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## Temporal Comparisons and the Perception of Posttraumatic Growth in Early Stage Cancer Patients

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Temporal Comparisons and the Perception of Posttraumatic Growth  
in Early Stage Cancer Patients

by

Sean Ransom

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
Department of Psychology  
College of Arts and Sciences  
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Dedication

To Elena.

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ABSTRACT

Like others who endure serious stressors, cancer patients often report personal growth as a result of their illness, a phenomenon termed "posttraumatic growth." Although researchers often accept these reports as valid, temporal comparison theory suggests that people may overestimate such growth. According to the theory, remembering the past self as less positive than the present self may serve as an illusory self-enhancement process that allows one to see continual personal growth. Thus, reports of posttraumatic growth may represent perceived rather than actual change in the self. To test this possibility, we prospectively examined 88 individuals with early stage breast (Stage 0, I or II) or prostate (Stage I or II) cancer. Patients completed measures of positive attributes and personal meaning prior to radiation treatment (Time 1) and again following radiation treatment (Time 2). At Time 2, participants were also asked to recreate their Time 1 responses (Recalled Time 1). Difference scores between Time 1 and Time 2 were generated to represent actual change, and between Recalled Time 1 and Time 2 to represent perceived change. Over the three assessments, ratings of personal meaning showed no change. Ratings of positive attributes showed actual positive change,  $F(1, 85) = 12.88, p = .0006$ . Patients, however, did not perceive themselves as changing,  $F(1, 85) = 3.34, p = n.s.$  Recalled Time 1 ratings significantly overestimated actual Time 1 ratings,  $F(1, 85) = 4.91, p = .03$ . Posttraumatic growth was not correlated with actual change,  $r = .12, n.s.$ , but was significantly correlated with perceived change,  $r = .27, p = .01$ . Findings suggest that self-reported posttraumatic growth may reflect perceived rather than actual change over time. In this sample, self-reported posttraumatic growth may have underestimated change since perceived change was less than actual change observed in patients' responses. In addition, results suggest that these patients had a strong bias to perceive stability in the self-concept even when change was taking place, a result that contradicts previous research on temporal self-comparisons.

## Chapter One

### Overview

Although there has been a long history in psychology of research on mental illness, negative emotion, and maladaptive coping, relatively little is known about positive human functioning (Seligman & Csikszentmihalyi, 2000). Recently, however, a growing number of social scientists have turned to fill this gap (Seligman, 2002). This trend includes efforts to understand how people thrive despite unusually stressful events, such as medical illness.

In the 1990s, Tedeschi and Calhoun (1996) hypothesized a construct termed posttraumatic growth (PTG) that describes how individuals perceive lasting positive change following unusually stressful events. Research in PTG indicates that a majority of people suffering significant stressors perceive positive personal change as a result of the stressor (e.g. Sears, Stanton & Danoff-Burg, 2003), including better interpersonal relationships, greater spirituality, a positively changed life philosophy, positively changed priorities, and a greater sense of personal strength (Tedeschi & Calhoun, 1996; Thornton, 2002). This construct has significant conceptual overlap with other similar hypothesized constructs such as benefit finding (e.g., Antoni et al., 2001) and positive reappraisal coping (e.g., Carver, Scheier, & Weintraub, 1989), and there is some confusion as to whether and how these constructs differ (see Sears et al., 2003). For the sake of convenience in this study, PTG will refer to the perception that one has gained positive changes in the self from an otherwise aversive experience.

A large number of studies related to PTG have focused on medical populations, including patients with AIDS (Milam, 2004), cancer (Thornton, 2002), rheumatoid arthritis (Tennen, Affleck, Urrows, Higgins & Mendola., 1992) and cardiac problems (Affleck, Tennen, Croog, & Levine, 1987). Cancer has been the focus of a majority of health-related PTG studies. Evidence suggests that most cancer patients experience PTG (Thornton, 2002), a repeated finding that has prompted Sears and her colleagues to

speculate that the ability to perceive positive outcomes from difficulty “may be a relatively ‘easy,’ natural process for most who confront cancer” (2003, p. 487).

It is unclear, however, whether PTG reflects actual, permanent positive change in an individual’s behavior, thoughts, and/or attitudes as described in Tedeschi and Calhoun’s (1996) original conceptualization. A few longitudinal studies of PTG have been published (e.g., Manne et al., 2004; Milam, 2004; Sears et al., 2003; see also Tennen & Affleck, 2002), but none of these studies were able to gain pre-stressor data. In addition, these studies have not compared self-reported PTG with other measures of growth. Most of the literature on PTG relies on cross-sectional data, and nearly all relies on retrospective self-report of the person undergoing the stress (e.g., Powell, et al., 2003). Retrospective self-reports, such as those used in most PTG studies, may often be inaccurate and subject to subtle cognitive biases, particularly when such reports refer to past personal attributes or behaviors (Greenwald, 1980; Neisser, 1994; Ross, 1989).

The absence of a prospective literature that correlates objective growth measures with self-reported PTG has led some to speculate that PTG is an illusory phenomenon (e.g., McFarland & Alvaro, 2000; Tennen & Affleck, 1998; Thornton, 2002). Indeed, research derived from temporal self-appraisal theory (Ross & Wilson, 2002; Wilson & Ross, 2000, 2001) suggests that individuals have a strong tendency to perceive growth in their positive personal attributes in any circumstance. This tendency to perceive growth holds true even when objective evidence of growth is absent (Wilson & Ross, 2001). This perception of growth is generated and maintained as individuals become less enthralled with the remembered version of the self – they tend to underestimate their past ratings of previously held positive attributes, a process called “temporal derogation” (Wilson & Ross, 2001). This derogation of one’s previously held positive attributes can lead to a perception that one has improved even when one’s standing has not changed (Ross, 1989).

In a study of university students, McFarland and Alvaro (2000) extended temporal self-appraisal theory into concepts related to PTG. In a series of four experiments, these researchers found that university students who were randomly assigned to recall severe stressors rated the attributes of their pre-stressor self less positively than did those who were assigned to remember less severe stressors. In addition, these

findings held true when students were randomized to groups who were assigned to think of previous life stressors of differing severity. The researchers also found that the temporal derogation of one's previous attributes was related to mood. Those who derogated the most strongly were those who felt most unhappy after thinking about their stressor, but these participants also experienced the most increase in mood after derogating. An increase in mood that follows greater derogation may indicate that, like other positive illusions (e.g., Taylor & Brown, 1988), temporal derogation may serve as a self-enhancement mechanism that reduces perceived threat.

