

# The interaction of post-traumatic growth and post-traumatic stress symptoms in predicting depressive symptoms and quality of life

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## Abstract

**Objective:** We sought to explore whether post-traumatic growth (PTG) (positive change or benefit finding resulting from trauma) moderates relationships between post-traumatic stress symptoms (PTSS) and both depression and quality of life (QOL) among breast cancer survivors.

**Methods:** We interviewed 161 women previously treated for early stage breast cancer. We assessed PTG using the Post-traumatic Growth Inventory, PTSS using the PTSD Checklist, depressive symptoms using the CES-D and QOL using the FACT-B.

**Results:** Higher PTSS was associated with greater depressive symptoms and lower QOL ( $p < 0.01$ ). The relationship between PTSS and depression was attenuated among women with higher levels of PTG (PTSS  $\times$  PTG interaction,  $p < 0.05$ ). The same pattern of results was found for QOL (interaction  $p < 0.01$ ).

**Conclusions:** We report the novel finding that PTG moderated relationships between PTSS and both depression and QOL. We speculate that finding positive meaning in response to a distressing event, such as diagnosis of cancer, may be psychologically protective and could indirectly influence the long-term occurrence of depressive symptoms and impaired QOL.

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Distressing or harmful events can lead to negative outcomes, such as post-traumatic stress symptoms (PTSS), but they can also lead to positive outcomes, an experience termed post-traumatic growth (PTG) [1]. In the context of a cancer diagnosis, PTG may improve important psychological outcomes, including depression, positive well-being, health behaviors and positive affect [2]. However, PTG also may offer more complex benefits that previous studies have left unexplored [3]. In this study of breast cancer survivors, we examined the possibility that PTG may offset some deleterious correlates of post-traumatic stress.

Post-traumatic stress disorder (PTSD) is a clinical anxiety disorder that occurs following an intensely threatening, traumatic event [4]. Events that unfold during a cancer diagnosis and subsequent treatment may produce PTSD and symptoms of PTSD [5,6]. Symptoms of PTSD have been reported in up to 50% of cancer patients [7] and, although less common, many breast cancer patients develop PTSD [6].

In addition to PTSD, depressive symptoms and lower quality of life (QOL) are two sequelae of

breast cancer diagnosis, treatment and survival [8]. Although rates of clinical depression are not higher in long-term cancer survivors compared with healthy controls [9], sub-syndromal depressive symptoms and poorer QOL remain important adverse effects of cancer [10–12]. In one study, 18% of breast cancer survivors reported clinically significant levels of psychological distress [10].

PTSD and sub-syndromal PTSS are associated with higher rates of depression and lower QOL among cancer patients and survivors [12,13]. One hypothesis is that intrusive and ruminative cognitions associated with PTSD increase cancer patients' susceptibility to other psychological harm. Breast cancer survivors who experience PTSS also appear to experience co-morbid symptoms of depression and other anxiety disorders and impaired functioning, suggesting the need to examine the relationships among these symptoms [14,15]. Breast cancer is the most commonly diagnosed cancer among women in the United States; thus, breast cancer-related PTSS have the potential to negatively impact the lives of thousands of women every year even if these

symptoms do not meet full *DSM-IV* diagnostic criteria [16].

Although people who experience traumas, such as loss of a loved one or serious illness, can suffer negative consequences, they often report PTG [17]. Dimensions of PTG include enhanced interpersonal relationships, appreciation for life, spirituality, personal strength, and positive changes in life priorities [18]. Perceived growth as a result of a cancer diagnosis, treatment and survivorship is common, reported by between 60 and 95% of cancer survivors [2]. Interest in examining the positive life changes that breast cancer survivors report following diagnosis and treatment has increased in recent years [2,3,19,20]. Correlates of PTG include demographic characteristics (socio-economic status, ethnicity and age), personality variables (optimism and positive personality resources, and approach-oriented coping) and psychological well-being (greater positive affect and less depression) [2,3]. However, studies have also reported inconclusive results or a lack of association with PTG for gender, perceived threat, disease severity, time since diagnosis, type or amount of treatment, marital status, avoidant-based coping, psychological distress and QOL [2,3].

