SD = 8.3$; range $= 30–68$). Women were predominately married or lived with a partner ($n = 44$, 88%); more than half reported having at least high school education ($n = 28$, 56%); and 69.4% ($n = 34$) were from middle socioeconomic status. A total of 46 women (92%) were diagnosed with invasive carcinoma. All women had undergone a lumpectomy ($n = 35$, 70%) or a mastectomy ($n = 15$, 30%); and 14 women (28%) had axillary lymph nodes removed. Women received adjuvant treatment including: chemotherapy ($n = 6$, 12%), radiotherapy ($n = 20$, 40%) or both ($n = 24$, 48%). At T3, 14 women (28%) were free of treatment and 36 (72%) were undergoing hormonotherapy.

**Measures**

**Sociodemographic and disease-related information**

Data regarding age, marital status, education and psychiatric history were obtained via participants’ self-report. Additionally, we collected data from patients’ medical records about time since diagnosis, type of treatment and treatment status at T3.

**Coping strategies**

Coping strategies were assessed at study entry using the Portuguese version of the Brief COPE (Carver, 1997; Pais Ribeiro & Rodrigues, 2004). It consists of 28 items tapping the way people deal with the stress in a response ranging from 0 (‘I have not been doing this at all’) to 3 (‘I have been doing this a lot’). It is generally analysed using 14 individual subscale scores (e.g. acceptance, denial, active coping, etc.). The guidelines for using the Brief Cope (Carver, Scheier, & Weintraub, 1989), also allow the use of aggregate scale scores, either based on content or statistical methodologies (Farley, Galves, Dickinson, & Perez, 2005; Sears, Woodward, & Twillman, 2007; Stanton et al., 2000). Following the procedures used in those studies, we selected seven subscales that closely matched Tedeschi and Calhoun’s model (2004) of the mechanisms that predict PTG and which are very similar to the content of the subscales created by Farley et al. (2005). Initially, we grouped the items into the following three aggregate scales: Cognitive Coping, Social Support and Emotional Expression. To refine and confirm the content-based groupings, a second-order principal components analysis with Varimax rotation was conducted, with eigenvalues set to be greater than 1.0. Examination of the eigenvalues and associated scree plot confirmed that three factors were distinct, consisting on the following grouped scales: Cognitive Coping (Acceptance, Humour, Planning and Positive...
reframing), Social Support Seeking (Seeking Emotional and Instrumental Support subscales) and Emotional Expression (Venting subscale). Cronbach’s alphas testing internal consistency were 0.69 for Seeking Social Support and 0.80 for Cognitive Coping. Emotional Expression had low-alpha reliability (0.43) and therefore was not included in further analysis.

**Posttraumatic growth**

The *Posttraumatic Growth Inventory* (PTGI; Tedeschi & Calhoun, 1996) was selected to assess women’s perceived positive life changes after BC at T2 and at T3. This is a 21-item questionnaire, rated on a six-point Likert scale, ranging from 0 (no change) to 5 (extreme change). The Portuguese version of PTGI (Silva, Moreira, Pinto, & Canavarro, 2009), used in this study, was also performed with women with BC and the items were keyed to the experience of having cancer as in previous studies (Cordova et al., 2007; Sears et al., 2003). It yields a total score on PTG and four independent dimensions: personal resources and skills (six items), new possibilities and life appreciation (six items), strengthening of social relationships (six items) and spiritual development (three items). In the Portuguese version, the internal consistency was adequate, with Cronbach’s alphas ranging from 0.81 (Spiritual development) to 0.87 (Personal resources and skills). In the current sample, Cronbach’s alphas ranged from 0.77 (Spiritual development – T3) to 0.90 (Personal resources and skills – T2).

**Psychological adjustment**

*Psychological quality of life*

The psychological domain of the Portuguese version of the *World Health Organization Quality of Life-Bref* (The WHOQOL Group, 1998; Vaz Serra et al., 2006) was used. It consists of six items assessing, for example, positive feelings (*How much do you enjoy life?*), self-esteem (*How satisfied are you with yourself?*) or spirituality/religion/personal beliefs (*To what extent do you feel your life to be meaningful?!). It employs a five-point Likert scale, with higher scores indicating better quality of life. In this study, Cronbach’s alphas ranged from 0.75 (T1) to 0.81 (T2 and T3).