The degree to which someone underreports their previous personal standing may be related to implicit theories of change that a person holds (Ross, 1989). When a person supposes that great change must have occurred during the intervening time period, that person may then reconstruct a remembered past self that is less positive than the person would have originally indicated, which thus contributes to a perception of intervening growth. This phenomenon was observed in a study of university students who undertook a study skills training class (Conway & Ross, 1984). Following the class, students misremembered their earlier study skills, remembering them as worse than they had originally reported. Contacted six months later, these same students remembered receiving higher grades during the semester they took the skills class than they actually did. Students assigned to a wait-list control did not show such biases. Ironically, these biases were evident even though a follow-up analysis showed no difference in the academic performance of students who took the class compared to those who had not. Conway and Ross interpreted the students' biases as arising from the internal theory that the class must have caused personal change to occur, therefore, these students believed that study skills and grades must have been affected and constructed their memories to reflect this belief.

Cultural theories of positive change following stressful events certainly exist, as evidenced by Nietzsche's famous maxim, "Whatever doesn't kill me makes me stronger" (1895/1977). The prevalence of PTG in samples of cancer patients may itself be an indication of the cultural beliefs of the positive effects of adversity that may be internalized as an implicit theory of positive change. Although PTG is theorized to increase as the trauma-level of the stressor increases (e.g., Powell et al., 2003; Tedeschi & Calhoun, 1996), cancer diagnosis and treatment, especially when the disease is in its early-stages, may not be as traumatic as

other conditions such as sexual assault and combat exposure (Thornton, 2002). Although the diagnosis is at times acutely distressing (e.g., Stark et al., 2002), severe psychological and quality of life problems subsequent to cancer diagnosis are unusual (e.g., Antoni et al., 2001; Omne-Pontén, Holmberg & Sjöden, 1994; Stark et al., 2002) and levels of distress are not often elevated compared to healthy control groups (e.g., Andrykowski et al, 1996). Likewise, posttraumatic stress symptoms are not common in early-stage cancer patients (Cordova et al., 1995).

Self-enhancement motivations and culturally invoked theories of change following cancer may both add to the amount of temporal derogation that a person may engage in when remembering the past self during threat. According to temporal comparison theory (e.g., Ross & Buehler, 2001; Ross & Wilson, 2002; Wilson & Ross, 2001) such reconstructions of the past self in memory leave room for self-serving errors that function in the same way as other so-called “positive illusions” (Taylor & Brown, 1988), cognitive distortions used to maintain positive psychological adjustment. Taylor and Brown (1988) argue that these positive illusions lead to mental health because they contribute to feelings of well-being, increase optimism in one’s choices and future path, elevate confidence in one’s abilities, and otherwise promote positive self-regard, all of which have been associated with positive psychological outcomes (Mischel, 1979; Taylor & Brown, 1988). These positive illusions have been found to increase with threat, such as cancer (Taylor, 1983; Taylor & Armor, 1996), and are associated with positive psychological adjustment to the disease (Taylor & Armor, 1996; Taylor, Lichtman & Wood, 1984; Wood, Taylor & Lichtman, 1985).

Numerous psychological factors may influence the extent to which an individual makes use of positive illusions. People with low self-esteem and depression are less likely to invoke such cognitive biases (Ross & Wilson, 2002; Suls, Lemos & Stewart, 2002), whereas those with high self-esteem may be more motivated to do so (Crocker & Schwartz, 1985; Crocker, Thompson, McGraw & Ingerman, 1987; Thompson & Crocker, 1990; McAllister, Baker, Mannes, Stewart & Sutherland, 2002; Ross & Wilson, 2002). Some researchers (e.g., Taylor & Brown, 1988) have equated self-enhancing illusions with a trait-like optimistic bias hallmarked by a tendency toward hopeful expectancies. In turn, dispositional optimism has been found to be related to depression (Marshall & Lang, 1990; Scheier, Carver & Bridges, 1995), positive mood (Weinglert & Rosen, 1995), and self-esteem (Montgomery, Haemmerlie & Ray, 2003), and

may therefore play a role in self-enhancing positive illusions such as self-enhancing temporal comparisons. If perceptions of growth following affliction are partly influenced by derogation of the past, then dispositional optimism, self-esteem, and implicit theories about the positive effects of cancer may influence the degree to which growth is perceived.

From a clinical perspective, understanding the processes of post-traumatic growth could help clinicians assist people who have suffered a significantly stressful event. Psychologists have written manuals to facilitate posttraumatic growth (e.g. Calhoun & Tedeschi, 1999), even though the basic mechanisms behind self-reports of posttraumatic growth are yet unclear. It is natural that clinicians are interested in posttraumatic growth and related concepts such as benefit finding since these constructs have been found to be associated with greater quality of life (Andrykowski et al., 1996) , greater optimism (Antoni et al., 2001), and less depression (Antoni et al., 2001) following aversive events. If posttraumatic growth is largely psychological, however, facilitating it in a client would necessitate a different clinical perspective than if posttraumatic growth were more related to behavioral change (e.g., spending more time with family).

The goal of this study, therefore, was to determine whether the perception of personal growth subsequent to cancer could be described as a positive illusion generated by temporal self-appraisal processes. Because dispositional optimism, self-esteem, and one's implicit theories of cancer-related growth were hypothesized to associate with both perceptions of growth and temporal derogation, a secondary goal of this study was to determine whether the amount of temporal derogation will mediate the relationships of these variables to PTG.

#### *Rationale and Aims*

The primary aim of this study was to determine whether cancer patients derogate their status on past positive attributes and whether this derogation is related to the amount of self-reported post-traumatic growth. Recent research indicates that the relative derogation of the past self is a common cognitive bias that serves to boost self-esteem and enhance current feelings of growth. Literature reviews indicate that no study has examined how temporal comparisons may influence reports of PTG associated with the concurrent experience of an actual stressful circumstance such cancer treatment. Likewise, no study has

attempted to analyze whether the amount of temporal derogation is able to predict the amount of perceived post-traumatic growth as measured by the PTGI.

