Predictors of posttraumatic growth in women with breast cancer

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Abstract

Objective—Posttraumatic growth (PTG) is defined as 'positive psychological change experienced as a result of a struggle with highly challenging life circumstances'. The current study examined change in PTG over 2 years following breast cancer diagnosis and variables associated with PTG over time.

Methods—Women recently diagnosed with breast cancer completed surveys within 8 months of diagnosis and 6, 12, and 18 months later. Linear mixed effects models were used to assess the longitudinal effects of demographic, medical, and psychosocial variables on PTG as measured by the Posttraumatic Growth Inventory (PTGI).

Results—A total of 653 women were accrued (mean age = 54.9, *SD* = 12.6). Total PTGI score increased over time mostly within the first few months following diagnosis. In the longitudinal model, greater PTGI scores were associated with education level, longer time since diagnosis, greater baseline level of illness intrusiveness, and increases in social support, spirituality, use of active–adaptive coping strategies, and mental health. Findings for the PTGI domains were similar to those for the total score except for the Spiritual Change domain.

Conclusion—PTG develops relatively soon after a breast cancer diagnosis and is associated with baseline illness intrusiveness and increases in social support, spirituality, use of active–adaptive coping strategies, and mental health.

Introduction

Posttraumatic growth

Posttraumatic growth (PTG) is 'positive psychological change experienced as a result of the struggle with highly challenging life circumstances' [1]. Although this concept has been recognized for centuries in literature, philosophy, and religion [2], it has only recently been examined empirically. According to Tedeschi and Calhoun, aspects of PTG include enhanced interpersonal relationships, increased appreciation for life, sense of increased personal strength, greater spirituality, and positive changes in life priorities or goals [3]. Recent work has confirmed its multidimensional (five-factor) nature measured by the Posttraumatic Growth Inventory (PTGI) [4–6]. The most comprehensive model of the PTG process posits several factors that promote the experience of such growth [7]. The process begins with an event that poses a threat to the individual's core belief system [8]. To any such event, people bring a variety of individual differences that may impact the likelihood of experiencing PTG (e.g., mental health history, spirituality, traits such as optimism). People

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then use various processes (e.g., coping strategies, social support) to manage distress and reevaluate beliefs. Although the process is thought to occur *over time* [9], there have been few longitudinal studies of PTG.

Posttraumatic growth and breast cancer

Posttraumatic growth in breast cancer has been associated with several individual and psychosocial factors, including younger age, longer time since diagnosis, greater cancer-related stress, perception of greater cancer-related threat, positive/adaptive coping, religious coping, talking about one's breast cancer, and seeking social support [10–18]. Although little research has examined the relationship between PTG and optimism, results from existing studies provide evidence to support a positive relationship [13, 19, 20]. To our knowledge, no research to date has examined the relationship between illness intrusiveness and PTG among women with breast cancer, but we believe that it is a relevant concept. One prior study suggests that it is related to quality of life, symptom distress, and physical functioning in women with breast cancer [21]. We include illness intrusiveness in the present analyses because degree of intrusion from breast cancer is likely related to the amount of challenge that women experience. Disease and treatment-related variables have been minimally related to PTG in women with breast cancer [11].

Although the process of developing PTG is hypothesized to develop over time [9], few longitudinal investigations of PTG have been conducted in women with breast cancer [16, 22] or have examined PTG over time [23, 24]. One study found that longer time since diagnosis, greater perceived cancer-related stress, and use of positive reappraisal coping at baseline predicted greater PTGI score 12 months later [16]. In another study of 59 breast cancer survivors, religious coping at baseline was significantly correlated with PTG 2 years later [22].

In the only longitudinal study that reported PTG following a breast cancer diagnosis, PTGI scores increased over 18 months ($N = 162$), and there was a positive relationship between time since diagnosis and reported PTG [23]. Further, significant predictors of PTG included younger age, greater contemplation of potential reasons for developing breast cancer, and higher emotional expressiveness [23]. Although this study appears to be the strongest longitudinal study of PTG in a breast cancer sample to date, there are several noteworthy limitations: relatively small sample ($N = 162$ at baseline), high rate of refusals to participate (60%) resulting in a very young survivor sample that may not generalize to the larger population of breast cancer survivors (mean age of participants = 50.1 ± 9.9 years versus mean age of refusers = 53.5 ± 11.3 years, $p < .001$), and a significant number of study dropouts ($n = 42$ or 26% of participants by final assessment). Researchers in the PTG-cancer arena have repeatedly pointed to the need for longitudinal studies of predictors of PTG in large samples of cancer patients [10, 25–27].