*Anxiety and depression*

The Portuguese version of the *Hospital Anxiety and Depression Scale* (HADS; Pais Ribeiro et al., 2007; Zigmond & Snaith, 1983) was administered. It consists of 14 items, divided into two subscales: anxiety and depression. It employs a four-point scale, with higher scores indicating higher emotional distress. A score of 11 or higher is indicative of possible clinical mood disorder (Snaith, 2003). Cronbach’s alphas were 0.93 (T1), 0.77 (T2) and 0.83 (T3) for anxiety and 0.82 (T1), 0.83 (T2) and 0.85 (T3) for depression.

**Results**

Table 1 presents mean scores and standard deviations for coping, PTG and psychological adjustment at the three measurement occasions. It also shows the
prevalence of clinical anxiety and depression. Considering PTG total scores \( \geq 3 \) on the 0–5 scale (Cordova et al., 2007) on average 56\% (\( n = 28 \)) of the sample at T2 and 60\% (\( n = 30 \)) at T3 reported experiencing positive life changes from a moderate (score 3) to an extremely high degree (score 5).

**PTG and psychological adjustment: Change/stability over time**

To investigate whether scores for PTG and adjustment changed or remained stable over time (Hypotheses 2 and 3), and whether these scores differed according to the type of surgery (breast conservation *vs.* mastectomy) or type of treatment (radiotherapy *vs.* chemotherapy; between-subjects factors), a series of repeated-measures MANOVAs and ANOVAs were conducted. The repeated-measures ANOVAS for the dimensions and total score of the PTGI and for the psychological quality of life revealed no significant multivariate effects for the within-subjects factor time, nor for the between-subjects factors. No interaction effects were found.

An overall multivariate time effect was found for the HADS on the repeated-measures MANOVA (Pillai’s trace = 0.33, \( F(4, 38) = 4.69, p = 0.004, \eta^2_p = 0.33 \)). Univariate tests with Greenhouse–Geisser correction showed that the effect of time was only significant for anxiety, \( F(1.43, 58.70) = 12.36, p = 0.000, \eta^2_p = 0.23 \). Bonferroni tests showed that levels of anxiety at T1 were significantly higher than T2 and T3. No interaction effects were found between time and type of surgery or treatments.

### Table 1. Descriptive statistics for all the variables at surgery, treatment and initial survival.

<table>
<thead>
<tr>
<th>Measures possible range</th>
<th>Time 1 Surgery</th>
<th>Time 2 Treatment</th>
<th>Time 3 Survival</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>( M )</td>
<td>SD</td>
<td>( M )</td>
</tr>
<tr>
<td><strong>Coping</strong></td>
<td></td>
<td></td>
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<tr>
<td>Social support seeking</td>
<td>8.0</td>
<td>2.5</td>
<td>18.5</td>
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<tr>
<td>Cognitive coping</td>
<td>16.6</td>
<td>4.3</td>
<td>16.0</td>
</tr>
<tr>
<td><strong>Post-traumatic growth</strong></td>
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<tr>
<td>Personal resources and skills</td>
<td>19.0</td>
<td>7.0</td>
<td>19.2</td>
</tr>
<tr>
<td>New possibilities and life appreciation</td>
<td>8.7</td>
<td>4.3</td>
<td>9.1</td>
</tr>
<tr>
<td>Strengthening of social relationships</td>
<td>62.1</td>
<td>22.4</td>
<td>63.3</td>
</tr>
<tr>
<td>Total PTG</td>
<td>62.1</td>
<td>22.4</td>
<td>63.3</td>
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<tr>
<td><strong>Psychological adjustment</strong></td>
<td></td>
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<tr>
<td>Psychological QoL</td>
<td>69.7</td>
<td>14.1</td>
<td>69.2</td>
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<tr>
<td>Anxiety</td>
<td>9.9( ^a )</td>
<td>5.6</td>
<td>7.5</td>
</tr>
<tr>
<td>Depression</td>
<td>5.2( ^a )</td>
<td>4.1</td>
<td>5.2</td>
</tr>
<tr>
<td>% of clinical anxiety</td>
<td>48.9( ^a )</td>
<td>10.0</td>
<td>20.0</td>
</tr>
<tr>
<td>% of clinical depression</td>
<td>13.3( ^a )</td>
<td>10.0</td>
<td>6.0</td>
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</table>

