# Posttraumatic Growth Outcomes and Their Correlates Among Young Adult Survivors of Childhood Cancer

# Jaehee Yi,<sup>1</sup> PHD, Brad Zebrack,<sup>2</sup> PHD, Min Ah Kim,<sup>3</sup> PHD, and Melissa Cousino,<sup>4</sup> PHD

<sup>1</sup>College of Social Work, University of Utah, <sup>2</sup>University of Michigan School of Social Work, <sup>3</sup>Department of Social Welfare, Myongji University, and <sup>4</sup>Department of Psychiatry, Boston Children's Hospital & Harvard Medical School

All correspondence concerning this article should be addressed to Jaehee Yi, PHD, College of Social Work, University of Utah, Salt Lake City, UT 84112, USA. E-mail: jaehee.yi@utah.edu

Received October 27, 2014; revisions received July 21, 2015; accepted July 21, 2015

#### Abstract

**Objective** This study aims to identify and examine posttraumatic growth (PTG) experiences, and their correlates, among young adult survivors of childhood cancer. **Methods** 602 long-term childhood cancer survivors between the ages of 18 and 39 participated. Their demographic (age, gender, race/ethnicity, education, relationship status, employment, and income), cancer-related (diagnosis, current health problem, age at diagnosis, and years since diagnosis), and psychosocial (social support and optimism) PTG correlates were examined using descriptive, correlational, and regression analyses. **Results** PTG was significantly greater for females and nonwhite survivors, and for those diagnosed at older ages. Survivors diagnosed with solid/soft tissue tumors reported lower PTG. Optimism and social support were positively associated with PTG. **Conclusion** Study findings highlight potential intervention opportunities for increasing PTG by facilitating discussion around growth experiences within an optimistic framework among a supportive network of family members and peers.

Key words: cancer and oncology; posttraumatic stress; quality of life.

# Introduction

According to the Diagnostic Statistical Manual of Mental Disorders (American Psychiatric Association, 2013), cancer can be a traumatic event. Certainly, a pediatric cancer diagnosis may evoke fears for children and their families about treatment and its effects, psychosocial stressors, and uncertainties about the future (Stanton, Bower, & Low, 2006). Given cancer's significant impact, deficit models have been widely used in survivorship research with an emphasis on examining the negative psychological impacts.

Despite the growing population of childhood cancer survivors (Hewitt, Weiner, & Simone, 2003), few studies have investigated posttraumatic growth (PTG) among them (Arpawong, Oland, Milam, Ruccione, & Meeske, 2013; Barakat, Alderfer, & Kazak, 2006;

Zebrack et al., 2015). PTG is defined as positive psychological change resulting from difficult life circumstances or trauma (PTG; Tedeschi & Calhoun, 2004). Studies of positive outcomes associated with cancer suggest that interventions to promote psychosocial adaptation are not just about preventing, minimizing, and/or treating distress but also about promoting positive adaptation, growth, and successful achievement of developmental tasks. Just as it is important to identify predictors of posttraumatic stress in order to target and tailor interventions that reduce distress, investigations into prevalence and predictors of positive adaptation and growth are needed to inform future interventions that promote growth and resilience. Researchers have documented evidence across both adult and pediatric survivor populations who report both positive and negative effects associated with cancer and its treatment (Bellizzi et al., 2009; Jim & Jacobsen, 2008). Barakat et al. (2006) found that nearly 85% of adolescent survivors of childhood cancer reported at least one positive outcome from their experience.

Optimism and social support are major factors influencing PTG (Bostock, Sheikh, & Barton, 2009) and positively related to PTG with adult survivors (Danhauer et al., 2013; Ho et al., 2011; Kinsinger et al., 2006; Love & Sabiston, 2011; Schulz & Mohamed, 2004; Yonemoto et al., 2009). Similar findings are reported in childhood cancer survivors (Michel, Taylor, Absolom, & Eiser, 2010). Optimistic people expect good things are more likely to happen than bad things (Scheier, Carver, & Bridges, 1994), and such an attitude might help individuals use more positive and adaptive illusions or perceptions about stressful life situations (Zoellner, Rabe, Karl, & Maercker, 2008). In addition, social support such as empathic listening, validation, and acceptance may empower individuals to process their trauma and potentially promote PTG (Lepore, 2001). Although optimism and social support are important factors in PTG (Tedeschi & Calhoun, 1996), there is a dearth of empirical evidence examining them in young adult childhood cancer survivors. Positive reframing (Bussell & Naus, 2010) and hope (Yuen, Ho, & Chan, 2014) were also positively associated with PTG among childhood cancer survivors; however, null associations between optimism and PTG have also been reported in both adolescent (Arpawong et al., 2013) and adult survivor populations (Sears, Stanton, & Danoff-Burg, 2003). Because optimism and social support influence PTG, it is important that these factors are studied and understood from a clinical basis so that they can be utilized in PTG-promoting interventions.

The following review of the literature on demographic and cancer-related correlates of PTG in cancer survivorship research summarizes the current knowledge and informs the identification of other potentially important correlates of PTG in addition to optimism and social support.

# Demographic Correlates of PTG Age

Mixed findings on age and PTG associations have been reported in adolescent and young adult survivors of childhood cancer. Positive associations between age and PTG were observed in a Korean sample (Yi & Kim, 2014), whereas no associations were observed in an ethnically diverse sample (Arpawong et al., 2013). Similarly, PTG was correlated with age in adults with breast cancer (Bellizzi & Blank, 2004; Manne et al., 2004), various cancers (Lechner et al., 2003; Tang et al., 2015), adult transplant survivors (Tallman, Shaw, Schultz, & Altmaier, 2010; Widows, Jacobsen, Booth-Jones, & Fields, 2005), and long-term adult survivors of high-grade osteosarcoma (Yonemoto et al., 2009). Yet in contrast, others failed to observe significant associations between age and PTG in adults with breast cancer (Cordova, Cunningham, Carlson, & Andrykowski, 2001; Sears et al., 2003), prostate cancer (Thornton & Perez, 2006), and adult cancer patients having undergone tumor surgery (Schulz & Mohamed, 2004).

