

Measuring Post-Traumatic Growth in People Diagnosed With Hepatobiliary Cancer: Directions for Future Research

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Purpose/Objectives: To highlight and provide preliminary data regarding issues in the measurement of post-traumatic growth in people diagnosed with primary or metastatic hepatobiliary cancer.

Design: Prospective.

Setting: A large medical center in Pittsburgh, PA.

Sample: 120 patients with hepatobiliary cancer.

Methods: Participants were administered a battery of questionnaires, including the Post-Traumatic Growth Inventory (PTGI), Center for Epidemiological Studies–Depression scale, and the Functional Assessment of Cancer Therapy–Hepatobiliary module. Family caregivers also rated patients' post-traumatic growth. Qualitative data collected from patients included positive and negative changes associated with their cancer diagnoses.

Main Research Variables: Post-traumatic growth, depression, quality of life, and caregiver ratings of patients' post-traumatic growth.

Findings: The results revealed that the PTGI is a reliable instrument in people diagnosed with cancer. The level of post-traumatic growth varies depending on hepatobiliary cancer type. The onset and process of post-traumatic growth differed based on the method of measurement employed (qualitative versus quantitative). Agreement on the PTGI was high between patients and caregivers, suggesting that the patients' growth was observable to others. Post-traumatic growth was not found to be associated with depressive symptoms, quality of life, or survival in patients diagnosed with hepatobiliary cancer.

Conclusions: The results of this study underscore the need to understand differences in the measurement and the process of post-traumatic growth in people with cancer.

Implications for Nursing: For some patients, post-traumatic growth as a result of a cancer diagnosis may be associated with positive cognitive, emotional, and behavioral changes that influence mental and physical health. For patients who experience post-traumatic growth, healthcare providers may be able to facilitate behavior changes to enhance health.

Key Points . . .

- Post-traumatic growth varies with the type of cancer and how the onset and process differ based on the method of measurement employed.
- A high level of agreement was seen on the Post-Traumatic Growth Inventory between the patient and the caregiver, suggesting that post-traumatic growth is observable.
- The results of this study underscore the need for further research in regard to the measurement and process of post-traumatic growth in patients with cancer.

also have been used to describe the construct. Researchers are beginning to explore the possibility that a diagnosis of cancer may serve as a catalyst for personal growth (Sears et al.). Post-traumatic growth may result in psychological and health benefits, but the study of post-traumatic growth is in its infancy.

A multitude of research exists regarding the negative effects of chronic illness on health-related quality of life (Ettema et al., 2005; Kalantar-Zadeh & Unruh, 2005; Tuzun, 2007; Younossi, Kallman, & Kincaid, 2007). Healthcare professionals have recognized physical and psychological suffering, but the broader significance of such suffering, including restrictions placed on life, social isolation, discreditation by others, and the feeling of being a burden to others as a result of a chronic illness, often is minimized. Despite those consequences, some individuals with chronic illness report positive changes in their lives as a result of a diagnosis with a chronic or life-threatening illness.

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Post-traumatic growth may be defined as “a positive cognitive process that is initiated to cope with traumatic events that extract an extreme cognitive and emotional toll” (Tedeschi & Calhoun, 1995, p. 5). Recently, the study of post-traumatic growth in patients with cancer has burgeoned (Cordova, Cunningham, Carlson, & Andrykowski, 2001; Fromm, Andrykowski, & Hunt, 1996; Helgeson, 2005; Manne et al., 2004; McGregor et al., 2004; Sears, Stanton, & Danoff-Burg, 2003; Stanton et al., 2002). Terms such as “benefit finding” (Affleck & Tennen, 1996; Antoni et al., 2001) and “stress-related growth” (Park, Cohen, & Murch, 1996)

Although behavioral scientists have begun to study post-traumatic growth in patients with cancer, the process of the phenomenon is not well understood. Before researchers can understand the possible benefits of post-traumatic growth in this population, further study is warranted concerning the methods to measure growth in people diagnosed with cancer as well as the process of post-traumatic growth. The aims of the present study were to begin to highlight some of the current methodologic issues and address some of the questions regarding post-traumatic growth that remain unanswered: (a) Does post-traumatic growth vary with cancer type, and are the current instruments used to measure post-traumatic growth reliable in patients with cancer? (b) When in the process of being diagnosed and treated for cancer does post-traumatic growth occur? (c) Is post-traumatic growth more than just a coping strategy? If so, are changes observable to others? (d) Does concordance exist between qualitative and quantitative methods of assessing post-traumatic growth?