Note: “These variables contain missing information.
**Direct and indirect links between coping and psychological adjustment: The role of the PTG dimension personal resources and skills**

To investigate Hypotheses 4 and 5, correlation analyses were conducted (Table 2). Results showed that cognitive coping at T1, but not social support seeking, was associated with better adjustment (lower levels of depression and anxiety and better psychological quality of life). In terms of the links between coping and PTG, cognitive coping at T1 was positively associated with only one dimension of PTG: Personal resources and skills. Social support seeking was linked to three dimensions: personal resources and skills; new possibilities and life appreciation and strengthening of social relationships. PTG dimension of personal resources and skills was also significantly linked to the three variables of psychological adjustment.

Hypothesis 6 was investigated using the bootstrap simple mediation procedure (Preacher & Hayes, 2008), according to which indirect effects are assessed based on a point estimate and bootstrapped 95% confidence interval (bias corrected and accelerated 95% CI; 5000 bootstrap iterations); an indirect effect is considered significant if the confidence interval does not include 0.

According to the correlations of the measures of adjustment and the proposed intervening variable PTG (composed of four dimensions), we opted to examine the indirect role of the PTG dimension of Personal resources and skills as it has shown significant correlations with all the adjustment variables. Therefore, we ran six simple mediation analyses to assess if personal resources and skills mediated the links.

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<th>1</th>
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<tbody>
<tr>
<td><strong>Coping (T1)</strong></td>
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<tr>
<td>1. Cognitive coping</td>
<td>−0.34*</td>
<td>−0.03</td>
<td>0.10</td>
<td>−0.05</td>
<td>0.34*</td>
<td>−0.47***</td>
<td>−0.35*</td>
<td>0.43**</td>
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<tr>
<td>2. Social support seeking</td>
<td>0.29*</td>
<td>0.32*</td>
<td>0.22</td>
<td>0.33*</td>
<td>0.02</td>
<td>0.07</td>
<td>0.11</td>
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<td><strong>Post-traumatic growth (T2)</strong></td>
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<td>3. New possibilities and life appreciation</td>
<td>0.69***</td>
<td>0.55***</td>
<td>0.69***</td>
<td>0.01</td>
<td>0.03</td>
<td>0.22</td>
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<td>4. Strengthening of social relationships</td>
<td>0.70***</td>
<td>0.83***</td>
<td>−0.11</td>
<td>−0.17</td>
<td>0.37**</td>
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<td>5. Spiritual development</td>
<td>0.66***</td>
<td>0.01</td>
<td>−0.02</td>
<td>0.13</td>
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<td>6. Personal resources and skills</td>
<td>0.31*</td>
<td>−0.37**</td>
<td>0.73***</td>
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<td><strong>Psychological adjustment (T3)</strong></td>
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<td>7. Anxiety</td>
<td>0.72***</td>
<td>−0.64***</td>
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<td>8. Depression</td>
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<td></td>
<td>−0.76***</td>
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<td>9. Psychol. QoL</td>
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</table>

Note: *p < 0.05, **p < 0.01, ***p < 0.001.
between coping strategies (social support seeking and cognitive coping) and psychological adjustment (psychological quality of life, anxiety and depression). Results showed that personal resources and skills significantly mediated four of the six links examined (Table 3): (a) the link between social support and psychological quality of life (point estimate = 4.36, CI = 0.50/9.43); (b) the link between social support and depression (point estimate = −0.92, CI = −2.54/−0.10); (c) the link between cognitive coping and psychological quality of life (point estimate = 4.00, CI = 0.58/9.67) and (d) the link between cognitive coping and depression (point estimate = −0.68, CI = −2.49/−0.01) at a marginal level of significance.

Discussion
This study examined the course of PTG and psychological adjustment throughout BC’s trajectory, the effect of treatment options, and the longitudinal relationship between coping strategies (T1), PTG (T2) and psychological adjustment (T3), especially the indirect role of PTG on the association between coping and adjustment. Although the findings were generally modest, some of our hypotheses were supported.

