

# Perceptions of Positive Meaning and Vulnerability Following Breast Cancer: Predictors and Outcomes Among Long-Term Breast Cancer Survivors

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## ABSTRACT

**Background:** Survival rates for women with early-stage breast cancer have increased significantly in recent years. However, little is known about the long-term impact of the cancer experience on women's psychological functioning. Theoretical and descriptive accounts suggest that cancer may evoke both perceptions of vulnerability and positive meaning, with potentially different effects on mental health. **Purpose:** This study was designed to evaluate the prevalence and stability of these perceptions in a large sample of breast cancer survivors, to identify their antecedents, and to determine their impact on long-term adjustment. **Methods:** Breast cancer survivors ( $N = 763$ ) were assessed longitudinally at 1 to 5 years and 5 to 10 years postdiagnosis. Participants completed surveys assessing perceptions of positive meaning and vulnerability and standard measures of psychological adjustment and quality of life. **Results:** The majority of women reported positive changes in outlook and priorities as well as feelings of

vulnerability at both assessment points. Consistent with hypotheses, results showed that perceptions of positive meaning and vulnerability were positively correlated and were both associated with factors that increased the disruptiveness of the cancer experience. Vulnerability was strongly associated with negative affect, whereas meaning was associated with positive affect in cross-sectional and longitudinal analyses. **Conclusions:** Results suggest that a cancer diagnosis may lead to enduring feelings of vulnerability as well as positive changes in meaning; however, these perceptions have very different mental health correlates.

(Ann Behav Med 2005, 29(3):236–245)

## INTRODUCTION

With advances in detection and treatment, the number of women who survive breast cancer has increased significantly in recent years. Five-year survival rates have climbed to 86%, resulting in an estimated 2 million North American women living in the aftermath of breast cancer (1). Although the number of breast cancer survivors is increasing, few studies have examined the long-term effects of cancer diagnosis and treatment on women's health and well-being. Initial reports focusing on quality of life suggest that most breast cancer survivors report high levels of functioning and quality of life, comparable to that seen in healthy age-matched controls (2–5). However, global measures of quality of life may miss more subtle, cancer-specific changes in psychological function (6,7). Identifying these changes is critical for understanding the experience of breast cancer survivors and addressing the specific needs of this growing population of women.

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This research was supported by Public Health Service grant R01CA63028 from the National Cancer Institute and by the Jonsson Comprehensive Cancer Center. Dr. Bower was supported in part by career development awards from the National Cancer Institute and the California Breast Cancer Research Program. Dr. Ganz was supported in part by an American Cancer Society Clinical Research Professorship.

We gratefully acknowledge Beth Leedham, Ph.D., who contributed to study design and implementation, and Katherine Masyn, Ph.D. and Annette Stanton, Ph.D., who provided consultation on data analysis and manuscript preparation.

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One of the most prominent concerns reported by breast cancer patients is a feeling of physical vulnerability, evidenced by fears of cancer recurrence and worries about side effects of cancer treatment (8). There is some evidence that these fears may endure for years postdiagnosis, even among disease-free survivors (9,10). For example, a recent study found that over 50% of women 1 to 7 years postdiagnosis reported moderate to strong fears about cancer recurrence (11). Cancer survivors also report feeling more vulnerable as a result of the cancer experience and feeling that the world is a more frightening and dangerous place (12). We use the term *vulnerability* in this article to describe both specific fears of cancer recurrence and more general perceptions of vulnerability that are triggered by the cancer experience.

Although researchers traditionally have focused on the negative effects of the cancer experience, there is growing evidence that positive changes are also common following a breast cancer diagnosis (12–15). Studies have shown that 53% to 83% of women report some type of positive change or benefit as a result of the cancer experience (16,17). In particular, many women describe a reordering of priorities, with greater emphasis on relationships, personal growth, and appreciation of life and with less energy devoted to trivial concerns. These changes have been noted in recently diagnosed breast cancer patients (14) and in women several months or years postdiagnosis (6,9,18). In this article, we use the term *positive meaning* to describe the range of positive changes in beliefs, perceptions, and behavior that may occur as a result of the cancer experience.

Research conducted to date provides preliminary evidence that perceptions of vulnerability and positive meaning are common among women who have completed cancer diagnosis and treatment. However, this literature has methodological and theoretical limitations. Most studies have used small samples and cross-sectional designs and have focused on women within the first 5 years after diagnosis. Thus, the trajectory of these perceptions over time, and the degree to which they persist in longer-term survivors, has not been examined. Moreover, because research on the positive and negative effects of cancer has been largely independent, the association between perceptions of meaning and vulnerability and the factors that elicit these perceptions have not been carefully evaluated. Finally, the impact of these perceptions on long-term adjustment is not known.

