Stress Management or Post-traumatic Growth Facilitation to Diminish Distress in Cancer Survivors? A Randomized Controlled Trial

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Abstract

This randomized controlled trial compared the efficacy of cognitive behavioral stress management (CBSM) and positive psychotherapy in cancer (PPC) to reduce post-traumatic stress symptoms (PTSS) and distress, and to promote post-traumatic growth (PTG) in cancer survivors. Participants were 140 adult women randomly allocated to CBSM (n = 73) or PPC (n = 67). PTSS, distress, and PTG were assessed at pre- and post-intervention, and at 3- and 12–month follow-ups. Analysis showed PPC was more effective in decreasing PTSS (b = -7.61, p < .001) and distress (b = -3.66; p < .001) than CBSM, but neither therapy significantly increased PTG (b = 0.77, p = .76). The relational veracity of PTG and its role predicting reduced PTSS was observed only in the PPC arm. In conclusion, PPC appears to be a valid therapeutic option for assimilating and accommodating the experience of cancer after treatment completion.

Keywords: cancer, psychotherapy, post-traumatic growth, post-traumatic stress, distress.

Introduction

Cancer is currently one of the most common illnesses, with around 14 million new cases diagnosed each year (American Cancer Society, 2015). Although the effectiveness of its treatments has increased in recent years, cancer survivors still report high levels of distress (Hoffman, McCarthy, Recklitis, & Ng, 2009) and post-traumatic stress (Abbey, Thompson, Hickish, & Heathcote, 2015; Cordova, Riba, & Spiegel, 2017). While research has historically focused on palliating the negative responses to cancer, an increasing number of studies in the last two decades have focused on the positive psychological aspects that may follow such traumatic events (Allison, Guichard, Fung, & Gilain, 2003; Dukes Holland & Holahan, 2003). In general terms, then, research has centered on either the positive or negative responses to the disease; however, it would be wrong to consider these two types of response as independent of one another, since the processes of post-traumatic stress symptoms (PTSS) and growth (PTG) in cancer have a common basis, namely, the threat to one's physical and psychological integrity (Joseph & Linley, 2006). This phenomenon is explained in the scientific literature (Cordova, Cunningham, Carlson, & Andrykowski, 2001; Janoff-Bulman, 1992; Joseph & Linley, 2006) in terms of adjusting to threatening events through two main processes: assimilation and accommodation.

The assimilation process commonly appears in the aftermath of trauma and focuses on managing the stressful event by integrating it into one's basic beliefs in order to prevent them from changing. Early evidence-based psychological treatments were designed to maximize this ability to assimilate the experience of cancer. Perhaps the most prominent example is cognitive behavioral stress management (CBSM) (Antoni, 2003), an approach that aims to help cancer patients improve their coping strategies by teaching them regulatory skills. This intervention has been applied in several studies during primary cancer treatment and has

obtained good results with regard to decreasing stress levels (Antoni et al., 2006, 2009, 2001; Groarke, Curtis, & Kerin, 2013; Stagl et al., 2015; Wang et al., 2018). Indeed, stress reduction through cognitive behavioral techniques seems especially important during peri-traumatic periods when the cancer threat is still present (Mehnert & Koch, 2007). However, post-traumatic stress and suffering may develop into a more global and existential distress after primary treatments (Ochoa, Sumalla, & Gil, 2006). It is at this point that the second adjustment process, accommodation, usually takes place, as the patient's mindset undergoes changes to fit the events experienced. To our knowledge, CBSM has not been tested with distressed cancer survivors at this stage. Therefore, it remains unclear whether CBSM is as appropriate in post-treatment cancer survivors as it is in patients still under therapy.

PTG after primary oncological interventions has been conceptualized as an indicator of the positive meaning-making accommodation process, and has been associated with PTSS reduction and better perceived health (Sawyer, Ayers, & Field, 2010). Nevertheless, it remains unknown whether PTG directly lessens PTSS or whether this reduction is due to the perceived change over time in PTG (Zoellner & Maercker, 2006). In any case, it seems that the facilitation of PTG could provide a valid psychotherapeutic framework for reducing distress and post-traumatic stress after cancer treatment (Roepke, 2015). Indeed, recent reviews and meta-analyses of positive psychology interventions (Bolier et al., 2013; Chakhssi, Kraiss, Sommers-Spijkerman, & Bohlmeijer, 2018; Ochoa, Sánchez, Sumalla, & Casellas-Grau, 2019) have shown their dual effect, both eliciting positive functioning and reducing distress. However, there is little evidence of the potential superiority of positive interventions over more consolidated active treatments such as cognitive-behavioral therapy (CBT). While we have not found any randomized clinical trials comparing these approaches in cancer, recent findings in clinical depression indicate that they are equally effective (Chaves, Lopez-Gomez, Hervas, & Vazquez, 2017). Moreover, a recent clinical trial (Ochoa, Casellas-Grau,

Vives, Font, & Borràs, 2017) has proved that PTG facilitation through a positive intervention effectively reduces distress among cancer patients (Ochoa et al., 2019). However, few articles have proposed psychological treatments that achieve a constructive and adaptive balance of both negative (traumatic) and positive (growth) responses in cancer (Ochoa et al., 2017; Pat-Horenczyk et al., 2016).

The first intervention to focus on this constructive stress-growth balance was positive psychotherapy in cancer (PPC) (Ochoa & Casellas-Grau, 2015; Ochoa et al., 2010). PPC embraces elements from humanistic-existential perspectives, along with strategies and tasks from positive psychology. With the aim of facilitating PTG, PPC was designed to complement and enhance traditional psychological treatments by working with patients' positive emotions, strengths, and personal meanings (Ochoa et al., 2017; Ochoa, Castejón, Sumalla, & Blanco, 2013). PPC has already proved effective in reducing stress among cancer survivors who have completed their primary treatment (Ochoa et al., 2010; Rashid & Seligman, 2013). The efficacy of PPC relies on the adaptive value of growth in buffering and reducing stress and discomfort (Ochoa et al., 2017), which has been indicated in other adverse events (Frazier, Conlon, & Glaser, 2001; Rashid & Seligman, 2013) in addition to cancer (Sawyer et al., 2010; Wang, Chang, Chen, Chen, & Hsu, 2014).

This focus on the stress-growth balance and its role in the positive adjustment to cancer sparked a debate on the distinction between illusory and real PTG in cancer patients and survivors (Sumalla, Ochoa, & Blanco, 2009; Widows, Jacobsen, Booth-Jones, & Fields, 2005). Zoellner and Maercker (2006) introduced the distinction between these two types of PTG, with the illusory conception referring to dysfunctional self-deceptive growth, and real or constructive growth referring to the functional aspects of positive changes. The relational veracity of PTG can be tested using a standard convergence validity process, estimating the

level of agreement between the patient's own score and that of their significant other. Indeed, significant others may be asked both how they perceive the patient's growth *(corroborated PTG)* and their own level (*vicarious PTG)* (Ochoa et al., 2013). This agreement helps to discriminate between real and illusory PTG in cancer survivors since, when high, it supports the relational veracity of the PTG (Moore et al., 2011; Ochoa et al., 2017, 2013).