The authors chose to study post-traumatic growth in people diagnosed with hepatobiliary cancer for several reasons. First, hepatobiliary cancer has been reported to have among the highest incidences of distress of all cancer types (Zabora, Brintzenhofesoc, Curbow, Hooker, & Piantadosi, 2001). Nevertheless, little research has been conducted with this cancer type, despite its expected increase in the coming decade secondary to hepatitis C (McCance, 1998). Furthermore, this cancer type has a poor prognosis, with a three-year survival rate of 15% (American Cancer Society, 2007). As a result, the diagnosis of hepatobiliary cancer can be expected to be traumatic for some individuals. The authors also have a unique data set that includes longitudinal quantitative data and qualitative post-traumatic growth data from people diagnosed with hepatobiliary carcinoma, as well as quantitative data from caregivers concerning patient growth.

Literature Review

Reliability and Variability of the Post-Traumatic Growth Inventory Across Cancer Types

Post-traumatic growth has just begun to be studied in people diagnosed with cancer (Cordova et al., 2001; Fromm et al., 1996; Manne et al., 2004; McGregor et al., 2004; Sears et al., 2003; Stanton et al., 2002). However, no instruments that measure post-traumatic growth have been specifically developed and standardized for patients with cancer (Antoni et al., 2001). The most widely employed instrument has been the Post-Traumatic Growth Inventory (PTGI). The PTGI was developed and standardized with college students; therefore, its relevance for people diagnosed with cancer is unknown. Patients with cancer often are older and likely have experienced more life events than college students. Furthermore, different cancer types may result in different experiences of post-traumatic growth. Thus far, women with breast cancer (Cordova et al.) and patients undergoing bone marrow transplantation (Curbow, Somerfield, Baker, Wingard, & Legro, 1993) have been studied in regard to post-traumatic growth.

The Process of Post-Traumatic Growth

Studies addressing the process of post-traumatic growth are almost nonexistent (O'Leary, Alday, & Ickovics, 1998).

Some researchers theorize that post-traumatic growth is a result of a long recovery process (Fromm et al., 1996; Park et al., 1996; Tedeschi & Calhoun, 1995), whereas others suggest that post-traumatic growth occurs soon after a traumatic event (Affleck, Tennen, Croog, & Levine, 1987; Affleck, Tennen, & Gershman, 1985; Bower, Kemeny, Taylor, & Fahey, 1998; Frazier & Burnett, 1994; Frazier, Conlon, & Glaser, 2001; Thompson, 1985). Three studies have found relatively little change in post-traumatic growth over time (Affleck et al., 1987; McMillen, Smith, & Fisher, 1997; Thompson), whereas others have found reductions in post-traumatic growth over time (Davis, Nolen-Hoeksema, & Larson, 1998). Limitations of previous research include a lack of standardized instruments to assess post-traumatic growth and the cross-sectional design of most studies.

Post-Traumatic Growth as a Separate Construct

Although numerous definitions and terms are used to describe post-traumatic growth, little research has been conducted to elucidate the construct from patients' perspectives. Early in the study of post-traumatic growth, theorists such as Rothbaum, Weisz, and Snyder (1982) described the process as a "secondary control" appraisal that provided decreased distress when a person was confronted by uncontrollable challenges. Similarly, critics argue that post-traumatic growth may simply be a coping strategy such as cognitive reappraisal that does not translate into observable behavior changes beneficial for health. Some critics argue that patients may report positive changes as a result of their diagnoses based on the method with which post-traumatic growth is assessed (e.g., only querying patients about positive and not negative changes subsequent to diagnosis), resulting in socially desirable responses. However, several investigators have demonstrated that post-traumatic growth and social desirability are unrelated (Cohen, Hettler, & Pane, 1998; Sears et al., 2003; Tennen & Affleck, 1998).

