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Posttraumatic Growth, Social Support and Social Constraint in Hematopoietic Stem Cell Transplant Survivors

Maria Nenova, M.A.[1,2], **Katherine DuHamel, Ph.D.**[2,3], **Vance Zemon, Ph.D.**[1], **Christine Rini, Ph.D.**[3,4], and **William H. Redd, Ph.D.**[3]

[1]Ferkauf Graduate School of Psychology, Yeshiva University

[2]Memorial Sloan-Kettering Cancer Center

[3]Mount Sinai School of Medicine

[4]University of North Carolina at Chapel Hill

Abstract

Objective—The relation between posttraumatic growth (PTG) and aspects of the social context, such as social support and social constraint, continues to be unclear in cancer survivors. Social-cognitive processing theory is a useful framework for examining the effect of the social context on PTG. In theory, support interactions may either facilitate or hinder cognitive processing and thus lead to different PTG outcomes. The current study tested the hypothesis that emotional support and instrumental support would each explain a unique amount of the variance in PTG in distressed hematopoietic stem cell transplant (HSCT) survivors. Additionally, it was predicted that social constraint on cancer-related disclosure would be negatively with PTG.

Methods—Forty-nine distressed HSCT survivors with a spouse or partner completed the posttraumatic growth inventory (PTGI) and measures of social support received from their spouse/partner and social constraint from people close to them as part of a larger clinical trial.

Results—Both emotional and instrumental social support were positively correlated with PTG and social constraint on disclosure was not associated with PTG. Contrary to hypotheses, instrumental support was the only unique social contextual predictor of PTG. Conclusions: The results of this study highlighted the importance of examining the effects of subtypes of social support on PTG separately. Findings are discussed in the context of the cognitive (i.e. processing of the traumatic event) versus non-cognitive (i.e. buffering stress) pathways between the social context and PTG. Future research directions are presented.

Keywords

cancer; oncology; posttraumatic growth; social support; social constraint

Introduction

Receiving a hematopoietic stem cell transplant (HSCT) can be a distressing experience for cancer patients, as it involves aggressive treatment regimens with unpleasant side effects and a high risk of complications [1]. HSCT survivors report a range of negative physical and psychosocial sequelae, which may disrupt normal role functioning and reduce quality of life.

Please send all correspondence to: Maria Nenova C/O Katherine DuHamel, Memorial Sloan-Kettering Cancer Center, Department of Psychiatry and Behavioral Sciences, 641 Lexington Avenue, 7th Floor, New York, NY 10022, Phone: (212) 888-0032, nenovam@mskcc.org.

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Individuals receiving HSCT can experience depressive and anxiety symptoms (5–40%) and, in some cases, posttraumatic stress symptoms (5–19%) [2]. In addition to the documented rates of distress in this population, a growing body of research has focused on examining the positive sequelae of undergoing HSCT, such as posttraumatic growth (PTG), broadly defined as "positive psychological change experienced as a result of the struggle with highly challenging life circumstances" (p. 1) [3]. Previous studies with HSCT survivors have found moderate levels of PTG persisting for years post-treatment [4, 5].

One line of research that continues to produce mixed findings in the PTG and cancer literature is the association between social support and PTG. Some studies show a significant association between social support and growth [6, 7] and others show no relation [4, 8–10]. Prior studies have rarely examined the effect of different types of social support on PTG separately and have instead relied on global measures of support, which may be one of the reasons for the mixed findings in this area. Two functional subtypes of support commonly distinguished in the literature are emotional and instrumental support. Emotional support refers to the provision of love, comfort, caring and affection, and an "empathic ear," whereas instrumental support consists of tangible services and goods, such as help with household chores, transportation or financial matters [11]. Although these subtypes of support are often correlated, they are conceptually and empirically distinct constructs [12]. Examining the effects of these types of social support on PTG in the context of existing theoretical models is a valuable next step in the literature.