# Gender

Although most studies show no relationship between gender and PTG in adults with cancer (Lechner et al., 2003; Schulz & Mohamed, 2004; Widows et al., 2005) and adolescent and young adult survivors of childhood cancer (Arpawong et al., 2013; Yi & Kim, 2014), some investigators did find significant associations. For example, greater levels of PTG among female childhood cancer survivors (Klosky et al., 2014; Zebrack et al., 2012), stem cell transplant survivors (Tallman et al., 2010), a broad range of cancer patients (Zwahlen, Hagenbuch, Carley, Jenewein, & Buchi, 2010), and Taiwanese terminally ill cancer patients (Tang et al., 2015) have been reported.

#### Race/Ethnicity

Nonwhite adolescent and young adult survivors of childhood cancer are more likely to experience PTG than white survivors (Klosky et al., 2014; Zebrack et al., 2012); and PTG has been found to be lower among Hispanic survivors who primarily speak English at home compared with non-Hispanics, and Hispanics who primarily speak Spanish at home (Arpawong et al., 2013). Some studies of adult cancer patients and survivors found that minority status was associated with greater PTG (Bellizzi et al., 2009), whereas other studies yielded nonsignificant results (Manne et al., 2004; Sears et al., 2003; Thornton & Perez, 2006).

#### Socioeconomic Status

A number of researchers have observed significant associations between socioeconomic status (i.e., income and education) and PTG in adult breast cancer patients and survivors (e.g., Cordova et al., 2001; Danhauer et al., 2013; Wang, Liu, Wang, Chen, & Li, 2014; Weiss, 2004), terminally ill cancer patients (Tang et al., 2015), and cancer patients following bone marrow transplantation (Widows et al., 2005); however, the direction of this relationship has yet to be consistently determined. Moreover, several studies reported no significant differences in PTG by socioeconomic status among adult cancer survivors (Lechner et al., 2003; Manne et al., 2004; Sears et al., 2003; Tallman et al., 2010; Thornton & Perez, 2006) or childhood cancer survivors (Yi & Kim, 2014).

#### Cancer-Related Correlates of PTG

Incongruent findings have also been documented in research investigating associations between PTG and cancer-related variables. In a sample of adolescent cancer survivors, greater perceived treatment severity was related to greater PTG (Barakat et al., 2006). Similar relationships have been found in adult breast cancer survivor populations (Cordova et al., 2001; Sears et al., 2003). Other studies have failed to detect this relationship (Arpawong et al., 2013).

In adolescent and young adult cancer survivors, greater time since diagnosis/treatment was related to lower levels of PTG (Barakat et al., 2006; Yi & Kim, 2014); yet the opposite has been found in adult cancer survivor populations (Cordova et al., 2001; Manne et al., 2004; Weiss, 2004) and adult survivors of childhood cancer (Klosky et al., 2014). Similarly, there is a lack of congruence regarding associations between disease stage and PTG with some reporting associations in a sample of adults with various cancers (Lechner et al., 2003), and others reporting null relationships in samples of adults with breast cancer (Cordova et al., 2001; Manne et al., 2004; Weiss, 2004) and adults with prostate cancer (Thornton & Perez, 2006). Cancer type (Arpawong et al., 2013) and treatment (Klosky et al., 2014) also contributed to PTG in childhood cancer survivors.

Clearly, findings across the pediatric and adult cancer survivor literature are strikingly contradictory. Moreover, there has been little exploration of PTG correlates in childhood cancer survivor populationsparticularly in long-term adult survivors of childhood disease. This lack of understanding limits providers from readily identifying patients with potential for PTG and/or those who may benefit from targeted interventions. The purpose of this study is to understand and identify PTG experiences among young adult survivors of childhood cancer and to examine their associated demographic, cancer-related, and psychosocial variables-namely, optimism and social support. See Figure 1 for a visual description of our study's theoretical model. It includes a number of demographic factors such as age, gender, race/ethnicity, socioeconomic status, relationship status, and cancer-related factors such as treatment severity, cancer type, age at diagnosis, and time since diagnosis. These variables may provide a setting that affects how the childhood cancer survivor experiences PTG. Psychosocial factors such as optimism and social support may influence PTG even beyond the other factors, thus showing intervention potential. The current study improves on previous research with its large and diverse sample, and



**Figure 1.** Theoretical model of posttraumatic growth. *Note.* The bolded variables had significant relationships with posttraumatic growth in this sample.

inclusion of psychosocial in addition to demographic and cancer-related variables; furthermore, the current study examines unique and shared variance changes of each PTG factor using hierarchical multiple regression analyses.

# Methods

# **Eligibility Criteria**

Young adult survivors of any childhood cancer were eligible for participation. Inclusion criteria included current age 18–39; age at diagnosis 0–21 years (with diagnosis and treatment conducted within a pediatric setting); and disease-free status at time of study participation. The age range was selected in accordance with the National Cancer Institute Adolescent and Young Adult Oncology Progress Review Group (2006).

# Procedures

Participants were recruited from three pediatric oncology medical treatment centers. Each of the Institutional Review Board-approved participating institutions sent out an introductory letter to eligible participants describing the project, outlining the eligibility criteria, and inviting survivors to participate. Enclosed was a postage-paid response form for potential participants to return indicating whether they accepted or declined

participation and, if they declined, their reasons for nonparticipation. Survivors who indicated that they were willing to participate were mailed an informed consent document and the survey. The study survey was sent to 2,864 potential participants. In total, 576 (20.3%) unopened surveys were returned as "undeliverable" and an additional 22 returned surveys were marked "deceased." In total, 666 survivors (29.3%) consented to participate and completed a self-report questionnaire. The remaining 1,600 subjects were deemed "nonrespondents." As summarized by Zebrack and Landier (2011), there were statistically significant differences between respondents and nonrespondents in terms of cancer diagnoses, but not in terms of age at study, age at diagnosis, or years since diagnosis (p < .001).

Of the 666 respondents, 64 (9.6%) were eliminated from subsequent analyses due to ineligibility with regard to age at study (18–39 years old), age at diagnosis (21 years or younger), and treatment status (not currently receiving treatment), because the questionnaire was completed by a surrogate (see Zebrack & Landier, 2011), or because they did not complete the measure of PTG. The final sample size was 602 young adult survivors of childhood cancer.