Theoretical accounts of adjustment to trauma may be helpful in understanding the range of responses to a cancer diagnosis and in identifying predictors of vulnerability and meaning. Janoff-Bulman has argued that traumatic life events challenge core assumptions about the self, the world, and the future and lead to heightened feelings of vulnerability and distress (19). At the same time, the realization that life is transient and insecure leads to a renewed appreciation of life and a reorganization of priorities (20). Tedeschi and Calhoun also maintained that challenges to fundamental assumptions are critical for positive changes in meaning, or “posttraumatic growth,” to occur (21). Both models are consistent with existential theorists, who argue that the most threatening of life experiences may also inspire positive changes and growth as individuals face the possibility of a shorter, yet more precious life span (22,23).

Based on these accounts, one could predict that perceptions of vulnerability would be associated with enhanced meaning following a cancer diagnosis. Further, one could predict that factors that increased the impact or disruptiveness of the cancer experience would be associated with higher levels of both vulnerability and meaning. As just noted, the association between positive and negative effects of cancer has received minimal empirical scrutiny. There is evidence that many cancer patients report both positive and negative changes following their cancer diagnosis, supporting the idea that types of changes may co-occur (12). Further, Fromm and colleagues found a weak positive correlation between reports of positive and negative changes among survivors of bone marrow transplantation (7). However, a more recent study of breast cancer survivors showed that perceptions of benefit from the cancer experience were negatively correlated with perceptions of harm (6).

There is more consistent evidence that greater impact is associated with perceptions of both vulnerability and positive meaning. Younger age at diagnosis and receipt of chemotherapy, both of which increase the disruptiveness of the cancer experience, are associated with increased fear of recurrence (11,24). Studies have also shown that younger patients, as well as those who perceive a greater physical threat associated with cancer and who undergo more risky medical treatment, report more positive changes (7,18,25). Other factors that may increase or sustain the impact of the cancer experience among cancer survivors have not been assessed. In particular, physical symptoms and occurrence of other stressful events are known to influence adjustment in the posttreatment period (3,26–28) but have not yet been examined in relation to meaning and vulnerability.

In terms of effects on psychological adjustment, fear of recurrence and other negative cancer-related changes are consistently associated with higher levels of distress, although longitudinal research is limited (6,7,10,29–31). Results for positive meaning are mixed. Cross-sectional studies have found that reports of meaning or benefit are associated with better adjustment (6,15) or have found no relationship (7,14,18). To date, only three longitudinal studies have examined the impact of positive meaning on psychological adjustment in cancer populations. One found no relationship between reports of benefit finding and adjustment (17), one found that benefit finding predicted decreased distress (32), and the third found that benefit finding predicted increased distress (33). It may be difficult to obtain a clear picture of the association between meaning and adjustment without considering the potential overlap between meaning and vulnerability, given the strong association between vulnerability and distress. In addition, it is possible that meaning may be more strongly associated with positive measures of well-being (e.g., positive affect) (6,17), which are not assessed in all reports.

In this study, we examined perceptions of positive meaning and vulnerability in 763 disease-free breast cancer survivors assessed at two time points (1–5 years and 5–10 years) following diagnosis. The study was unique in the large size of the sample and in the longitudinal nature of the assessment. Thus, our first

goal was to describe the prevalence and the stability of meaning and vulnerability over time. Our second goal was to examine the association between meaning and vulnerability and to identify predictors of these changes. Based on theoretical accounts of adjustment to stressful life events (19, 21), we hypothesized were that perceptions of meaning and vulnerability would co-occur and that both would be triggered by factors that increased the impact or disruptiveness of the cancer experience, including younger age, receipt of chemotherapy, physical symptoms, and occurrence of non-cancer-related stressors. Our third goal was to examine the impact of meaning and vulnerability on long-term adjustment, as reflected in negative affect, positive affect, and health-related quality of life. We hypothesized that vulnerability would lead to increases in negative affect and decreases in positive affect and quality of life, whereas positive meaning would lead to increases in positive affect.

## METHOD

### Participants

Breast cancer survivors ( $N = 1,957$ ) were initially recruited between September 1994 and June 1997 as part of a large survey study on quality of life, intimacy, and sexuality (3,4). Two independent samples of women were studied. Sample 1 included 863 breast cancer survivors recruited between September 1994 and November 1995, and Sample 2 included 1,094 breast cancer survivors recruited between January 1996 and June 1997. Women were eligible for participation if they met the following criteria: (a) they had been diagnosed with Stage I or II breast cancer, (b) they were between 1 and 5 years after initial breast cancer diagnosis, (c) they were disease free, and (d) they were not receiving any cancer therapy other than tamoxifen. In 1998, participants ( $N = 1,336$ ) from the initial study who were at least 5 years postdiagnosis were recontacted to participate in a follow-up survey. Completed surveys were received from 817 women, or 61% of survivors initially contacted. Participants in the follow-up study were better educated, more likely to be White, and had better scores on some quality of life measures than nonparticipants. Details of the recruitment process and characteristics of responders and nonresponders are provided in Ganz et al. (2).