Few studies that focus on PTG following breast cancer have specifically looked at PTGI domains and their relationship to other variables [28]. In these cross-sectional studies, the PTGI domains have shown some different patterns of relationships with variables such as coping and psychological adjustment [29, 30].

Goals of the current study

The present analyses are based on a large ($N = 653$), longitudinal study designed to explain age-related differences in response to a breast cancer diagnosis. This dataset allowed us to examine change in PTG over 24 months following a breast cancer diagnosis and the role of multiple variables (sociodemographic, cancer-related, and psychosocial) associated with change in PTG.

The present study had the following objectives: (1) to estimate change in PTGI total scores over the 24 months following breast cancer diagnosis; (2) to identify socio-demographic, disease/treatment, and psychosocial variables associated with PTGI scores over time; and (3) to determine whether there are differential relationships of associated variables between each of the PTGI domains. We hypothesized that increases in mental health, active–adaptive coping strategies, peace/meaning, religious faith, and a decrease in illness intrusiveness would be associated with higher PTGI total scores over time. No relationships were hypothesized for the PTGI domain scores.

Method

Sample

These analyses are part of a larger study of age differences in adjustment to breast cancer [31]. This observational, longitudinal study was conducted with women aged   18 years newly diagnosed with stage I–III breast cancer. Recruitment was conducted at Memorial Sloan Kettering Cancer Center and the University of Texas Southwestern Center for Breast Care.

Procedure

Women were recruited through clinics and advertisements, and screened by chart review or telephone. Eligible women were mailed a baseline questionnaire to complete and return to the Coordinating Center at the Wake Forest School of Medicine. Baseline questionnaires were completed within 8 months of diagnosis. Follow-up questionnaires were completed 6, 12, and 18 months after baseline. Because the baseline questionnaire was administered to women at differing lengths of time following diagnosis, we used the dates of completion of each survey along with the date of diagnosis to create a continuous variable of time since diagnosis (in months).

Measures

All psychosocial variables were chosen on the basis of those with previously demonstrated significant relationships with PTG.

Demographic variables

Age, marital status, educational level, race, and religious preference were collected.

Medical variables

A medical chart review was performed upon completion of primary treatment. Data included the following: date of breast cancer diagnosis, cancer stage (I–III), type of surgery, receipt of radiation therapy, and receipt of chemotherapy.

Posttraumatic growth

The PTGI was used to measure PTG. The 21-item scale includes items that assess the degree to which an individual reports specific positive changes attributed to the struggle with a highly stressful event (possible total scores range from 0 to 105) [4]. Five empirically derived domains are assessed: Relating to Others, New Possibilities, Appreciation of Life, Personal Strength, and Spiritual Change. Cronbach's alphas for the total score have ranged from $\alpha = 0.91$ to 0.93 [6,32–36].

Social support

The RAND Social Support Scale measured respondents' evaluation of the resources provided by their social network [37]. It measures four aspects of support: emotional, tangible, affection, and social interaction [38]. A total score sums the four categories with a possible total score ranging from 19 to 95 (higher scores = greater support).

Spirituality

Spirituality was assessed by the Functional Assessment of Chronic Illness Therapy – Spiritual Well-Being (FACIT-Sp) scale [39, 40]. This 12-item scale contains two subscales – meaning/peace and faith. The eight-item meaning/peace subscale assesses a sense of meaning, peace, and purpose in life (possible scores: 0 to 32) (Cronbach's alpha = 0.81). The faith factor contains four items measuring comfort and strength derived from one's faith (possible scores: 0 to 16) (Cronbach's alpha = 0.88). Higher scores indicate greater spiritual well-being.