# Measures

#### The Posttraumatic Growth Inventory

This 21-item scale measures the degree of positive changes experienced in the aftermath of a traumatic event and has been used widely across groups of cancer survivors including young adult survivors of childhood cancer (Love & Sabiston, 2011). The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) consists of five subscales: Relating to Others (7 items), New Possibilities (5 items), Personal Strength (4 items), Spiritual Change (2 items), and Appreciation of Life (3 items). Each item is rated using a 6-point Likert scale, with values ranging from 0 (I did not experience this change as a result of my crisis) to 5 (I experienced this change to a very great degree as a result of my crisis). All responses were summed to obtain a total PTGI score. Scores can range from 0-10 to 0-35 for subscales, and 0-105 for the total PTGI score, with higher scores indicating greater levels of PTG. Internal consistencies were high: total PTGI  $(\alpha = .87)$ , Relating to Others  $(\alpha = .89)$ , New Possibilities ( $\alpha = .85$ ), Personal Strength ( $\alpha = .82$ ), Spiritual Change ( $\alpha = .86$ ), and Appreciation of Life  $(\alpha = .80).$ 

#### Demographic and Cancer-Related Variables

Demographic information (on age at time of study, gender, race/ethnicity, relationship status, education, employment, and income) was collected via an investigator-designed instrument. Self-reported information (on cancer type, current health problems, age at diagnosis, and years since diagnosis) was also collected.

# **Psychosocial Variables**

Participants' psychosocial characteristics, including optimism and social support, were collected and examined. The Life Orientation Test-Revised (LOT-R) by Scheier, Carver, and Bridges (1994) was used as a self-report measure of optimism. It is comprised 10 items measuring optimism versus pessimism: 3 items for optimism, 3 items for pessimism, and 4 filler items. Each item ranges on a 5-point Likert scale from 0 (strongly disagree) to 4 (strongly agree). The total score of the LOT-R ranges from 0 to 24, with a score of 0-13 categorized as low optimism, 14-18 as moderate, and 19–24 as high optimism (Scheier & Carver, 1985). Internal consistency of the LOT-R was acceptable ( $\alpha = .85$ ). The Medical Outcomes Study Social Support Survey (MOS-SSS; Sherbourne & Stewart, 1991) was used as a self-reported measure of perceived availability of social support. It consists of 19 items, including four dimensions of perceived social support (information/emotion, tangible, affection, and positive social interactions). Each item ranges from 1 (none of the time) to 5 (all of the time) and total range is rated from 19 to 95 on four subscales with higher scores representing greater levels of social support. Internal consistency of the MOS-SSS was excellent  $(\alpha = .96).$ 

# Analytic Strategy

Descriptive analyses were preliminarily conducted to examine the major demographic (age, gender, race/ ethnicity, education, employment, and income), cancer-related (diagnosis, current health problem, age at diagnosis, and years since diagnosis), psychosocial variable characteristics (relationship status, social support, and optimism), and PTG outcomes of the sample. (Income was dichotomized using \$25,000 poverty line cutoff based on U.S. census data for the average family of 4.)

Bivariate relationships of PTG with continuous variables were examined using Pearson correlation efficient. Group differences in the PTG mean scores among categorical variables were examined using Independent *T*-tests.

Hierarchical multiple regression analyses were conducted to examine the unique and shared contributions of demographic, cancer-related, and psychosocial variables on PTG. Demographic variables were entered in the first step, cancer-related variables in the second, and psychosocial variables in the last step. The cancer diagnosis variable was dichotomized with solid/soft tissue tumor and others as a reference group. The model included only the correlates that were significant at the bivariate level. All data were analyzed using SPSS version 16.0 (SPSS Inc., 2007). The alpha level was set at p = .05.

### Results

# Participants

In total, 602 young adult survivors of childhood cancer, ranging from 18 to 39 years of age (M = 26.9,SD = 5.4) participated. There were slightly more women (n = 318, 53%) than men (n = 282, 47%). The participants were mostly white (n = 381, 64.1%) but other races were reflected: African American (4.4%), Asian (6.6%), Hispanic (23.4%), American Indian (1.2%), and others (0.4%). The participants had predominantly surpassed high school level education (some college or college graduate) (n = 474, 80.2%), were employed (n = 518, 86.9%), and had income above  $$25,000 \ (n = 377, 64.3\%)$ . More than half (n=320, 54.1%) reported having health problems. Participants were diagnosed with hematological cancers (n = 373, 62%), solid/soft tissue tumors and others (n = 157, 26.1%), and central nervous system or brain tumors (n = 72, 12%). On average, the participants were diagnosed 15.7 years ago and were 11.2 years of age at the time of study. About 46.5% (n = 279) were in a significant relationship and 24.4% (n = 144) reported high optimism (Scheier & Carver, 1985). Their perceived social support score ranged from 23 to 95 (M = 78.4, SD = 15.7). Complete sample characteristics are presented in Table I.

#### **Characteristics of PTGI**

The large majority (88.5%, n = 533) of the survivors reported some degree of positive change as reflected by a mean PTGI total score above 1 (i.e., higher than very little influence of cancer on growth) on the 6point scale. PTG scores were generally moderate, with a mean PTGI total score of 2.73 (SD = 1.21). The highest scores were found for Appreciation of Life (M = 3.30, SD = 1.40), followed by Personal Strength (M = 3.08, SD = 1.33), Relation to Others (M = 2.72, SD = 1.31), Spiritual Change (M = 2.50, SD = 1.75), and New Possibilities (M = 2.22, SD = 1.35).

In the bivariate correlations, age at diagnosis (r = .175, p < .001), years since diagnosis (r = -.155, p < .001), perceived social support (r = .211, p < .001), and optimism (r = .182, p < .01) were significantly correlated with the PTGI total score. The *t*-test results show that the PTGI mean scores were significantly different by gender, t(598) = 2.336, p < .05; race/ethnicity, t(592) = -1.986, p < .05; and cancer type, t(598) = 2.443, p < .05. Pearson correlation coefficients and *t* statistics are presented in Table II.