The present study aimed to compare the effectiveness of CBSM and PPC in reducing stress and distress, and promoting growth, in cancer survivors who had completed their primary oncological treatment. In the light of previous findings (Chakhssi et al., 2018), we hypothesized that CSBM and PPC would achieve similar efficacy in reducing participants' PTSS and distress, while the PPC group would show greater improvement in PTG than the CSBM group. This superiority is to be expected given that the end of treatment is a fertile period for fostering growth, which is one of the specific targets of PPC (Ochoa et al., 2017). Furthermore, the relational veracity of this PTG was also analyzed for both interventions, in which we anticipated that the presence of survivors' PTG would be confirmed by their significant others. Finally, the possible relationship between PTG facilitation and reduced PTSS was also assessed for both interventions, hypothesizing that higher increase in PTG scores would be inversely related to PTSS scores over time after controlling for the number of previous extreme life events.

Materials and methods

Participants

This study, registered in ClinicalTrials.gov (NCT03010371), recruited 196 women with diverse cancer diagnoses. Participants were referred by medical oncologists or nurses to the psycho-oncology unit of a comprehensive cancer center if they presented emotional distress at the end of their primary treatment (i.e., screening scores ≥ 5 on a visual analog scale). This

cut-off point was found to be appropriate for detecting general psychosocial morbidity in a southern European sample of cancer patients (Gil, Grassi, Travado, Tomamichel, & Gonzalez, 2005). Participants meeting the following inclusion criteria were then invited to participate in the study: (a) age ≥ 18 years; (b) presentation of a single primary cancer; (c) primary cancer treatment already completed (surgery, chemotherapy, or radiotherapy); (d) significant clinical distress with a global score of 10 or more points on the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983); and (e) ability to understand and read Spanish. We excluded patients who reported any prior cancers, any prior or current severe mental disorders (hospitalization, psychosis, suicidal behavior, or substance dependency), or any major illness seriously affecting their cognitive performance (e.g., neurological disorders). The HADS cut-off score to confirm the presence of emotional distress was established on the basis of a previous study conducted in the same population (Costa-Requena, Pérez Martín, Salamero Baró, & Gil Moncayo, 2009).

Procedure and Study Design

This Randomized Controlled Trial (RCT) with a mixed design compared the efficacy of CBSM and PPC (between-subject) at four different assessment times (within-subject). Psychometric evaluation of PTSS, distress, PTG (primary outcomes), and extreme life events (control variable) was conducted in the first group session. After completing the whole intervention program, and at the 3-month and 12-month follow-ups, participants were asked to complete the primary outcomes measures again.

Participants were assigned to the different intervention arms in a two-step block randomization procedure. For this purpose, a computer-generated randomization table with random block sizes was created by an independent researcher. First, participants were allocated to a group and, when the group reached 8 to 12 survivors, it was randomly assigned

to one of the two study arms using a list of sequentially numbered allocations. Participants and psychotherapists were aware of the allocated arm, while data managers and assessors remained blinded. A research assessor obtained written informed consent from all participants prior to their enrollment**.** Both interventions consisted of 12 weekly manualized 90-minute long sessions and were led by clinical psychologists trained in the use and management of CBSM and PPC. Their performance was supervised by two experts in the application of the techniques (Antoni, 2003; Ochoa et al., 2010). Treatment integrity was randomly assessed by the two supervisors, either via monitors or by videotaping 25% of the sessions in each group intervention. The study complied with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Instruments

Post-traumatic stress

The Post-traumatic Stress Disorder Checklist-Civilian version (PCL-C) (Weathers, Litz, Herman, Huska, & Keane, 1993) is a 17-item self-rating questionnaire that assesses the diagnostic criteria of post-traumatic stress disorder, as outlined in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (American Psychiatric Association, 2000). We used the Spanish version of this tool, which has previously shown good reliability for the total score ($\alpha = 0.90$) (Costa-Requena & Gil, 2010). In the current sample, the PCL-C showed good reliability as well ($\alpha = 0.86$).

Distress

The HADS is a 14-item scale that measures distress in people with physical illnesses (Zigmond & Snaith, 1983). The validation in Spanish cancer outpatients was used (Costa-

Requena et al., 2009), which has demonstrated good internal reliability (Cronbach's α between 0.82 and 0.84). We obtained a similar reliability in this study ($\alpha = 0.88$).

Post-traumatic growth

The Post-traumatic Growth Inventory (PTGI) (Tedeschi & Calhoun, 1996) assesses positive changes experienced after a trauma through 21 items. In this study, we used the Spanish version, which showed good reliability ($\alpha = 0.86$) in our sample, though lower than that obtained by Costa-Requena & Gil (2007) ($\alpha = 0.95$). To assess the relational veracity of PTG using a standard convergence validity process, we evaluated two interpersonal indicators: *corroborated PTG* and *vicarious PTG* in the relatives of the cancer survivors. First, they were administered a modified version of the PTGI to assess their perception of PTG in the study participants (i.e., *corroborated PTG*). Later, the significant others were also asked about their own PTG in relation to the cancer diagnosis of their loved ones (i.e., *vicarious PTG*). The instructions were modified again to ask them about their own PTG and their opinion of the study participant's PTG.

Extreme life events

The Extreme Life Events Inventory (Pérez-Sales et al., 2012) collects information about the number and impact of 34 extreme life experiences, mostly related to trauma, loss, and crisis. The study participants could have experienced other extreme life events before their cancer diagnosis, which might have affected their PTG before PPC treatment. In this study, the

number of prior extreme events was used to control for the effects of PTG facilitation on stress reduction.

Interventions

Cognitive behavioral stress management

The B-SMART Breast Cancer Stress Management and Relaxation Training program (Antoni, 2003) was designed to be performed in 10 therapy sessions. However, during its adaptation into Spanish culture, it gained more acceptance from patients and therapists when performed in 12 sessions (Ochoa et al., 2006). The main objective of this therapy is to reduce the emotional discomfort resulting from cancer diagnosis and treatment in order to facilitate adjustment to the illness and improve quality of life. Stress management and relaxation techniques are designed to help patients to know their own stress responses and learn alternative ways of thinking and behaving when facing highly stressful experiences (see supplementary table 1). In the present study, the program consisted of 12 weekly 90-minute sessions.