Indeed, emotional and instrumental support may vary in how they facilitate cognitive and emotional processes theorized to lead to PTG. Current PTG theories emphasize the importance of cognitive processing in producing growth after trauma. It is theorized that following a traumatic event, the individual undergoes a period of emotional and cognitive processing in an attempt to find meaning and to re-build or modify preexisting mental models about the self, world, and others, and that it is during this period that growth begins to take place [3, 13–15]. According to Lepore's [16] social-cognitive processing model of adjustment to cancer, social interactions play a significant role in facilitating or hindering cognitive adaptation processes. Specific behaviors inherent in supportive social interactions, including empathic listening, validation, and encouragement of acceptance may increase an individual's ability to cognitively process a traumatic experience, and thus promote better adjustment and possibly PTG. In research, such behaviors can be assessed with measures of emotional support, albeit sometimes indirectly. A recent longitudinal study by Schroevers and colleagues [7] found that received emotional support was predictive of PTG, whereas emotional support satisfaction and perception did not show an association with growth. These findings were in line with the social-cognitive processing theory of PTG, because only individuals who reported actually receiving emotional support in the months following diagnosis, and who therefore arguably had the most opportunity to disclose and process their experience, reported the highest levels of growth eight years post-diagnosis. Another study that focused on received emotional support also found a significant association with benefit finding in cancer patients [17]. However, neither of these studies included a measure of other functional types of support for comparison, such as instrumental support, and it is still unclear whether the effects of received emotional support on PTG are unique or more powerful than those of other types of supportive interactions. Additionally, studies have not examined the association between subtypes of social support and the different domains of growth.

Independent of the provision of positive support, close others can also be a source of negative and constraining interactions that may pose barriers to cognitive processing. Social constraints are defined as both "objective social conditions and individuals' construal of those conditions that lead individuals to refrain from or modify their disclosure of stress-

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and trauma-related thoughts, feelings, or concerns" (p. 315) [18]. For example, when others criticize, minimize or avoid a particular topic, survivors may feel constrained and respond by withdrawing and avoiding talking about cancer, which may in turn affect their ability to achieve PTG by gaining new information and perspectives through unconstrained social interactions.

Only one published study to date has examined the association between social constraint and growth in a cancer population. Cordova and colleagues [19] found that social constraint did not predict PTG in a cross-sectional study of 65 early-stage breast cancer patients. However, because their sample consisted of mostly low-distress women with breast cancer, it is not known whether their results would generalize to a sample of distressed men and women in a relationship who survived HSCT, the targeted population of the current study.

Study Hypotheses

The present study examined the effects of received emotional and instrumental support from a partner on PTG in distressed HSCT survivors, guided by the social-cognitive processing theory of adjustment and PTG after cancer [16]. Because emotionally supportive interactions (e.g., listening, demonstrating caring) would appear to provide more opportunities for cancer-related disclosure than instrumental supports (e.g., help with chores or financial matters), emotional support should facilitate cognitive processes required for PTG to a greater extent than instrumental support. Therefore, the current study hypothesized that emotional support would be a unique predictor of overall PTG in HSCT survivors above and beyond any effect of instrumental support. It was also hypothesized that social constraint from close others would be negatively correlated with PTG, explaining a unique amount of the variance in growth. In addition, exploratory analyses were conducted to examine the relation between social support and the five different domains of growth.

Methods

Participants

The current study used baseline data from HSCT survivors who participated in a randomized clinical trial of a cognitive-behavioral intervention for cancer-related posttraumatic stress symptoms and were married or in a relationship [20]. Out of 89 participants enrolled in the clinical trial, 49 had complete data on the variables measured in the current study. For inclusion in the larger study, the participants had to be between 12 and 36 months post-HSCT, fluent in English, and at least 18 years of age. As previously reported [20], the participants had to show significant distress as indicated by one of the following: a probable posttraumatic stress disorder (PTSD) diagnosis on the PTSD Checklist-Civilian Version (PCL-C) [21] by using the three- or four-symptom cluster criteria [21, 22]; scores of one or more standard deviations greater than the PCL-C mean; or scores exceeding the clinical cutoff on any two subscales of the Brief Symptom Inventory (BSI) or the BSI General Severity Index (BSI-GSI) [23] and scores exceeding the clinical cutoff for at least one PTSD symptom cluster on the PCL-C (using either the three- or four-symptom cluster method).

Procedures

Participants were recruited from one of three major medical centers in New York and New Jersey: Mount Sinai Medical Center, Memorial Sloan-Kettering Cancer Center, and Hackensack University Medical Center. Institutional Review Board (IRB) approval for the larger study was obtained at each recruitment site. In addition, the current study was approved by the Committee on Clinical Investigations of the Albert Einstein College of Medicine at Yeshiva University. Data relevant to the current study were collected through

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mail-in questionnaires or telephone interviews. Please refer to the report of the clinical trial for detailed study procedures [20].