#### Table I. Sample Characteristics of Participants

Variables	$n$ (%) or $M \pm SD$
Demographic characteristics	
Age in years $(M \pm SD)$	$26.9 \pm 5.4$
Gender	
Male	282 (47)
Female	318 (53)
Race/ethnicity	
White	381 (64.1)
Hispanic/Latino	139 (23.4)
Asian/Pacific Islander	39 (6.6)
African American	26 (4.4)
American Indian/Alaskan Native	7 (1.2)
Other	2 (0.4)
Education	
High school graduates	117 (19.8)
Some college	276 (46.7)
College graduates	198 (33.5)
Employment	· /
Ünemployed	78 (13.1)
Employed	518 (86.9)
Income (\$)	
≤25,000	209 (35.7)
>25,000	377 (64.3)
Relationship status	
In significant relationship	279 (46.5)
Not in significant relationship	321 (53.5)
Cancer-related characteristics	
Cancer types	
Hematological cancers	373 (62)
CNS or brain tumors	72 (12)
Solid/soft tissue tumors and others	157 (26.1)
Health problems	
Yes	320 (54.1)
No	271 (45.9)
Age at diagnosis in years $(M \pm SD)$ ,	$11.2 \pm 6.0 \ (0-21)$
range	
Years since diagnosis ( $M \pm SD$ ), range	$15.7 \pm 7.0 \ (2-37)$
Psychosocial characteristics	
Life Orientation Test	
High Life Orientation Test (19–24)	144 (24.4)
Moderate Life Orientation Test	218 (36.9)
(14–18)	
Low Life Orientation Test (0–13)	228 (38.6)
Perceived social support	78.4 ± 15.7 (23–95)

Note. CNS = central nervous system. N sizes fluctuate slightly due to missing values.

#### **Hierarchical Regression Analyses**

As shown in Table III, the demographic variables accounted for 1.1% of the variance in the total PTGI on the first step of the equation, F(2,565) = 4.252, p < .05. The cancer-related variables accounted for an additional 3.8% in the variance in the second step, F(5,562) = 6.891; p < .001. The psychosocial variables added 4.6% in the variance in the third step, F(7,560) = 9.454; p < .001; and the final model explained 9.5% of the variance of the PTGI. Being female,  $\beta = .092$ , p < .05, and nonwhite,  $\beta = .087$ , p < .05, was associated with greater levels of the total PTGI. Solid/soft tissue tumor and other tumor diagnosis was related with lower levels of the total PTGI in

	r	<i>M</i> (SD)	df	t
Age	.00			
Age at diagnosis	.175***			
Years since diagnosis	155***			
Perceived social support	.211***			
Life Orientation Test	.182**			
Gender			598	2.336*
Male		2.84 (1.19)		
Female		2.61 (1.22)		
Race/ethnicity		. ,	592	-1.986*
White		2.66 (1.21)		
Nonwhite		2.87 (1.19)		
Education		· · · · ·	589	-1.028
$\leq$ High school		2.63 (1.27)		
>High school		2.76 (1.19)		
Income		. ,	584	-1.118
≤25,000		2.65 (1.28)		
>25,000		2.77 (1.16)		
Employment			594	-0.631
Unemployed		2.65 (1.30)		
Employed		2.74 (1.19)		
Relationship status			598	1.846
In significant relationship		2.83 (1.18)		
Not in significant relationship		2.65 (1.23)		
Cancer type		. ,	600	2.443*
Hematological cancers and central nervous system or brain tumors		2.80 (1.19)		
Solid/soft tissue tumors and others		2.53 (1.22)		
Health problem			589	0.995
Yes		2.78 (1.15)		
No		2.68 (1.27)		

**Table II.** Bivariate Correlations and Group Differences in Demographic and Cancer-Related

 Variables and Posttraumatic Growth Outcomes

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

Table III. Hierarchical Regression Analysis for Variables Predicting Posttraumatic Growth (N= 567)

	Model 1		Model 2		Model 3	
	<i>b</i> (SE <i>b</i> )	β	<i>b</i> (SE <i>b</i> )	β	<i>b</i> (SE <i>b</i> )	β
Step 1: Demographic						
Gender (female)	4.976 (2.12)	.098*	5.655 (2.09)	.111**	4.694 (2.05)	.092*
Race/ethnicity (nonwhite)	3.812 (2.21)	.072	4.010 (2.21)	.076	4.589 (2.16)	.087*
Step 2: Cancer-related	· · · · ·		· · · · · ·		, , , , , , , , , , , , , , , , , , ,	
Solid/soft tissue tumors and others			-6.296 (2.42)	108*	-5.905 (2.36)	102*
Age at diagnosis			0.565 (0.23)	.134*	0.570 (0.22)	.136*
Years since diagnosis			-0.183(0.20)	050	-0.187(0.19)	051
Step 3: Psychosocial					. ,	
Life Orientation Test					0.626 (0.23)	.122**
Perceived social support					0.228 (0.07)	.141**
<i>F</i> value	4.252*		6.891***		9.454***	
Adjusted $R^2$	.011		.049		.095	

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

comparison to hematological cancer or central nervous system/brain tumor diagnosis,  $\beta = -.102$ , p < .05. Age at diagnosis was positively associated with greater levels of the total PTGI,  $\beta = .136$ , p < .05. Greater levels of optimism,  $\beta = .122$ , p < .01, and perceived social support,  $\beta = .141$ , p < .01, were associated with greater levels of the total PTGI. Reporting

PTG did not appear to be a function of years since diagnosis.

#### Discussion

This study's overarching goal was to inform future interventions for promoting positive growth following cancer experiences. Following our theoretical model (refer to Figure 1 for a visual representation) we examined the relationships between PTG and various factors such as demographic, cancer-related, and psychosocial variables. Our findings highlight several important areas for intervention. First, consistent with previous studies, being female (Klosky et al., 2014; Tallman et al., 2010; Zwahlen et al., 2010) and nonwhite (Bellizzi et al., 2009; Klosky et al., 2014) was associated with greater levels of PTG. As these correlates have not been adequately examined, we can only theorize that gender and minority status might be related to positive resilient responses based on their shared status as underprivileged groups. Further theoretical discussion and empirical research, especially using qualitative methods, should examine how females and ethnic minorities experience growth after cancer.