We hypothesize that PTG may act as a coping resource that protects cancer patients against the corrosive effects of PTSD on well-being. Although PTG may not successfully uproot the intrusive thoughts and cognitions that accompany PTSD, it may provide a positive buffer. More specifically, PTG may reflect cognitive adaptation in response to cancer diagnosis (e.g. a positive reinterpretation) [3] that can alter the global meaning of the cancer experience. Similar cognitive reappraisal has been demonstrated to reduce the effect of PTSS on psychological distress in breast cancer survivors [21].

Studies of the relationship of PTG to well-being have found inconsistent results [3]. Several hypotheses may explain these inconsistencies, including varying levels of PTSS and PTG within individuals. Cordova and Andrykowski [1] argue that it is possible to experience cancer-related stress and growth simultaneously because people often view the experience as both a trauma and a transition to a new phase in their lives. The interaction between PTSS and PTG may be an additional reason for the unstable findings.

We hypothesize that PTG may moderate the relationship between PTSS and psychological well-being. We expect that PTSS are associated with both QOL and depression, but PTG will moderate the relationship between PTSS and both outcome variables. Specifically, we expected that when PTG is weaker, PTSS will be associated more strongly with lower QOL and greater depression. However, when PTG is stronger, PTSS will be more weakly associated with lower QOL and greater depression.

## Methods

### Participants

Study participants were English-speaking adult women treated for Stages I and II primary breast cancer at the University of North Carolina Breast Clinic. As a part of a larger study about risk for breast cancer recurrence, we recruited only women who were post-surgery and post-treatment and were not currently receiving neo-adjuvant/adjuvant treatments (those currently receiving hormone therapy were allowed in the study). Additionally, patients who had a life-threatening co-morbid disease, a second primary cancer diagnosis, cancer recurrence, metastasis or a history of serious psychiatric illness were excluded from participation. We interviewed only women who had not had a cancer recurrence, either previously or during the present clinic visit, to create a more homogeneous group with respect to anxiety. The study protocol and materials were approved by our institutional review board.

### Measures

All measures used in this study are reliable measures of the constructs of interest and have been validated in this population. Reliability statistics for each measure used in this study are reported below. QOL was measured using the Functional Assessment of Cancer Therapy Scale—Breast (FACT-B) [22], a 44-item measure specific to breast cancer (Cronbach's alpha = 0.88). Each item is rated on a five-point scale from 'not at all' to 'very much' with regard to how true each item has been in the past 7 days. Symptoms of depression were assessed using the Center for Epidemiological Studies—Depression Measure (CES-D) (23), a 20-item questionnaire (Cronbach's alpha = 0.84). The 21-item Post-traumatic Growth Inventory (PTGI) [18] was used to assess post-traumatic growth (Cronbach's alpha = 0.96). The 17-item PTSD Checklist—Civilian Version (PCL-C) [24] was used to assess PTSS (Cronbach's alpha = 0.96).

The survey assessed age, education, race, parental status, employment status, insurance status, financial status and marital status. In cases when patients offered incomplete age or race information, it was collected from their medical records. Financial status was assessed by asking participants 'Without giving exact dollars, how would you describe your household's financial situation right now?', with responses on a four-point scale ranging from 1 = 'You are having difficulty paying the bills, no matter what you do'; 2 = 'You have money to pay the bills, but only because you have cut back on things'; 3 = 'You have enough money to pay the bills, but little spare money to buy extra

or special things'; and 4 = 'After paying the bills, you still have enough money for special things that you want.' Marital status was coded on a five-point scale ranging from 1 = 'Married or living as married'; 2 = 'Divorced'; 3 = 'Widowed'; 4 = 'Separate'; and 5 = 'Never married.' Additionally, we collected data from participants' medical records about treatment (surgery, chemotherapy, radiation therapy, endocrine therapy) and time since diagnosis.

### Data analysis

To identify potential covariates, we examined correlations between the primary predictor and outcome variables and time since diagnosis, type of treatment and demographic characteristics, retaining those that were correlated ( $p < 0.10$ ). Regression analyses were conducted in which each outcome (QOL and depression) was simultaneously regressed on PTSS, PTG, their interaction and covariates. Significant interactions were explored using Aiken and West's method for probing interactions among continuous variables [25]. Although both outcome measures were slightly skewed, analyses using square-root transformed variables yielded the identical pattern of results. For the sake of simplicity, we report the results of analyses using the non-transformed variables. Statistical tests were two-tailed, with a critical alpha of 0.05.