Sears et al. (2003) found a distinction between positive reappraisal and post-traumatic growth and concluded that the two constructs had different predictors and outcomes even though the measures were correlated. Some critics still suggest that post-traumatic growth is only a cognitive process that has little to do with behavioral change. The present study will begin to explore the behavioral changes associated with post-traumatic growth that are absent from other studies.

Qualitative and Quantitative Methods of Assessing Post-Traumatic Growth

Earlier studies have involved primarily qualitative methods or single items to assess post-traumatic growth. Because of the variety of measures that have been employed, making definitive conclusions about post-traumatic growth is difficult. In the 1990s, several quantitative methods were developed, including the PTGI. However, many of the instruments that have been developed, including the PTGI, are positively skewed (i.e., only include items that reflect positive changes after a traumatic event). To gain a fuller picture of the process of post-traumatic growth, inclusion of positive and negative events associated with trauma is critical (Frazier & Burnett, 1994). A review by Linley and Joseph (2004) included studies using qualitative and quantitative methods; however, differences in regard to the approaches were not addressed in this review.

The objectives of the present study were to begin to highlight methodologic issues critical in understanding post-traumatic growth in people with cancer. Heretofore unexplored issues regarding measurement and design must be addressed prior to further research concerning the relationship of post-traumatic growth to psychological and physical health or benefits of psychosocial interventions.

Methods

Design

The study was a prospective, nonrandomized design that included patients diagnosed with biopsy-proven primary or metastatic hepatobiliary cancer. Patients were followed from diagnosis to death or until they were too ill to complete the battery of questionnaires. For the purposes of this report, data from diagnosis until six-month follow-up are presented.

Sample

One hundred and twenty patients and their family caregivers from the Liver Cancer Center at the University of Pittsburgh Medical Center were recruited at diagnosis for participation in the study. Patients were diagnosed with hepatobiliary cancer and treated with transarterial chemoembolization, hepatic arterial infusion of yttrium-90 microspheres (TheraSphere®, Theragenics Corporation), or surgical resection. To decrease risk to patients participating in the study, the researchers established the following exclusion criteria: (a) current suicidal ideation, (b) current psychosis, and (c) health so poor that the patient was unable to complete the questionnaires. The high rate of attrition at three months ($n = 37$ of 120) and six months ($n = 20$ of 120) was secondary to death and illness.

Instruments

The **Demographic and Disease-Specific Questionnaires** included items related to patient and caregiver age, gender, ethnicity, marital status, educational level, and occupation. Disease-specific information was obtained from the patients' medical records.

The **PTGI** (Tedeschi & Calhoun, 1996) is a 21-item instrument for assessing positive outcomes in people who have experienced traumatic events. The PTGI is comprised of five subscales (Relating to Others, New Possibilities, Personal Strength, Spiritual Change, Appreciation of Life) and a total post-traumatic growth score. Each participant was asked to respond to each of the 21 items on a six-point Likert-type scale: 0 = I did not experience this change as a result of the incident, 1 = I experienced this change to a very small degree as a result of the incident, 2 = I experienced this change to a small degree as a result of the incident, 3 = I experienced this change to a moderate degree as a result of this incident, 4 = I experienced this change to a great degree as a result of the incident, 5 = I experienced this change to a very great degree as a result of this incident. The instrument has been used widely across different populations and has demonstrated reliability and validity (Tedeschi & Calhoun, 1996). The possible range for each subscale is as follows: Relating to Others 0–35, New Possibilities 0–20, Personal Strength 0–30, Spiritual Change 0–10, and Appreciation of Life 0–10. The total score can range from 0–105. Higher scores reflect greater positive change or growth. Caregivers were administered the same

questionnaire but were asked about post-traumatic growth changes in their loved ones rather than themselves.

