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Authors

Zimmerman, Sheryl
Smith, Sophia
Samsa, Greg
et al.

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Is there a relationship between posttraumatic stress and growth after a lymphoma diagnosis?

Sophia K. Smith[1], **Greg Samsa**[1], **Patricia A. Ganz**[2], and **Sheryl Zimmerman**[3]

[1]Duke University

[2]University of California at Los Angeles

[3]University of North Carolina at Chapel Hill

Abstract

Objective—There are conflicting empirical data regarding the relationship between posttraumatic stress (PTS) and growth (PTG) observed in cancer survivors. Clarification of this association could inform evidence-based therapeutic recommendations to promote adjustment in survivors following a cancer diagnosis.

Methods—This cross-sectional study employed standardized measures to examine the **association** between PTS and PTG in a sample of long-term lymphoma survivors. In addition, associations between PTG and demographic, clinical and psychosocial variables were identified to inform clinical recommendations.

Results—Long-term survivors of non-Hodgkin lymphoma provided informed consent (n=886; 74% response rate). Subjects averaged 10.2 years post-diagnosis and 62.9 years of age. No significant association was found between the PTS and PTG summary scores. Several demographic and clinical variables (e.g., female gender, greater social support) were independently associated with greater PTG.

Conclusions—Clinicians are advised to be attentive to psychosocial needs throughout the post-cancer diagnosis adjustment period by screening for PTS symptomatology and recognizing that survivors who report growth may also be highly distressed.

Keywords

posttraumatic stress; PTSD; posttraumatic growth; cancer survivor; oncology

BACKGROUND

Historically, psychosocial research in cancer patients has focused on the negative aspects of the experience, including posttraumatic stress (PTS). Recent research has also noted evidence of positive changes resulting from the cancer diagnosis and treatment and this paradoxical finding has been generally referred to as post-traumatic growth (PTG) or "benefit finding." Calhoun and Tedeschi [1,2] define PTG as the "positive psychological

Address correspondence to: Sophia Smith, PhD MSW; Duke Cancer Institute; DUMC 2732; Durham, NC 27710; (919) 668-4381, FAX (919) 668-2939; sophia.smith@duke.edu.

change experienced as the result of the struggle with highly challenging life circumstances." Positive changes have been reported by cancer survivors and include a greater sense of closeness with others, better appreciation of each day, establishment of a new path or direction in life, and greater compassion for others [3].

An intriguing question that has been asked over the years regarding an individual's psychosocial adjustment to a cancer diagnosis and treatment is whether or not growth and distress are at opposite ends of a continuum. For example, does alleviating distress promote growth and/or does promoting growth alleviate distress along the survivorship trajectory? Or, are growth and distress separate and independent concepts with a range of associations? The answers to these questions have important clinical implications in the design of therapeutic interventions for cancer survivors (e.g., selection of, duration, and dose of therapy).

Different theories have been proposed to address these questions and help explain an individual's reaction to stressful events such as cancer diagnosis and treatment. According to Zoellner and Maercker [4], PTG has been conceptualized as a coping strategy and an outcome resulting from a struggle with a traumatic event. For example, Park and Folkman [5] conceptualize PTG within a meaning-making coping process. In addition, Taylor's Cognitive Adaptation Theory [6] purports that the adjustment process involves a search for meaning, gaining a sense of mastery, and the process of self-enhancement. It is generally accepted that her work initiated research into PTG. Tedeschi & Calhoun's [7] conceptual model of PTG as an outcome describes how cognitive processing of a traumatic event (particularly ruminative thought) is related to growth (i.e., a positive linear association between distress and growth). The overwhelming and traumatic nature of the cancer diagnosis, the need for prompt decisions about treatment, and the repeated exposures to toxic treatments, creates a setting that is particularly prone to ruminative and intrusive thoughts (i.e., analyzing the situation, finding meaning, and reappraisal leads to personal growth).