### Results

Of the eligible 231 patients contacted, 65 declined to participate, either via mail ( $n = 48$ ) or at the clinic ( $n = 17$ ), yielding a response rate of 72% ( $\frac{166}{231}$ ). Because one participant consented but did not participate in the survey, her data were not included. Four participants completed surveys but did not complete measures of depressive symptoms and QOL; their data were not used in data analyses presented in this paper. Hence, we report findings based on 161 participants.

Mean age of participants was 59 years ( $SD = 10.6$ , range = 36–87). Participants were generally well educated; 97% had graduated from high school and 53% were college graduates. Women self-identified primarily as Caucasian or white (85%), with African American or black as the largest minority group (12%). Most participants were married or living as married (73%) and had children (84%). Slightly more than half the participants worked for pay (56%) and only 4% reported not having health insurance. The majority of participants reported having spare money after paying their bills (66%), with a small minority reporting having difficulty paying the bills (6%).

**Table 1.** Means (SD) for predictor and outcome variables

PCL-C	24 (7.6)
PTGI	73 (21)
FACT_B	117 (15)
CES-D	8 (7.7)

$N = 161$ ; PCL-C, the PTSD Checklist—Civilian Version; PTGI, The Post-traumatic Growth Inventory; FACT-B, The Functional Assessment of Cancer Therapy Scale—Breast; CES-D, The Center for Epidemiological Studies—Depression Measure.

Fifty-five percent of participants were diagnosed with stage I breast cancer, 29% stage IIA and 14% stage IIB. With regard to previous treatment for breast cancer, 99% ( $\frac{159}{161}$ ) had surgery, 53% ( $\frac{86}{161}$ ) received chemotherapy, 62% ( $\frac{99}{161}$ ) received radiation and 67% ( $\frac{108}{161}$ ) received tamoxifen. Additionally, participants in the current study were on average four years out from diagnosis ( $SD = 3.1$ ).

Means and standard deviations for all variables of interest are depicted in Table 1. Specifically, participants reported lower levels of PTSS with mean PCL-C scores of 24 ( $SD = 7.6$ , 95%  $CI = 22.9–25.3$ ) compared with breast cancer patients in a previous study (mean = 27,  $SD = 12.7$ ) [12]. Three participants (1.9%) met or exceeded the recommended cutoff score of 50 on the PCL-C, indicating they would likely meet DSM-IV criteria for PTSD [24]. Participants had relatively high levels of PTG with mean PTGI scores of 73 ( $SD = 21.0$ , 95%  $CI = 69.3–75.9$ ) compared with breast cancer survivors in a previous study (mean = 64,  $SD = 24.8$ ) [19]. Participants' QOL scores (mean = 117,  $SD = 14.5$ , 95%  $CI = 114–119$ ) were similar to those of breast cancer patients in the validation study for the FACT-B (mean = 113,  $SD = 20.9$ ) [22]. Levels of depressive symptoms as measured by the CES-D (mean = 8,  $SD = 7.7$ , 95%  $CI = 6.9–9.3$ ) were relatively lower than breast cancer patients three weeks post-treatment (mean = 12.8,  $SD = 10.2$ ) and similar to healthy controls (mean = 8,  $SD = 7.5$ ) in a previous study [26]. Using the traditional cutoff of 16, 25 participants (15.5%) reported clinically significant depressive symptomatology [23].

With regard to covariation among treatment variables, demographic characteristics, predictor and outcome variables, we found that having had chemotherapy, level of education, financial situation and marital status were correlated with either QOL or depressive symptoms at the  $p < 0.10$  level. Thus, these variables were included in subsequent analyses (see Table 2). Additionally, we found that PTSS and PTG were associated  $r = 0.16$ ,  $p < 0.05$  (Table 2).

### Moderating effect of post-traumatic growth

PTSS and PTG were significantly associated with QOL ( $p < 0.01$  and  $p < 0.05$ , respectively; Table 3).