A second aim of this study was to determine whether there are actual improvements in patients' self-evaluations over time. Recent literature currently disagrees about the nature of self-reported feelings of growth that arise subsequent to stress. Although some argue that self-reports of stress-related growth reflect legitimate positive change, others assert that such feelings reflect positive cognitive biases recruited for coping purposes and may not reflect actual personal improvement. Although we did not expect to find improvement in individuals' self-reported attribute ratings over time, we tested the hypothesis that the stress of cancer treatment would result in an increase in individuals' ratings of positive personal attributes over time.

A third aim of this study was to identify psychological factors that may influence both the amount of temporal derogation and self-reported post-traumatic growth. Several psychological factors – including dispositional optimism, self-esteem, and implicit theories of growth – were theorized to affect the positive cognitive biases involved with temporal comparisons, as well as perceptions of growth.

Several studies have indicated that optimism is highly related to perceptions of personal growth following stressful events (e.g., Curbow, Somerfield, Baker, Winegard & Legro, 1993; Fontaine, Manstead & Wagner, 1993; Scheier & Carver, 1985; Tennen et al., 1992), but Tennen and Affleck (1998) point out that most of these studies used an older version of the Life Orientation Test (LOT, Scheier & Carver, 1985) that had items that appeared to measure a tendency to find benefit when afflicted. Although the revised version of the LOT (LOT-R; Scheier, Carver & Bridges, 1994) largely eliminated these items, previous use of the LOT raises questions about previous findings of a relationship between optimism and perceived growth equivocal. The relationship of dispositional optimism and PTG, therefore, is still in question.

Self-esteem has a close relationship with a tendency to self-enhance and thus may be related with self-enhancing temporal comparisons. Numerous researchers have indicated that individuals suffer from compromised self-esteem during stressful events, including cancer treatment, and make downward comparisons to bolster this self-esteem (Taylor & Armor, 1996; Wills, 1981). Because temporal comparisons typically involve comparing oneself with a less favorable past version of the self, temporal

comparisons are overwhelmingly downward comparisons (Wilson & Ross, 2000). However, individuals with chronically low self-esteem may not be as prone to use downward comparison strategies, including temporal derogation, which tend to reduce negative affect (Wills, 1981). Although no research has examined the effects of self-esteem on temporal derogation, individuals high in depression, which is marked by lowered self-esteem, are less prone to avail themselves of positive cognitive biases, generally (Taylor & Armor, 1996).

Finally, McFarland, Ross and Decourville (1989) found that people's implicit theories of how they change over time influence their recollection of their past status. Although Wilson and Ross (2000) offered evidence that implicit theories of change do not account for all of the self-enhancement effects of temporal comparisons, Winters (2003) found that cancer patients who expected growth to occur during their treatment for cancer were much more likely to score higher on a scale measuring PTG after bone marrow transplant.

The study aims were addressed by assessing early-stage cancer patients' perceived standing on a variety of personal attributes at two times – before (Time 1) and after (Time 2) a course of radiotherapy. In addition, at the second assessment, patients were asked to recall the ratings they made on their personal attributes at the Time 1 assessment in order to measure temporal derogation (Recalled Time 1). At both assessments, participants were asked to fill out measures of their implicit theories of cancer-related growth. At the Time 2 assessment, participants were asked to fill out additional questionnaires to assess dispositional optimism, self-esteem and post-traumatic growth.

### *Hypotheses*

The first set of hypotheses (1-2b) refer to changes in participants' perceived standing on positive attributes and personal meaning over three assessments (i.e., Time 1, Time 1, Recalled Time 1).

*Hypothesis 1* - A significant difference will be found between patients' Time 1 reports of their positive attributes and personal meaning and their Recalled Time 1 reports of these same characteristics, such that the recollections will underestimate (i.e., derogate) the actual Time 1 ratings. (This outcome variable termed "derogation" or "biased recall.")

*Hypothesis 2a* - There will be a significant, positive change over time in patients' current reports of positive attributes and personal meaning such that Time 2 ratings will be higher than Time 1 ratings. (Not expected.) (This outcome variable termed "actual growth.")

*Hypothesis 2b* - There will be a significant difference between patients' Time 2 reports of positive attributes and personal meaning and their Recalled Time 1 reports, such that Time 2 ratings will be higher than Recalled Time 1 ratings. (This outcome variable termed "perceived growth.")

The second set of hypotheses (3-6) refer to variables measured at Time 2 that are expected to be related to derogation of Time 1 positive attributes (i.e., difference between Time 1 and Recalled Time 1 ratings).

*Hypothesis 3* - The amount of derogation of Time 1 status will be significantly positively related to reports of post-traumatic growth at Time 2, such that greater derogation will be related to reports of greater perceived post-traumatic growth.

*Hypothesis 4* - The amount of derogation of Time 1 status will be significantly positively related to dispositional optimism at Time 2 such that greater amounts of derogation will be related to more dispositional optimism.

*Hypothesis 5* - The amount of derogation of Time 1 status will be significantly positively related to implicit theories of cancer-related change at Time 2, such that greater derogation will be related to stronger implicit theories of change.

*Hypothesis 6* - The amount of derogation of Time 1 status will be significantly positively related to self-esteem at Time 2, such that greater derogation will be related to higher self-esteem.

The third set of hypotheses (7-9) refer to variables measured at Time 2 that are expected to be related to perceived post-traumatic growth at Time 2.

*Hypothesis 7* - The amount of post-traumatic growth at Time 2 will be significantly positively related to dispositional optimism at Time 2 such that greater amounts of post-traumatic growth will be related to greater dispositional optimism.

*Hypothesis 8* - The amount of post-traumatic growth at Time 2 will be significantly positively related to implicit theories of cancer-related change at Time 2, such that greater derogation will be related to stronger implicit theories of change.

*Hypothesis 9* - The amount of post-traumatic growth at Time 2 will be significantly positively related to self-esteem at Time 2, such that greater derogation will be related to higher self-esteem.