The qualitative data were gathered through self-report questionnaires in which patients had the opportunity to respond to a closed-ended question as well as elaborate in writing their responses. Patients were asked the following. Have you changed your life in any way as a result of being diagnosed with cancer? If yes, how? If a patient answered yes to the first question, he or she was asked: Did the way you changed happen mostly in the way you think, feel, or behave? If you have experienced a change, when did it occur? The qualitative questionnaire was administered first so that participants had the option to describe positive and negative changes as a result of their diagnoses of cancer.

The **Functional Assessment of Cancer Therapy–Hepatobiliary (FACT-Hep)** was used to assess changes in symptoms and side effects of treatment. The FACT-Hep is a combination of the FACT-General, a 27-item instrument that measures four dimensions of quality of life (Cella et al., 1993), and a module with 18 additional items specific for participants with hepatobiliary disease (Heffernan et al., 2002) that includes questions pertaining to symptoms of the disease as well as side effects of treatment. The FACT is one of the most widely used quality-of-life questionnaires in clinical trials for new cancer treatments, and the FACT-General and hepatobiliary module have been demonstrated to be valid and reliable (Cella et al.; Heffernan et al.).

The **Center for Epidemiological Studies–Depression (CES-D)** scale (Radloff, 1977) was employed to assess depressive symptoms. The CES-D provides a narrow-band index for the presence of depression and is a 20-item self-report questionnaire that queries patients regarding depressive symptoms in the prior seven days. Participants respond on four-point Likert scales (0 = rarely or none of the time [less than one day], 1 = some or a little of the time [one or two days], 2 = occasionally or a moderate amount of time [three or four days], and 3 = most or all of the time [five to seven days]). A score of 16 or greater suggests that an individual may be clinically depressed and should undergo further evaluation of depressive symptoms. The CES-D has been found to be reliable in measuring depression in breast cancer populations (Hann, Winter, & Jacobsen, 1999) and has been demonstrated to have adequate content validity (Okun, Stein, Bauman, & Silver, 1996).

Procedure

Institutional review board approval was obtained prior to commencement of the study. Oncologists approached patients who met the inclusion criteria to determine their interest in learning more about the purpose, risk, and benefits of the study. If a patient agreed to learn more, a clinical psychologist explained the study in detail and asked for the patient's informed consent. Upon receipt of written informed consent, the patient was asked to complete the battery of questionnaires. The quantitative questionnaires were administered to the patient at baseline, three months, and six months. Patients were asked to complete the qualitative questions at baseline, and caregivers completed the PTGI approximately three months after the patients' baseline assessments.

Data Analyses

Data were entered into an SPSS® 14 database, validated, and then analyzed. Descriptive statistics were used to describe

demographic and disease-specific variables. Cronbach alpha also was performed to test the internal consistency of the patient and caregiver versions of the questionnaire. One-way random interclass correlation coefficients were calculated between the patient and caregiver reports on each of the PTGI scales. Analysis of variance (ANOVA) was performed to assess the relationship between post-traumatic growth and health-related quality of life. Content analysis was employed to explain responses to the qualitative questions. Based on the qualitative responses to the items, patients were divided into three groups: those who reported positive and negative changes as a result of cancer (i.e., post-traumatic growth), those who reported negative changes only, and those who reported no changes. Subjects in the three categories were analyzed in regard to their mean total PTGI scores. The qualitative and quantitative items were compared by two independent raters to determine whether the qualitative responses matched any of the items included in the PTGI. Ninety-six percent inter-rater reliability was achieved between two separate raters. Items not included on the PTGI then were identified, and the two independent raters developed categories in which the items could be included.

Results

Sample

Seventy-four percent of the patients were male. The mean age of the patients was 63 years, with a range from 30–86 years. Ninety-one percent of the sample was Caucasian. The majority of the sample (65%) was treated with chemoembolization; 30% had received hepatic arterial infusion of 90-yttrium. Sixty percent of the sample had cirrhosis, and patients had an average tumor size of 6.8 cm. Thirty percent of patients had more than five lesions as detected by computed tomography scans. Thirty-seven percent had vascular invasion (see Table 1). Because of the advanced stage at which primary and metastatic colorectal and neuroendocrine carcinomas often present, the patients had a median survival of approximately eight months.