Positive psychotherapy for cancer survivors

PPC aims to facilitate PTG through psychotherapeutic methods associated with the development of positive life changes after cancer. Sessions are spread across four modules, each with different lengths and aims. The general objective of the first two modules is to assimilate the cancer experience, while the final two modules focus on encouraging accommodation and personal growth from the experience of having the illness (see supplementary table 2). The PPC program is manualized, and the guide is available in Spanish (Ochoa et al., 2010) and English (Ochoa & Casellas-Grau, 2015). Although many authors consider that real growth only takes place through the accommodation process (Joseph & Linley, 2006; Sumalla et al., 2009), a number of factors associated with both assimilation and

accommodation have been linked to the process of personal growth resulting from adversity (Zoellner, Rabe, Karl, & Maercker, 2008). Consequently, this group-based program, also composed by 12 weekly 90-minute sessions, devotes more sessions to accommodation than to assimilation.

Statistical analyses

Statistical analysis was performed using IBM SPSS for Windows, Version 21.0 (IBM, 2012). Sociodemographic and clinical differences between both groups at baseline were examined by Student's *t*-tests and *chi-squared* tests, as appropriate.

Intention-to-treat (ITT) analyses were performed using general linear mixed models (LMM) to test the effect of the interventions on post-traumatic stress (PCL-C), distress (HADS) and post-traumatic growth (PTGI) controlling for baseline scores. LMMs can account for the multiple dependence between repeated measures and are not limited to the strong restrictions imposed by repeated measures ANOVA. Further, LMMs can provide a better fit to data, as they allow the choice of the appropriate covariance structure, and greater power, as they use all the available data from each participant to fit the model (Hesser, 2015; Moerbeek & van de Schoot, 2018).

Little's MCAR (missing completely at random) test indicated that data were missing completely at random (χ^2 (48) = 51.30, p = .346). Since MCAR can be assumed and since maximum likelihood (ML) was the estimation method used, no imputation method of missing data was applied, as in this situation LMM yields valid estimates (Gałecki & Burzykowski, 2013; Verbeke & Molenberghs, 2000). In addition, logistic regressions were used to appraise

differences in attrition, comparing both groups in terms of adherence (i.e., treatment completion) and retention (i.e., follow-up assessments completion).

Differences at 3, 6 and 12 months from baseline were used as repeated measures. Akaike's Information Criterion (AIC) and Likelihood ratio test were used respectively in non-nested and nested models, to guide the modeling process. Visual inspection of residual plots did not reveal any obvious deviations from homoscedasticity or normality.

Covariance structures that best fit the data according to likelihood ratio tests (LRT) were autoregressive (level 1) and variance components (level 2). The modeling process began with the most meaningful model closest to the null which, in this study, was the unconditional with time as a linear fixed effect and the intercept as a random effect. Since time (both linear and quadratic) was found to be non-significant whether entered as fixed or as random, the final model included random intercepts, and intervention and control variables (baseline, age, metastasis recurrence and oncological stage) as fixed effects. For all outcomes, 95% confidence intervals were calculated based on estimates and their standard errors, while Cohen's *d* was used for effect sizes (ES).

Intraclass correlation (ICC) was used to assess the corroboration of patients' PTG scores by their significant other. We decided to run the ICC to test the agreement between two 'judges' (i.e., participant and relative) on the same quantitative object (i.e., PTG scores). In turn, we used simple regression analyses to assess the predictive role of patients' PTG on their relatives' PTG, and of PTG facilitation in predicting reduced PTSS.

Finally, the percentage of patients showing a clinically significant change at 12-month follow-up in PTSS, according to the Reliable Change Index (RCI; Jacobson & Truax, 1991; Lambert,

Hansen, & Bauer, 2007), was compared using the *chi-squared* test. Statistical significance was assumed at a *p*-value < .05 in all cases.

Results

Study groups

Fig. 1 shows a flowchart of the number of participants recruited, the allocation of each intervention group, and the participants who could be followed up and analyzed. Of the 196 patients recruited, 21 did not meet the inclusion criteria, while 35 refused to participate due to a lack of interest (n = 16), lack of time (n = 13), or health issues (n = 6). The remaining 140 participants were then allocated to either the PPC (n = 67) or the CBSM group (n = 73). In the PPC group 80.60% of participants completed the intervention, while the adherence in the CBSM was of 76.71%. In turn, in the PPC arm 67.16% of participants initially allocated to this treatment were retained at 3-month follow-up, and 64.18% at 12-month follow-up. Retention rates in the CBSM group were of 61.64% at 3-month and 54.79% at 12-month follow-ups. Attrition analyses did not find significant differences between groups, neither in adherence (b = 0.140, p = .588, 95%CI = -0.367 - 0.647), nor in retention after 3 months (b = 0.203, p = .357, 95%CI = -0.229 - 0.634) and 12 months (b = 0.388, p = .067, 95%CI = -0.026 - 0.801).

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Participant characteristics

The sociodemographic and medical characteristics of the study participants are summarized in Table 1. There were no significant differences between the intervention groups in their

sociodemographic, medical, or psychological characteristics, or in the PCL-C, HADS, and PTGI scores at baseline (T0).

---INSERT TABLE 1 APPROXIMATELY HERE---

Effects of PPC and CBSM over time

Means and SD of each group in all measures reported over time, and ES for between-group differences, are included in Table 2.

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None of the models yielded a significant main effect of time when treatment and control variables (i.e., baseline, age, metastasis recurrence and oncological stage) were included. No significant moderation effect was found between time and treatment. The final linear mixed models included the effect of treatment on the dependent variables (i.e., PCL-C, HADS and PTGI) adjusted for baseline, age, metastasis recurrence and oncological stage.

The analysis of the effect of treatment on PCL-C yielded significant variance in intercepts across participants ($Var(u_{0j}) = 34.11$, $p = .035$). No significant variation was detected in slopes, nor any covariation between intercepts and slopes. A significant fixed effect of therapy (PPC vs CBSM) of $b = -7.61$ ($p < .001$, 95% CI = -10.86 – 4.35) was found in favour of PPC (see Fig. 2).

LMM analysis of the effect of treatment on HADS showed a variance in intercepts across participants near to significance (Var(u_{0j}) = 9.75, p = .07). No significant variation in slopes was found across participants, nor any covariation between intercepts and slopes. A significant fixed effect of therapy of b = -3.66 (p < .001, 95% CI = -5.45 – -1.88) was found, showing again that PPC was more effective.

Regarding PTGI, the final linear mixed model yielded significant variance in intercepts across participants: Var(u_{0j}) = 132.10, p < .001. Meanwhile, the estimate of the effect of treatment was positive, indicating better results in the participants treated with PPC than with CBSM, though this effect was not statistically significant (b = 0.77, p = .76, 95% CI = -4.22 – 5.76).