Depending upon the results of hypothesis testing, exploratory analyses will be undertaken to determine the extent that differences in derogation mediate any discovered relationships of psychosocial variables to PTG at Time 2.

## Chapter Two

### *Participants*

Participants were male and female patients scheduled for radiotherapy at the H. Lee Moffitt Cancer Center (HLMCC) and the James A. Haley VA Hospital (JAHVAH), both in Tampa, FL. Female patients were diagnosed with Stage 0, I, or II breast cancer and male patients were diagnosed with Stage I or II prostate cancer. All patients also met the following eligibility criteria: 1) no history of cancer other than basal cell skin carcinoma; 2) scheduled to begin radiotherapy for treatment of their cancer; 3) greater than 18 years of age; 4) able to read and speak English; 5) at least a sixth grade education; 6) willing and able to provide informed consent.

### *Procedure*

Participants were screened for eligibility using computerized medical databases and were identified through face-to-face contact at HLMCC and JAVAH clinics. During the first contact, those individuals willing to participate signed an informed consent form (see Appendix A) and were asked to complete the first assessment. Participants could choose to complete the assessment at the clinic or take it home and return it by mail before their radiation therapy was to begin. Upon completion of radiotherapy (approximately six weeks later), participants were given or mailed a second assessment and asked to complete the assessment at the clinic or return it by mail.

### *Measures*

The first assessment used the following self-report questionnaires (see Appendix B):

*Demographics and medical information form:* A self-report form was used gather data on age, gender, ethnicity, race, education, marital status, employment, household income, and place of domicile during treatment.

*Implicit Theories of Change Scale (ITCS)* – The ITCS is a 10-item questionnaire that assesses participants' beliefs about the amount of change a cancer patient typically experiences as a result of the

disease. Beliefs about both positive and negative changes are assessed. The measure uses a 1 (*Strongly Disagree*) to 5 (*Strongly Agree*) scale. Although the scale has had little psychometric testing, one study found that the five positive questions on the scale correlate highly with self-reports of growth after cancer (Winters, 2003). In the current study, the positive items had acceptable internal consistency (alphas = .72 - .82 over two replications) but the five items related to negative changes due to cancer did not (alphas = .54 - .58 over two replications), therefore, only the positive subscale of this measure will be further examined in this study.

*Personal Meaning Profile (PMP)*: The self-rating version of the PMP (Wong, 1998) is a 57-item scale that assesses the degree to which individuals believe they currently live a meaningful life. The measure has adequate psychometric characteristics and is a reliable and valid measure of where and to what extent an individual finds personal meaning (Wong, 1998). The questionnaire uses a 1 (*not at all*) to 7 (*a great deal*)-point Likert scale and is divided into seven factors – Achievement striving (16 items), Religion (9 items), Relationship (9 items), Self-transcendence (8 items), Intimacy (5 items), Self-acceptance (6 items), and Fair treatment (4 items). Scale scores as well as a total score can be considered for the measure. In community samples, the scale's total score was reported to have a Cronbach's alpha of .93, with subscale coefficient alphas ranging from .54 to .91 (Wong, 1998). In the current study, the PMP's total score had good internal consistency (alpha = .97 repeated over three replications).

Because all items of the PMP are worded in a positive direction, with higher scores representing socially desirable responses, 15 additional items related to extrinsic goal strivings (e.g. desires for wealth, popularity, and attractiveness) were included in order to prevent a positive response set. These additional items are not related to study hypotheses.

*Personal Attribute Rating Scales (PARS)*: The PARS is a 39-item self-reported measure developed by McFarland and Alvaro (2000) in their study of self-perceptions of positive personal attributes and modified for this study. The scale uses a 1 (*not at all*) to 9 (*extremely*)-point Likert scale to ask respondents the degree to which positive attributes (e.g., kind, friendly) describe them. The scale was derived from existing literature (e.g., Park, Cohen & Murch, 1997; Tedeschi & Calhoun, 1996) and had excellent internal consistency over four replications (alphas = .93-.97). In the present study, the PARS had similarly good

internal consistency (alphas = .93 - .95 over three replications). Because all items of the PARS are worded in a positive direction with higher scores representing socially desirable responses, additional items related to negative personal attributes were included in order to prevent a positive response set. These additional items are not related to study hypotheses.

For the second assessment, the demographics questionnaire only asked about participation in support groups or psychotherapy since the start of radiation treatment. The second assessment included all the other measures used in the first assessment. In addition, the PMP and PARS were re-administered with the following instructions: "We are interested in how well you can remember the answers you gave on this questionnaire from when you filled it out before you started radiation treatment. Please answer the following questions by circling the number you think you did at that time. We will compare your answers with the ones you made then, so please do your best." The current and recall versions of the PMP and PARS were presented to participants in a counterbalanced order.

The following measures were also included in the packet for the second assessment (see Appendix C):

*Rosenberg Self-Esteem Scale (RSE)*: The RSE (Rosenberg, 1965) is the best-validated and most widely used measure of self-esteem (Robins, Hendin, & Trzesniewski, 2001). It is a 10-item measure that scores self-esteem on a single scale. Respondents rate the degree to which they agree with statements as they relate to themselves. The measure is scored on a 1 (*Strongly Agree*) to 4 (*Strongly Disagree*) scale. In the current study, the measure had good internal consistency (alpha = .89)

*Life Orientation Test-Revised (LOT-R)*: The LOT-R (Scheier, Carver & Bridges, 1994) is a 10-item measure that assesses dispositional optimism, or the degree to which a person expects positive future outcomes. Each item is rated on a 1 (*I agree a lot*) to 5 (*I disagree a lot*) point Likert scale. The measure is well validated (e.g., Scheier, Carver & Bridges, 1994) and widely used. The measure had acceptable internal consistency in the present study (alpha = .75).