Reliability and Variability of the Post-Traumatic Growth Inventory Across Cancer Types

The mean total PTGI score at diagnosis for patients was 51 (SD = 28), which is lower than the mean in other studies of patients with breast cancer (\bar{X} = 60) (Cordova et al., 2001) or college students and the general population (\bar{X} = 75) (Tedeschi & Calhoun, 1996) (see Table 2). The Personal Strength subscale was significantly positively associated with age ($F[1,86] = 1.7, p = 0.04$) at diagnosis, and Appreciation for Life was negatively associated with age ($F[1,35] = 3.0, p = 0.03$) at three months. No significant differences in gender were found in the current sample; however, women tended to report higher levels of Spirituality ($F[1,88] = 2.5, p = 0.09$) and Appreciation for Life ($F[1,88] = 2.9, p = 0.06$) when compared to men at diagnosis.

The PTGI had adequate internal consistency (Cronbach alpha > 0.70) on all of the scales at each time point. The patients' PTGI scores had a Cronbach alpha of 0.82–0.96 at diagnosis, 0.70–0.96 at three months, and 0.76–0.97 at six months. The caregivers' assessments also had adequate internal consistency, with Cronbach alphas ranging from 0.79–0.96 at three months (see Table 3).

Table 1. Demographic and Disease-Specific Characteristics

Characteristic	\bar{X}	Range
Age (years)	63.0	30–86
Characteristic	n	%
Gender		
Male	89	74
Female	31	26
Ethnicity		
Caucasian	109	91
African American	8	7
Asian American	3	2
Diagnosis^a		
Hepatocellular carcinoma	85	71
Colorectal cancer with liver metastases	13	11
Cholangiocarcinoma	11	9
Neuroendocrine carcinoma	5	4
Vascular invasion		
Yes	44	37
No	76	63

^a Diagnostic data were available on 114 patients.

N = 120

The Stability and Process of Post-Traumatic Growth

To assess test-retest reliability, researchers conducted one-way intraclass correlations, and all of the scales were significantly correlated with coefficients ranging from 0.70–0.91. The correlation coefficients for Relating to Others ($\kappa = 0.90, p < 0.001$), New Possibilities ($\kappa = 0.67, p = 0.01$), Personal Strength ($\kappa = 0.62, p < 0.01$), Spirituality ($\kappa = 0.94, p < 0.001$), Appreciation for Life ($\kappa = 0.74, p < 0.001$), and overall PTGI score ($\kappa = 0.87, p < 0.001$) from baseline to three months were adequate. Similar reliability was found for the PTGI subscales from baseline to six months and three to six months. See Table 4 for a complete listing.

The qualitative data were categorized according to whether the patient reported (a) positive and negative changes, (b) negative changes only, or (c) no changes subsequent to a diagnosis of cancer. Participants who reported negative changes only or no changes at diagnosis had increases in scores over time on the PTGI (see Figure 1).

Qualitatively, 70% of patients reported positive and negative changes occurring at the time of diagnosis of primary lung cancer or metastatic disease. Nineteen percent reported the changes when they (experienced symptoms), 5% when they went for their first treatments, 3% when they were diagnosed with hepatitis (prior to diagnosis of cancer), and 3% when they “realized their mortality.”

Post-Traumatic Growth as a Separate Construct

Prior research has suggested that post-traumatic growth may only be cognitive reappraisal. As a result, the researchers were interested in testing whether the changes reported by the patients were observable by others, providing some basis that post-traumatic growth was separate from a coping strategy used by patients and perhaps manifested behaviorally. Patient and caregiver reports of patient growth were compared with one-way random intraclass correlations.