This article focuses on the 763 women who completed both the initial survey (Time 1) and the follow-up (Time 2) survey and were still disease free at the time of the follow-up assessment. The average time between assessments was 2.8 years (range = 1–4 years). Demographic and treatment-related characteristics of study participants are described in Table 1.

### Procedure

Potential participants for the initial study were recruited from two large urban areas (Los Angeles and Washington, DC) and identified from tumor registry listings, offices of surgeons and medical oncologists, and hospital and clinic logs. Participants were first contacted by letter and then screened for eligibility by telephone. Eligible women were sent a questionnaire booklet and consent form. For the follow-up study, invitation letters were sent including a response form. Respondents indi-

TABLE 1  
Sample Characteristics at Time 1

Characteristic	
Age at diagnosis ( $M$ )	55.6 years (range = 30–87)
Time since diagnosis ( $M$ )	3.4 years (range = 1–5)
Ethnicity	
White	83.7%
African American	8.7%
Other	7.6%
Income	
Under \$45,000	30%
\$45,000–100,000	45%
Over \$100,000	25%
College graduate	52%
In married/committed relationship	73%
Type of surgery	
Lumpectomy	53%
Mastectomy	28%
Mastectomy with reconstruction	19%
Treated with chemotherapy	42%
Treated with tamoxifen	60%

Note.  $N = 763$ .

cating an interest in participation were mailed the study questionnaire and consent form. We reviewed all questionnaires for completeness and contacted participants to obtain values for missing item responses.

### Measures

Demographic and treatment-related information, including date of diagnosis and type of treatment received, was obtained from the Time 1 questionnaire.

Perceptions of positive meaning and vulnerability were assessed at Time 1 and Time 2 using a questionnaire developed for this study. Twelve items were developed based on a review of the literature, focus groups with cancer survivors, and the clinical experience of the investigators to assess common changes in outlook following breast cancer. Items represent several key domains of change identified in previous research with cancer patients, including changes in priorities, daily activities, relationships, self-view, and worldview (12,17). Respondents indicated the extent to which they believed their outlook had changed in each way on a 5-point scale, ranging from 0 (*not at all*) to 4 (*very much*). This measure was developed before more specific measures of positive meaning (e.g., Posttraumatic Growth Inventory) (34) and vulnerability (e.g., Concerns about Recurrence Scale) (11) were available.

Maximum likelihood factor analysis with varimax rotation was conducted on data from Sample 1 ( $N = 826$ ), yielding a two-factor model. Items that had a moderate to strong factor loading ( $> .4$ ) on only one factor were maintained. Through this process, 11 items were maintained that had factor loadings ranging from .51 to .78 on the rotated factor matrix. Data from Sample 2 participants ( $N = 1,088$ ) were subjected to a confirmatory factor analysis. The original model was confirmed with items

TABLE 2  
Positive Meaning and Vulnerability Scale Items, Means, and Standard Deviations

Scale Item	Time 1		Time 2	
	M	SD	M	SD
<b>Positive Meaning Scale</b>				
1. Surviving breast cancer has changed my outlook on life	2.5	1.4	2.3	1.4
2. I lead a healthier lifestyle	2.2	1.3	2.1	1.3
3. Surviving cancer has forced me to deal with other issues in my life	2.0	1.4	1.7	1.4
4. I no longer have time for unimportant activities; I'm more selective about what I do	1.9	1.3	1.9	1.3
5. I get less worried about trivial things	1.9	1.3	1.8	1.3
6. I am more particular about the people I become friends with	1.5	1.5	1.6	1.5
<b>Vulnerability Scale</b>				
1. I worry about the cancer coming back	1.6	1.2	1.2	1.0
2. I think about my body more	1.5	1.2	1.1	1.1
3. I feel more vulnerable now, as if the world is a more dangerous place	1.1	1.2	0.8	1.0
4. I feel less comfortable with my body	1.0	1.1	1.0	1.1
5. My body has let me down; I can no longer trust it in the same way	0.7	1.1	0.6	1.0

having factor loadings ranging from .57 to .83. Scale items are indicated in Table 2.