**Table 2.** Bivariate correlations among study variables

	PTGI	PCL-C	CES-D	FACT-B
Age	-0.15	-0.23**	0.03	0.12
Time since Dx	0.11	-0.09	-0.04	0.01
Children	0.12	-0.04	-0.04	0.06
Working	0.05	0.03	0.04	-0.07
Surgery	0.14	0.06	0.01	0.01
Radiation	-0.04	0.01	-0.02	0.01
Tamoxifen	-0.02	-0.11	-0.03	0.01
Chemotherapy	0.12	0.19*	0.07	-0.14#
Education	-0.32**	-0.20*	-0.19*	0.17*
Financial status	-0.25**	-0.34**	-0.41**	0.41**
Marital status	-0.02	-0.02	-0.22*	0.10#
PTGI	1.00	0.16*	0.09	-0.05
PCL-C	0.16*	1.00	0.52**	-0.61**

PCL-C, The PTSD Checklist—Civilian Version; PTGI, The Post-traumatic Growth Inventory; FACT-B, The Functional Assessment of Cancer Therapy Scale—Breast; CES-D, The Center for Epidemiological Studies—Depression Measure.  
 \*\* $p < 0.01$ ; \* $p < 0.05$ ; # $p < 0.10$ .

**Table 3.** Predictors of quality of life and symptoms of depression

	Quality of life $\beta$	Symptoms of depression $\beta$
Level of education	0.03	-0.04
Financial situation	0.21**	-0.21**
Marital status	0.05	-0.17*
Chemotherapy	-0.01	-0.07
Post-traumatic stress symptoms (PTSS)	-0.61**	0.51**
Post-traumatic growth (PTG)	0.16*	-0.09
PTSS $\times$ PTG	0.19**	-0.16*

Figures in table are standardized regression coefficients. All variables were entered simultaneously in regression.  
 \* $p < 0.05$ , \*\* $p < 0.01$ .

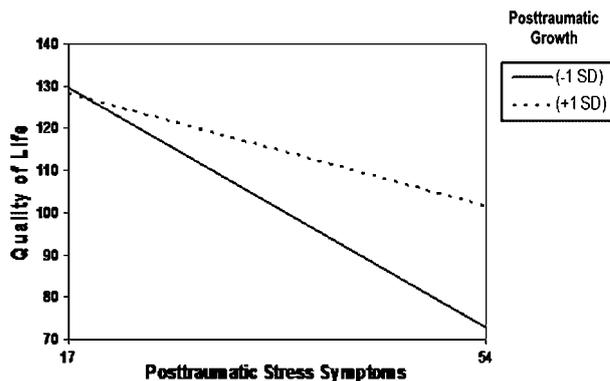
These findings were qualified by the predicted interaction of PTSS and post-traumatic growth ( $p < 0.01$ ). The model accounted for 46% of the variance in QOL.

PTSS were significantly associated with depressive symptom scores ( $p < 0.01$ ; see Table 3). PTG was not related to depressive symptoms. PTG interacted with PTSS in predicting depressive symptoms ( $p < 0.01$ ). The model accounted for 38% of the variance in depressive symptoms.

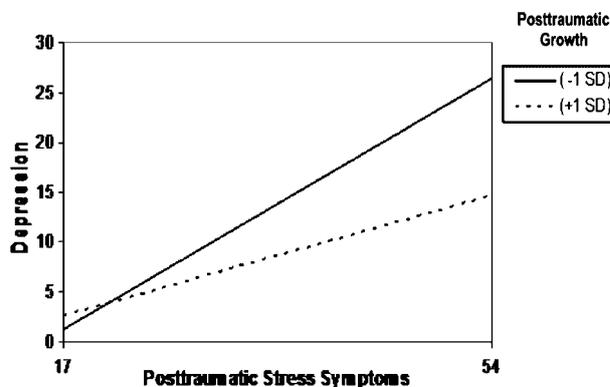
To better visualize the two significant interactions, we plotted the points at one standard deviation above and below the mean for PTG and from the lowest level to the highest level of PTSS score in the sample for each predictor [25]. Interactions are depicted in Figure 1 and Figure 2. As predicted, when PTG was low, PTSS were more strongly associated with QOL and depressive symptoms.