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Veracity of PTG

This study also assessed PTG facilitation among the participants by consulting their significant others. Intra-class correlations showed agreement between the PTG of participants and the PTG corroborated by their significant other before PPC (*ICC* = .44, 95% CI = .21 – 0.63, p < .001) or CBSM (*ICC* = .53, 95% CI = .31 – .69, p < .001). However, after the interventions, this agreement was observed in the PPC group (*ICC* = 0.46, 95% CI = .15 – .68, p < .01), but not in the CBSM group (*ICC* = .19, 95% CI = -.11 – .46, p = .11).

The effect of the type of intervention (PPC or CBSM) on the influence of the participant's PTG on their relative's PTG was also studied, but no significant results were obtained before PPC (B = .25, 95% CI = -.09 – .58, p = .14) or CBSM (B = .09, 95% CI = -.22 – .39, p = .57),

nor after both psychotherapies (PPT: B = .22, 95% CI = -.16 – .61, p = .26; CBSM: B = .15, 95% CI = -.23 – .53, p = .42).

The role of PTG facilitation in predicting reduced post-traumatic stress after PPC and CBSM

The possible predictive role of PTG in reducing PTSS was also explored. A linear regression analysis was performed, including post-intervention (T1) PCL-C score as dependent variable, and the differences between pre-intervention (T0) and post-intervention (T1) PTGI as predictor. The linear regression analysis showed that the increase in PTGI scores during PPC predicted a decrease in PCL-C after treatment, once the number of prior extreme life events was controlled (B = -.18, 95% CI = -.36 – -.11, p = .04). However, the PTGI scores did not have this predictive role in patients who had undergone CBSM (B = .01, 95% CI = -.26 – .27, p = .99).

Clinically significant change

Based on the data from participants who provided data at 12-month follow-up (n = 81), 46.5% of the PPC group experienced a reliable improvement, 48.8% did not experience any change, and 4.7% individuals reliably deteriorated. In turn, in the CBSM group, 25% of participants improved reliably, 70% did not change, and 5% reliably worsen. These ratios did not differ significantly between therapies (χ^2 = 4.23, p = .121).

Discussion

Our results showed that attritions rates where similar between groups, with no significant differences in adherence throughout the interventions and in retention at follow-ups, although slightly better rates are achieved in the PPC arm.

Overall, PPC was more effective in reducing stress and distress in cancer survivors over time than CBSM, from pre-intervention to all the follow-ups. These results could be explained by the characteristics of our sample. In effect, psychological therapies focusing on stress management produce better outcomes in patients who are undergoing cancer treatment and coping with its side effects and the threat of cancer (peri-traumatic stress) (Antoni, 2003; Penedo et al., 2006). However, our participants were survivors who had already completed their primary cancer treatment (chemotherapy, radiotherapy, or surgery). Hence, their sources of stress and distress were associated less with managing their reactions or coping with the threat of cancer, and more with accommodating their experience of cancer in their psychosocial identity (basic beliefs) and the return to their new daily life. Thus, it may be that the cognitive and behavioral techniques of CBSM may help survivors manage their updated reactions during the intervention, but do not help them maintain reduced levels of distress in follow-up through the accommodation of altered basic beliefs or views of the self (e.g., sense of continuity and congruence), others (e.g., closeness, openness, gratitude, or forgiveness), and the world (e.g., changes in priorities and values) (Janoff-Bulman, 1992). In turn, PPC, designed for distressed cancer survivors who have completed primary treatments (Ochoa et al., 2017), may be a more suitable psychological intervention for this population. Its strategies may facilitate narrative meaning-making to restore altered basic beliefs, giving continuity and a renewed personal coherence to cancer as a biographical disruption, maximizing relational synchrony and interpersonal relationships with significant others, and accommodating the experience of having cancer into one's values and future priorities.

Although PTG was higher in PPC than in CBSM, the difference was not significant, and neither intervention significantly improved PTG over time. Therefore, our original hypothesis that the PPC group would present a greater increase in PTG than the CBSM group was partially borne out. This result could be attributed to the ceiling effect of PTGI recently

reported by other studies (Taku, Iimura, & McDiarmid, 2018), given that cancer patients tend to report polarized emotional responses.

Since PTG was not significantly enhanced in any of the two groups, we still wanted to test whether the improvements recorded were corroborated by patients' significant others. Our results further reinforced the superiority of PPC over CBSM. In effect, relatives of participants corroborated the PTG induced after the intervention in the PPC group only. These results replicate those of our preliminary study (Ochoa et al., 2017), in which this finding was interpreted as relational veracity and synchrony of growth promotion. However, in this RCT, we did not find the same results for CBSM. The individualistic approach of this intervention, focusing on improving personal coping skills, might not promote enough relational synchrony between cancer survivors and their relatives. By contrast, the PPC program includes specific sessions to facilitate relational growth, which seems to foster this corroborated PTG. In turn, neither of the interventions induced *vicarious PTG* (i.e., personal growth in relatives related to the personal growth of participants). This finding was also observed in our previous study (Ochoa et al., 2017), which attributed the lack of vicarious growth to the fact that the significant others had not directly received any psychological treatment. Indeed, Heinrichs et al. (2012) reported increased vicarious PTG in cancer survivors and their partners who were all enrolled in a couple-based group psychological intervention.

In turn, our results indicated that PTG facilitation predicted reduced stress in the PPC group, but again not in the CBSM group, after controlling for the number of prior extreme life events. Although CBSM has been shown to increase growth in other studies (Penedo et al., 2004), this was a side effect of stress management that is associated with 'benefit-finding' (assigning a positive value to cancer). In contrast, PTG measures are related to meaning-making narratives that involve identity reconstruction (Sumalla et al., 2009). In fact, a

longitudinal study by Lechner et al. (2006) showed that current growth (measured as benefit-finding) did not indicate reduced current or future stress. Increased growth over time has been associated with decreased stress only when the cancer survivor maintains a meaning-based coping process, actively searching for meaning that leads to more deep and stable changes in one's perceptions of oneself, others, and the world (Ochoa *et al.* 2019).

Despite the strengths of our study, there are some limitations that should be mentioned. First, as has been reported for several multicomponent psychological treatment programs, the difficulty in pinpointing the elements of a program that generate the greatest psychotherapeutic impact may produce discrepancies between hypotheses and results. Further research is required to clarify the psychotherapeutic impact of a psychological intervention with several components. Furthermore, our sample was composed mostly of breast cancer survivors, a circumstance that may have biased the results. More heterogeneous samples of survivors of different types of cancer should also be studied to explore the effects of these psychotherapies in other populations.

Finally, both therapies showed comparable results in terms of the clinically significant change they produced. The vast majority of participants providing data to the last follow-up of the study either reliably improved or stayed the same in terms of their PTSS, while very few cases of deterioration were identified. Nonetheless, the percentage of patients who experienced an improvement in their symptoms was higher in the PPC group, thus corroborating the results of the LMM for this outcome.