The first factor includes six items assessing changes in priorities, perspective, and daily activities and was used as a measure of positive meaning. Items on this scale are consistent with the positive changes described by cancer patients in interviews (12,16,17) and with the domains assessed by more recent measures of growth (34) or benefit finding after cancer (14). Of note, the Positive Meaning Scale assesses changes in outlook and behavior that occur after cancer, but it does not assess the extent to which those changes imbue life with additional meaning or purpose. One difference between the Positive Meaning Scale and other measures of positive change or growth is that several of the scale items are not worded in an explicitly positive way (e.g., "Surviving breast cancer has changed my outlook on life"). To determine whether women in our sample responded to these items in a positive way (e.g., to indicate a positive change in outlook), we examined the association between scores on the Positive Meaning Scale and the Posttraumatic Growth Inventory (PTGI) (34). The PTGI was developed specifically to assess positive changes following stressful life events, and it was administered at the Time 2 assessment to evaluate positive changes that may have occurred as a result of breast cancer.<sup>1</sup> We found a strong correlation between the Positive Meaning Scale and the PTGI ( $r = .71, p < .0001$ ), supporting the validity of our scale as a measure of positive change. The internal consistency of the Positive Meaning Scale was .84 at Time 1 and Time 2.

The second factor includes five items assessing fears about recurrence as well as more general fears about one's body and safety in the world, and it was used as a measure of vulnerability.

Items on this scale are similar to those included on more recent measures specifically designed to assess fear of cancer recurrence (e.g., "I worry about the cancer coming back") (11). They also assess more general feelings of vulnerability described by cancer patients in interview reports (e.g., "I feel more vulnerable now, as if the world is a more dangerous place") (12). All but one of the items on this scale is worded in a negative way. The Vulnerability Scale had an internal consistency of .83 at Time 1 and .81 at Time 2.

Physical symptoms were assessed at Time 1 and Time 2 using an abbreviated list of symptoms from the Breast Cancer Prevention Trial symptom checklist (35). The 16-item checklist used in this study includes commonly reported physical symptoms, including hot flashes, breast sensitivity/tenderness, forgetfulness, and weight gain. Respondents indicated whether they had experienced each symptom in the past 4 weeks, and the total number of symptoms endorsed at each assessment was computed.

Stressful life events were assessed using the Life Events Scale, adapted from Holmes and Rahe (36). This 25-item inventory assesses the occurrence of stressful life events in the last 12 months, including stressors related to work (e.g., was laid off or fired), close relationships (e.g., became separated or divorced), finances (e.g., had major money problems), and health (e.g., experienced serious physical illness or injury in self, family member, or close friend). Participants can also write in additional stressful experiences that they may have experienced during the past 12 months. This scale was completed at Time 1 by participants in Sample 2 only ( $N = 354$ ) and by all participants at Time 2.

Health-related quality of life was assessed at Time 1 and Time 2 using the RAND SF-36 (also known as the MOS SF-36) (37,38). The SF-36 contains eight individual subscales: Physical Functioning, Role Function—Physical, Bodily Pain, Social Functioning, Mental Health, Role Function—Emotional, Vitality, and General Health. Each scale is scored from 0 to 100, with

<sup>1</sup>Because the study was designed to evaluate longitudinal relationships between meaning, vulnerability, and adjustment, we elected to use the Positive Meaning Scale (administered at both Time 1 and Time 2) rather than the PTGI (administered at Time 2 only) in our analyses.

higher scores indicating better quality of life. In addition, the SF-36 can be scored as two summary scales, one for physical health and one for mental health. These scales are called the Physical Component Summary (PCS) and the Mental Component Summary (MCS) and were the two primary quality of life outcomes of interest in this study.

Positive and negative affect were assessed at Time 1 and Time 2 using the Center for Epidemiological Studies Depression Scale (CES-D). This is a 20-item scale originally designed by Radloff (39) to assess depressive symptomatology in the general population. Respondents indicated how often they had experienced a variety of affective and vegetative symptoms in the past week on a 4-point scale ranging from 0 (*rarely or none of the time*) to 3 (*most or all of the time*). Previous factor analyses of this scale suggest four subscales: Positive Affect, Negative Affect, Somatic, and Interpersonal (40–43). This factor structure was confirmed in our sample using confirmatory factor analysis. The two subscales of interest for this study were Positive Affect and Negative Affect. The positive affect factor includes the following four items: “I felt that I was just as good as other people,” “I felt hopeful about the future,” “I was happy,” and “I enjoyed life.” The negative affect factor includes the following six items: “I felt that I could not shake off the blues even with help from family and friends,” “I felt depressed, blue, or down,” “I felt fearful,” “I felt lonely,” “I had crying spells,” and “I felt sad.” For the Positive Affect Scale, Cronbach’s alpha was .77 at Time 1 and .72 at Time 2. For the Negative Affect scale, Cronbach’s alpha was .88 at Time 1 and .85 at Time 2. For the overall CES-D, Cronbach’s alpha was .76 at Time 1 and .78 at Time 2.