In terms of evidence for a potential relationship between cancer-related PTS and PTG, there are conflicting and sparse empirical data among cancer survivor populations. In four of only five cancer-related studies identified in the literature that employed standardized measures for PTSD (i.e., maps to the 17 DSM-IV criteria) and PTG, short-term breast cancer [8–10] and bone marrow transplant [11] survivors reported no association. In contrast to these findings, Lechner et al. [12] and Carver and colleagues [13], reported a curvilinear association (i.e., PTS symptoms of thought avoidance and intrusion were lowest in women with recently diagnosed breast cancer who reported the least and most PTG). In addition, Helgeson, Reynolds, & Tomich [14] found a positive association between more intrusive and avoidant thoughts and PTG in a meta-analysis of 87 cross-sectional studies conducted with survivors of various life-threatening events (e.g., illness, rape, war). Furthermore, a review of studies conducted with various trauma populations revealed inconsistent associations between growth and distress variables such as depression, anxiety and PTS [15].

Given the dearth of studies in cancer samples and conflicting evidence, this study examines the association between PTS and PTG in a large sample of lymphoma survivors, an understudied group. It also identifies the demographic, clinical, and psychosocial variables that are associated with PTG; a previous study with this same sample of lymphoma survivors identified correlates for PTS [16]. We hypothesized that non-Caucasian race [12,17,18], younger age (i.e., more opportunity for growth and less "ceiling effect")[11,12], more social support [19,20], and greater life threat [8,12] would be associated with greater PTG. To the best of our knowledge, this is the first examination of PTS and PTG among cancer survivors which employs a standardized PTSD instrument that maps to all three DSM-IV symptom clusters (i.e., re-experiencing, avoidance and arousal).

METHODS

Participants and Procedures

Potential study participants were identified through the Duke University and University of North Carolina Lineberger Tumor Registry databases following Institutional Review Board and physician approvals. Eligible individuals were those diagnosed with adult non-Hodgkin lymphoma (19 years old at diagnosis) and at least 2 years post-diagnosis. Prospective subjects were mailed a consent form, a letter of introduction from their oncologist, a self-administered questionnaire, and a $2 bill incentive. Replacement mailings and telephone confirmation of the receipt of the mailed package were made to non-respondents.

Measures

Demographic and Clinical Characteristics—Clinical characteristics such as histology and the date of and stage at diagnosis were obtained from the Tumor Registry databases. Histology was categorized as indolent or aggressive based on the updated Revised European American Lymphoma/World Health Organization (REAL/WHO) classification system [21]. All other data were self-report, including demographic information (i.e., gender, race, income, education, age), treatment status, and health using the 12-item self-report version of the Charlson Index (Self-administered Co-morbidity Questionnaire) [22].

Psychosocial Status—The perceived availability of social support was measured with the 20-item Medical Outcomes Study-Social Support Survey [23]. Scores ranged from 20–100 (with higher scores indicating more support) and α=.97 in this study. The six-item Appraisal of Life Threat and Treatment Intensity Questionnaire (ALTTIQ; α=.80) was used to measure the extent to which cancer and its treatment are perceived to be life-threatening and intense [24].

Posttraumatic Outcomes—The PTSD Checklist (PCL-C) [25] was used to assess symptomatology; it includes a self-report symptom checklist that closely mirrors criteria set forth by the DSM-IV for a formal diagnosis of PTSD [26]. PCL-C instructions were modified to elicit responses from survivors with respect to their diagnosis and treatment for lymphoma. Two approaches were used to construct an aggregate score in assessing symptoms: 1) the continuous score (range, 17–85); and 2) the DSM-IV PTSD symptom cluster method (i.e., at least moderately bothered by ≥1 re-experiencing symptom, ≥3

avoidance symptoms, or ≥2 arousal symptoms. The total score yielded an α=.91; the internal consistency of the subscales were as follows: re-experiencing (α=.88); avoidance (α=.82), and arousal (α=.78). The 21-item Posttraumatic Growth Inventory [3] was used to measure positive life changes as a result of having lymphoma. Reliability of the total scale was α=.96; internal consistency of the five subscales were as follows: relating to others (α=.92); new possibilities (α=.88); personal strength (α=.86); spiritual change (α=.89); and appreciation of life (α=.80).