In summary, our results provide further information on psycho-oncological interventions in cancer survivors. In testing two different ways of reducing stress and distress in patients who have completed their primary treatment, we confirmed that psychological treatments should consider the fact that there are different sources of distress, stress, and growth during and after

primary cancer treatment. Interventions like PPC, designed to facilitate PTG in order to reduce stress, are more effective than CBSM in individuals who have completed their cancer treatment. In contrast, during the initial phases of diagnosis and primary cancer treatment, CBSM may be better for reducing the stress associated with the initial threat and facilitating resistance and the assimilation process (Ochoa *et al.* 2019). Further research is needed to clarify whether interventions that facilitate growth, such as PPC, also reduce distress at these early stages. What seems certain is that psychotherapy in cancer patients and survivors should be tailored according to their stress-growth balance and to the phase of the cancer treatment process (Ochoa et al., 2017). Finally, PTG facilitation predicted reduced stress in the PPC but not in the CBSM group, as corroborated by the significant others of the cancer survivors. This reinforces the relational veracity and importance of the PTG induced by this psychological treatment.

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Disclosure statement

The authors have no conflicts of interest to declare.

Data availability statement

The authors will make the dataset available upon request.

References

Abbey, G., Thompson, S. B. N., Hickish, T., & Heathcote, D. (2015). A meta-analysis of prevalence rates and moderating factors for cancer-related post-traumatic stress disorder. *Psycho-Oncology*, *24*(4), 371–381. https://doi.org/10.1002/pon.3654

Allison, P. J., Guichard, C., Fung, K., & Gilain, L. (2003). Dispositional Optimism Predicts Survival Status 1 Year After Diagnosis in Head and Neck Cancer Patients. *Journal of Clinical Oncology*, *21*(3), 543–548. https://doi.org/10.1200/JCO.2003.10.092

American Cancer Society. (2015). *Cancer Facts & Figures 2015*. Atlanta, GA: Author.

American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders (4th ed., text rev.)*. Washington, DC: Author.

Antoni, M. H. (2003). *Stress management intervention for women with breast cancer.* https://doi.org/10.1037/10488-000

Antoni, M. H., Lechner, S. C., Kazi, A., Wimberly, S. R., Sifre, T., Urcuyo, K. R., … Carver, C. S. (2006). How Stress Management Improves Quality of Life After Treatment for Breast Cancer. *Journal of Consulting and Clinical Psychology*, *74*(6), 1143–1152. https://doi.org/10.1037/0022-006X.74.6.1152

Antoni, M. H., Lechner, S., Diaz, A., Vargas, S., Holley, H., Phillips, K., … Blomberg, B. (2009). Cognitive behavioral stress management effects on psychosocial and physiological adaptation in women undergoing treatment for breast cancer. *Brain, Behavior, and Immunity*, *23*(5), 580–591. https://doi.org/10.1016/j.bbi.2008.09.005

Antoni, M. H., Lehman, J. M., Kilbourn, K. M., Boyers, A. E., Culver, J. L., Alferi, S. M., … Carver, C. S. (2001). Cognitive-behavioral stress management intervention decreases the prevalence of depression and enhances benefit finding among women under treatment

for early-stage breast cancer. *Health Psychology*, *20*(1), 20–32. https://doi.org/10.1037/0278-6133.20.1.20

Bolier, L., Haverman, M., Westerhof, G. J., Riper, H., Smit, F., & Bohlmeijer, E. (2013). Positive psychology interventions: a meta-analysis of randomized controlled studies. *BMC Public Health*, *13*(1), 119. https://doi.org/10.1186/1471-2458-13-119

Chakhssi, F., Kraiss, J. T., Sommers-Spijkerman, M., & Bohlmeijer, E. T. (2018). The effect of positive psychology interventions on well-being and distress in clinical samples with psychiatric or somatic disorders: a systematic review and meta-analysis. *BMC Psychiatry*, *18*(1), 211. https://doi.org/10.1186/s12888-018-1739-2

Chaves, C., Lopez-Gomez, I., Hervas, G., & Vazquez, C. (2017). A Comparative Study on the Efficacy of a Positive Psychology Intervention and a Cognitive Behavioral Therapy for Clinical Depression. *Cognitive Therapy and Research*, *41*(3), 417–433. https://doi.org/10.1007/s10608-016-9778-9

Cordova, M. J., Cunningham, L. L. C., Carlson, C. R., & Andrykowski, M. A. (2001). Posttraumatic growth following breast cancer: A controlled comparison study. *Health Psychology*, *20*(3), 176–185. https://doi.org/10.1037/0278-6133.20.3.176

Cordova, M. J., Riba, M. B., & Spiegel, D. (2017). Post-traumatic stress disorder and cancer. *The Lancet Psychiatry*, *4*(4), 330–338. https://doi.org/10.1016/S2215-0366(17)30014-7

Costa-Requena, G., & Gil, F. (2010). Posttraumatic stress disorder symptoms in cancer: psychometric analysis of the Spanish Posttraumatic Stress Disorder Checklist-Civilian version. *Psycho-Oncology*, *19*(5), 500–507. https://doi.org/10.1002/pon.1601

Costa-Requena, G., & Gil, F. L. (2007). Crecimiento postraumático en pacientes oncológicos. *Análisis y Modificación de Conducta*, *33*(148), 229–250.

Costa-Requena, G., Pérez Martín, X., Salamero Baró, M., & Gil Moncayo, F. L. (2009). Discriminación del malestar emocional en pacientes oncológicos utilizando la escala de ansiedad y depresión hospitalaria (HADS). *Ansiedad y Estrés*, *15*(2), 217–229.

Dukes Holland, K., & Holahan, C. K. (2003). The Relation of Social Support and Coping to Positive Adaptation to Breast Cancer. *Psychology & Health*, *18*(1), 15–29. https://doi.org/10.1080/0887044031000080656

Frazier, P., Conlon, A., & Glaser, T. (2001). Positive and negative life changes following sexual assault. *Journal of Consulting and Clinical Psychology*, *69*(6), 1048–1055.

Gałecki, A. T., & Burzykowski, T. (2013). *Linear mixed-effects models using R: a step-by-step approach*. New York, NY: Springer.