Coping

Coping was assessed with the 28-item Brief COPE scale, which measures 14 conceptually differentiable coping reactions and is based on the longer COPE inventory [41]. A second-order factor analysis revealed two domains comprised of 11 COPE subscales: (1) active–adaptive coping (i.e., self-distraction, active coping, emotional support, instrumental support, venting, positive reframing, planning, turning to religion) and (2) passive coping (i.e., self-blame, denial, behavioral disengagement). Cronbach's alpha for individual scales ranged from 0.50 to 0.90 [41].

General health-related quality of life

We used the two component scores of the SF-36 Health Status Questionnaire: Mental Component Score and Physical Component Score [42]. The SF-36 has a mean of 50 and *SD* of 10 (higher scores = better functioning); Cronbach's alphas ranged from 0.73 to 0.96 [42].

Optimism

Optimism was assessed with the eight-item version of the self-report Life Orientation Test [43,44]. Respondents rate their degree of agreement with statements on a four-point scale. Cronbach's alpha was reported as 0.76 [43].

Illness intrusiveness

The Illness Intrusiveness Rating Scale measures perceptions of how much breast cancer diagnosis/treatment affect 13 life domains (e.g., work, active recreation, relationship with spouse) [45–47]. Respondents assess the impact of their illness on each domain from 1 (not very much) to 7 (very much). Total scores range from 13 to 91, with internal consistency typically in the 0.80s–0.90s [48].

Analysis

We assessed baseline and longitudinal models of PTG. Linear models were used to assess effects of demographic, medical, and psychosocial variables on PTGI scores at baseline, and random coefficient models were used to assess effects of these variables on PTGI scores over all time points. Separate models were run for total PTGI score and each domain score.

Time was calculated as months since diagnosis and included in the model using both linear and quadratic terms. The intercept and time slope were included as random effects in the models.

Predictor variables included in the model were sociodemographics (age, education, race, marital status, religious preference), medical (cancer stage), and psychosocial (social support, spirituality, active–adaptive coping factor, mental health, optimism, and illness intrusiveness) variables. The baseline analysis included only baseline PTGI and baseline values of covariates. For the longitudinal model, we included baseline values for demographic variables, cancer stage, and optimism and entered the time-varying predictors as a baseline value and as the change from baseline at each subsequent time. Beta coefficients and standard errors were estimated using models containing all covariates listed earlier, and least squares mean estimates for PTGI total score and domains were calculated from the models with covariates set to their mean levels. We also classified the questionnaire responses into 6-month increments following diagnosis and used repeated measures models to assess unadjusted changes over time in PTGI and the time varying covariates. An unstructured covariance matrix was used to model the within patient correlations over time in these analyses. SAS version 9.2 was used for all analyses.

Results

Sample

A total of 658 women were recruited from 740 mailed surveys (initial response rate 89%). Five women were determined to be ineligible, leaving a sample of 653 women. Of those, 571 (87.4%) participated at the 18-month follow-up, and 544 (83.3%) completed all four surveys. Median time since diagnosis was 4.7 months (Table 1). Most participants were White people and married/ partnered. Median age was 54 years. Most women had stage I disease and a lumpectomy. Three-quarters of respondents had radiation therapy.

PTG over time

Table 2 summarizes descriptive data on the PTGI and all psychosocial variables at each data collection point. Unadjusted PTGI total score and all but one of the domains (Relating to Others) show a significant increase over time. Psychosocial variables except for spirituality (meaning/peace) also change significantly over time, though social support, spirituality (faith), active–adaptive coping, and illness intrusiveness decrease over time while mental health improves. In the multivariable model that adjusts for psychosocial variables, PTGI total scores had a quadratic relationship with time since diagnosis, increasing initially after diagnosis and leveling off over time. The least squares mean (adjusted for covariates) for PTGI total score increased, on average, by approximately 10 points between 1 and 21 months post-diagnosis. Total PTGI score over time adjusted for all covariates increased over the first 12 months following diagnosis and then stabilized (Figure 1).