Statistical Analyses

Descriptive statistics were employed to summarize demographics, clinical characteristics, psychosocial status, and PTS and PTG outcomes. Pearson product moment correlations were used to explore the bivariate association between PCL-C (PTS) and PTGI (PTG) total scores and subscales. A cross tabulation of PTGI total score and PCL-C symptom cluster score was performed with administration of a chi-square test. Each subject's PTGI total score was plotted against each PCL-C subscale and total score; the estimated coefficients, the corresponding standard errors and p-values, and the model's R-square were calculated.

A series of linear regression models were used to identify independent associations with PTG. Bivariate associations between the demographic, clinical, and psychosocial variables and PTGI were tested. Independent variables that were at least marginally significant ($p < 0.10$) were included in the multiple linear regression that controlled for PCL-C. The estimated coefficients, the corresponding standard errors, p-values, and model-adjusted R-square were reported. Descriptive, bivariate and multivariate regression data analyses were performed using SAS Version 9.2. Scatterplots and curve fit statistics were generated using SPSS Version 20.

RESULTS

Sample Characteristics

Surveys were mailed to 1312 eligible survivors; 117 survey packages were returned undelivered. Among the survivors who were assumed to receive a survey, 886 participated and returned their surveys, representing a response rate of 74%. Non-responders included those who did not respond to the mailing and those who declined to participate.

Table 1 summarizes the sample characteristics. A similar number of female and male survivors participated and the sample was predominately Caucasian (85%). Participants' mean age and years since diagnosis (SD) at survey completion was 62.9 (13.4) and 10.2 (7.1), respectively. Most (58%) of the sample were diagnosed at stage >1 and half (50%) had an indolent type of lymphoma. A small percentage (13%) of participants was currently receiving treatment. A majority of participants (78%) reported having received chemotherapy in the past, whereas a minority (15%) had received a bone marrow or stem cell transplant. The average PCL-C score was 27 (9.9) in a range of 17–85 where higher scores indicate more stress, and scores for all subscales were lower than the midpoint of the range. Using the symptom cluster scoring method, 7% of our sample met the criteria for full PTSD; and an additional 9% met criteria for partial PTSD. The average PTGI score was

60.5 (24.7) in a range of 0–105, where higher scores indicate more growth, and scores for all subscales were at or above the midpoint of the range.

Relationship between Posttraumatic Stress and Posttraumatic Growth

Bivariate associations between PCL-C and PTGI subscale and total scores are shown in Table 2. The PCL-C Total score was not associated with the PTGI Total score; its only association was a modest one with greater Appreciation of Life (r=.09, p<.05). The PCL-C Re-experiencing subscale had the strongest (yet still modest) associations with the PTGI, including a greater Total score (r=.10) and less New Possibilities (r=−.11), greater Spiritual Change (r=.11), and greater Appreciation of Life subscales (r=.16; all at p<.01). The PCL-C Avoidance subscale was associated with less Relating to Others (r=−.09) and less Personal Strength (r=−.08; both at p<.05). The PCL-C Arousal subscale was associated only with greater Appreciation of Life (r=.08; p<.05).

Results from the cross tabulation between PTGI and PTS (Table 3) were non-significant (p=.11). Regressions were conducted to fit a linear and quadratic model for each pair of independent and dependent variables. As shown in Table 4, no statistically significant **associations** between PTS and the PTG total score was observed in either the linear or quadratic models, with the exception of the PCL-C Re-experiencing subscale (p<.01 linear, p<.05 quadratic). However, for these latter two models the R-squared statistic was small (.01 and .02), indicating that the PCL-C variables explained relatively little of the variance associated with PTGI.