Gil, F., Grassi, L., Travado, L., Tomamichel, M., & Gonzalez, J. R. (2005). Use of distress and depression thermometers to measure psychosocial morbidity among southern European cancer patients. *Supportive Care in Cancer*, *13*(8), 600–606. https://doi.org/10.1007/s00520-005-0780-0

Groarke, A., Curtis, R., & Kerin, M. (2013). Cognitive-behavioural stress management enhances adjustment in women with breast cancer. *British Journal of Health Psychology*, *18*(3), 623–641. https://doi.org/10.1111/bjhp.12009

Heinrichs, N., Zimmermann, T., Huber, B., Herschbach, P., Russell, D. W., & Baucom, D. H. (2012). Cancer Distress Reduction with a Couple-Based Skills Training: A Randomized Controlled Trial. *Annals of Behavioral Medicine*, *43*(2), 239–252. https://doi.org/10.1007/s12160-011-9314-9

Hesser, H. (2015). Modeling individual differences in randomized experiments using growth models: Recommendations for design, statistical analysis and reporting of results of

internet interventions. *Internet Interventions*, *2*(2), 110–120. https://doi.org/10.1016/j.invent.2015.02.003

Hoffman, K. E., McCarthy, E. P., Recklitis, C. J., & Ng, A. K. (2009). Psychological Distress in Long-term Survivors of Adult-Onset Cancer. *Archives of Internal Medicine*, *169*(14), 1274–1281. https://doi.org/10.1001/archinternmed.2009.179

IBM. (2012). *IBM SPSS Statistics for Windows*. Armonk, NY: Author.

Jacobson, N. S., & Truax, P. (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology*, *59*(1), 12–19. https://doi.org/10.1037/0022-006X.59.1.12

Janoff-Bulman, R. (1992). *Shattered assumptions: towards a new psychology of trauma*. New York, NY: Free Press.

Joseph, S., & Linley, P. A. A. (2006). Growth following adversity: Theoretical perspectives and implications for clinical practice. *Clinical Psychology Review*, *26*(8), 1041–1053. https://doi.org/10.1016/j.cpr.2005.12.006

Lambert, M. J., Hansen, N. B., & Bauer, S. (2007). Assessing the Clinical Significance of Outcome Results. In *Evidence-Based Outcome Research* (pp. 359–378). https://doi.org/10.1093/med:psych/9780195304633.003.0017

Lechner, S. C., Carver, C. S., Antoni, M. H., Weaver, K. E., & Phillips, K. M. (2006). Curvilinear associations between benefit finding and psychosocial adjustment to breast cancer. *Journal of Consulting and Clinical Psychology*, *74*(5), 828–840. https://doi.org/10.1037/0022-006X.74.5.828

Mehnert, A., & Koch, U. (2007). Prevalence of acute and post-traumatic stress disorder and comorbid mental disorders in breast cancer patients during primary cancer care: a

prospective study. *Psycho-Oncology*, *16*(3), 181–188. https://doi.org/10.1002/pon.1057

Moerbeek, M., & van de Schoot, R. (2018). *Multilevel analysis: techniques and applications (3rd. ed.)*. New York, NY: Routledge.

Moore, A. M., Gamblin, T. C., Geller, D. A., Youssef, M. N., Hoffman, K. E., Gemmell, L., … Steel, J. L. (2011). A prospective study of posttraumatic growth as assessed by self-report and family caregiver in the context of advanced cancer. *Psycho-Oncology*, *20*(5), 479–487. https://doi.org/10.1002/pon.1746

Ochoa, C., & Casellas-Grau, A. (2015). Positive Psychotherapy in Cancer: Facilitating Posttraumatic Growth in Assimilation and Accommodation of Traumatic Experience. In *Comprehensive Guide to Post-Traumatic Stress Disorder* (pp. 1–14). https://doi.org/10.1007/978-3-319-08613-2_77-1

Ochoa, C., Casellas-Grau, A., Vives, J., Font, A., & Borràs, J.-M. (2017). Positive psychotherapy for distressed cancer survivors: Posttraumatic growth facilitation reduces posttraumatic stress. *International Journal of Clinical and Health Psychology : IJCHP*, *17*, 28–37. https://doi.org/10.1016/j.ijchp.2016.09.002

Ochoa, C., Castejón, V., Sumalla, E. C., & Blanco, I. (2013). Posttraumatic growth in cancer survivors and their significant others: vicarious or secondary growth? *Terapia Psicologica*, *31*, 81–92.

Ochoa, C., Sánchez, N., Sumalla, E. C., & Casellas-Grau, A. (2019). Stress and Growth in Cancer: Mechanisms and Psychotherapeutic Interventions to Facilitate a Constructive Balance. *Frontiers in Psychology*, *10*, 177. https://doi.org/10.3389/fpsyg.2019.00177

Ochoa, C., Sumalla, E. C., & Gil, F. L. (2006). World assumptions and posttraumatic cognitions related to trauma response in cancer patients. *8th World Congress of Psycho-*

Oncology. Venice, Italy.

Ochoa, C., Sumalla, E. C., Maté, J., Castejón, V., Rodríguez, A., Blanco, I., & Gil, F. (2010). Psicoterapia Positiva Grupal en Cáncer. Hacia una atención psicosocial integral del superviviente de cáncer. *Psicooncologia*, *7*, 7–34.

Pat-Horenczyk, R., Saltzman, L. Y., Hamama-Raz, Y., Perry, S., Ziv, Y., Ginat-Frolich, R., & Stemmer, S. M. (2016). Stability and transitions in posttraumatic growth trajectories among cancer patients: LCA and LTA analyses. *Psychological Trauma: Theory, Research, Practice, and Policy*, *8*(5), 541–549. https://doi.org/10.1037/tra0000094

Penedo, F. J., Dahn, J. R., Molton, I., Gonzalez, J. S., Kinsinger, D., Roos, B. A., … Antoni, M. H. (2004). Cognitive-behavioral stress management improves stress-management skills and quality of life in men recovering from treatment of prostate carcinoma. *Cancer*, *100*(1), 192–200. https://doi.org/10.1002/cncr.11894

Penedo, F. J., Molton, I., Dahn, J. R., Shen, B. J., Kinsinger, D., Traeger, L., … Antoni, M. (2006). A randomized clinical trial of group-based cognitive-behavioral stress management in localized prostate cancer: Development of stress management skills improves quality of life and benefit finding. *Annals of Behavioral Medicine*, *31*(3), 261–270. https://doi.org/10.1207/s15324796abm3103_8

Pérez-Sales, P., Eiroa-Orosa, F. J., Olivos, P., Barbero-Val, E., Fernández-Liria, A., & Vergara, M. (2012). Vivo Questionnaire: A Measure of Human Worldviews and Identity in Trauma, Crisis, and Loss—Validation and Preliminary Findings. *Journal of Loss and Trauma*, *17*(3), 236–259. https://doi.org/10.1080/15325024.2011.616828

Rashid, T., & Seligman, M. E. P. (2013). *Positive Psychotherapies in Current Therapies* (10th ed.; R. J. Corsini & D. Wedding, Eds.). Belmont, CA: Cengage.