Variables associated with PTG

In the multivariable baseline model, longer time since diagnosis, greater social support, spirituality-faith, use of active–adaptive coping strategies, and illness intrusiveness ($p < .05$) were all significantly associated with higher PTGI scores (Table 3). In the multivariable longitudinal model, longer time since diagnosis, education (except beyond college graduate), higher baseline level of illness intrusiveness, and greater increases in social support, mental health, spirituality-meaning/peace, spirituality-faith, and use of active–adaptive coping strategies were significantly associated with higher PTGI scores. PTGI scores increased as level of education increased until the college graduate level, and then decreased. Use of active–adaptive coping strategies was highly associated with PTGI; a 1-unit increase in baseline active–adaptive coping predicted a 13-point increase on PTGI total score, and a 1-unit increase in time-varying active–adaptive coping predicted a 5.3-point increase on PTGI total score. Although time-varying values of most psychosocial variables were significant, only baseline level of illness intrusiveness was significant in this model.

Table 4 summarizes analyses for each PTGI domain. Findings across PTGI domains were fairly consistent, with some exceptions. For example, social support was only associated with the Relating to Others domain; religious preference was only associated with Spiritual Change. Younger age was only significantly associated with New Possibilities and Appreciation of Life.

Discussion

Building on minimal prior longitudinal PTG research in women with breast cancer [23], this study brought a number of strengths: large sample size ($N = 653$), wide age range of breast cancer survivors, data collected across four time points with minimal missing data, and a range of psychosocial variables. Our finding that PTGI increased over time supports the theory that PTG develops over time and suggests that at least some women perceive positive changes during and after breast cancer treatment. PTG increased most in the first year following diagnosis corresponding to the time when one's assumptions about the world and oneself are likely to be most challenged [8, 49, 50].

In our longitudinal model, education (except beyond college graduate), time since diagnosis, baseline level of illness intrusiveness, and greater increases in social support, spirituality-meaning and peace, spirituality-faith, use of active–adaptive coping strategies, and mental health were associated with greater total PTGI score. Other sociodemographics and cancer-related variables showed little association with PTGI.

This study is the first to show that *increases* in social support are associated with PTG and, as discussed later, predominantly with the Relating to Others domain of the PTGI, supporting the theory that social support promotes PTG by allowing disclosure about the highly stressful event [2,4]. Discussions about the breast cancer experience met with supportive reactions might aid in managing distressing emotions and influence the cognitive 'work' needed for PTG to develop [51].

Use of active–adaptive coping strategies was associated with total PTGI score and every PTGI domain. Active–adaptive coping strategies may allow some relief from emotional distress, and encourage self-disclosure and support-seeking. Coping also may be one way to integrate new information into a rebuilt assumptive world [8]. Use of strategies such as positive reframing can help to recognize potential positive changes related to breast cancer [24]. The associations between baseline illness intrusiveness and increases in spirituality and mental health with greater PTG are also consistent with PTG theory. It is not surprising that change in illness intrusiveness was not associated with PTG and illness intrusiveness declines over time (from a mean of 35 to 26), whereas PTG remains generally stable after the first year.

The lack of relationship between optimism and PTGI total and domain scores over time was a surprising finding, which is inconsistent with studies of women with breast cancer in which optimism plays a significant role in the development of PTG [13,19,20].

One question that emerges in PTG research and in our own work is the degree to which PTGI overlaps with concepts such as spirituality, social support, and active coping strategies. Several aspects of our data suggest otherwise. We did not include variables that were highly correlated or conceptually similar to PTGI in our models. For example, spirituality-faith was not entered into the model examining PTGI Spiritual Change because the two variables were highly correlated at baseline ($r = 0.67$, $p <.001$), though social support was entered into the model examining the PTGI Relating to Others domain as these variables were not highly correlated ($r = 0.25$, $p <.0001$). All other variables entered into the

models demonstrated low to moderate correlations, suggesting that the analyses were not comparing concepts with substantial conceptual overlap.

Few studies have looked at individual PTGI domains to determine whether domain scores demonstrate differential patterns of relationships. In general, the patterns of variables associated with PTGI domain scores did not differ substantially from those of the total score, suggesting that examination of individual PTGI domain scores may add little to the use of overall PTGI total score.

This study had several limitations. First, the sample has limited diversity (race, education, disease stage), which may limit generalizability. Future studies should consider recruiting a large minority sample to replicate these findings in a minority population. Second, the PTGI, like most self-report measures, requires respondents to assess their change from their own perspective. Finally, while we examine relationships over time in this large, longitudinal dataset, we acknowledge that we cannot draw causal conclusions about relationships between a variety of variables and PTG. Although we have explained our findings in terms of how these variables 'set the stage' for the development of PTG, we fully realize that the development of PTG could actually precede increases in constructs such as social support, mental health, and active coping.