Other Associations with Posttraumatic Growth

Table 5 displays the results of: 1) bivariate **associations** between the independent variables and posttraumatic growth; and 2) linear regression and the contribution of demographic, clinical and psychosocial variables to explain the variance in PTGI Total scores while controlling for PCL-C. In bivariate analyses, all variables tested were associated with PTGI Total score except for PCL-C, having received a transplant, and the comorbidity score. The following demographic variables were independently associated with greater PTGI while controlling for PCL-C: female gender, non-Caucasian race, having less than a college degree, and younger age (all p<.05). Stage >1 at diagnosis was the only clinical variable independently associated with greater PTGI (p<.001). Both psychosocial variables, Social support and ALTTIQ, were independently associated with greater PTGI (both at p<.001). The independent variables explained 20% of the variance associated with PTGI.

DISCUSSION

In this study of PTS and PTG among survivors of adult lymphoma, we found that there was no significant association between the PTGI total score and PCL-C symptom score. In addition, there were no significant linear associations between the two variables in the linear and quadratic models except for the PCL-C Re-experiencing subscale. These findings of no association between PTGI and PCL-C Avoidance and Arousal subscales and the Total Score are consistent with those found in breast cancer studies [8–10] but inconsistent with a meta-analytic review of benefit finding and growth from studies conducted among various trauma

samples [14]. The conceptual placement of PTG and PTS on two ends of a continuum is not supported in our sample of cancer survivors (i.e., absence of a linear association); therefore, they represent two virtually distinct constructs.

The curvilinear association found between PTGI and the PCL-C Re-experiencing domain is consistent with findings from another breast cancer sample that examined benefit finding and thought intrusion [27] but differs from our findings related to the other PCL-C subscales. However, our finding is muted given the low proportion of the variance explained by this model (i.e., R-square <2%). Therefore, there is only slight evidence within these data to suggest that the amount of growth that an individual experiences increases as one's symptoms of re-experiencing (e.g., nightmares) rise but only up to a certain point, and then declines as the amount of distress becomes overwhelming. This finding is consistent with the conceptual model of PTG proposed by Tedeschi and Calhoun [7] in which they propose that ruminative thought is positively associated with growth (i.e., some amount of distress is needed to foster growth).

Several characteristics were identified such as male gender and less social support that could help identify survivors with low PTG. Our hypothesis was supported; in addition, higher education and Stage I variables were found to be independently associated with less PTG while controlling for PCL-C in the multiple linear regression. In addition, PTG was found to be unrelated to global quality of life in a meta-analytic review [14]; however, these authors found evidence that benefit finding or PTG was related to less depression and greater positive well-being in various trauma samples. Yet, a sizable 80% of the variance associated with PTG was unaccounted for in this analysis, suggesting that more research is needed to fully understand the correlates and predictors of cancer-related growth. For example, the quality of a marital relationship, being in contact with someone who has experienced PTG [28], and coping strategies [29–31] were found to be associated with the development of PTG following a breast cancer diagnosis.

These findings are especially useful given the large sample size, excellent response rate, and use of standardized measures. Study limitations include the representation of lymphoma survivors from two large comprehensive cancer centers in the Southeast, thereby potentially restricting the generalizability of our results to survivors living in other regions and treated at smaller hospitals. However, our demographic profile closely mirrors that of the national population of lymphoma survivors, thereby strengthening the generalizability of our findings. In addition, the cross-sectional study design prevents determination of whether PTG or certain risk factors (e.g., PTS, less social support) occurred first. However, there is certainty that the demographic factors (e.g., male gender, Caucasian race) preceded the PTG. Also, the extended length of time since diagnosis in our sample may have mitigated any findings of a PTG-PTS association. Furthermore, the 28-page survey lacked measures assessing other life traumas in an effort to minimize respondent burden. However, the PCL-C questions were modified to assess for cancer-related PTSD.

In conclusion, this manuscript contributes to the PTG literature by examining the relationships between PTG and PTS among a large sample of long-term lymphoma survivors. Only a small curvilinear relation between the PCL-C Re-experiencing domain and

PTG was identified and the remaining PCL-C domains were found to be unrelated to PTG. Importantly, these findings support the need to focus on the treatment for cancer-related PTS even if it has the beneficial 'side effect' of some PTG. Clinicians are advised to be attentive to psychosocial needs throughout the post-cancer diagnosis adjustment period by screening for PTS symptomatology and recognizing that exhibiting high growth is independent of distress (i.e., survivors who report growth may also be highly distressed). Future work should continue to search for individual characteristics that can explain PTG outcomes following diagnosis and treatment for cancer (in addition to breast and lymphoma), cross-sectionally and longitudinally.