Older age at diagnosis was related to higher levels of PTG. The average age at diagnosis in our sample was 11.2. According to developmental psychology theory, adolescents begin to have abstract reasoning at about 12 (Piaget, 1971). Such abstract thinking is essential for posing existential questions such as those that one may ask when facing a cancer diagnosis to try to make meaning out of and grow from the traumatic experience. Considering this developmental explanation, it follows that those diagnosed later in adolescence tend to report higher postcancer growth than those diagnosed earlier. This finding provides insight for age-appropriate approaches to childhood cancer survivors. Because those diagnosed at younger ages might not have had the cognitive opportunity to experience growth without external stimulation, it might be helpful to encourage them to consider that traumatic experiences from cancer might have positive outcomes. We should be mindful that most of those diagnosed later in age may already have positive experiences from cancer; for them we should focus on validating and actively promoting their growth experiences (Barakat et al., 2006).

The solid/soft tissue and other tumor diagnosis groups reported lower levels of PTG, demonstrating the different impact of trauma by disease group. The present study did not have variables related to treatment types, but this difference might be due to different treatments and late effects: Treatment type was associated with PTG among breast cancer survivors (Lerolain, Bonnaud-Antignac, & Florin, 2010; Mols, Vingerhoets, Coebergh, & van de Poll-Franse, 2009). It could also be theorized that survivors of childhood central nervous system or brain tumors are more impacted by the cancer trauma in both positive and negative ways, thus they have more potential for PTG than other cancer type groups. Greater disease severity has indeed been found significantly associated with PTG (Tomich & Helgeson, 2004; Urcuvo, Boyers, Carver,

& Antoni, 2005). These theories warrant further examination in research.

Controlling for demographic and cancer-related factors, optimism and social support were associated with greater levels of PTG. Optimists are more likely to experience PTG (Michel et al., 2010) and, according to the cognitive adaptation theory (Taylor, 1983), optimism is one of the protective cognitive strategies that traumatized individuals utilize. The association between social support and PTG found in the current study highlights important clinical considerations for developing programs for adult survivors of childhood cancer. In their theoretical model of PTG mechanisms, Tedeschi and Calhoun (2006) described how PTG is promoted via motivating and growth-oriented influences from people surrounding the survivors. If one is supported by others who promote the idea of learning from challenges and exemplify thriving beyond difficulties, one is more likely to experience growth following trauma. Such supportive networks are an invaluable resource for modeling (Nenova, DuHamel, Zemon, Rini, & Redd, 2013; Schulz & Mohamed, 2004) and may also facilitate comfort and ease in talking about the cancer experience. Talking about and considering loss has been associated with growth experiences in other traumatized populations (Bower, Kemeny, Taylor, & Fahey, 1998; Calhoun, Cann, Tedeschi, & McMillan, 2000). A family-based approach may likewise facilitate greater PTG for survivors and their support systems, who may also experience trauma effects from the cancer experience (Kazak, 1997). These potential opportunities for fostering PTG warrant future research, including examination of the survivor's perceptions of different types of support and helpfulness (or lack thereof).

The large majority (88.5%) of the survivors reported some degree of positive change, similar to Barakat et al.'s (2006) findings. The participants reported lower levels of total PTG (M = 2.73) compared with other type of adult cancer survivors such as breast cancer survivors (M = 4.51, SD = 0.92) from Brunet, McDonough, Hadd, Crocker, and Sabiston (2010), and hematopoietic stem cell transplant survivors (M = 2.96) (Nenova et al., 2013). These findings seem to validate that PTG exists, yet do not answer the deeper question around the construct of PTG: That is, does PTG actually happen, or is it an illusion intentionally used as a coping strategy by the survivor to deal with the current adversity (Sumalla, Ochoa, & Blanco, 2009)? It is still important to examine whether PTG is an outcome or a process; this could most effectively be done in a mixed method study incorporating both quantitative and qualitative methods.

The study findings should be interpreted in the context of the following limitations. First, the survey questionnaires were self-reported, thereby limited in not being from objective sources such as medical records. Also, the participants were volunteers and may not be representative of the general population of young adult survivors of childhood cancer. Nonetheless, including participants from several treatment centers throughout the city of Los Angeles and Michigan state provided greater variation in patient characteristics and experiences, thereby increasing the generalizability of the findings.

Another possible limitation is that correlation coefficients and group differences in the bivariate relationship tests (Table II) have small (Cohen, 1988) effect sizes. However, although small effect sizes are common in studies of PTG (Boals, Steward, & Schuettler, 2010; Vishnevsky, Cann, Calhoun, Tedeschi, & Demakis, 2010), we want to stress that the significance should be interpreted with caution. Our findings showed relatively low variance in comparison with previous studies (e.g., 13-44%, Arpawong et al., 2013; Turner-Sack, Menna, & Setchell, 2012; Yi & Kim, 2014) which included other variables such as posttraumatic stress or depressive symptoms. In addition the sample characteristics of the previous studies are different in that they were short-term survivors of cancer, younger survivors in adolescence, from a different cultural background (Korea), or a small (31 participants) sample.

Other possible limitations are that both positive and negative trauma impacts may dwindle over time since exposure. Younger survivors in young adulthood tend to have greater PTG (Bower et al., 2005; Lechner et al., 2003; Manne et al., 2004; Widows et al., 2005). Furthermore, in collectivist societies, the perception of social support might have even more impact on PTG than in individualistic societies. All of these elements should be examined in future studies.

And finally, in order to experience PTG, one must consider his or her experience a trauma. The study did not assess whether participants considered their cancer a trauma, nor did it control for other traumas they may have experienced. However, it did employ a cross-sectional methodology so causal inferences are limited. Future longitudinal investigations may lead to an increased understanding of the interplay between demographic, cancer-related, and psychosocial variables and PTG, thereby informing the development and implementation of interventions aimed at promoting positive adaptation.