Measures

Sociodemographic and Clinical Characteristics: Data on common sociodemographic characteristics were obtained using self-report questionnaires. Medical chart reviews provided clinical characteristics of the sample, including transplant type (autologous vs. allogeneic) and time since HSCT.

Functional Status

The Karnofsky Performance Status – Self-Report (KPS-SR) was used as a measure of patient-reported functional status at the time of assessment [24]. This version of the scale ranges from 100% (able to carry normal activity with no physical complaints) to 30% (severelydisabled with hospitalization and continuous nursing care required). A score of 70% (unable to carry on normal activity but able to care for self) indicates clinically significant functional impairment.

Posttraumatic Growth: PTG was assessed with the 21-item Posttraumatic Growth Inventory (PTGI) [25], which measures positive changes after a specified trauma on a 6-point Likert scale from 0 (I did not experience this change as a result of my cancer diagnosis and transplant) to 5 (I experienced this change to a very great degree) in five different domains. In the current study, Cronbach's α for the total score was .94. Cronbach α for the five subscales was as follows: Relating to Others .84, New possibilities .86, Personal Strength . 70, Spiritual Change .68, and Appreciation of Life .82.

Social Support

Social support was measured using the Emotional and Instrumental Support subscale of the Partner Responses to Cancer Inventory (PRCI) [26]. This scale consists of eight items and measures received support interactions from a partner. The anchor and a sample item are as follows: "During the past month, when dealing with my illness and the transplant, my partner… asked me how I was feeling." Items are rated on a scale from 1 (never responds this way) to 4 (often responds this way). The eight items were used to create two separate scales based on a principal component analysis (PCA, see Results) that yielded two components that matched the categorization of the emotional and instrumental items provided by Manne and colleagues in their original validation study [26]. One component was composed of four emotional support items (α = .77), and the other of three instrumental support items (α = .69, after dropping one item that did not clearly load on either component).

Social Constraint

Social constraint was measured with an adapted version of the Social Constraints Scale (SCS) [27]. In the current study, the participants indicated how often in the past month their attempts at illness and transplant-related disclosure were met with socially constraining responses from other people, rated from 1 (never) to 4 (often). Five of the original 15 items were removed during the design of the parent study to reduce participant burden and because they were judged to be highly similar to the remaining items. Cronbach's α for the ten items was .80 in the current sample.

Distress

Distress was measured as part of the eligibility criteria for the parent study and is reported in the current study to characterize the sample with regards to emotional functioning. General

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distress and cancer-related PTSD symptoms were measured using the 53-item Brief Symptom Inventory – Global Severity Index (BSI-GSI) [23] and the 17-item PTSD Checklist-Civilian Version (PCL-C) [21], respectively. Cronbach α in the current study was .94 for the BSI-GSI and .73 for the total PCL-C score.

Statistical Analyses

Analyses were conducted using the Statistical Package for the Social Sciences (version 19.0). The frequency distributions of all variables were examined for outliers and for meeting assumptions for parametric tests. Variables that were found to differ significantly from normality were transformed using appropriate non-linear functions. Missing data analyses were performed comparing means and proportions of demographic, clinical and distress characteristics between completers for this study (i.e., participants with data on all social context and growth measures) and non-completers (i.e., participants missing data on one or more measures) using t or χ^2 tests. Bivariate correlations were computed among all demographic, medical, distress and study variables using two-tailed Pearson product-moment correlations. A hierarchical linear regression was used to test the main study hypotheses.

Results

Participant Characteristics

Sociodemographic, clinical and distress characteristics for the 49 participants are presented in Table 1. Functional status ranged from normal to requiring occasional assistance, as demonstrated by KPS scores ranging from 100 to 60. The majority of participants (79%) reported a KPS functional status of 80 or greater, indicating that as a whole the group was functioning normally. Twenty-one percent of participants reported being significantly impaired and unable to carry on with normal activity (scores of 60 or 70). As expected given the parent study eligibility criteria, a large minority of participants (n = 17, 35%) reported clinically significant posttraumatic stress symptoms. Five participants (10%) exceeded the clinical cutoff of 50 on the PCL-C [21] (four of these overlapped with the 16 who met the three- or four-symptom cluster criteria for PTSD). Ten participants (20%) likely met criteria for a PTSD diagnosis based on the three or four-symptom cluster method [21, 22], and another six (13%) likely met PTSD criteria using the three-symptom cluster method only. Missing data analyses revealed that non-completers (n = 30) were, on average, further away in time from their transplant (M = 25.74 months, SD = 6.98) than completers (n = 43, M = 21.16, SD = 6.78), $t(60) = -2.427$, $p < .05$. In addition, non-completers (n = 40) had significantly higher BSI-GSI scores (M = 57.3, SD = 27.29) than completers (n = 49, M = 46.69, SD = 18.26), $t(87) = -2.187$, $p < .05$. There were no differences between the groups in age, gender, level of education, annual income, type of transplant, posttraumatic stress symptoms or social constraint. Because non-completers were mostly missing social support data, the difference between groups on social support measures could not be evaluated.