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Table 1

Characteristics of the study sample (N=886)

	Number or Mean	Percent or SD
Demographic characteristics		
Gender		
Female	451	51
Male	435	49
Race		
White	757	85
Black	91	10
Other	38	5
Income		
<$30,000	225	26
$30,000 – $59,999	239	27
$60,000 – $89,999	139	16
≥ $90,000	189	21
Missing	99	10
Education		
Less than 12 grade	96	11
High school/GED	154	17
Training after high school	89	10
Some college	188	21
College graduate	199	23
Post-college graduate	138	16
Missing	22	2
Mean age (SD) at study	62.9	13.4
Clinical characteristics		
Mean years (SD) since diagnosis	10.2	7.1
Stage at diagnosis of NHL		
Stage 1	247	28
Stage 2	159	18
Stage 3	146	16
Stage 4	214	24
Missing	120	14
Histology of NHL		
Indolent	445	50
Aggressive	391	44
Missing	50	6
Was currently receiving treatment		
No	752	85
Yes	117	13
Missing	17	2

	Number or Mean	Percent or SD
Had received chemotherapy		
No	194	22
Yes	692	78
Had received a transplant[1]		
No	754	85
Yes	132	15
Mean (SD) co-morbidity score[2]	6	5
Psychosocial status scores		
Social support[3]	83.1	16.4
ALTTIQ[4]	19.3	6.0
Posttraumatic stress (PCL-C)		
PCL-C total score[5]	27.0	9.9
Re-experiencing[6]	6.9	3.1
Avoidance/numbing[7]	10.8	4.4
Arousal[8]	9.3	3.8
Posttraumatic stress symptoms (PCL-C)		
PCL-C symptoms[9]		
No symptoms	532	60
One symptom	193	22
Two symptoms	77	9
Three symptoms	66	7
Missing	18	2
Posttraumatic growth index (PTGI)		
PTGI total score[10]	60.5	24.7
Relating to others[11]	21.8	8.7
New possibilities[12]	11.0	6.4
Personal strength[13]	11.9	5.2
Spiritual change[14]	6.2	3.4
Appreciation of life[15]	9.7	3.8

[1] Bone marrow Aggressive or stem cell transplant

[2] Self-administered Missing Co-morbidity Questionnaire; possible range, 0–45; higher scores indicate more comorbidities

[3] Medical Outcomes Study Social Support total score; possible range, 0–100; higher scores indicate more support

[4] Appraisal of Life Threat and Treatment Intensity Questionnaire; possible range, 0 – 35; higher scores indicate more negative No appraisals (lower quality of life)

[5] PTSD Checklist Yes total score; possible range, 17–85; higher scores indicate more symptoms (lower quality of life)

[6] Re-experiencing Missing score; possible range 5 – 25; higher scores indicate more symptoms

[7] Avoidance/numbing score; possible range 7 – 35; higher scores indicate more symptoms

[8] Arousal score; possible range 5 – 25; higher scores indicate more symptoms

[9] PTSD Checklist symptom score; Symptomatology is indicated by score ≥3 in one or more re-experiencing items, three or more avoidance items, or two or more arousal items; more symptoms indicate lower quality of life; Three symptoms are indicative of PTSD

[10] Posttraumatic growth inventory (PTGI); possible range 0 – 105; higher scores indicate more posttraumatic growth.