### Statistical Analyses

Changes in meaning and vulnerability from Time 1 to Time 2 were evaluated using paired *t* tests, and the association between these changes was evaluated using residualized change scores. Hypothesized predictors of meaning and vulnerability at Time 1 were examined using one-way analysis of variance, Pearson’s product–moment correlation, and multiple regression. The associations between meaning, vulnerability, and measures of overall adjustment were evaluated using correlation and multiple regression. Predictor variables were entered simultaneously in all multiple regression analyses. All statistical tests were two sided. No adjustments were made for multiple comparisons.

## RESULTS

### Prevalence of and Association Between Meaning and Vulnerability

Item scores for the Positive Meaning and Vulnerability Scales are shown in Table 2. The most frequently endorsed items on the Positive Meaning Scale were “Surviving breast cancer has changed my outlook on life” and “I lead a healthier lifestyle”; over 70% of study participants reported that they had experienced at least a fair amount of change on these items at Time 1, and over 63% had experienced at least a fair amount of

change at Time 2. On average, study participants reported “a fair amount” of change on the positive meaning items at Time 1 and Time 2. There was a small but significant decrease in meaning scores from Time 1 ( $M = 12.1$ ,  $SD = 6.1$ ) to Time 2 ( $M = 11.4$ ,  $SD = 6.1$ ),  $t(758) = -3.99$ ,  $p < .0001$ .

A substantial number of women also reported changes consistent with feelings of personal vulnerability. The two most frequently endorsed items on the vulnerability scale were “I worry about the cancer coming back” and “I think about my body more”; over 40% of women reported that they had experienced at least a fair amount of change on these items at Time 1, and over 25% had experienced at least a fair amount of change on these items at Time 2. On average, study participants reported “a little” change on the vulnerability items at Time 1 and Time 2. Scores on the vulnerability scale showed a significant decline from Time 1 ( $M = 5.9$ ,  $SD = 4.6$ ) to Time 2 ( $M = 4.7$ ,  $SD = 4.0$ ),  $t(758) = -9.69$ ,  $p < .0001$ .

Meaning and vulnerability scores were positively correlated at Time 1 ( $r = .37$ ,  $p < .0001$ ) and Time 2 ( $r = .29$ ,  $p < .0001$ ). Thus, women who reported that breast cancer had changed their outlook and priorities were also more likely to endorse worries about their body and the possibility of cancer recurrence. In addition, residualized change scores for meaning and vulnerability were modestly correlated ( $r = .16$ ,  $p < .0001$ ) such that women who reported increases in positive outlook also felt more vulnerable at the second assessment, adjusting for Time 1 values.

### Predictors of Meaning and Vulnerability

We first examined the associations between demographic factors and perceptions of meaning and vulnerability at Time 1. As predicted, age at diagnosis was negatively correlated with perceptions of meaning and vulnerability such that younger women reported both increased meaning and increased vulnerability as a result of their cancer experience (Table 3). Income was also a significant predictor of meaning,  $F(2, 734) = 4.13$ ,  $p < .05$ , and vulnerability,  $F(2, 734) = 4.05$ ,  $p < .05$ . Post hoc comparisons indicated that women with a household income over \$100,000 per year reported significantly higher levels of meaning and vulnerability than did those with household incomes of \$45,000 to \$100,000 or under \$45,000 per year. The overall *F* test for ethnicity showed a marginally significant association with meaning,  $F(2, 758) = 2.9$ ,  $p < .06$ . Post hoc comparisons indicated that African American women reported significantly higher levels of meaning than did White women, with women of “other ethnicity” falling between these two groups. Education and relationship status were not associated with meaning or vulnerability at Time 1.