**Posttraumatic growth**
In this study, we explored the emergence of PTG early in the onset of the BC trajectory. Supporting Hypothesis 1, the results showed that approximately six months after diagnosis, at the time of adjuvant treatment, a high percentage of women (56%) reported positive life changes to have occurred in the self and their relationship with others, spiritual values and life appreciation in a moderate to a high degree. The magnitude of total PTG was in line with total scores found in the studies of Cordova et al. (2001) and Weiss (2002) with BC survivors two years ($M = 64.1$) and three years post-treatment ($M = 60.2$), respectively. The findings were even higher than in the studies of Manne et al. (2004) with women assessed 4.5 months after diagnosis and nine and 18 months later ($M = 49.0$, 52.8 and 55.7) and Sears et al. (2003) with BC survivors evaluated approximately two years after diagnosis ($M = 58.4$). Overall, these findings support the claim that people are capable of transforming traumatic experiences and adversities into positive life experiences (Tedeschi & Calhoun, 2004).

We consider that this finding is particularly important as it suggests that PTG can occur shortly after the stressful event takes place (Manne et al., 2004), challenging the counter-argument that PTG only occurs at the end of an extended period after cancer has been diagnosed (Cordova et al., 2001; Helgeson et al., 2006; Sears et al., 2003). Our findings suggest that soon after the beginning of the process of coping with a life-threatening illness, women start trying to make sense of the cancer experience. During this time, some women realised that they became stronger and skilled to deal with life difficulties. They also perceived that their relationships with others had become deeper and were strengthened in the face of adversity. Women are also provided with information about self-reliance, affecting self-evaluations of competence in difficult situations, which increase the likelihood of addressing problems and future traumas in a more assertive fashion (Tedeschi & Calhoun, 1996).
Table 3. Regression results for the links between coping, PTG dimension of personal resources and skills and the adjustment measures of psychological quality of life and depression: unstandardised direct, indirect and total effects.

<table>
<thead>
<tr>
<th>Independent variable (IV)</th>
<th>Mediator (M)</th>
<th>Dependent variable (DV)</th>
<th>Effect of IV on M (a path)</th>
<th>Effect of M on DV (b path)</th>
<th>Direct effect (c path)</th>
<th>Indirect effect (ab path)</th>
<th>Total effect (c’ path)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social support seeking (T1)</td>
<td>Personal resources and skills (T2)</td>
<td>Psychological QoL (T3)</td>
<td>0.63*</td>
<td>6.93**</td>
<td>-1.68</td>
<td>4.36*</td>
<td>2.68</td>
</tr>
<tr>
<td>Cognitive coping (T1)</td>
<td>Personal resources and skills (T2)</td>
<td>Depression (T3)</td>
<td>0.63*</td>
<td>-1.46**</td>
<td>1.40</td>
<td>-0.92*</td>
<td>0.48</td>
</tr>
</tbody>
</table>

Notes: Table shows unstandardised regression coefficients.

*p ≤ 0.05. **p < 0.01. ~≤0.11.
In regard to the longitudinal course of PTG, it remained stable from the period of treatment to initial survival. According to our findings, during the treatment phase, when women are required to directly confront the illness and its secondary effects, they may be compelled to think more about themselves, to reshape their self-concept and, thus, to experience high levels of PTG which remain stable, even after they return to other areas of life, during the initial survival period. Although this finding did not support Hypothesis 2, it is in line with a recent study where no differences in PTG mean scores were found between time of treatment and 6 months later (Scrignaro et al., 2011). It is likely that the time between T2 and T3 was too short to allow increases in the PTG experience, and thus future studies should examine the longitudinal experience of PTG over a longer period of time. An alternative explanation may be that the levels of PTG at T2 were already high and no further increase should be expected in a short time period at T3.

Psychological adjustment

The results on the course of the adjustment only partially supported Hypothesis 3. In general, women were well adjusted across the BC trajectory. The negative impact of BC on psychological functioning was greatest in the initial period (T1), but only for anxiety. During this period, when women were waiting for breast surgery, 48.9% were clinically anxious, which is in general consistent with previous evidence (Gallagher et al., 2002). For example, Schwarz et al. (2008) also found that more than half of the women show significant anxiety during their stay in the hospital to begin the treatment. As in past research, the proportion of women with clinical levels of depression, 13.3%, was significantly smaller than of anxiety (Schwarz et al., 2008; Silva, Moreira, & Canavarro, 2009).