[11] PTGI Factor Yes 1: Relating to others; possible range 0 – 35

[12] PTGI Factor 2: New possibilities; possible range 0 – 25

[13] PTGI Factor 3: Personal strength; possible range 0 – 20

[14] PTGI Factor 4: Spiritual Change; possible range 0 – 10

[15] PTGI Factor 5: Appreciation of Life; possible range 0 – 15

Table 2

Correlations between posttraumatic growth and posttraumatic stress

	PCL-C Scale			
PTGI Scale	**Total Score**	**Re-experiencing**	**Avoidance**	**Arousal**
Total score	.03	.10**	−.06	.05
Relating to others	−.01	.05	−.09*	.02
New possibilities	.04	−.11**	−.03	.05
Personal strength	−.01	.06	−.08*	.04
Spiritual change	.04	.11**	−.04	.06
Appreciation of life	.09*	.16***	.02	.07*

* p<.05;

** p<.01

*** p<.001

Abbreviations: PTGI, Posttraumatic Growth Inventory; PCL-C, Posttraumatic Stress Disorder Checklist – Civilian Version

Table 3

Cross tabulation of PTGI Total Score with PCL-C Cluster Score (n=855)

	PCL-C Symptom Clusters				
PTGI Score	**0**	**1**	**2**	**3**	**TOTAL**
Low	168	41	21	18	248
Medium	175	83	27	27	312
High	178	69	28	20	295
TOTAL	521	193	76	65	855

Table 4

Curve fit between posttraumatic stress and posttraumatic growth (n=855)

	Linear Model Response: PTGI total score			Quadratic Model Response: PTGI total Score		
PCL-C Scale	**β**	**SE**	**P-value**	**β**	**SE**	**P-value**
Total score	.06	.09	.467	.61	.38	.104
(Total score)^2				−.01	.01	.133
R-square		.001			.003	
Re-experiencing	.79	.27	.004	3.62	1.15	.002
(Re-experiencing)^2				−.13	.05	.011
R-square		.010			.017	
Avoidance	−.33	0.19	.091	0.76	.86	.378
(Avoidance)^2				−.04	.03	.196
R-square		.003			.005	
Arousal	.32	.22	.153	.75	.97	.441
(Arousal)^2				−.02	.04	.647
R-square		.002			.003	

Abbreviations: PTGI, Posttraumatic Growth Inventory; PCL-C, Posttraumatic Stress Disorder Checklist – Civilian Version

Table 5

Multiple linear regression to identify associations with posttraumatic growth

	PTGI adjusted for PCL-C					
	Bivariate association (n=886)			Multivariate association (n=762)		
Characteristic	**Coefficient, β**	**SE**	***P***	**Coefficient, β**	**SE**	***P***
PCL-C	0.06	0.09	.467	−0.06	0.10	.535
Demographic characteristics						
Female gender	6.27	1.67	<.001	6.74	1.63	<.001
Non-Caucasian race	11.55	2.38	<.001	10.55	2.50	<.001
Income < $30,000	4.63	1.93	.016	1.96	2.04	.338
Less than college degree	7.19	1.70	<.001	5.56	1.76	.002
Age at study enrollment	−0.15	0.06	.019	−0.14	0.07	.031
Clinical characteristics						
Years since diagnosis	0.23	0.12	.046	0.12	0.12	.312
Stage >1 at diagnosis	8.42	1.69	<.001	6.56	1.75	<.001
Aggressive lymphoma type	4.74	1.73	.006	1.64	1.75	.350
Not currently receiving treatment	7.12	2.50	.004	5.84	2.42	.016
Ever received chemotherapy	9.07	2.04	<.001	0.56	2.27	.805
Ever received a transplant	4.32	2.33	.064	−1.58	2.42	.515
Co-morbidity score[1]	0.03	0.17	.878	0.11	0.18	.564
Psychosocial status						
Social Support[2]	0.32	0.05	<.001	0.35	0.05	<.001
ALTTIQ[3]	1.10	0.14	<.001	0.83	0.16	<.001
Model-adjusted R^2		N/A			0.20	

[1] Self-administered Co-morbidity Questionnaire; possible range, 0–45; higher scores indicate more comorbidities.

[2] Medical Outcomes Study Social Support total score; possible range, 0–100; higher scores indicate higher support.

[3] Appraisal of Life Threat and Treatment Intensity total score; possible range, 0–35; higher scores indicate more negative appraisals.