The study results highlight several important directions for clinical intervention. Previous studies found that cognitive-behavioral stress management (Antoni et al., 2001), mindfulness-based stress reduction programs (Garland, Carlson, Cook, Lansdell, & Speca, 2007; Labelle, Lawlor-Savage, Campbell, Faris, & Carlson, 2015), and healing through creative arts (Garland et al., 2007) were effective in promoting PTG. Lechner and Antoni (2004) discussed how group-based interventions, particularly, might promote PTG by helping survivors revise their schemas while sharing their experiences with others who have had similar experiences. Our study results demonstrate how current interventions might be improved by integrating optimism and social support factors. Building upon the work of Kazak et al. (1999, 2004), which combines cognitive–behavioral and family therapy interventions to decrease posttraumatic stress symptoms and anxiety, while also aiming to improve family functioning, our findings highlight the potential intervention opportunities for also increasing PTG by facilitating discussions around growth experiences within an optimistic framework among a supportive network of family members and peers with similar experiences.

# Funding

This study was partially funded by NIH Grant #K07 CA100380.

Conflicts of interest: None declared.

# References

- Adolescent and Young Adult Oncology Progress Review Group. (2006). *Closing the gap: Research and care imperatives for adolescents and young adults with cancer*, Bethesda, MD: Department of Health and Human Services, National Institutes of Health, National Cancer Institute, and the LiveStrong Young Adult Alliance, NIH Publication No. 06-6067.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA/Washington, DC: American Psychiatric Association.
- Antoni, M. H., Lehman, J. M., Kilbourn, K. M., Boyers, A. E., Culver, J. L., Alferi, S. M., ... Carver, C. S. (2001). Cognitive-behavioral stress management intervention decreases the prevalence of depression and enhances benefit finding among women under treatment for early-stage breast cancer. *Health Psychology*, 20(1), 20–32. doi:10.1037/0278-6133.20.1.20
- Arpawong, T. E., Oland, A., Milam, J. E., Ruccione, K., & Meeske, K. A. (2013). Post-traumatic growth among an ethnically diverse sample of adolescent and young adult cancer survivors. *Psycho-Oncology*, 22, 2235–2244. doi:10.1002/pon.3286
- Barakat, L. P., Alderfer, M. A., & Kazak, A. E. (2006). Posttraumatic growth in adolescent survivors of cancer and their mothers and fathers. *Journal of Pediatric Psychology*, 31, 413–419. doi:10.1093/jpepsy/jsj058
- Bellizzi, K. M., & Blank, T. O. (2004). Predicting posttraumatic growth in breast cancer survivors. *Health Psychology*, 25(1), 47–56. doi:10.1037/0278-6133.25.1.47
- Bellizzi, K. M., Smith, A. W., Reeve, B. B., Alfano, C. M., Bernstein, L., Meeske, K., ... Ballard-Barbash, R. R. (2009). Posttraumatic growth and health-related quality of life in a racially diverse cohort of breast cancer survivors. *Journal of Health Psychology*, 15, 615–626. doi:10.1177/ 1359105309356364

- Boals, A., Steward, J. M., & Schuettler, D. (2010). Advancing our understanding of posttraumatic growth by considering event centrality. *Journal of Loss and Trauma: International Perspectives on Stress & Coping*, 15, 518– 533. doi:10.1080/15325024.2010.519271
- Bostock, L., Sheikh, A. I., & Barton, S. (2009). Posttraumatic growth and optimism in health-related trauma: A systematic review. *Journal of Clinical Psychology in Medical Settings*, 16, 281–296. doi:10.1007/s10880-009-9175-6
- Bower, J. E., Kemeny, M. E., Taylor, S. E., & Fahey, J. L. (1998). Cognitive processing, discovery of meaning, CD4 decline, and AIDS-related mortality among bereaved HIV-seropositive men. *Journal of Consulting and Clinical Psychology*, 66, 979–986. doi:10.1037/0022-006X.66.6.979
- Bower, J. E., Meyerowitz, B. E. Desmond, K. A., Bernaards, C. A., Rowland, J. H., & Ganz, P. A. (2005). Perceptions of positive meaning and vulnerability following breast cancer: Predictors and outcomes among long-term breast cancer survivors. *Annuals of Behavioral Medicine*, 29, 236–245. doi:10.1207/s15324796abm2903\_10
- Brunet, J., McDonough, M. H., Hadd, V., Crocker, P. R., & Sabiston, C. M. (2010). The Posttraumatic Growth Inventory: An examination of the factor structure and invariance among breast cancer survivors. *Psychooncology*,19, 830–838. doi:10.1002/pon.1640
- Bussell, A., & Naus, M. J. (2010). A longitudinal investigation of coping and posttraumatic growth in breast cancer survivors. *Journal of Psychosocial Oncology*, 28(1), 61– 78. doi:10.1080/07347330903438958
- Calhoun, L. G., Cann, A., Tedeschi, R. G., & McMillan, J. (2000). A correlational test of the relationship between posttraumatic growth, religion, and cognitive processing. *Journal of Traumatic Stress*, 13, 521–527. doi:10.1023/ A:1007745627077
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Cordova, M. J., Cunningham, L. L. C., Carlson, C. R., & Andrykowski, M. A. (2001). Posttraumatic growth following breast cancer: A controlled comparison study. *Health Psychology*, 20, 176–185. doi:10.1037/0278-6133.20.3.176
- Danhauer, S. C., Case, L. D., Tedeschi, R., Russell, G., Vishnevsky, T., Triplett, K., ... Avis, N. E. (2013). Predictors of posttraumatic growth in women with breast cancer. *Psycho-Oncology*, 22, 2676–2683. doi:10.1002/ pon.3298
- Garland, S. M., Carlson, L. E., Cook, S., Lansdell, L., & Speca, M. (2007). A non-randomized comparison of mindfulness-based stress reduction and healing arts programs for facilitating post-traumatic growth and spirituality in cancer outpatients. *Supportive Care in Cancer*, 15, 949–961. doi:10.1007/s00520-007-0280-5
- Hewitt, M., Weiner, S., & Simone, J. (2003). Childhood cancer survivorship improving care and quality of life. Washington, DC: The National Academies Press.
- Ho, S., Rajandram, R. K., Chan, N., Samman, N., McGrath, C., & Zwahlen, R. A. (2011). The roles of hope and optimism on posttraumatic growth in oral cavity cancer patients. *Oral Oncology*, 47, 121–124. doi:10.1016/ j.oraloncology.2010.11.015

