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The Interaction of Posttraumatic Growth and Posttraumatic Stress Symptoms in
Predicting Depressive Symptoms and Quality of Life

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ABSTRACT

We sought to explore whether posttraumatic growth (PTG) (positive change or benefit finding resulting from trauma) moderates relationships between posttraumatic stress symptoms (PTSS) and both depression and quality of life among breast cancer survivors. We interviewed 161 women previously treated for early stage breast cancer. We assessed PTG using the Posttraumatic Growth Inventory, PTSS using the PTSD Checklist, depressive symptoms using the CES-D and quality of life using the FACT-B. Higher PTSS was associated with greater depressive symptoms and lower quality of life ($p < .01$). The relationship between PTSS and depression was attenuated among women with higher levels of PTG (PTSS x PTG interaction, $p < .05$). The same pattern of results was found for quality of life (interaction $p < .01$).

We report the novel finding that posttraumatic growth moderated relationships between posttraumatic stress symptoms and both depression and quality of life. 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 quality of life.

The Interaction of Posttraumatic Growth and Posttraumatic Stress Symptoms in Predicting Depressive Symptoms and Quality of Life

Distressing or harmful events can lead to negative outcomes, such as posttraumatic stress symptoms (PTSS), but they can also lead to positive outcomes, an experience termed posttraumatic growth (1). In the context of a cancer diagnosis, posttraumatic growth (PTG) may improve important psychological outcomes, including depression, positive well being, health behaviors and positive affect (2). However, posttraumatic growth 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 posttraumatic growth may offset some deleterious correlates of posttraumatic stress.

Posttraumatic 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 post-traumatic stress disorder (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 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 to healthy controls (9), sub-syndromal depressive symptoms and poorer quality of life 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 posttraumatic stress symptoms are associated with higher rates of depression and lower quality of life 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 posttraumatic stress symptoms 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 posttraumatic stress symptoms 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 posttraumatic growth (17). Dimensions of posttraumatic growth include enhanced interpersonal relationships, greater appreciation for life, greater spirituality, sense of increased personal strength, and valued change in life priorities or goals (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 posttraumatic growth include demographic characteristics (socioeconomic 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 posttraumatic growth for gender, perceived threat, disease

severity, time since diagnosis, type or amount of treatment, marital status, avoidant-based coping, psychological distress, and quality of life (2, 3).

We hypothesize that posttraumatic growth may act as a coping resource that protects cancer patients against the corrosive effects of PTSD on well being. Although posttraumatic growth may not successfully uproot the intrusive thoughts and cognitions that accompany PTSD, it may provide a positive buffer. More specifically, posttraumatic growth 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 posttraumatic stress symptoms on psychological distress in breast cancer survivors (21).

Studies of the relationship of posttraumatic growth to well-being have found inconsistent results (3). Several hypotheses may explain these inconsistencies, including varying levels of posttraumatic stress symptoms and posttraumatic growth within individuals. Cordova and Andrykowski (2003) argue that it is possible to experience cancer-related stress and growth simultaneously because people often view the experience as both a trauma and transition to a new phase their lives (1). The interaction between posttraumatic stress symptoms and posttraumatic growth may be an additional reason for the unstable findings.

We hypothesize that posttraumatic growth may moderate the relationship between posttraumatic stress symptoms and psychological well being. We expect that posttraumatic stress symptoms are associated with both quality of life and depression, but posttraumatic growth will moderate the relation between posttraumatic stress symptoms and both outcome variables. Specifically, we expected that when posttraumatic growth is weaker, posttraumatic stress symptoms will be associated more strongly with lower quality of life and greater depression. However, when posttraumatic growth is stronger, posttraumatic stress symptoms will be more weakly associated with lower quality of life and greater depression.

METHODS

Participants

Study participants were English-speaking adult women treated for Stage I and II primary breast cancer at the University of North Carolina Breast Clinic. As 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. Last, we interviewed only women who had not had a cancer recurrence, either previously or during the present clinic visit, to create a more homogenous 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. Quality of life 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 = .88). Each item is rated on a 5-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 = .84). The 21-item Post Traumatic Growth Inventory (PTGI) (18) was used to assess posttraumatic growth (Cronbach’s alpha = .96). The 17-item PTSD Checklist - Civilian Version (PCL-C) (24) was used to assess posttraumatic stress symptoms (Cronbach’s alpha = .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?” 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 ranging from 1 = “Married or living as married”; 2 = “Divorced”; 3 = “Widowed”; 4 = “Separate”; and 5 = “Never married.” Additionally, we collected data from patients’ medical records about patients’ treatment participants (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 ($p < .10$). Regression analyses were conducted in which each outcome (quality of life and depression) was simultaneously regressed on posttraumatic stress symptoms, posttraumatic growth, 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 .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% (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 quality life; 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 to 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%).