*Post-traumatic Growth Inventory (PTGI)* – The PTGI (Tedeschi & Calhoun, 1996) is a 21-item measure that assesses the amount of growth perceived in oneself after one undergoes a highly stressful experience. Each item is rated on a 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*)-point Likert scale. Ratings yield scores on five subscales – New Possibilities (5 items), Relating to Others (7 items), Personal Strength (4 items), Spiritual Change (2 items), and Appreciation of Life (3 items). The scale shows good psychometric properties in community samples (Tedeschi & Calhoun, 1996) and has been successfully used in samples of cancer patients (e.g., Cordova, Cunningham, Carlson & Andrykowski, 2001; Sears et al., 2003; Weiss, 2002; Widows, Jacobsen, Booth-Jones & Fields, 2005). In this study the total score was used and showed excellent internal consistency ( $\alpha = .96$ ).

### *Analyses*

Preliminary analyses were conducted to identify the relationship of demographic and clinical variables to this study's primary outcomes (actual change, perceived change, derogation, and posttraumatic growth). Variables found to be significantly ( $p < .05$ ) associated with a primary outcome were controlled for in the relevant analyses examining the relationship of psychosocial variables with these outcomes.

In order to test the hypotheses that participants will differ in their reported standing across assessments on positive attributes (Hypotheses 1, 2a, and 2b), total scores on the PMP and PARS scales were entered into separate multivariate analysis of variance (MANOVA) designs with one between group factor (Group: breast cancer, prostate cancer) and one within group factor (Assessment: Time 1, Time 2, Time 1 retrospective). The analytic strategy was to first determine if there was a main effect for Assessment and to evaluate whether there was an interaction between Group and Assessment. If there was no main effect for Assessment, no planned comparisons for PARS or PMP scores were conducted. If a main effect of Assessment or of Group were discovered and no Group x Assessment interaction effect, planned comparisons were performed for the sample as a whole. If there was a Group x Assessment interaction effect, planned comparisons were performed separately for each group.

To determine whether participants would derogate their past standing (Hypothesis 1) planned contrasts were used to compare participants' responses at Time 1 with their Recalled Time 1 responses. To determine whether participants would experience actual change in their responses (Hypothesis 2a), planned contrasts compared responses made at Time 1 with those made at Time 2. To determine whether

participants recalled standing at Time 1 would be lower than their current report at Time 2 (Hypothesis 2b), planned contrasts compared Recalled Time 1 responses with responses made at Time 2.

In order to test the hypotheses that posttraumatic growth would be related to the amount of temporal derogation made by participants (Hypothesis 3), difference scores on PARS and PMP total scales were calculated by subtracting Time 1 scores from Recalled Time 1 scores. Correlational analyses were then conducted between these difference scores and PTGI scores. Likewise, in order to test the hypothesis that temporal derogation would be related to optimism, self-esteem, and implicit theories of cancer-related change (Hypotheses 4, 5, and 6), correlation analyses were conducted between these difference scores and scores on the respective psychosocial measure.

In order to test the hypotheses that psychosocial factors would be related to the amount of posttraumatic growth reported by participants (Hypotheses 7, 8, and 9), correlational analyses were conducted between PTGI scores and scores on psychosocial measures (optimism, self-esteem, and implicit theories of cancer-related growth).

For those psychosocial variables found to be significantly correlated with both temporal derogation and posttraumatic growth, a hierarchical regression analysis was planned to determine whether temporal derogation mediated the relationship between psychosocial factors and posttraumatic growth. Following Baron and Kenny's (1986) mediational model, difference scores between Time 1 and Recalled Time 1 scores would be regressed onto PTGI scores in the first step of the equation and the related psychosocial variables (e.g., implicit theories of cancer-related growth; self-esteem, or optimism) would be entered into the equation as the second step. The mediational hypothesis would be supported if the addition of difference scores into the model reduced the amount of variance in PTGI scores explained by the psychosocial variables as to render such variance explained non-significant.

## Chapter Three

### *Participant recruitment and compliance*

As shown in Figure 1, 148 individuals were approached for participation in the study. Four patients refused, two due to a lack of interest and one each due to privacy concerns and excessive distress. An additional 17 patients were found to be ineligible. Reasons included the presence of advanced cancer (n = 6), an earlier cancer diagnosis (n = 6), and an inability to understand the questionnaire due to language or cognitive problems (n = 5). An additional eight participants became ineligible after consenting to the study. Seven of these had a change in their treatment regimen and did not complete radiotherapy and one had a cancer recurrence.

Of the 119 participants who remained eligible, two did not follow instructions regarding their Time 1 questionnaire packet and 15 failed to return their Time 1 questionnaire packet prior to the start of their radiotherapy. An additional 6 participants withdrew prior to completing their Time 1 packet. Two of these individuals withdrew because they felt the questionnaire content was too personal (n = 1) or too emotional (n = 1), and one withdrew because of general dislike for the hospital. Three others did not give reasons for withdrawal.

Of the 96 people who completed their Time 1 questionnaire packet, three people did not complete their Time 2 questionnaire packet after repeated follow-up attempts, and one person died. An additional two people withdrew from the study, one due to lack of time and another without providing a reason.

Prior to analysis, the data was screened to detect possible univariate outliers. Two male participants were found to be outliers on one or more of the primary outcome variables (derogation, perceived change, or actual change). Both of these individuals scored at least four standard deviations from the mean on at least one outcome measure and were deleted from all subsequent analyses. The final sample numbered 88.

### *Participant characteristics*

As a group, participants ranged from 37 to 83 years old and averaged 67 days between the Time 1 and Time 2 assessments (see Table 1). The typical patient was a married White female. Additional descriptive information about the study sample appears in Table 1.

#### *Descriptive examination of study variables*

Responses on the PARS and the PMP were marked by high mean item scores and low variability at all assessments (see Table 2), with few people scoring on the low ends of these scales. Greater variability was found in responses on the PTGI.

#### *Relationship of demographic and clinical variables to positive attributes, personal meaning and posttraumatic growth*

As described previously, preliminary analyses were conducted to determine whether demographic and clinical variables were related to the study's primary outcomes (see Table 3). Four significant relationships were found. Being White was related to lower PTGI scores, being male and being older were related to greater derogation of Time 1 positive attributes, and being married was related to greater perceived changes in personal meaning. In addition, order effects were tested to determine whether the order of presentation of the Time 2 and Recalled Time 1 assessments affected participants' responses. No order effects were found with variables related to study hypotheses (see Table 3).