Table 2. Post-Traumatic Growth Inventory Scores

Scale	Patients at Baseline (N = 120)		Patients at Three Months (n = 37)		Patients at Six Months (n = 20)		Caregivers at Three Months (n = 40)	
	\bar{X}	SD	\bar{X}	SD	\bar{X}	SD	\bar{X}	SD
Relating to Others	20	10	18	11	18	10	18	10
New Possibilities	8	7	7	6	7	5	8	6
Personal Strength	10	6	9	6	9	6	9	5
Spirituality	5	4	4	4	4	4	4	3
Appreciation for Life	9	4	8	4	9	4	8	4
Total score	51	28	46	27	47	26	47	25

Agreements between patients and family caregivers were all significant. See Table 5 for kappa coefficients for the patients' and caregivers' reports of patient post-traumatic growth at diagnosis, three months, and six months.

Qualitative and Quantitative Methods of Assessing Post-Traumatic Growth

Using the three qualitative items assessing positive and negative changes resulting from cancer diagnosis, the researchers found that the PTGI captures many of the areas of change patients reported as a result of cancer diagnosis. However, patients reported additional areas of growth that were not included on the PTGI, the most frequently reported being changes in health behaviors (e.g., smoking, drinking, diet). The other areas patients listed that are not reflected on the PTGI were changes in the meaning or philosophy of life. Patients reported, for example, "appreciating the simple things in life," "meaning of life has changed," and "learned how little material things mean."

Further qualitative research should be performed to determine whether additional items would be appropriate to add to the measurement for post-traumatic growth in patients with cancer.

Association Between Post-Traumatic Growth and Health and Mental Health Outcomes

Using ANOVA, the researchers found that total and subscale scores of the PTGI were not associated with health-related quality of life as measured by the FACT-Hep module or with depressive symptoms as measured by the CES-D. However, the qualitative reports of post-traumatic growth were found to be associated with health-related quality of life as well as depressive symptoms. However, using ANOVA to test differences across three groups of patients (positive and negative changes, only negative changes, or no positive or negative changes as a result of cancer), patients who reported both positive and negative changes after diagnosis reported poorer physical well-being, ($F[1,33] = 3.9$, $p = 0.03$), poorer overall quality of life ($F[1,32] = 3.4$, $p = -0.05$), and higher CES-D scores ($F[1,23] = 3.6$, $p = 0.04$) than the patients who reported only negative changes or no changes.

Discussion

The aims of this study were to highlight some of the issues associated with measuring post-traumatic growth in people diagnosed with cancer. Before researchers test whether post-traumatic growth has psychological or health outcomes, they need to understand whether the current instruments are appropriate for use with patients with cancer, whether differences exist among cancer types, how the timing of assess-

ment affects the report of post-traumatic growth, and whether changes in post-traumatic growth are observable to others.

Reliability and Variability of the Post-Traumatic Growth Inventory Across Cancer Types

In the present study, the PTGI was found to have good internal consistency (> 0.70) at all time points. For people diagnosed with hepatobiliary carcinoma, the mean score for the overall PTGI was lower than for the general population and women diagnosed with breast cancer (Cordova et al., 2001; Tedeschi & Calhoun, 1996). The lower mean score may be secondary to the fact that most of the participants in the current study were men (69%) and males generally report lower levels of post-traumatic growth than females (Tedeschi & Calhoun, 1996). However, when the researchers tested gender differences, they found no significant differences between males and females and mean PTGI scores in the sample.

Some researchers argue that the more severe the traumatic event, the greater the post-traumatic growth (Tedeschi & Calhoun, 1996). Many would argue that a diagnosis of hepatobiliary carcinoma may present as a more "severe" trauma than a diagnosis of breast cancer because of its poor prognosis. Perhaps people with hepatobiliary carcinoma have such a poor prognosis that it dampens the process of post-traumatic growth. Maybe past studies measured post-traumatic growth later in the course of illness in patients with breast cancer and therefore the patients had more time to experience post-traumatic growth. Prior research also has found that stage of cancer is associated with post-traumatic growth in a curvilinear fashion, with patients with stage I and IV cancer reporting less post-traumatic growth when compared to patients with stage II or III cancer (Lechner et al., 2003). This may account for the relatively low scores found in patients with hepatobiliary carcinoma because the sample included patients diagnosed with advanced cancer (e.g., stage III and IV).