We next evaluated two treatment-related variables—time since diagnosis and receipt of chemotherapy—both of which have been associated with adjustment after cancer diagnosis. Women who had been treated with chemotherapy reported significantly higher levels of meaning,  $F(1, 758) = 12.3$ ,  $p < .001$ , and vulnerability,  $F(1, 758) = 8.5$ ,  $p < .01$ , consistent with predictions. There was a modest negative correlation between years postdiagnosis and vulnerability, indicating that vulnerability de-

TABLE 3  
Correlations Between Study Variables at Time 1

	1	2	3	4	5	6	7	8	9	10
1. Meaning										
2. Vulnerability	.37***									
3. Age at dx	-.20***	-.17***								
4. Time since dx	-.06	-.09**	-.02							
5. Physical sx	.17***	.29***	-.07*	.12**						
6. Life stressors <sup>a</sup>	.17**	.16**	-.30***	.01	.25***					
7. CES-D – PA	.03	-.32***	.01	-.03	-.25***	-.22***				
8. CES-D – NA	.13***	.45***	-.11**	-.02	.39***	.31***	-.59***			
9. MCS	-.09*	-.40***	.21***	-.005	-.40***	-.28***	.55***	-.72***		
10. PCS	-.02	-.08*	-.27***	-.07	-.25***	-.15**	.11**	-.05	-.15***	

Note. dx = diagnosis; sx = symptoms; CES-D = Center for Epidemiological Studies Depression Scale; PA = positive affect; NA = negative affect; MCS = Mental Component Summary; PCS = Physical Component Summary.

<sup>a</sup>*n* = 354.

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

clined slightly during the first 1 to 5 years after cancer diagnosis (Table 3). Number of physical symptoms and number of other life stressors were positively correlated with meaning and vulnerability (Table 3). As predicted, women who endorsed more physical symptoms after the diagnosis and who experienced a higher number of other stressors reported higher levels of meaning and vulnerability.

Multiple regression analyses were conducted to determine which of the predictor variables were most strongly associated with meaning and vulnerability at Time 1. Independent variables included age at diagnosis, income, ethnicity, relationship status, education, treatment with chemotherapy, time since diagnosis, and number of physical symptoms. Of note, number of other stressors was not included in this model because it was not administered to all study participants at Time 1. Younger age at diagnosis, higher income, shorter time since diagnosis, and more physical symptoms were all significant predictors of increased meaning and vulnerability; African American ethnicity was also a significant predictor of increased meaning. For meaning, the overall  $F(10, 726) = 6.5, p < .0001, R^2 = .08$ ; for vulnerability, the overall  $F(10, 726) = 10.9, p < .0001, R^2 = .13$ .

In addition to looking at cross-sectional relationships, we wanted to determine whether any of the Time 1 predictors influenced perceptions of meaning and vulnerability at Time 2. Multiple regression analyses were conducted including all predictor variables (age at diagnosis, income, ethnicity, relationship status, education, treatment with chemotherapy, time since diagnosis, and number of physical symptoms) and controlling for Time 1 values of the target outcome variable (meaning or vulnerability). Results showed that women who were younger at diagnosis and those who were married or in a committed relationship at Time 1 reported significantly higher levels of meaning and vulnerability at Time 2. Women who experienced more physical symptoms at Time 1 also reported significantly higher vulnerability at Time 2. In contrast, those with a college degree reported significantly lower meaning and marginally lower vulnerability

at Time 2. Meaning and vulnerability at Time 1 were the strongest predictors of the Time 2 outcomes and accounted for the majority of the variance explained. For meaning, the overall  $F(11, 723) = 89.6, p < .0001, R^2 = .58$ ; for vulnerability, the overall  $F(11, 723) = 70.3, p < .0001, R^2 = .52$ .

### Meaning, Vulnerability, and Overall Adjustment

To determine whether perceptions of meaning and vulnerability were associated with global measures of adjustment, we first examined their cross-sectional associations with the CES-D Positive Affect and Negative Affect subscales and the SF-36 summary scales for mental health and physical health. Bivariate correlations at Time 1 are shown in Table 3. We also conducted multiple regression analyses that included both meaning and vulnerability as independent variables to identify the unique contribution of each domain to adjustment. Results are shown in Table 4 and indicate that meaning was associated with higher levels of positive affect and marginally higher ratings of mental health at Time 1. Conversely, vulnerability was associated with higher levels of negative affect, lower levels of positive affect, lower ratings of mental health, and lower ratings of physical health. Analyses conducted at Time 2 revealed a similar pattern of results (results not shown). Further examination of individual SF-36 subscales revealed that vulnerability was associated with lower ratings on all aspects of quality of life.<sup>2</sup>

Next, multiple regression analyses were conducted to determine whether perceptions of meaning and vulnerability at 1 to 5 years postdiagnosis prospectively influenced later adjustment. These analyses included the variables previously identified as

<sup>2</sup>Vulnerability at Time 1 was negatively correlated with Physical Functioning ( $r = -.09$ ), Role Function—Physical ( $r = -.13$ ), Mental Health ( $r = -.42$ ), Role Function—Emotional ( $r = -.27$ ), Vitality ( $r = -.30$ ), Social Functioning ( $r = -.31$ ), Bodily Pain ( $r = -.19$ ), and General Health ( $r = -.32$ ), all  $ps \leq .01$