Principal Component Analysis (PCA) of Social Support Items

PCA was performed (N = 49) on the eight emotional and instrumental support items from the PRCI [26]. Based on the number of eigenvalues greater than one and examination of the scree plot, the analysis yielded two components that explained 62% of the total variance. A moderate correlation between the components (r = .413) was obtained following an oblique (promax) rotation. Four items loaded onto an “emotional support” component (“Joked or tried to cheer me up,” .762; “Let me know that they would always be around if I needed assistance,” .827; “Asked me how I was feeling,” .819; “Comforted me by showing me some physical affection,” .778), and three items loaded onto an “instrumental support” component (“Handled or cleared up money matters,” .706; “Pitched in to do something that

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needed to be done," .870; "Did household chores or errands I found difficult to do," .914). One item was excluded from the final subscales ("Provided me with transportation") because it did not clearly load on either component.

Characteristics of Posttraumatic Growth and Social Context Variables

The frequency distribution of PTGI scores was approximately normal with a mean total score of 62.22 (SD = 21.06, range 9–105), which indicates a moderate level of growth. These levels of PTG are consistent with previous research with HSCT survivors [4, 5]. In contrast, the distributions of both emotional and instrumental support scores were significantly different from normal. Skewness and kurtosis were −1.31 (SE = 0.34) and 1.67 (SE = 0.67), respectively, for emotional support and −1.07 (SE = 0.34) and 0.74 (SE = 0.67) for instrumental support. Thus, the social support frequency distributions were negatively skewed, indicating that most participants were receiving moderate to high levels of emotional and instrumental support. In order to meet assumptions for parametric tests, a square root transformation was applied to the reflected emotional and instrumental support subscale scores. In contrast to social support, social constraint scores were normally distributed (M = 22.53, SD = 5.79) and indicated that on average participants felt "rarely" to "sometimes" constrained when attempting to disclose cancer-related concerns to others. Ceiling effects on measures of positive support are a common finding in the literature, while negative social interactions tend to display greater variability [28].

Relations between PTG and demographic/clinical characteristics

Contrary to what studies have generally shown, age and time since transplant were not correlated with PTG (ps >.10). An unexpected relation emerged between type of transplant and PTG (r = .362, p = .011), such that patients who received an allogeneic transplant reported more growth than those who received an autologous transplant. Additionally, correlations revealed that patients receiving an allogeneic transplant tended to be younger (r = .400, p = .004) and reported more emotional support (r = .313, p = .029). Other sociodemographic characteristics (i.e., gender and annual income) were not correlated with PTG (ps >.10).

Relations between PTG, Social Context and Distress Variables

Correlations among the main study variables are reported in Table 2. As hypothesized, both emotional support (r = .301, p = .034) and instrumental support (r = .353, p = .013) were positively correlated with total PTGI scores. When looking at the PTGI subscales, emotional support was significantly correlated with Relating to Others only (r = .308, p = .032), whereas instrumental support correlated with both Relating to Others (r = .330, p = .020) and Personal Strength (r = .313, p = .028). Contrary to the hypothesis, social constraint scores were not associated with PTG (r = − .122, p = .405). However, social constraint was related to PTSD symptoms (r = .349, p = .014) and general distress (r = .448, p = .001). No other significant correlations were observed among social support, social constraint and distress variables.