Table 3. Cronbach Alphas for Patients at Three Time Points and Caregivers

Scale	Patients at Baseline (N = 120)	Patients at Three Months (n = 37)	Patients at Six Months (n = 20)	Caregivers at Three Months (n = 40)
Relating to Others	0.93	0.94	0.93	0.95
New Possibilities	0.87	0.82	0.82	0.86
Personal Strength	0.82	0.86	0.93	0.86
Spirituality	0.84	0.84	0.97	0.92
Appreciation for Life	0.82	0.70	0.76	0.79
Total score	0.96	0.96	0.97	0.96

Table 4. One-Way Random Interclass Correlations of Post-Traumatic Growth Over Time

Scale	Baseline and Three Months		Baseline and Six Months		Three and Six Months	
	Kappa	95% CI	Kappa	95% CI	Kappa	95% CI
Relating to Others	0.88***	0.77–0.94	0.77***	0.45–0.92	0.90***	0.71–0.96
New Possibilities	0.63**	0.29–0.82	0.62*	0.08–0.86	0.67**	0.23–0.88
Personal Strength	0.91***	0.83–0.96	0.34	–0.59–0.76	0.62**	0.06–0.86
Spirituality	0.87***	0.75–0.93	0.82***	0.56–0.93	0.94***	0.86–0.98
Appreciation for Life	0.70***	0.42–0.85	0.58*	–0.09–0.85	0.74***	0.39–0.90
Total score	0.92*	0.84–0.96	0.71**	0.28–0.90	0.87***	0.70–0.95

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

CI—confidence interval

The qualitative data collected as part of this study underscore the need to revise the PTGI or develop a cancer-specific post-traumatic growth measurement that includes items related to health behaviors as well as philosophy and meaning of life. Further qualitative research is needed to explore additional areas of growth or positive change that patients experience as a result of cancer diagnosis. Because currently available instruments to measure post-traumatic growth have not been developed or validated with people with cancer, their relevance is unknown.

The Process of Post-Traumatic Growth

The qualitative and quantitative results suggest that post-traumatic growth occurs early in the process of diagnosis and treatment for hepatobiliary carcinoma. Consistent with previous research concerning post-traumatic growth (Tedeschi & Calhoun, 1995), 50% of patients reported no change or negative changes as a result of cancer diagnosis. Several other researchers have observed similar rates of change (e.g., 60%–90% of patients reported positive changes as a result of a diagnosis of cancer) (Fromm et al., 1996; Petrie, Buick, Weinman, & Booth, 1999).

To truly understand the process of post-traumatic growth, researchers must allow patients the option to report no change or only negative changes, otherwise post-traumatic growth may be overrepresented when participants are forced to answer questionnaires that only provide positively skewed items (Tomich & Helgeson, 2004).

In regard to the quantitative results, PTGI scale scores were the highest at the time of diagnosis for all scales, and all scales decreased slightly at three and six months, with the exception of Appreciation for Life, which returned to baseline. All other subscales and time points (baseline to three months, three months to six months, and baseline to six months) were significantly correlated, suggesting that post-traumatic growth occurs primarily at the time of diagnosis and is a stable construct once it occurs in patients diagnosed with hepatobiliary carcinoma.

Most patients who were assessed at diagnosis had already learned of their diagnoses from evaluations performed at other clinics or presented to the authors' center with a strong suspicion of cancer based on liver function tests or radiologic findings reported by their family physicians or hepatologists. Although the first visit at the authors' center was either con-

firmatory or a second opinion, many of the patients had been aware of their diagnoses for one to eight weeks prior. The results reported in this article are consistent with other studies that reported post-traumatic growth occurring soon after the traumatic event (Affleck et al., 1985, 1987; Frazier & Burnett, 1994; Frazier et al., 2001; Manne et al., 2004; McMillen et al., 1997; Thompson, 1985).