TABLE 4  
Cross-Sectional Multiple Regression Analyses With Meaning and Vulnerability as Predictors of Adjustment at Time 1

Predictor Variable	CES-D NA		CES-D PA		MCS		PCS	
	$\beta$	<i>p</i>	$\beta$	<i>p</i>	$\beta$	<i>p</i>	$\beta$	<i>p</i>
Meaning (T1)	-0.04	.21	0.18	.0001	0.07	.05	0.01	.71
Vulnerability (T1)	0.47	.0001	-0.39	.0001	-0.42	.0001	-0.08	.04
Total $R^2$	0.21	.0001	0.13	.0001	0.16	.0001	0.006	.10

Note. All parameter estimates are standardized. CES-D = Center for Epidemiological Studies Depression Scale; NA = negative affect; PA = positive affect; MCS = Mental Component Summary; PCS = Physical Component Summary.

TABLE 5  
Longitudinal Multiple Regression Analyses With Meaning and Vulnerability as Predictors of CES-D NA and CES-D PA

Predictor Variable (T1)	Time 2 CES-D NA		Time 2 CES-D PA	
	$\beta$	<i>p</i>	$\beta$	<i>p</i>
CES-D subscale (NA or PA)	0.43	.0001	0.35	.0001
Meaning	-0.006	.87	0.09	.01
Vulnerability	0.09	.02	-0.09	.03
Age at dx	-0.02	.56	-0.03	.41
Income				
Under \$45,000	0.01	.83	-0.06	.28
\$45,000-\$100,000	0.01	.76	-0.04	.35
Over \$100,000 <sup>a</sup>				
Ethnicity				
African American	-0.02	.44	0.06	.07
Other	-0.002	.95	-0.01	.77
White <sup>a</sup>				
Married/ committed relationship	0.02	.52	0.002	.96
College graduate	-0.08	.02	0.04	.26
Treated with chemotherapy	-0.03	.38	0.006	.88
Time since dx	0.01	.71	-0.03	.45
Number of physical symptoms	0.13	.0004	-0.03	.36
Total $R^2$	0.31	.0001	0.18	.0001

Note. All parameter estimates are standardized. CES-D = Center for Epidemiological Studies Depression Scale; NA = negative affect; PA = positive affect; dx = diagnosis.

<sup>a</sup>Indicates reference group.

predictors of meaning and/or vulnerability (i.e., age at diagnosis, income, ethnicity, education, relationship status, years postdiagnosis, chemotherapy, physical symptoms). As shown in Table 5, meaning and vulnerability were both significant predictors of positive affect at Time 2, controlling for Time 1 positive affect and other variables,  $F(13, 717) = 12.3, p < .0001$ . Vulnerability was also a significant predictor of negative affect at Time 2, controlling for Time 1 negative affect and other variables,  $F(13, 717) = 24.8, p < .0001$ . These results indicate that perceptions of meaning led to increased positive affect, whereas perceptions of vulnerability led to decreased positive affect and increased negative affect in the years following cancer diagnosis and treatment. Neither meaning nor vulnerability was a significant predictor of Time 2 mental or physical health, despite cross-sectional relationships with these quality of life scales.

## DISCUSSION

This study was designed to document the prevalence of cancer-related changes in outlook and perspectives in a large geographically diverse sample of disease-free breast cancer survivors, to identify predictors of these changes and to determine their impact on global measures of adjustment. Our results indicate that perceptions of vulnerability and positive meaning were prevalent in this sample, a finding consistent with previous reports (9-13,16-18). Over 40% of study participants reported persistent concerns about cancer recurrence and thought about their bodies more in the first 5 years after cancer diagnosis, and almost 75% reported that breast cancer had changed their outlook on life and that they now led a healthier lifestyle. These changes were still apparent up to 10 years after cancer diagnosis.

Our results offer strong support for the hypothesis that perceptions of meaning and vulnerability co-occur and that factors that increase the disruptiveness of the cancer experience provide an opportunity for both responses. Meaning and vulnerability were positively correlated and were both predicted by younger age, physical symptoms, and occurrence of other stressful life events. For younger women, cancer may spark a more pronounced and premature confrontation with mortality, provoking increases in vulnerability but also inspiring positive shifts in outlook and priorities. The presence of minor physical symptoms may keep the memory of the cancer experience alive, provoking fears about a possible recurrence but also reinforcing changes in outlook. Similarly, confronting another stressful life experience may remind one of the shift in perspective elicited by the cancer diagnosis. These results support theoretical models of adjustment to trauma proposed by Janoff-Bulman (20) and Tedeschi and Calhoun (21), which predict that disruption of assumptions about personal safety and security leads to enhanced feelings of vulnerability and to the construction of positive meaning or growth. Indeed, these models suggest that it is the realization that loss can occur at any time that motivates and maintains the sense that life is more precious.