#### *Actual change, perceived change, and biased recall in positive attributes and personal meaning*

To test hypotheses related to actual change, perceived change, and biased recall in ratings of personal meaning (i.e., PMP scores), we conducted a MANOVA with one between groups factor (Group: breast cancer, prostate cancer) and one within groups factor (Assessment: Time 1, Time 2, Recalled Time 1). There was no main effect for Assessment,  $F(2, 154) = .87, p = .42$ , and the interaction between Group and Assessment was not significant,  $F(2, 154) = .07, p = .94$ . Because no multivariate effect of Assessment was found in PMP scores, further analyses to detect univariate differences between pairs of assessments (i.e., planned comparisons) were not conducted.

To test hypotheses related to actual change, perceived change, and biased recall in ratings of positive attributes (i.e., PARS scores), we conducted a MANOVA with one between groups factor (Group: breast cancer, prostate cancer) and one within groups factor (Assessment: Time 1, Time 2, Recalled Time

1). As expected, the main effect for Assessment was significant,  $F(2, 168) = 5.79, p = .003$ . The interaction between Group and Assessment was not significant,  $F(2, 168) = .73, p = .48$ . Based on this pattern of results, we proceeded with proposed planned comparisons designed to test study hypotheses in regards to positive attributes.

The first planned comparison examined the difference between patients' actual ratings of their positive attributes at Time 1 and their later recollection of their Time 1 attributes (see Table 4). As hypothesized (Hypothesis 1), there was a significant difference between patients' ratings of their positive attributes at Time 1 and their Recalled Time 1 ratings,  $F(1, 85) = 4.91, p = .03, d = .17$ . Contrary to the hypothesis, however, patients' Recalled Time 1 ratings were more favorable than their actual Time 1 ratings. That is, when recalling their earlier responses patients overestimated rather than underestimated how favorably they had actually rated themselves at Time 1.

The second planned comparison examined the difference between patients' actual ratings of their positive attributes at Time 1 and Time 2 (see Table 4). Contrary to the expectation that these scores would not differ (Hypothesis 2a), patients' actual ratings of their positive attributes increased significantly between Time 1 and Time 2,  $F(1, 85) = 12.88, p = .0006, d = .25$ . In other words, there was an actual improvement in positive attribute ratings between Time 1 and Time 2.

The third planned comparison examined the difference between patients' actual ratings of their positive attributes at Time 2 and their Recalled Time 1 ratings (see Table 4). The hypothesis (Hypothesis 2b) that Time 2 actual ratings would be higher than ratings for recollected Time 1 status was not supported,  $F(1, 85) = 3.34, p = .07$ . In other words, patients did not perceive themselves to have changed.

*Relation of optimism, self-esteem, and implicit theories of cancer-related change to changes in positive attributes, personal meaning, and posttraumatic growth*

We had anticipated that the degree to which participants derogated (i.e., underestimated) their previous standing on positive attributes and personal meaning (recalled Time 1 ratings < actual Time 1 ratings) would be related to differences in posttraumatic growth (Hypothesis 3), optimism (Hypothesis 4), implicit theories of cancer-related change (Hypothesis 5), and self-esteem (Hypothesis 6). In the absence of evidence that mean values shifted in a negative direction (i.e., derogation), this difference score has been

re-labeled as biased recall. Correlational analyses indicated that posttraumatic growth, optimism, implicit theories of change, and self-esteem were unrelated (i.e.,  $p > .05$ ) to biased recall of past positive attributes and past sources of personal meaning. (See Table 5.)

We also hypothesized that posttraumatic growth would be associated with optimism (Hypothesis 7), implicit theories of cancer-related change (Hypothesis 8), and self-esteem (Hypothesis 9). As shown in Table 3, posttraumatic growth was marginally associated with optimism ( $p < .06$ ), but in a direction opposite of that hypothesized (Hypothesis 7). That is, those with less optimism reported marginally greater posttraumatic growth. Implicit theories of cancer-related change were also associated with posttraumatic growth. Those who expected cancer to have a positive impact in their lives reported significantly more posttraumatic growth ( $p < .05$ ) a finding that was consistent with Hypothesis 8. No relationship was found between posttraumatic growth and self-esteem, thus, Hypothesis 9 was not supported.

Because race was associated with posttraumatic growth, the relationship of optimism and posttraumatic growth was reexamined in a hierarchical regression analysis that controlled for race. Results indicated that controlling for race increased the relationship between optimism and posttraumatic growth,  $\beta = -.23$ ,  $p = .02$ , partial R-squared = .05. Likewise, the relationship between implicit theories of cancer related change and posttraumatic growth was examined in a hierarchical regression analysis that controlled for race. The relationship between implicit theories of change and posttraumatic growth remained significant in this analysis,  $\beta = .22$ ,  $p = .03$ , partial R-squared = .05.

Although no hypotheses were offered, we also examined whether posttraumatic growth, optimism, implicit theories of change, and self-esteem were associated with actual change (Time 2 ratings - Time 1 ratings) and perceived change (Time 2 ratings - Recalled Time 1 ratings) on positive attributes and personal meaning. In regards to positive attributes, perceived change in positive attributes was significantly associated with posttraumatic growth ( $p < .05$ ), such that greater perceived change was associated with greater posttraumatic growth. Actual change in positive attributes was not associated with any of the psychosocial variables examined. In regards to personal meaning, actual and perceived change in personal meaning were unrelated to psychosocial variables of interest (see Table 5).

#### *Mediational Analyses*

We had hypothesized that individuals would derogate their previous standing on measures of personal meaning and positive attributes, that this derogation would be related to posttraumatic growth, and that both derogation and posttraumatic growth would be related to self-esteem, optimism, and implicit theories of cancer-related change. Thus, we had expected to test whether self-esteem, optimism, and implicit theories of cancer-related change would mediate the expected derogation-posttraumatic growth relationship.

This mediational analysis was not able to proceed. The sample used in this study did not derogate their previous standing on either positive attributes or personal meaning measures, and individual differences in derogation had none of the expected relationships with optimism, implicit theories of change, or self-esteem. In other words, derogation was not related with posttraumatic growth, or with any of the variables that had been considered potential mediators. The lack of these relationships indicates that the criteria necessary to conduct mediational analysis were not met (Baron & Kenny, 1986).