- Jim, H. S. L., & Jacobsen, P. B. (2008). Posttraumatic stress and posttraumatic growth in cancer survivorship: A review. *The Cancer Journal*, 14, 414–419. doi:10.1097/ PPO.0b013e31818d8963
- Kazak, A. E. (1997). A contextual family/systems approach to pediatric psychology: Introduction to the special issue. *Journal of Pediatric Psychology*, 22, 141–148. doi:10.1093/jpepsy/22.2.141
- Kazak, A. E., Alderfer, M. A., Streisand, R., Simms, S., Rourke, M. T., Barakat, L. P., ... Cnaan, A. (2004). Treatment of posttraumatic stress symptoms in adolescent survivors of childhood cancer and their families: A randomized clinical trial. *Journal of Family Psychology*, 18, 493–504. doi:10.1037/0893-3200.18.3.493
- Kazak, A. E., Simms, S., Barakat, L., Hobbie, W., Foley, B., Golomb, V., & Best, M. (1999). Surviving cancer competently intervention program (SCCIP): A cognitive-behavioral and family therapy intervention for adolescent survivors of childhood cancer and their families. *Family Process*, 38, 175–191. doi:10.1111/j.1545-5300.1999.00176.x
- Kinsinger, D. P., Penedo, F. J., Antoni, M. H., Dahn, J. R., Lechner, S., & Schneiderman, N. (2006). Psychosocial and sociodemographic correlates of benefit-finding in men treated for localized prostate cancer. *Psycho-Oncology*, 15, 954–961. doi:10.1002/pon.1028
- Klosky, J. L., Krull, K. R., Kawashima, T., Leisenring, W., Randolph, M. E., Zebrack, B., ... Phipps, S. (2014). Relations between posttraumatic stress and posttraumatic growth in long-term survivors of childhood cancer: A report from the Childhood Cancer Survivor Study. *Health Psychology*, 33, 878–882. doi:10.1037/hea0000076
- Labelle, L. E., Lawlor-Savage, L., Campbell, T. S., Faris, P., & Carlson, L. E. (2015). Does self-report mindfulness mediate the effect of Mindfulness-Based Stress Reduction (MBSR) on spirituality and posttraumatic growth in cancer patients? *The Journal of Positive Psychology*, 10, 153– 166. doi:10.1080/17439760.2014.927902
- Lechner, S. C., & Antoni, M. H. (2004). Posttraumatic growth and group-based interventions for persons dealing with cancer: What have we learned so far? *Psychological Inquiry*, 15(1), 35–41.
- Lechner, S. C., Zakowski, S. G., Antoni, M. H., Greenhawt, M., Block, K., & Block, P. (2003). Do sociodemographic and disease-related variables influence benefit-finding in cancer patients? *Psycho-Oncology*, 12, 491–499. doi:10.1002/pon.671
- Lepore, S. J. (2001). A social-cognitive processing model of emotional adjustment to cancer. In A. Baum & B. Andersen (Eds.), *Psychosocial interventions for cancer* (pp. 99–116). Washington, DC: American Psychological Association.
- Lerolain, S., Bonnaud-Antignac, A., & Florin, A. (2010). Long term posttraumatic growth after breast cancer: Prevalence, predictors and relationship with psychological health. *Journal of Clinical Psychology in Medical Settings*, 17(1), 14–22. doi:10.1007/s10880-009-9183-6
- Love, C., & Sabiston, C. M. (2011). Exploring the links between physical activity and posttraumatic growth in young adult cancer survivors. *Psycho-Oncology*, 20, 278–286. doi:10.1002/pon.1733

- Manne, S., Ostroff, J., Winkel, G., Goldstein, L., Fox, K., & Grana, G. (2004). Posttraumatic growth after breast cancer: Patient, partner, and couple perspectives. *Psychosomatic Medicine*, 66, 442–454. doi:10.1097/ 01.psy.0000127689.38525.7d
- Michel, G., Taylor, N., Absolom, K., & Eiser, C. (2010). Benefit finding in survivors of childhood cancer and their parents: Further empirical support for the Benefit Finding Scale for Children. *Child: Care, Health and Development*, 36(1), 123–129. doi:10.1111/j.1365-2214.2009.01034.x
- Mols, F., Vingerhoets, A. J., Coebergh, J. W., & van de Poll-Franse, L. V. (2009). Well-being, posttraumatic growth and benefit finding in long-term breast cancer survivors. *Psychology & Health*, 24, 583–595. doi:10.1080/ 08870440701671362
- Nenova, M., DuHamel, K., Zemon, V., Rini, C., & Redd, W. H. (2013). Posttraumatic growth, social support, and social constraint in hematopoietic stem cell transplant survivors. *Psycho-Oncology*, 22(1), 195–202. doi:10.1002/ pon.2073
- Piaget, J. (1971). The theory of stages in cognitive development. In D. R. Green (Ed.), *Measurement and Piaget* (pp. 1–11). New York, NY: McGraw-Hill.
- Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A re-evaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*, 67, 1063–1078. doi:10.1037/0022-3514.67.6.1063
- Scheiner, M. F., & Carver, C. S. (1985). Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health Psychology*, 4, 219–247. doi:10.1037/0278-6133.4.3.219
- Schulz, U., & Mohamed, N. E. (2004). Turning the tide: Benefit finding after cancer surgery. Social Science & Medicine, 59, 653–662. doi:10.1016/j.socscimed.2003.11.019
- Sears, S. R., Stanton, A. L., & Danoff-Burg, S. (2003). The Yellow Brick Road and the Emerald City: Benefit-finding, positive reappraisal coping, and posttraumatic growth in women with early stage breast cancer. *Health Psychology*, 22, 487–497. doi:10.1037/0278-6133.22.5.487
- Sherbourne, C. D., & Stewart, A. L. (1991). The MOS social support survey. *Social Science and Medicine*, *32*, 705–714. doi:10.1016/0277-9536(91)90150-B
- SPSS Inc. (2007). SPSS for Windows, rel. 16.0.0. Chicago, IL: SPSS Inc.
- Stanton, A., Bower, J., & Low, C. (2006). Posttraumatic growth after cancer. In L. G. Calhoun & R. G. Tedeschi (Eds.), *Handbook of posttraumatic growth: Research and practice* (pp. 138–175). Mahwah, NJ: Erlbaum.
- Sumalla, E., Ochoa, C., & Blanco, I. (2009). Posttraumatic growth in cancer: Reality or illusion? *Clinical Psychology Review*, 29(1), 24–33. doi:10.1016/j.cpr.2008.09.006
- Tallman, B., Shaw, K., Schultz, J., & Altmaier, E. (2010). Well-being and posttraumatic growth in unrelated donor marrow transplant survivors: A nine-year longitudinal study. *Rehabilitation Psychology*, 55, 204–210. doi:10.1037/a0019541
- Tang, S. T., Lin, K. C., Chen, J. S., Chang, W. C., Hsieh, C. H., & Chou, W. C. (2015). Threatened with death but growing: Changes in and determinants of posttraumatic