Multiple Regression Analyses of Social Context Predictors of PTG

Because type of transplant correlated with PTG it was controlled in the analysis by entering it in the first step of the model. Instrumental support, emotional support and social constraint were entered in consecutive steps in order to determine the unique explanatory power in PTG variance of each social context predictor. Instrumental support was entered first and it was expected that emotional support would explain an additional significant portion of the variance in PTG when entered second. The results indicated that type of transplant, instrumental support, emotional support and social constraint together explained 25% of the

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variance in PTG (F[4,44] = 4.56, p = .007). Regression coefficients are reported in Table 3. After entering all social context variables, transplant type yielded only a trend (β = .26, p = .074). Contrary to expectations, instrumental support was the only unique social context predictor of PTG, explaining 9% of the variance in PTG (β = .29, p = .047). Five exploratory regression analyses using the PTGI subscales as outcomes and the same predictors indicated above produced non-significant regression coefficients (not shown in table) after adjusting the p-value to .01 (ps > .05), to account for multiple comparisons.

Discussion

The main objective of the present study was to examine the associations between social contextual variables – received emotional and instrumental support from a partner and social constraint on cancer-related disclosure – and PTG. This question was investigated in distressed HSCT survivors who are married or who have a main romantic partner. Contrary to the main hypothesis that emotional support from a partner would have a unique association with PTG, in addition to any association between instrumental support and PTG, it was found that instrumental support, including help with chores and financial matters, was the only unique social contextual predictor of PTG. Though unexpected, this finding can help narrow the pathways through which survivors' social context promotes PTG, guiding future research on this topic. This study did not find an association between the extent to which participants felt constrained by others in their cancer-related disclosure attempts and the degree of growth they reported.

Interestingly, a study of Malaysian patients with mixed cancers by Schroevers and Teo [29] also found that, although coping through seeking both emotional and instrumental support was positively correlated with PTG, only instrumental support coping predicted growth. How can these unexpected findings be explained? The main hypotheses of the current study were guided by the social-cognitive processing theory. This theory has had a prominent place in the PTG literature and emphasizes the indirect pathways from the social context to PTG through cognitive adaptation processes (e.g., lowering of intrusions and repetitive search for meaning) [16]. Those processes most clearly implicate emotional social support and the benefits that occur when people close to cancer survivors listen to and understand their problems in a way that demonstrates caring and closeness.

However, in an expanded social-processing model of positive life changes in the context of illness, Lepore and Kernan [30] argued that the social context may also exert direct effects on non-cognitive factors important for PTG. For example, supportive interactions may directly mitigate stressors, increase self-efficacy and create a sense of belonging and safety [30]. Applying this expanded framework to the current findings, it is possible that for people who are sick or emotionally vulnerable, having a significant other who takes care of chores, errands and other practical matter – as indicated by instrumental support – can buffer the deleterious effects of stressors. This in turn may manifest as growth in the patient, such as an increased sense of personal strength.

Furthermore, we note that HSCT survivors in the current sample were emotionally distressed and a significant minority reported some functional impairment and/or bothersome physical symptoms. Taken together, these impairments may make them particularly likely to have benefitted from instrumental assistance from their partner. Bivariate correlations in the current study demonstrated that an aspect of PTG indicating growth in personal strength was correlated with instrumental support but unrelated to emotional support. Although preliminary, this finding bolsters the interpretation that high levels of instrumental support may directly imbue a sense of personal strength by preserving

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survivors' psychological and physical resources and buffering them from feeling overwhelmed by the many demands of coping with illness and daily life.

Additionally, emotionally supportive behavior expressed in words, such as simply asking how one is feeling, may at times be experienced by survivors as less of a testament of the love or kindness of others than actual acts of care, such as expending extra effort to help in more tangible ways. It is plausible that a partner who takes on additional burdens in times of need is perceived as kind, loving and generous, thereby engendering a sense of closeness and appreciation of others, another domain of PTG. In fact, the current study revealed a correlation between instrumental support and the PTGI factor indicating growth in relating to others, supporting the view that instrumentally supportive behaviors can bring people closer. This view is also supported by a unique qualitative study by Semmer and colleagues [31], which found that hospital patients frequently ascribed emotional meaning to instrumental behaviors when explaining why support behaviors were helpful.