## Chapter Four

In general, the findings did not support the hypotheses and in some cases the hypotheses were contradicted. Two broad areas of possible growth were measured - personal meaning and positive attributes. On measures of personal meaning, striking stability was found. We had hypothesized that participants would derogate their previous standing such that recalled Time 1 responses would be lower than actual Time 1 responses (Hypothesis 1). This hypothesis was unsupported when personal meaning was examined. We had hypothesized (though we did not expect) that participants would experience significant changes in personal meaning such that personal meaning would increase from Time 1 to Time 2 (Hypothesis 2a). Responses did not change, thus Hypothesis 2a was unsupported when personal meaning was examined. We had also hypothesized that participants would see themselves on a growth trajectory such that Time 2 responses would be higher than recalled Time 1 responses (Hypothesis 2b). This was unsupported when personal meaning was examined.

A different pattern of results was observed for participants' reports of their positive attributes. In terms of derogation (Hypothesis 1), participants' recalled Time 1 standing was significantly higher than their actual Time 1 standing. In other words, they did not derogate their previous standing on positive attributes, but inflated it. Since Hypothesis 1 stated that participants would underestimate their previous standing on positive attributes, this hypothesis was contradicted. In terms of actual growth in positive attributes (Hypothesis 2a), participants' ratings of their positive attributes did experience a positive change between Time 1 and Time 2. This supported Hypothesis 2a but we did not expect to see this hypothesis supported. Thus, we found actual change where we did not expect to see it. In terms of perceived change in positive attributes (Hypothesis 2b), participants' Time 2 responses did not significantly differ from their recalled Time 1 attributes. Participants remembered themselves as being stable in their positive attributes over time. Thus, Hypothesis 2b was not supported when positive attributes were examined.

This study also hypothesized that derogation of meaning and derogation of positive attributes would both be associated with posttraumatic growth (Hypothesis 4). No correlation between posttraumatic growth and either derogation measure was found, so Hypothesis 4 was not supported. However, one important unhypothesized relationship was found. Posttraumatic growth was related to perceived change in positive attributes, though it was not related to actual change in positive attributes. Thus, it appears that participants' reports of posttraumatic growth were indeed inaccurate, just not in ways we expected. Since PTGI scores more closely tracked perceived change than actual change, and since perceived change was less than actual change, the PTGI appears to have underestimated the amount of change that occurred.

Additional hypotheses concerned the relationships of optimism, implicit theories of change, and self-esteem to derogation of positive attributes and personal meaning. Hypothesis 4 predicted that optimism would relate with derogation on both variables. It was related to neither. Likewise, Hypothesis 5 predicted that implicit theories of cancer-related change (Hypothesis 5) would be related to derogation of meaning and positive attributes. It was not. Finally, self-esteem (Hypothesis 6) was hypothesized to relate with derogation of both meaning and positive attributes, but it related with neither.

These psychosocial variables were also hypothesized to relate with posttraumatic growth. Here, we found significant relationships, but these were not entirely in the anticipated direction. Optimism had been hypothesized to have a positive relationship with posttraumatic growth (Hypothesis 7), but a marginally ( $p < .06$ ) significant negative relationship was found. This relationship became significant when race (which was significantly related to PTGI scores) was controlled for statistically. Thus, people with a pessimistic dispositional style were more likely to perceive posttraumatic growth. This contradicted Hypothesis 7. Implicit theories of cancer-related change (Hypothesis 8) were also hypothesized to have a positive relationship with posttraumatic growth. This hypothesis was supported. Those who had a pre-radiotherapy belief that cancer produced positive changes in a person's life were significantly more likely to report posttraumatic growth after radiotherapy was complete. Finally, self-esteem had been hypothesized to be related to posttraumatic growth (Hypothesis 9). No relationship was found, so Hypothesis 9 was left without support.

The findings in the present study directly contradict findings of previous research that has looked at changes in positive attributes using similar methodology. For example, McFarland and Alvaro (2000) found that college students were prone to misremember their previous standing in such a way that these students inaccurately saw themselves as growing more after they thought about a moderate to severe stressful event than a mildly stressful event. More generally, Wilson and Ross (2001) found in several studies that college students have a persistent bias in their autobiographical recall that allows them to see the self as continually growing. Contrary to these studies, participants in the present study were biased to see themselves as stable. The differences in the two studies may be related to the differences in the samples used - older adults may be particularly prone to seeing the self as consistent, even when this is in error. Indeed, recent theorizing in developmental psychology suggests that younger people invest more resources into positive change whereas older people place more resources to the maintenance and preservation of the status quo (Baltes, Staudinger & Lindenberger, 1999). Related research suggests that an emphasis on stability over growth is highly related to age (Timmer, Steverink, Stevens & Dittmann-Kohli, 2003). Thus, the sample of older adults in the current study may have been more strongly motivated to perceive stability than growth, especially in comparison to the college-aged young adult samples of previous research in temporal comparisons.

The results of this study challenge the previous literature on posttraumatic growth, which has typically considered self-reported posttraumatic growth to be a valid construct. Although several studies have considered posttraumatic growth longitudinally in the months following a stressful event (e.g., Manne et al., 2004; Sears et al., 2003), this is the first study that has attempted to find a relationship of posttraumatic growth to actual changes in personal meaning and positive attributes by obtaining pre- and post-stressor self-ratings. The finding that posttraumatic growth is related to perceived but not actual change suggests that self-reported posttraumatic growth may be confounded with psychological biases that lead a person to unknowingly distort the actual change they experienced. If such distortions are made differently according to age, they could lead to exaggerated stability in some samples (i.e., older adults) and exaggerated growth in others (i.e., college students) (e.g., McFarland & Alvaro, 2000).