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% (159/161) had surgery, 53% (86/161) received chemotherapy, 62% (99/161) received radiation, and 67% (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 posttraumatic stress symptoms with mean PCL-C scores of 24 ($SD = 7.6$, 95% CI = 22.9 - 25.3) when compared to 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 posttraumatic growth with mean PTGI scores of 73 ($SD = 21.0$, 95% CI = 69.3 - 75.9) when compared with breast cancer survivors in a previous study (mean = 64, $SD = 24.8$) (19). Participants' quality of life 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 symptomology (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 quality of life or depressive symptoms at the $p < .10$ level. Thus, these variables were included in subsequent analyses (see Table 2). Additionally, we found that posttraumatic stress symptoms and post traumatic growth were associated $r = .16$, $p < .05$ (Table 2).

Moderating Effect of Posttraumatic Growth

Posttraumatic stress symptoms and posttraumatic growth were significantly associated with quality of life ($p < .01$ and $p < .05$, respectively; Table 3). These findings were qualified by the predicted interaction of posttraumatic stress symptoms and posttraumatic growth ($p < .01$). The model accounted for 46% of the variance in quality of life.

Posttraumatic stress symptoms were significantly associated with depressive symptom scores ($p < .01$; see Table 3). Posttraumatic growth was not related to depressive symptoms. Posttraumatic growth interacted with posttraumatic stress symptoms in predicting depressive symptoms ($p < .01$). 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 posttraumatic growth, and from the lowest level to the highest level of posttraumatic stress symptom scores in the sample for each predictor (25). Interactions are depicted in Figure 1. As predicted, when posttraumatic growth was low, posttraumatic stress symptoms were more strongly associated with quality of life and depressive symptoms.

DISCUSSION

Posttraumatic growth weakened deleterious relationships between posttraumatic stress symptoms and both quality of life and depressive symptoms among breast cancer survivors, as predicted. This finding extends the growing body of literature exploring relationships among posttraumatic growth, posttraumatic stress symptoms, and psychosocial well being. To our knowledge, this is the first study to report moderation of the relationship between posttraumatic stress symptoms and quality of life and depression symptoms by posttraumatic growth.

We speculate that posttraumatic growth may reflect a cognitive adaptation process among those who experience posttraumatic 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 (1997) conceptualize posttraumatic growth as an attempt to understand the value or meaning of trauma for one's life (27). 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 posttraumatic stress symptoms on psychological distress in breast cancer survivors (21).

Additionally, our findings could be viewed as a part of the larger literature on the buffering effect of cognitive adaptation and positive psychosocial resources such as social support or the experience of positive life events by among others Taylor (1983) and Cohen and Hoberman (1983) (17, 28). As such, the experience of posttraumatic growth 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 posttraumatic growth had a positive association with posttraumatic stress symptoms. This finding bolsters the assertion by Cordova and Andrykowski (2003) that cancer patients and survivors can simultaneously experience posttraumatic stress and growth (1). 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 quality of life 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 quality of life or depressive symptoms affect posttraumatic growth and posttraumatic stress symptoms 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 posttraumatic (21, 29).

Previous studies have explored posttraumatic growth 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 posttraumatic growth interacts with posttraumatic stress symptoms in predicting depressive symptoms and quality of life.

Although replication and longitudinal studies are needed to establish causality and explore the generalizability of our findings, we discuss potential clinical implications for 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 posttraumatic growth which may be especially relevant to quality of life and psychological distress. In light of the rapidly growing population of long term cancer survivors (30), identifying and intervening to bolster positive agents such as posttraumatic growth is becoming increasingly important to both short-term functioning of cancer patients and long-term outcomes in cancer survivors.

AUTHORS' NOTE

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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)

Note. N = 161; PCL-C = the PTSD Checklist- Civilian Version; PTGI = the Posttraumatic Growth Inventory; FACT-B = the Functional Assessment of Cancer Therapy Scale – Breast; and CES-D = the Center for Epidemiological Studies-Depression Measure.