The findings of the present study should not be interpreted to mean that social-cognitive processes are not important for PTG to occur. In fact, it is possible that individuals receiving more instrumental support are able to engage in cognitive processing more frequently due to having more time and psychological resources available. Further, emotionally supportive behaviors that are more cognitive in nature, such as helping one problem-solve and clarify one's situation may be more conducive to cognitive processing than affective components of support, and therefore would be a stronger predictor of PTG. Affective components of support, such as the ones measured in the current study (i.e., asking how one is feeling, providing comfort through physical affection, trying to cheer the person up and offering reassurance that one would be around when helps is needed) may not be sufficient for cognitive processing or PTG to take place. Therefore, to better understand which components of supportive interactions are most important after a traumatic event, future research should compare the effect of different components of emotionally supportive interactions, including problem-solving, appraisal and affection on PTG in cancer patients, as well as the specific mechanisms that lead from emotional and instrumental support to growth (e.g., increased cognitive processing, increased self-efficacy, reduced stress, etc.).

The current study did not find evidence that social constraint on disclosure is associated with PTG. However, social constraint scores did correlate with distress. These results parallel those of a previous study with early-stage breast cancer patients by Cordova and colleagues, who found that although social constraint predicted more posttraumatic stress symptoms, it had no effect on PTG [19]. The authors concluded that negative social interactions may be less relevant to positive outcomes than are positive social interactions. Although this may be true, it would be premature to discontinue investigations of the relation between social constraint and PTG because the roles of the social context and cognitive processing in facilitating PTG are just beginning to be explored. It is plausible that socially constraining interactions moderate the relation between PTG and other social context, cognitive processing or dispositional variables. For instance, some studies have demonstrated an interaction effect between social constraint and cancer-related intrusions on emotional adjustment to cancer, such that high levels of intrusions were related to negative affect only in individuals high on constraints [16]. As more empirical evidence is gathered about the cognitive and emotional processes important for PTG and the relative contribution of the indirect versus direct effects of social context towards growth, new hypotheses about the association between social constraint and PTG will be generated.

Limitations

Several limitations of the study merit consideration. First, the relatively small sample size prevented certain analyses, such as a full examination of the effect of social support on the

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different domains of PTG using multiple regression or exploratory analyses examining the interaction effect of social constraint and social support on growth. Second, the association between the social context and PTG was examined in a sample of individuals who are married or in a relationship and the results cannot be generalized to those who are single and rely on other members in their social network for support. Additionally, social support and constraint were assessed from different sources (partner vs. "other people"), which may or may not have affected the findings. Third, the ranges of both emotional and instrumental social support were restricted and negatively skewed, indicating that few participants were lacking in support. While distributions such as these are not uncommon in the social support literature, the findings of this study should be interpreted cautiously as future studies with populations displaying greater variability in social support may reveal a different pattern of results. Fourth, although social support and social constraint were measured using items from previously published and well-validated scales and a PCA was performed on the social support items, evidence of the reliability and validity of the modified social context measures in the current study is limited and comparison of the results obtained to other research is potentially an issue. Finally, the cross-sectional design and demographic homogeneity of the sample (i.e., mostly middle-aged, well-educated Caucasian men and women of relatively high SES) are limitations that affect the ability to make inferences about the role of instrumental support at different times after HSCT in the development of PTG and restrict generalization of the results to other ethnic groups and members of lower SES.

Conclusions

The current study showed that emotional and instrumental support vary in their ability to predict PTG in distressed HSCT survivors in the early years after treatment. The main finding of the study, that instrumental support was the only unique predictor of PTG, highlights the importance of examining the contribution of social context variables on PTG separately. These results provide preliminary evidence for the role of the non-cognitive pathways from the social context to positive changes after cancer and complement the current cognitive-processing focus in the literature. Future research should consider both the indirect and direct pathways from social support to PTG, and aim to delineate supportive and unsupportive interactions into their various components isolating specific factors and mechanisms that promote or inhibit PTG in cancer patients.

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Table 1

Sociodemographic, clinical and psychosocial characteristics of sample

Variable	N (%)	M	SD	Range
Age		49.57	10.53	29–69
Gender				
Female	26 (53)			
Male	23 (47)			
Marital status				
Married or equivalent	44 (90)			
Never Married	4 (8)			
Separated, Divorced or Widowed	1 (2)			
Ethnicity				
White	43 (88)			
Hispanic	3 (6)			
African American	1 (2)			
Other	2 (4)			
Education				
Partial HS or less	1 (2)			
Completed High School	8 (16)			
Partial College	10 (20)			
College educated	17 (35)			
Graduate Degree	13 (27)			
Estimated annual income				
< $19,000	3 (6)			
$20,000 – 39,000	1 (2)			
$40,000 – 59,000	8 (16)			
$60,000 – 80,000	6 (12)			
> $80,000	28 (57)			
Not reported	3 (6)			
Type of transplant				
Autologous	27 (55)			
Allogeneic (from donor)	22 (45)			
Time since transplant (months)[a]		21.1	6.81	13 – 38
Functional Status (KPS-SR)				
100% able to carry normal activities: no physical complaints	5 (11)			
90% able to carry on normal activities: minor physical complaints	15 (32)			
80% normal activity with effort because of physical complaints	17 (36)			
70% cares for self; unable to carry on normal activity	4 (8)			
60% occasional assistance but is able to care for most needs	6 (13)			
Missing	2			
PTGI				
Total		62.22	21.06	9 – 105