Although demographic factors were not a primary focus of this study, results from these analyses deserve mention. We found that women with a household income of over \$100,000 per year reported higher levels of meaning and vulnerability than did women of lower income, suggesting that the former may perceive cancer as being more threatening and may also be better positioned to accrue the positive consequences of stressful events (44). Further, we found that African American women reported higher levels of positive meaning than did White women, consistent with previous research (6). Our results suggest that this difference may not be attributable to increased perceptions of vulnerability, as there were no group differences on this variable. Differences in religiosity/spirituality may play a role here, as religious and spiritual change is an important aspect of posttraumatic growth (34). It should be noted that this study included a relatively small percentage of African American and other ethnic women who were likely highly self-selected and may not be fully comparable to the White participants or representative of the full range of breast cancer survivors (45).

Results strongly supported the hypothesis that feelings of cancer-related vulnerability are closely tied with poor overall adjustment and predict increased negative affect in the 5 to 10 years postdiagnosis. These results are consistent with previous, cross-sectional research (6,7,10,29–31) and extend earlier findings by documenting a longitudinal relationship among long-term cancer survivors. Although feelings of vulnerability were not prominent for the majority of women in our sample, they may be an important target for intervention given their potentially detrimental effects on mental health. The factors that sustain fears and concerns about cancer, and techniques to ameliorate these fears, are an important topic for future research.

Results also supported that hypothesis that perceptions of positive meaning are associated with higher levels of positive af-

fect and predict modest increases in positive affect among long-term breast cancer survivors. Past research linking meaning-related changes and mental health in cancer patients has been inconsistent; although several studies have shown a positive relationship between reports of positive changes and psychological adjustment (6,15,32), others have found no such relationship (7,14,18) or have shown a negative effect of finding benefit on distress (33). Our results suggest two possible explanations for these divergent findings. First, perceptions of positive meaning may be more closely tied with positive indexes of psychological functioning, such as positive affect, than with measures of psychological distress (6,17). Second, the relationship between meaning and adjustment may be obscured by the overlap between meaning and vulnerability. In our study, the association between meaning and adjustment was evident only when the CES-D was divided into Positive Affect and Negative Affect subscales and when vulnerability was included in the analytic model. Indeed, bivariate analyses showed a positive correlation between meaning and CES-D Negative Affect at Time 1; in the absence of further analyses, these findings could be interpreted as suggesting that changes in outlook and priorities are associated with elevated depressive symptoms. We encourage other researchers to consider both positive and negative responses to stressful experiences and their unique effects on different aspects of psychological adjustment.

Several limitations of this study deserve mention. First, the study was not designed to examine the development of meaning and vulnerability in the immediate aftermath of the cancer diagnosis. Cancer patients report benefits as early as 4 to 8 weeks postsurgery (14), and recent evidence suggests that cancer-related growth continues to increase over the first 18 months postdiagnosis (46). Assessing women at 1 to 5 years after diagnosis clearly does not capture the dynamic changes in meaning and vulnerability that occur in this initial postdiagnosis period. However, our results do shed light on factors that may sustain these perceptions over time, a potentially important finding given the increasing longevity of breast cancer survivors. Second, we focused on a select number of theoretically derived predictors that reflected increased impact of the cancer experience. These predictor variables explained a relatively small percentage of the variance in perceptions of meaning and vulnerability, ranging from 7% to 12%. As suggested above, this may have been due to the timing of assessments, but it also suggests that important variables were not included in the model. In a recent review (47), we identified two promising antecedents of positive change in cancer patients: perceived impact of the stressor and intentional engagement with the stressor (e.g., cognitive processing and emotional expression) (18,46,48). These predictors merit increased attention in future research. Finally, we relied on patients' self-report to assess changes in outlook and priorities. There is some question about whether these reports (particularly reports of growth) reflect "real" changes or are illusory, driven by self-enhancement (49) or avoidance (50) motives.

Overall, results from this study indicate that breast cancer leads to changes in outlook on life that are both pervasive and

enduring. Although breast cancer survivors look similar to healthy age-matched controls on global dimensions of quality of life, many women do report subtle cognitive, behavioral, and emotional changes related to their cancer diagnosis and treatment. Many of these changes are positive and emphasize leading a healthier life and maximizing the value of one's time. However, women also report a variety of concerns related to cancer, particularly a fear of recurrence. These changes have implications for overall psychological and physical well-being and are an important aspect of cancer survivorship.

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