Roepke, A. M. (2015). Psychosocial interventions and posttraumatic growth: A meta-analysis. *Journal of Consulting and Clinical Psychology*, *83*(1), 129–142. https://doi.org/10.1037/a0036872

Sawyer, A., Ayers, S., & Field, A. P. (2010). Posttraumatic growth and adjustment among individuals with cancer or HIV/AIDS: A meta-analysis. *Clinical Psychology Review*, *30*(4), 436–447. https://doi.org/10.1016/j.cpr.2010.02.004

Stagl, J. M., Antoni, M. H., Lechner, S. C., Bouchard, L. C., Blomberg, B. B., Glück, S., … Carver, C. S. (2015). Randomized controlled trial of cognitive behavioral stress management in breast cancer: A brief report of effects on 5-year depressive symptoms. *Health Psychology*, *34*(2), 176–180. https://doi.org/10.1037/hea0000125

Sumalla, E. C., Ochoa, C., & Blanco, I. (2009). Posttraumatic growth in cancer: Reality or illusion? *Clinical Psychology Review*, *29*(1), 24–33. https://doi.org/10.1016/j.cpr.2008.09.006

Taku, K., Iimura, S., & McDiarmid, L. (2018). Ceiling Effects and Floor Effects of the Posttraumatic Growth Inventory. *Journal of Child and Family Studies*, *27*(2), 387–397. https://doi.org/10.1007/s10826-017-0915-1

Tedeschi, R. G., & Calhoun, L. G. (1996). The posttraumatic growth inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress*, *9*(3), 455–471. https://doi.org/10.1002/jts.2490090305

Verbeke, G., & Molenberghs, G. (2000). *Linear Mixed Models for Longitudinal Data*. New York, NY: Springer.

Wang, A. W. T., Bouchard, L. C., Gudenkauf, L. M., Jutagir, D. R., Fisher, H. M., Jacobs, J. M., … Antoni, M. H. (2018). Differential psychological effects of cognitive-behavioral

stress management among breast cancer patients with high and low initial cancer-specific distress. *Journal of Psychosomatic Research*, *113*, 52–57. https://doi.org/10.1016/j.jpsychores.2018.07.011

Wang, A. W. T., Chang, C. S., Chen, S. T., Chen, D. R., & Hsu, W. Y. (2014). Identification of posttraumatic growth trajectories in the first year after breast cancer surgery. *Psycho-Oncology*, *23*(12), 1399–1405. https://doi.org/10.1002/pon.3577

Weathers, F. W., Litz, B. T., Herman, J. A., Huska, J. A., & Keane, T. M. (1993). The PTSD Checklist (PCL): Reliability, validity and diagnostic utility. *9th Annual Conference of the ISTSS*. San Antonio, TX.

Widows, M. R., Jacobsen, P. B., Booth-Jones, M., & Fields, K. K. (2005). Predictors of Posttraumatic Growth Following Bone Marrow Transplantation for Cancer. *Health Psychology*, *24*(3), 266–273. https://doi.org/10.1037/0278-6133.24.3.266

Zigmond, A. S., & Snaith, R. P. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica*, *67*(6), 361–370. https://doi.org/10.1111/j.1600-0447.1983.tb09716.x

Zoellner, T., & Maercker, A. (2006). Posttraumatic growth in clinical psychology — A critical review and introduction of a two component model. *Clinical Psychology Review*, *26*(5), 626–653. https://doi.org/10.1016/j.cpr.2006.01.008

Zoellner, T., Rabe, S., Karl, A., & Maercker, A. (2008). Posttraumatic growth in accident survivors: openness and optimism as predictors of its constructive or illusory sides. *Journal of Clinical Psychology*, *64*(3), 245–263. https://doi.org/10.1002/jclp.20441

Table 1. Sample characteristics.

	PPC Group *n* = 67	CBSM Group *n* = 73	***t***	*p*
Age (years)			**-0.59**	.49
Mean	50.81	49.68		
SD	9.49	10.18		
Range	31-70	20-69		
Time since diagnosis (months)				
Mean	18.10	19.70	**0.99**	.32
SD	15.27	50.35		
Range	0-79	3-138		
Marital status			**4.52**	.19
Married/partnered	70.8	81.1		
Separated/divorced	18.1	6.8		
Never married	6.9	9.4		
Widowed	4.2	2.7		
Educational level			**2.53**	.33
No studies	4.1	0		
High school or less	45.7	45.9		
Some college	32.8	37.8		
University studies	17.1	16.2		
Psychotropics			**6.17**	.26
None	44.4	43.2		

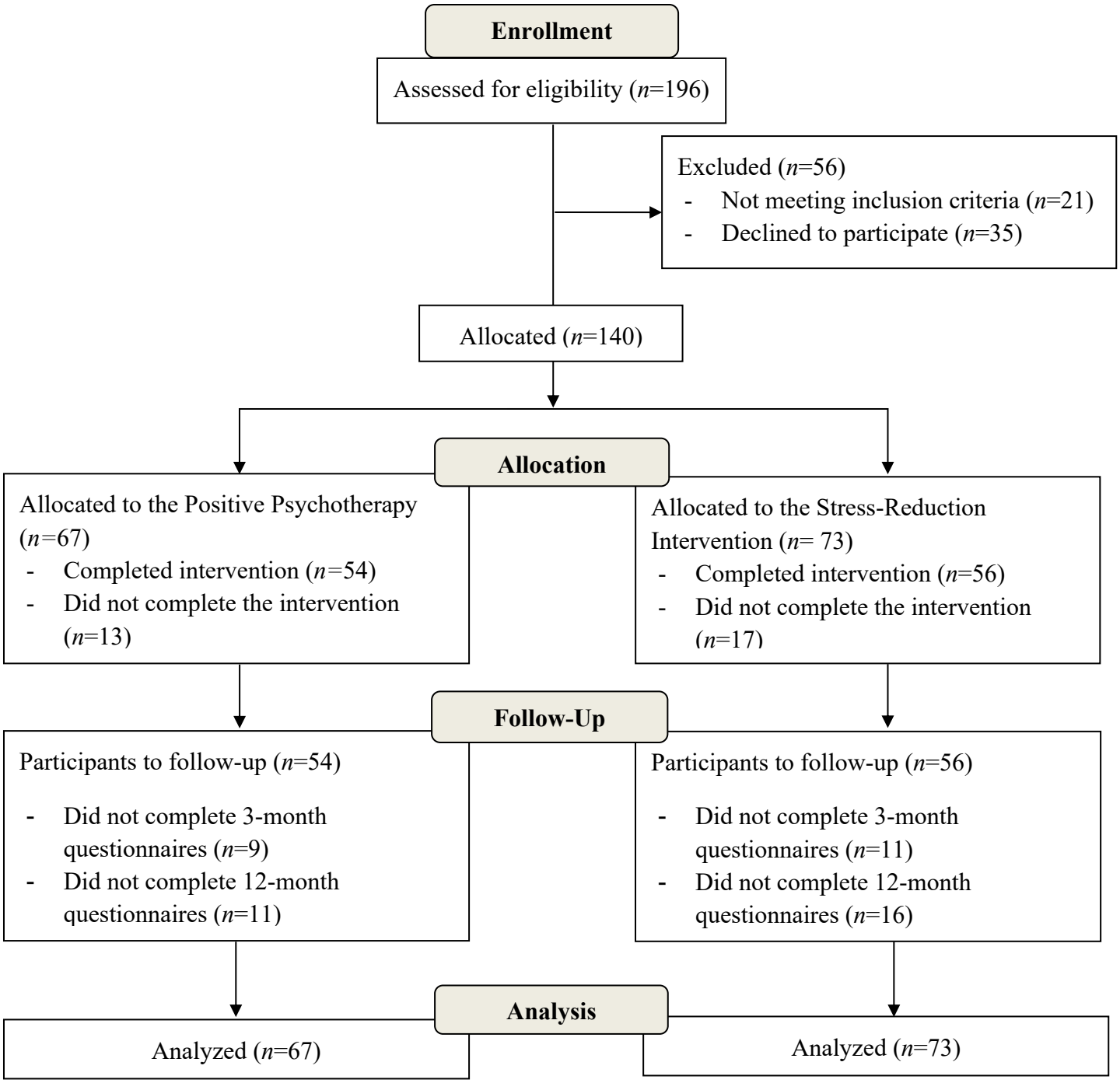
Anxiolytic	27.8	14.9		
Antidepressant	9.7	16.2		
Hypnotic	6.9	9.4		
Anxiolytic + Antidepressant	9.7	16.2		
Others	1.4	0		
Cancer site			**7.83**	.45
Breast	81.9	85.1		
Colorectal	2.8	6.8		
Gynecological	5.6	1.4		
Others	9.7	6.7		
Cancer stage			**3.07**	.54
0-I	47.1	34.2		
II	28.6	34.2		
III	18.6	23.3		
IV	5.7	8.2		
Cancer surgery			**0.21**	.73
Yes	90.3	91.9		
No	9.7	8.1		
Cancer treatment				
Chemotherapy	77.8	79.7	**0.79**	.77
Radiotherapy	70.8	71.6	**0.75**	.92
Hormone therapy	55.6	67.6	**2.07**	.14