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Variable	N (%)	M	SD	Range
Relating to Others		22.21	6.99	5 – 25
New Possibilities		11.43	6.34	0 – 25
Personal Strength		12.61	4.37	0 – 20
Spiritual Change		5.84	3.29	0 – 10
Appreciation of Life		10.75	3.18	4 – 15
Social Context Variables				
Emotional Social Support		13.26	2.72	4 – 16
Instrumental Social Support		9.67	2.40	3 – 12
Social Constraint		22.53	5.79	11 – 34
PCL-C				
Total score		38.3	8.45	25 – 62
# Symptoms endorsed[b]		6.51	3.00	2 – 15
Met symptom criteria	16 (33)			
Met cut-off criteria[c]	5 (10)			
BSI-GSI		46.69	18.26	16 – 96

Note. N = 49 unless otherwise noted; KPS-SR, Karnofsky Performance Scale – Self-Report; PTGI, Posttraumatic Growth Inventory; PCL-C, Posttraumatic Stress Disorder Checklist – Civilian Version; BSI-GSI, Brief Symptom Inventory – Global Severity Index

[a] Mean calculated with N = 43

[b] endorsement, rating of ≥3 on a 5-point scale

[c] Four out of these five participants also meet symptom criteria above.

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Table 2

Intercorrelations among study variables

Variable	1	2	3	4	5
1. Emotional social support[a]	–				
2. Instrumental social support[a]	0.368**	–			
3. Social constraint	0.035	0.168	–		
4. PCL-Ctotal	−0.212	0.112	0.349*	–	
5. BSI-GSI	−0.222	0.018	0.448**	0.682**	–
6. PTGItotal	0.301*	0.353*	−0.122	−0.121	−0.150
7. PTGIrelatingtoothers	0.308*	0.330*	−0.165	−0.182	−0.175
8. PTGInewpossibilities	0.259	0.279	−0.210	−0.057	−0.157
9. PTGIpersonalstrength	0.161	0.313*	−0.012	−0.147	−0.085
10.PTGIspiritualchange	0.258	0.258	0.077	0.043	0.081
11.PTGIappreciationoflife	0.166	0.250	−0.122	−0.097	−0.182

Note. N = 49; PCL-C, Posttraumatic Stress Disorder Checklist – Civilian Version; BSI-GSI, Brief Symptom Inventory – Global Severity Index; PTGI, Posttraumatic Growth Inventory

[a]Bivariate correlations were performed with square-root transformed social support variables

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Table 3

Summary for hierarchical regression analysis for social context variables predicting posttraumatic growth

Variable	B	SE	β	t	ΔR^2 Step
Step 1					.13 *
Type of transplant	15.18	5.70	.36	2.67 *	
Step 2					.09 *
Type of transplant	13.19	5.52	.32	2.39 *	
Instrumental support[a]	10.08	4.37	.30	2.31 *	
Step 3					.01
Type of transplant	11.95	5.77	.29	2.07 *	
Instrumental support[a]	8.85	4.66	.27	1.90 †	
Emotional support[a]	3.60	4.65	.11	.77	
Step 4					.02
Type of transplant	10.80	5.90	.26	1.83 †	
Instrumental support[a]	9.68	4.74	.29	2.04 *	
Emotional support[a]	3.72	4.66	.12	.80	
Social constraint	−.48	.49	−.13	−.97	
Total R^2	.25 *				

Note. N = 49; Transplant type: 0 = autologous, 1 = allogeneic; B/β, unstandardized/ standardized regression coefficient; ΔR^2, change in explained variance; Total R^2, total explained variance;

[a]Indicates a square-root transformation was performed on reflected total scores

* $p < .05$

† $p < .10$