**Discussion**

PTG weakened deleterious relationships between PTSS and both QOL and depressive symptoms



**Figure 1.** Post-traumatic growth (PTG) weakened the relationship of post-traumatic stress symptoms (PTSS) to quality of life ( $p < 0.01$ ), Y-axis is predicted quality of life; X-axis is PTSS: minimum observed score in sample = 17, maximum = 54. Stratifying variable is mean PTGI: -1 SD = 53, +1 SD = 94.  $N = 161$



**Figure 2.** Post-traumatic growth (PTG) weakened the relationship of post-traumatic stress symptoms (PTSS) to depression ( $p < 0.05$ ), Y-axis is predicted depressive symptoms; X-axis is PTSS: minimum observed score in sample = 17, maximum = 54. Stratifying variable is mean PTGI: -1 SD = 53, +1 SD = 94.  $N = 161$

among breast cancer survivors, as predicted. This finding extends the growing body of literature exploring relationships among PTG, PTSS and psychosocial well-being. To our knowledge, this is the first study to report moderation of the relationship between PTSS and QOL and depression symptoms by PTG.

We speculate that PTG may reflect a cognitive adaptation process among those who experience post-traumatic symptomatology in response to their cancer diagnoses (a positive reinterpretation) [3]. This process may enable cancer survivors to reframe the cancer experience as a transition and perceive potential benefits, such as relationships with others, new possibilities, personal strength, spiritual change or appreciation of life. Janoff-Bulman and Frantz [27] conceptualize PTG as an attempt to understand the value or meaning of trauma for one's life. A positive reinterpretation of the cancer experience may lead to an alteration in the global meaning of the cancer experience which has previously been shown to buffer the effect of

PTSS on psychological distress in breast cancer survivors [21].

Additionally, our findings contribute to the literature on the buffering effects of cognitive adaptation and the literature on positive psychosocial resources (such as social support), including work by Taylor [17] and Cohen and Hoberman [28]. As such, the experience of PTG could be characterized as a positive psychosocial resource similar to social support or the perception of psychological mastery following a difficult or potentially trying stressful life event [17].

In addition to the main findings of the study, we found that PTG had a positive association with PTSS. This finding bolsters the assertion by Cordova and Andrykowski [1] that cancer patients and survivors can simultaneously experience post-traumatic stress and growth. Additionally, results of bivariate correlations indicate that higher financial status (i.e. 'having money to spare after paying bills') and more education were associated with greater well-being. These findings in and of themselves are not surprising as the association between socioeconomic status and both depression and QOL is well established. However, the finding highlights the necessity to include demographic variables, such as financial status and education, in research designed to explore relationships among these constructs.

The study had several shortcomings. The cross-sectional design limits our ability to infer causal relations among the study constructs. It is possible that QOL or depressive symptoms affect PTG and PTSS or that an unmeasured variable is the causal link to all these constructs. The sample was homogeneous with regard to race, marital status and financial status, and inclusion criteria limited participation to women who were post-treatment for breast cancer, potentially limiting the generalizability of the findings. Future research could benefit by interviewing women going through the process of diagnosis and treatment for breast cancer and following them over time. Our study relied on self-report measures and, as such, the associations reported may be suspect due to common method variance. We wish to acknowledge that future research may benefit from exploring individual differences such as perceptions of global meaning and optimism which previous research has demonstrated to be associated with post-traumatic growth [21,29].

Previous studies have explored PTG in moderation models with variables, such as time since diagnosis, nature of the stressor, race and gender. Our study is the first to demonstrate that PTG interacts with post-traumatic stress symptoms in predicting depressive symptoms and QOL.

Although replication and longitudinal studies are needed to establish causality and explore the generalizability of our findings, we discuss potential clinical implications of our findings. Finding

positive meaning in response to a distressing event, such as diagnosis with cancer, may be psychologically protective and thus may indirectly influence the long-term occurrence of depressive symptoms and impaired QOL. Our results could lead to interventions designed to increase the experience of PTG which may be especially relevant to QOL and psychological distress. In light of the rapidly growing population of long-term cancer survivors [30] and work to understand their treatment experiences [31,32], identifying and intervening to bolster positive agents such as PTG are becoming increasingly important to both short-term functioning of cancer patients and long-term outcomes in cancer survivors.

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