Post-Traumatic Growth as a Separate Construct

The results of the present study confirm previous findings in that post-traumatic growth is likely conceptually different from positive reappraisal and

that observable changes occur in people who report post-traumatic growth. Sears et al. (2003) reported that although positive reappraisal was associated with post-traumatic growth after a diagnosis of cancer, the constructs were different based on the findings that the predictors and outcomes of the two constructs were different. In the present study, a robust relationship between the patients' and caregivers' scores on the PTGI was found for all scales, at baseline and three months. The results suggest that the changes patients report are observable to others and likely more than coping or cognitive reappraisal. The results of the present study are similar to those reported by Park et al. (1996) and Weiss (2002), who found that family members', friends', husbands', and wives' scores of post-traumatic growth corroborated.

Qualitative and Quantitative Methods of Assessing Post-Traumatic Growth

Patients who reported positive changes on the qualitative items had greater agreement with their family caregivers than those who reported no changes or negative changes only. Although few differences existed in regard to changes in post-traumatic growth scores among the three subgroups of patients (i.e., positive changes, negative changes, and no

Health Behaviors (New)

I stopped drinking alcoholic beverages.
I changed my diet.
I stopped smoking.

Coping Strategies (New)

I try and live day to day.
I gave God control of the situation.
I feel calmer.
I have great peace of mind.
I am taking life more seriously.

Relating to Others (Addition)

I want to be around others.
I am more tolerant of others.
I am more appreciative of my family.

Appreciation of Life (Addition)

I appreciate the simple things in life. The meaning of my life has changed. I treasure every moment more. I don't take anything for granted. I have found how little material things mean.

Spirituality (Addition)

I am praying more.
I am attending church more frequently.
I appreciate each day God gives me.

Figure 1. Examples of Positive Changes That Were Not Included in the Post-Traumatic Growth Index

Table 5. One-Way Random Interclass Correlations (95% Confidence Intervals) of Patient and Caregiver Reports of Patient Post-Traumatic Growth Over Time

Scale	Patients at Baseline, Caregivers at Three Months (N = 37)		Patients at Three Months, Caregivers at Three Months (N = 20)	
	Kappa	95% CI	Kappa	95% CI
Relating to Others	0.67***	0.35–0.84	0.66*	0.10–0.89
New Possibilities	0.67***	0.35–0.84	0.32	–0.77–0.78
Personal Strength	0.64**	0.31–0.83	0.62*	–0.08–0.87
Spirituality	0.74***	0.49–0.87	0.60*	–0.09–0.86
Appreciation for Life	0.74***	0.46–0.87	0.60*	–0.08–0.86
Total score	0.67***	0.35–0.84	0.62*	–0.07–0.89

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

CI—confidence interval

changes), reports of post-traumatic growth using qualitative and quantitative methods in the current sample were quite similar. Many of the patients reported positive changes that were not reflected on the PTGI. The PTGI should be expanded, or a new instrument developed, to reflect health behavior changes that many patients report after cancer diagnosis.

Future research concerning post-traumatic growth in this population as well as others should assess for previous traumatic life events and changes that may have occurred previous to the event under study. Some participants in the current study reported that they already had experienced post-traumatic

growth and, as a result, had no change. The PTGI does not differentiate between changes that already occurred as a result of other life events. Future research also should address maintenance of post-traumatic growth over time, particularly if it is associated with psychological or health outcomes.

The study of post-traumatic growth has important clinical implications. Many therapists tend to focus on the consequences of a traumatic event and ignore or downplay the possible benefits of traumatic experiences and miss opportunities to facilitate behavioral change. Resilience is an important aspect of recovering from traumatic life events; gaining a better understanding of the predictors of post-traumatic growth as well as how resilience may be facilitated, if possible, should be explored further. However, positive change should not always be expected as a result of a chronic illness.

The present study had several limitations, the small sample size the most significant, particularly at three and six months. Although the PTGI was used with this sample, further research is warranted that may include a revision of the PTGI or the development of a questionnaire specifically designed for measuring post-traumatic growth in people diagnosed with cancer. Once an instrument has been developed, research can examine the process and psychological and health correlates of post-traumatic growth. The aims of the present study were not to provide answers to those questions but rather to highlight the need for future research and caution researchers about studying a construct without measures that appropriately address the construct and with a lack of understanding of the process of post-traumatic growth.

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