Note. PPC = positive psychotherapy in cancer, CBSM = cognitive behavioral stress management.

Table 2. Mean, SD and effect sizes for between-group differences in primary outcomes.

	PPC		CSBM		ES
	n = 67		*n* = 73		
	Mean	SD	Mean	SD	Cohen's *d* (95% CI)
PCL-C					
T0	54.22	13.08	52.88	12.20	0.11 (-0.22 – 0.44)
T1	45.00	14.39	49.34	12.90	-0.32 (-0.65 – 0.02)
T2	45.30	14.77	49.87	11.39	-0.35 (-0.68 – -0.01)
T3	44.93	15.89	48.50	11.31	-0.26 (-0.59 – 0.07)
HADS					
T0	23.40	6.66	21.81	7.47	0.22 (-0.11 – 0.56)
T1	18.64	8.22	19.73	7.32	-0.14 (-0.47 – 0.19)
T2	17.46	8.20	21.27	7.08	-0.50 (-0.83 – -0.16)
T3	16.56	8.02	20.28	7.38	-0.48 (-0.82 – -0.15)
PTGI					
T0	51.16	19.07	48.86	18.82	0.12 (-0.21 – 0.45)
T1	55.06	19.33	54.02	17.32	0.06 (-0.27 – 0.39)
T2	54.72	20.88	51.33	15.87	0.18 (-0.15 – 0.52)
T3	55.36	18.84	53.25	18.37	0.11 (-0.22 – 0.45)

Note. PPC = positive psychotherapy in cancer, CBSM = cognitive behavioral stress management, ES = effect size, PCL-C = post-traumatic stress disorder checklist-civilian version, HADS = hospital anxiety and depression scale, PTGI = Post-traumatic Growth Inventory.


Enrollment
Assessed for eligibility (n=196)
Excluded (n=56)
- Not meeting inclusion criteria (n=21)
- Declined to participate (n=35)
Allocated (n=140)
Allocation
Allocated to the Positive Psychotherapy (n=67)
- Completed intervention (n=54)
- Did not complete the intervention (n=13)
Allocated to the Stress-Reduction Intervention (n= 73)
- Completed intervention (n=56)
- Did not complete the intervention (n=17)
Follow-Up
Participants to follow-up (n=54)
- Did not complete 3-month questionnaires (n=9)
- Did not complete 12-month questionnaires (n=11)
Participants to follow-up (n=56)
- Did not complete 3-month questionnaires (n=11)
- Did not complete 12-month questionnaires (n=16)
Analysis
Analyzed (n=67)
Analyzed (n=73)

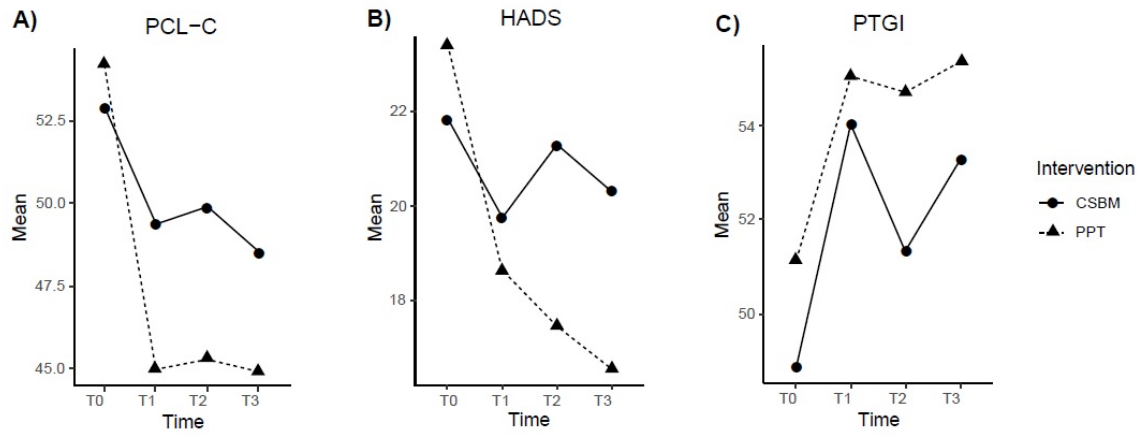

A)
PCL−C
Mean
52.5
50.0
47.5
45.0
T0
T1
T2
T3
Time
B)
HADS
Mean
22
20
18
T0
T1
T2
T3
Time
C)
PTGI
Mean
54
52
50
T0
T1
T2
T3
Time
Intervention
CSBM
PPT

Figure Captions

Figure 1. CONSORT Flow Diagram.

Figure 2. Means of posttraumatic stress (PCL-C), distress (HADS), and posttraumatic growth (PTGI) for positive psychotherapy in cancer (PPC) and cognitive behavioral stress management (CBSM) at T0, T1, T2, and T3.