growth over the dying process for Taiwanese terminally ill cancer patients. *Psycho-Oncology*, 24, 147–154. doi:10.1002/pon.3616

- Taylor, S. E. (1983). Adjustment to threatening events: A theory of cognitive adaptation. *American Psychologist, 38*, 1161–1173. doi:10.1037/0003-066X.38.11.1161
- Tedeschi, R., & Calhoun, L. (1996). The Posttraumatic Growth Inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress*, 9, 455–471. doi:10.1007/BF02103658
- Tedeschi, R., & Calhoun, L. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry*, 15(1), 1–18. doi:10.1207/ s15327965pli1501\_01
- Tedeschi, R. G., & Calhoun, L. G. (Eds.) (2006). Expert companions: Posttraumatic growth in clinical practice. In *Handbook of posttraumatic growth: Research and practice* (pp. 291–310). Mahwah, NJ: Lawrence Erlbaum Associates.
- Thomas, W. I., & Thomas, D. (1928). *The child in America*. New York, NY: Knopf.
- Thornton, A. A., & Perez, M. A. (2006). Posttraumatic growth in prostate cancer survivors and their partners. *Psycho-Oncology*, 15, 285–296. doi:10.1002/ pon.953
- Tomich, P. L., & Helgeson, V. S. (2004). Is finding something good in the bad always good? Benefit finding among women with breast cancer. *Health Psychology*, 23(1), 16– 23. doi:10.1037/0278-6133.23.1.16
- Turner-Sack, A. M., Menna, R., & Setchell, S. R. (2012). Posttraumatic growth, coping strategies, and psychological distress in adolescent survivors of cancer. *Journal of Pediatric Oncology Nursing*, 29(2), 70–79. doi:10.1177/ 1043454212439472
- Urcuyo, K. R., Boyers, A. E., Carver, C. S., & Antoni, M. H. (2005). Finding benefit in breast cancer: Relations with personality, coping, and concurrent well-being. *Psychology and Health*, 20, 175–192. doi:10.1080/08870440512331317634
- Vishnevsky, T., Cann, A., Calhoun, L. G., Tedeschi, R. G., & Demakis, G. J. (2010). Gender differences in selfreported posttraumatic growth: A meta-analysis. *Psychology of Women Quarterly*, 34(1), 110–120. doi:10.1111/j.1471-6402.2009.01546.x
- Wang, M. L., Liu, J. E., Wang, H. Y., Chen, J., & Li, Y. Y. (2014). Posttraumatic growth and associated sociodemographic and clinical factors in Chinese breast cancer survivors. *European Journal of Oncology Nursing*, 18, 478–483. doi:10.1016/j.ejon.2014.04.012
- Weiss, T. (2004). Correlates of post-traumatic growth in married breast cancer survivors. *Journal of Social and Clinical Psychology*, 23, 733–746. doi:10.1521/ jscp.23.5.733.50750
- Widows, M. R., Jacobsen, P. B., Booth-Jones, M., & Fields, K. K. (2005). Predictors of posttraumatic growth following bone marrow. *Health Psychology*, 24, 266–273. doi:10.1037/0278-6133.24.3.266
- Yi, J., & Kim, M. A. (2014). Postcancer experiences of childhood cancer survivors: How is posttraumatic stress related with posttraumatic growth? *Journal of Traumatic Stress*, 27, 461–467. doi:10.1002/jts.21941

- Yonemoto, T., Kamibeppu, K., Ishii, T., Iwata, S., Hagiwara, Y., & Tatezaki, S. (2009). Psychosocial outcomes in long-term survivors of high-grade osteosarcoma: A Japanese single-center experience. *Anticancer Research*, 29, 4287–4290.
- Yuen, A. N. Y., Ho, S. M. Y., & Chan, C. K. Y. (2014). The mediating roles of cancer-related rumination in the relationship between dispositional hope and psychological outcomes among childhood cancer survivors. *Psycho-Oncology*, 23, 412–419. doi:10.1002/pon.3433
- Zebrack, B., Kwak, M., Salsman, J., Cousino, M., Meeske, K., Aguilar, C., ... Cole, S. (2015). The relationship between posttraumatic stress and posttraumatic growth among adolescent and young adult (AYA) cancer patients. *Psycho-Oncology*, 24, 162–168. doi:10.1002/pon.3585
- Zebrack, B., & Landier, W. (2011). The perceived impact of cancer on quality of life for post-treatment survivors of

- Zebrack, B. J., Stuber, M. L., Meeske, K. A., Phipps, S., Krull, K. R., Liu, Q., ... Zeltzer, L. K. (2012). Perceived positive impact of cancer among long-term survivors of childhood cancer: A report from the childhood cancer survivor study. *Psycho-Oncology*, 21, 630–639. doi:10.1002/pon.1959
- Zoellner, T., Rabe, S., Karl, A., & Maercker, A. (2008). Posttraumatic growth in accident survivors: Openness and optimism as predictors of its constructive or illusory sides. *Journal of Clinical Psychology*, 64, 245–263. doi:10.1002/ jclp.20441
- Zwahlen, D., Hagenbuch, N., Carley, M. I., Jenewein, J., & Buchi, S. (2010). Posttraumatic growth in cancer patients and partners—effects of role, gender and the dyad on couples' posttraumatic growth experience. *Psycho-Oncology*, 19(1), 12–20. doi:10.1002/pon.1486