In the subsequent months following diagnosis, survivors’ levels of anxiety decreased significantly and the percentage of women with a probable clinical anxiety fell from 48.9% to 20% at T2, and to 14% at T3. These results reinforce previous research showing that moderate to high levels of distress in cancer patients are particularly evident in the following weeks after diagnosis, especially anxiety (Knobf, 2007; Schwarz et al., 2008), but this pattern tends to be followed by a significant decrease. It is noteworthy that the fact that women were assessed during their hospitalisation may also have contributed to the increased levels of anxiety, as they may have been concerned about issues related to the hospital stay, surgical procedures, and uncertainty about the surgery’s impact on their physical functioning and body appearance. Thus, this result must be interpreted carefully.

The levels of depression and psychological quality of life remained stable over time, not supporting Hypothesis 3 and previous studies that found significant decreases in depression (Schwarz et al., 2008) and improvements in quality of life over time (Schou et al., 2005). We consider that the lack of significant results may have been occurred as the levels of depression and psychological quality of life were, respectively, lower and greater than what was expected. Those levels were, indeed, comparable to that of women of similar age in the general population, which were previously published by one of us (Silva, Moreira, & Canavarro, 2011). Thus, we believe these findings strengthen the resilient pattern of adjustment proposed in previous literature (Knobf, 2007; Rowland & Baker, 2005).
Overall, our findings are in line with other studies suggesting that women with BC may show positive adjustment even in times of enduring treatment. However, also show that transitional periods in the BC trajectory, such as the time before the beginning of treatment, is indeed a particular time of increased anxiety (Knobf, 2007).

The results of this study did not reveal a significant impact of the type of breast surgery and type of adjuvant treatment on women’s PTG and psychological adjustment throughout the BC trajectory. Several factors may help to explain the absence of significant results. First, the reduced size of the sample might have prevented finding significant effects. Second, other factors than disease-related ones may have a greater impact on psychological adjustment and PTG over time, such as age, education and marital status (King et al., 2000), as well as other cognitive and emotional strategies involved in the process of cognitive restructuring of the trauma narrative, which goes beyond the objectives of this study (Manne et al., 2004).

Coping, PTG, and adjustment: Links over time

PTG does not occur as a direct result of adversity. The individual’s attempts to cope with the changed reality are decisive in the emergence of PTG (Tedeschi & Calhoun, 2004). Our findings indicate that differences in coping played an important role in the experience of BC patients, both in terms of their psychological adjustment and PTG.

Partially supporting Hypothesis 4, correlation analyses showed that in the process of coping with BC, women who engaged more in cognitive strategies either by planning their actions, accepting life-circumstances, attempting to reframe BC in a more positive light or having an humorous approach, revealed higher PTG during the treatment phase in terms of finding positive changes in their personal resources and skills to deal with the stress. Almost one year after diagnosis, they also revealed lower levels of depression and anxiety and better psychological quality of life.

Efforts to seek social support before surgery for BC were not associated with psychological adjustment in initial survival (which was not expected according to Hypothesis 4). However, efforts to seek social support were significantly associated with higher levels of PTG during the period of adjuvant treatments, supporting Tedeschi and Calhoun’s (2004) proposal of social support as an important precursor of PTG.

How might these factors (cognitive coping and social support seeking) facilitate PTG? First, individuals who seek more social support will tend to talk more about the traumatic experience, expressing their negative emotions and thoughts. Through the stimulation of emotional expression, this self-disclosure induces women to cognitively process the cancer experience, i.e. to attempt to understand the potential meaning of BC, making sense of the cancer experience (Manne et al., 2004). It is also possible that the expression of negative emotions may contribute to desensitising oneself of the negative feelings, which may allow a greater focus on positive feelings and benefits (Foa, Steketee, & Rothbaum, as cited in Manne et al., 2004). Second, supportive others may offer new perspectives, encouraging women to find (positive) meaning in the cancer experience (Tedeschi & Calhoun, 2004). The empathetic response of others to that self-disclosure, giving feedback about one’s personal strength, may prompt the recognition of ways in which cancer has changed women’s...
self-concept (i.e. ‘You are such a brave person!’ enhances personal strength and self-assurance; Manne et al., 2004, p. 451).