From the data reported here, important results emerge. One, PTG can develop relatively soon following a breast cancer diagnosis. Second, PTG is reported by persons confronted with this major stressor over 2 years. This stability in PTG may be supported by the salient threat of cancer recurrence, as threat and distress appear to be important aspects in the development of PTG. Distress (as indicated by intrusive thinking about one's cancer), support from others, coping strategies (including a reliance on religious faith), and finding a degree of meaning and peace were associated with higher levels of PTG. This combination represents a broad validation of the PTG model [52] and corresponds to recent research that indicates that finding meaning has an important relationship to PTG [53]. These data also suggest that PTG may be facilitated by encouraging attempts at coping, a tolerance of some intrusive thinking and distress, and ways of finding meaning and peace during breast cancer treatment.

Acknowledgments

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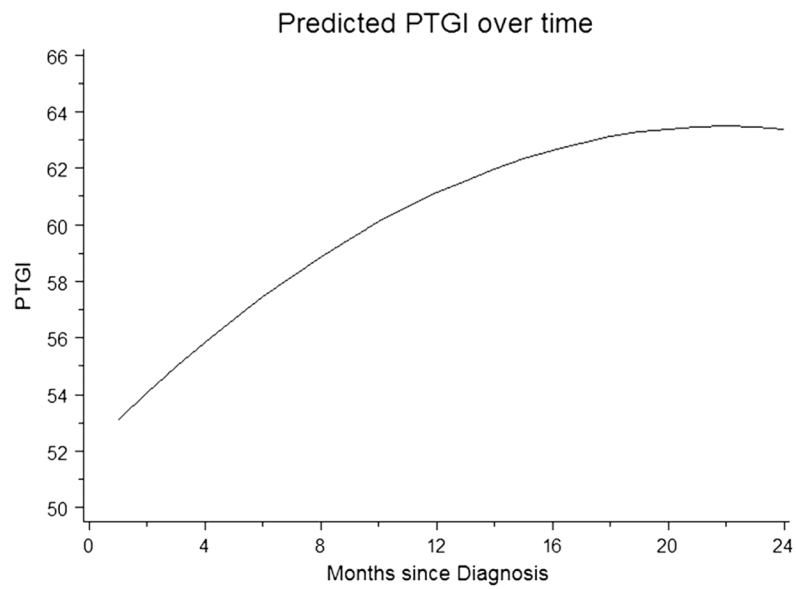
Figure 1.
Least-squares means (adjusted for study covariates) of total Posttraumatic Growth Inventory (PTGI) scores

Table 1

Characteristics of the study sample ($N = 653$)

Demographic/medical characteristics	N (%)
Age (years) – median (range)	54 (25–96)
Race (White)	585 (90)
Marital status (married/partnered)	468 (72)
Education	
<High school	82 (13)
High school <college graduate	162 (25)
College graduate	149 (23)
>College graduate	260 (40)
Employment status	
Retired	140 (21)
Homemaker	99 (15)
Employed	272 (42)
Other	142 (22)
Religious preference	
Catholic	254 (39)
Jewish	120 (18)
Protestant	198 (30)
Other	24 (4)
None	56 (9)
Months since diagnosis at study entry – median (range)	4.7 (0.1 – 7.3)
Cancer Stage	
I	338 (52)
II	262 (40)
III	53 (8)
Surgery	
Lumpectomy only	416 (64)
Mastectomy only	106 (16)
Mastectomy/reconstruction	131 (20)
Radiation therapy (yes)	472 (72)
Chemotherapy	
No chemotherapy	217 (33)
Chemotherapy – no adriamycin	109 (17)
Chemotherapy – with adriamycin	327 (50)
Hormonal therapy	
Tamoxifen (yes)	266 (41)
Aromatase inhibitor (yes)	243 (37)

Table 2

Psychosocial characteristics by time since diagnosis (*N* = 653)