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	-.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**

Note: PCL-C = the PTSD Checklist- Civilian Version; PTGI = the Posttraumatic Growth Inventory; FACT-B = the Functional Assessment of Cancer Therapy Scale – Breast; and 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 β	Symptoms of Depression β
Level of Education	.03	-.04
Financial Situation	.21**	-.21**
Marital Status	.05	-.17*
Chemotherapy	-.01	-.07
Posttraumatic stress symptoms (PTSS)	-.61**	.51**
Posttraumatic growth (PTG)	.16*	-.09
PTSS x PTG	.19**	-.16*

Note: Figures in table are standardized regression coefficients. All variables were entered simultaneously in regression.

*= $p < .05$, ** $p < .01$

Figure 1. Posttraumatic growth weakened the relation of posttraumatic stress symptoms to quality of life ($p < .01$), $N = 161$. PTGI (-1 SD) = 52.7, (+1 SD) = 93.6 on a 140 point scale: Labels for posttraumatic stress symptoms represent the minimum and maximum scores observed in the sample.

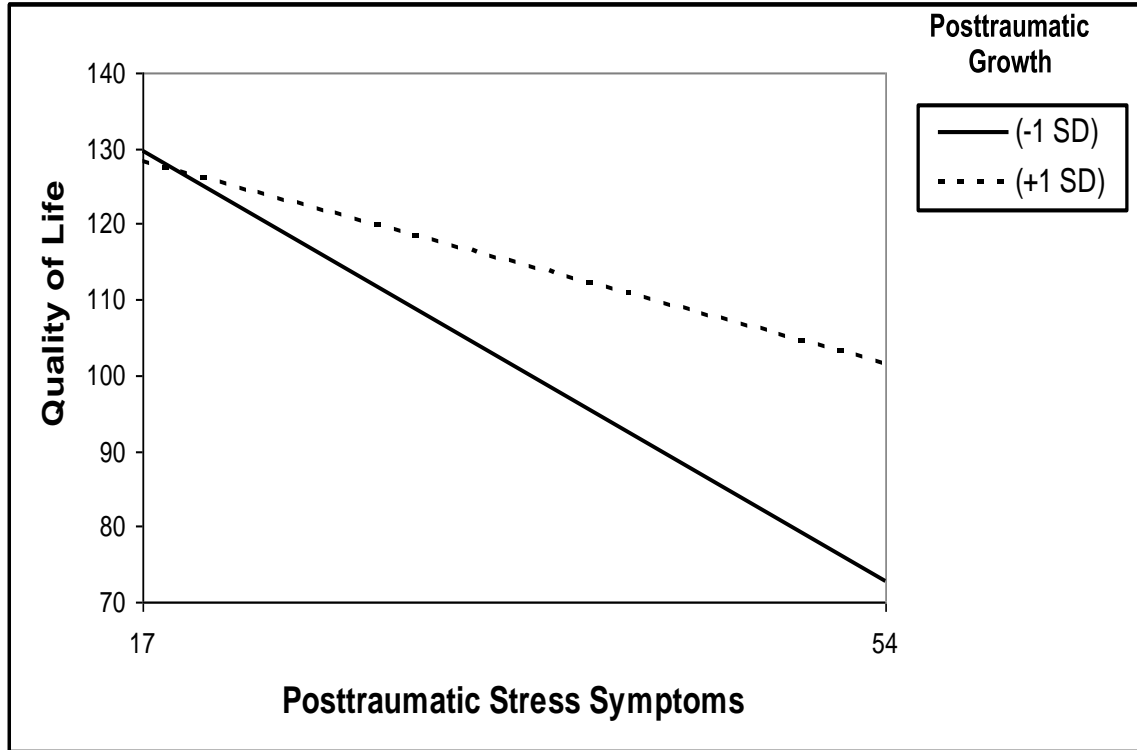


Figure 2. Posttraumatic growth weakened the relation of posttraumatic stress symptoms with depressive symptoms ($p < .05$), $N = 161$. Note: PTGI (-1 SD) = 52.7, (+1 SD) = 93.6 on a 140 point scale: Labels for posttraumatic stress symptoms represent the minimum and maximum scores observed in the sample.