In addition, the results of this study corroborate Hypothesis 5 and earlier literature suggesting that finding positive changes in BC experience, mainly in the dimension of personal resources and skills may be associated with reduced levels of psychological distress and enhanced quality of life some time later (Carver & Antoni, 2004). In this sense, we may consider that PTG refers to a process that the individual goes through in the aftermath of trauma, i.e. a mechanism by which women try to alter the global significance of the cancer experience in order to construct meaning (Janoff-Bulman & Frantz, 1997; McMillen, 1999), and this may promote adjustment and psychological quality of life. Thus, out of Helgeson et al.’s (2006) three possible explanations for the relationship between PTG and psychological adjustment, our findings support the option stating that PTG may function as a coping strategy, which, if successful, may be an important pathway for psychological adjustment.

Finally, partially supporting Hypothesis 6, our results showed that the use of coping strategies before surgery, such as social support seeking and cognitive coping, indirectly influenced levels of depression and psychological quality of life at the survival phase via PTG. It is reasonable to consider that the use of adaptive coping strategies facilitates the development of more positive perceptions of self-efficacy and self-confidence in personal resources and skills, which alleviate feelings of depression and psychological suffering. More precisely, social support seeking and cognitive coping may increase women’s psychological quality of life and reduce levels of depression by promoting change in women’s thoughts about their capabilities to exercise control over adversity and to successfully manage new challenges and life demanding situations. It is likely that success with these coping efforts promotes a sense of self-efficacy as well as the feeling of growing stronger, which seem to be an important pathway for later psychological adjustment. However, this association is not significant in the reduction of anxiety. It should be further investigated in future research.

Limitations and strengths

First, our findings must be carefully considered due to the reduced size of our sample, which may have limited our ability to find significant effects. Second, results of the mediation analysis should be interpreted carefully as longitudinal studies were not adjusted for psychological adjustment at study entry due to the small sample size that reduced the power and the ability to include further variables in the indirect effects assessment calculations. Thus, future studies with larger samples could provide additional validation for this model. Third, the fact that the first assessment occurred in the context of women’s hospitalisation, on the day before breast surgery, makes it difficult to draw conclusions about the level of anxiety. Fourth, in this study, we have only focused on social support seeking and cognitive coping. It would be relevant to have a measure of social support satisfaction as well as measures tapping other cognitive processes such as rumination, as posited by Tedeschi and Calhoun (2004). Fifth, in this study coping strategies were assessed only during T1. As the adaptive significance of coping processes may vary across the cancer trajectory, it would be relevant, in future studies, to examine if the coping styles reported before breast surgery, remain stable throughout treatment and
survivorship. Finally, although PTG was assessed at an early phase of the BC trajectory, the fact that we opted to start the assessment of PTG only at treatment phase (T2) limited our understanding of the process of PTG. Future investigation should consider an earlier evaluation of PTG.

Despite these limitations, we believe our findings are innovative and will add data to the previous literature in the field of adjustment and PTG, over time and across the BC trajectory. This study is one of the few longitudinal studies designed according to both temporal and clinical criteria. The coverage of a one-year period of managing BC diagnosis and surgery, adjuvant treatment and initial survival, allowed us to examine the longitudinal links between coping strategies, PTG and adjustment, advancing previous research that has focused on these variables separately or in pairs. The evidence that positive life changes may help to explain the association between coping and adjustment is a very relevant contribution to the literature.

Implications and conclusions

The findings of this study are relevant to mental health professionals working with BC patients. First, it shows that the initial phase of the BC trajectory, mainly the time right before the beginning of treatment (surgery), is the most debilitating. In order to prevent long-term adjustment problems, this phase should be especially targeted for intervention. Second, such efforts must include the promotion of adaptive coping strategies such as cognitive coping and social support seeking which are important pathways for psychological adjustment through the development of more positive perceptions of self-efficacy and self-confidence, which alleviate suffering and distress. Although mental health professionals should be particularly careful not to force the occurrence of PTG, they should reinforce the patient’s own specific PTG experiences whenever they occur, encouraging the use of this growth perspective in the patient’s daily life.

References