	0 to <6 months			6 to <12 months			12 to <18 months			18 to <24 months			
	N	Mean	SD	*N*	Mean	SD	*N*	Mean	SD	*N*	Mean	SD	*p*-value
Months since diagnosis	619	4.37	1.23	590	9.91	1.35	578	15.90	1.37	567	22.09	1.34	NA
PTGI – total	619	54.03	23.12	589	56.47	22.99	578	57.31	23.23	566	58.14	22.65	<0.0001
PTGI domains													
Relating to others	619	21.55	8.47	589	21.75	8.27	578	21.77	8.38	566	21.60	8.31	0.8585
New possibilities	619	8.04	6.18	589	8.77	6.47	578	9.13	6.32	566	9.51	6.44	<0.0001
Personal strength	619	11.13	5.39	589	11.97	5.31	578	12.30	5.25	566	12.75	5.06	<0.0001
Spiritual change	611	3.84	3.59	584	4.07	3.58	573	4.28	3.63	564	4.31	3.57	<0.0001
Appreciation of life	619	9.45	4.23	589	9.87	4.08	578	9.82	4.01	566	9.96	3.82	0.0021
Social support	619	4.29	0.72	589	4.17	0.78	578	4.17	0.80	567	4.17	0.79	<0.0001
Spirituality (meaning/peace)	612	23.73	6.18	589	23.74	6.06	578	24.06	6.22	566	23.97	6.09	0.3751
Spirituality (faith)	604	9.78	4.90	581	9.51	4.92	572	9.35	4.99	562	9.32	4.96	0.0595
Active–adaptive coping	619	2.58	0.58	590	2.34	0.62	578	2.24	0.63	567	2.14	0.61	<0.0001
SF-36 MCS	619	46.88	11.22	589	49.46	10.41	575	50.55	10.13	564	50.08	10.31	<0.0001
Illness intrusiveness	619	34.78	16.79	590	29.94	14.96	577	26.56	13.64	567	26.10	13.90	<0.0001

PTGI, Posttraumatic Growth Inventory; MCS, Mental Component Score.

Table 3

Association of demographic, clinical, and psychosocial characteristics with Posttraumatic Growth Inventory scores[a]

Covariate	Baseline model[b] ($N = 635$)		Longitudinal model[c] ($N = 635$, $N_{obs} = 2332$)	
	Estimate (*SE*)	*p*-value	Estimate (*SE*)	*p*-value
Time	1.80 (0.63)	0.0044	1.04 (0.18)	<0.0001
Time × time	—		−0.02 (0.01)	0.0002
Age at Dx (per decade)	−1.25 (0.74)	0.0926	−1.08 (0.59)	0.0662
Education		0.2385		0.0101
HS	Ref		Ref	
>HS, <college graduate	1.06 (2.79)		0.38 (2.21)	
College graduate	0.50 (2.93)		1.93 (2.32)	
>College graduate	−2.75 (2.74)		−3.27 (2.16)	
Stage		0.2405		0.7404
I	Ref		Ref	
II	−0.56 (1.80)		−1.09 (1.43)	
III	−5.26 (3.13)		−0.23 (2.48)	
Social support				
Baseline	2.58 (1.30)	0.0483	2.26 (1.05)	0.0315
Change from baseline			1.94 (0.70)	0.0054
Spirit (meaning and peace)				
Baseline	0.32 (0.21)	0.1187	0.55 (0.17)	0.0013
Change from baseline			0.48 (0.09)	<0.0001
Spirit (role of faith)				
Baseline	1.46 (0.22)	<0.0001	1.44 (0.18)	<0.0001
Change from baseline			0.78 (0.13)	<0.0001
Active–adaptive coping				
Baseline	11.46 (1.62)	<0.0001	13.07 (1.30)	<0.0001
Change from baseline			5.26 (0.73)	<0.0001
Optimism (baseline)	−0.15 (0.17)	0.3684	−0.14 (0.13)	0.2868
Mental health				
Baseline	−0.06 (0.01)	0.5270	0.01 (0.08)	0.8985
Change from baseline			0.15 (0.04)	0.0007
Illness intrusiveness				
Baseline	0.14 (0.07)	0.0328	0.20 (0.05)	0.0002
Change from baseline			0.05 (0.03)	0.1106

[a] Demographic variables that were nonsignificant in the models (race, marital status, religion) are not shown.

[b] Baseline data (surveys completed between 0.7 and 7.3 months).

[c] Longitudinal model using baseline value and change from baseline for time varying covariates.

Table 4

Association of demographic, clinical, and psychosocial characteristics with Posttraumatic Growth Inventory domain scores (multivariable model)[a]

Covariate	Relating to others		New possibilities		Personal strength		Spiritual change		Appreciation of life	
	Estimate (*SE*)	*p*-value	Estimate (*SE*)	*p*-value	Estimate (*SE*)	*p*-value	Estimate (*SE*)	*p*-value	Estimate (*SE*)	*p*-value
Age at Dx (per decade)	0.17 (0.22)	0.44	−0.75 (0.17)	<0.0001	−0.17 (0.15)	0.24	0.10 (0.10)	0.31	−0.34 (0.11)	0.003
Social support										
Baseline	2.19 (0.39)	<0.0001	0.08 (0.30)	0.79	0.03 (0.26)	0.90	−0.05 (0.18)	0.77	−0.004 (0.20)	0.98
Change from baseline	1.67 (0.27)	<0.0001	0.36 (0.21)	0.09	0.05 (0.20)	0.82	0.04 (0.10)	0.68	−0.03 (0.14)	0.80
Spirit (meaning and peace)										
Baseline	0.10 (0.06)	0.10	0.17 (0.05)	0.0003	0.16 (0.04)	0.0003	0.16 (0.03)	<0.0001	0.13 (0.03)	<0.0001
Change from baseline	0.17 (0.04)	<0.0001	0.15 (0.03)	<0.0001	0.11 (0.03)	<0.0001	0.05 (0.01)	<0.0001	0.06 (0.02)	0.001
Spirit (role of faith)										
Baseline	0.31 (0.07)	<0.0001	0.31 (0.05)	<0.0001	0.19 (0.04)	<0.0001	—[b]	—[b]	0.10 (0.03)	0.004
Change from baseline	0.18 (0.05)	0.001	0.12 (0.04)	0.002	0.16 (0.04)	<0.0001			0.08 (0.03)	0.002
Active–adaptive coping										
Baseline	5.21 (0.48)	<0.0001	3.22 (0.37)	<0.0001	2.20 (0.32)	<0.0001	1.13 (0.22)	<0.0001	1.55 (0.25)	<0.0001
Change from baseline	1.74 (0.29)	<0.0001	1.74 (0.22)	<0.0001	0.76 (0.20)	0.0002	0.36 (0.10)	0.0004	0.82 (0.14)	<0.0001
Optimism										
Baseline	−0.02 (0.05)	0.69	−0.04 (0.04)	0.29	−0.03 (0.03)	0.36	−0.003 (0.02)	0.90	−0.01 (0.03)	0.66
Mental health										
Baseline	0.003 (0.03)	0.91	0.002 (0.02)	0.93	0.002 (0.02)	0.91	−0.04 (0.01)	0.01	0.02 (0.02)	0.28
Change from baseline	0.04 (0.02)	0.03	0.04 (0.01)	0.002	0.03 (0.01)	0.01	0.01 (0.01)	0.13	0.03 (0.01)	0.0003
Illness intrusiveness										
Baseline	0.05 (0.02)	0.007	0.07 (0.02)	<0.0001	0.01 (0.01)	0.42	0.02 (0.01)	0.01	0.05 (0.01)	<0.0001
Change from baseline	0.02 (0.01)	0.08	0.01 (0.01)	0.19	−0.002 (0.01)	0.87	0.01 (0.005)	0.18	0.01 (0.01)	0.11
Time	0.27 (0.07)	<0.0001	0.26 (0.05)	<0.0001	0.28 (0.05)	<0.0001	0.10 (0.02)	<0.0001	0.12 (0.04)	0.0005
Time × time	−0.007 (0.002)	0.003	−0.005 (0.002)	0.01	−0.007 (0.002)	0.0003	−0.002 (0.001)	0.01	−0.003 (0.001)	0.03

[a] Demographic variables (except age) and cancer stage are not shown.

[b] Excluded due to high correlation.