It should be noted that PTGI scores in the present study were low compared to other research using cancer patients. Among 70 breast cancer survivors, Cordova et al. (2001) reported an average PTGI score of 64.1. Manne et al (2004) reported average PTGI scores that ranged from 49.0 to 55.7 in 162 breast cancer survivors when measured three times over the course of nine months. Most recently, Widows et al. (2005) reported an average score of 65.7 in patients receiving hematopoietic stem cell transplantation, a particularly aggressive form of cancer therapy. The average PTGI score in this study of 31.6 suggests that patients did not see radiation therapy as a particularly stressful event and that this therapy engendered limited perceptions of change in most participants. Since the concept of posttraumatic growth is based on the idea that difficult stressors generate personal change, an event that participants consider non-stressful could result in low PTGI scores and recalled stability in their personal attributes. It should be noted, however, that perceived stress was not measured in this study, so no firm conclusions can be made as to whether or not participants saw radiotherapy as stressful or whether those who did perceive it as more stressful experienced greater posttraumatic growth.

The nature of the actual change that occurred in this sample also requires more understanding. Although the posttraumatic growth literature proposes that threatening events engender lasting changes in a person's self-concept and behavior, it is possible that the actual change found here is an artifact of the timing of the assessments. Some researchers have suggested that medical illness creates a sense of threat that lowers self-esteem (cf., Taylor & Armor, 1996). It is possible, therefore, that participants who were starting radiotherapy underestimated their positive attributes due to the negative psychological effects engendered by their earlier cancer diagnosis. If that were the case, the actual change found in this study may simply represent a return to pre-diagnosis baseline ratings. Alternatively, it is possible that participants did grow, but that this change was too subtle to be perceived by participants. If so, participants who undergo a more threatening event may have a greater perception of their change since such changes may occur more suddenly and be more obvious. If this were the case then more stressful events would create conditions where perceived change would better reflect actual change.

This study also adds to mixed literature that has examined the relationship of optimism and posttraumatic growth. Those who were less optimistic in this study were more likely to report posttraumatic

growth, particularly when race/ethnicity was controlled. This contradicts other findings that suggested that optimism is positively related to posttraumatic growth. For example, optimism was positively related to posttraumatic growth in a sample of patients with HIV (Milam, 2004) and in samples of college students (Tedeschi & Calhoun, 1996), but Sears et al. (2003) found that optimism did not relate with PTGI scores in a sample of breast cancer survivors. Sears et al. did find, however, that optimism was related to benefit finding and positive reappraisal, two constructs that are conceptually similar, if not identical, to posttraumatic growth (see also Urcuyo, Boyers, Carver & Antoni, 2005). Since benefit finding, positive reappraisal, posttraumatic growth, and related terms have often been used interchangeably (see, e.g., Thornton, 2002), the present findings are difficult to reconcile with previous literature.

The present study suggests that obtaining self-reports of posttraumatic growth is problematic if researchers are attempting to understand the actual change that takes place following stressful events. The PTGI appears to reflect respondents' psychological biases and, in this case, underestimated the amount of change in positive attributes that actually occurred. Interestingly, a recent experimental study by Smith and Cook (2004) also suggested that the PTGI was biased to underestimate change. In their study, a mixed sample of college students and jury pool participants were instructed to measure their growth either in relation to a stressor or in relation to a matched time period unlinked to a stressor. Unexpectedly, those who thought about a stressor had lower PTGI scores than those who did not, a finding interpreted by the authors as reflecting efforts to reduce cognitive dissonance arising from the knowledge that their stressor had negative effects.

Although the PTGI was related to participants' perceived change in positive attributes, it was unrelated to changes in personal meaning. This finding is important because posttraumatic growth as presently defined is thought to be related to changes in life priorities, spirituality, family relationships, personal achievement, and other facets of a meaningful life. Indeed, item content on the Personal Meaning Profile (e.g., "I care about other people," "I am helped by others") strongly mirrored item content on the PTGI (e.g., "Having compassion for others," "I accept needing others"). This again suggests that the PTGI does not measure or reflect changes in the PTGI's content areas, but reflects a psychological construct related to a person's sense of remembered self.

Thus, this study raises numerous questions as to the nature of temporal comparisons, the validity of the Posttraumatic Growth Inventory in measuring actual change, and in the psychological phenomena that occur as a person undergoes a stressful event. In order to clarify these questions, additional research should use a matched comparison group of non-cancer patients to help determine whether cancer patients' change and perceptions of change in positive attributes reflect a return to a pre-cancer baseline on these attributes (i.e., resiliency) or whether this represents growth over and above the patients' baseline standing (i.e., thriving). As mentioned previously, patients in this study could have rated themselves more modestly at Time 1 due to the psychological effects of dealing with cancer. A matched control group would help examine this possibility.

Additionally, it is possible that patients consider their positive traits differently than their negative traits. Although patients in this study perceived no change in their positive attributes, it is possible that patients see some kind of change in their negative attributes - that is, instead of seeing change in positive areas, patients may see themselves as becoming more refined in their negative areas. For example, patients may see themselves as irritable during treatment, but also see such irritability becoming easier to manage as treatment endures. Indeed, a growing body of research suggests that people judge their standing on negative traits in a way that substantially differs from their judgment of positive traits (e.g., Suls, Lemos & Stewart, 2002). Thus, future studies may benefit from an examination of negative traits as well as positive traits.

Likewise, it is essential that future studies more carefully examine ethnic and cultural differences in the psychology surrounding posttraumatic growth. As with other studies (e.g., Milam 2004; Winters, 2003), the findings of this study suggest that ethnicity is an important moderator of PTGI scores, thus the cultural values that are often intertwined with ethnicity may play an important role in the way individuals interpret personal changes following a major stressor. Religio-cultural values could have particularly meaningful relationships with posttraumatic growth, particularly since variables related to religiosity and religious coping has been found to relate with posttraumatic growth in a growing number of studies (e.g., Tedeschi & Calhoun, 1996; Milam, Ritt-Olsen & Unger, 2004; Winters 2003). Religious and cultural values are not exclusive, and these interrelated belief systems may create an interpretive lens through which individuals construct their beliefs about the positive outcomes of major life stressors as well as their own

growth-oriented responses to these stressors. In short, diverse patient samples will enable researchers to more fully understand the psychology of posttraumatic growth.

In addition, past experiences may influence an individual's perception of a stressor and subsequent stressor-related growth. It is unknown, for example, whether U.S. military veterans, such as many of the male patients assessed here, perceive the diagnosis and treatment of prostate cancer differently from men who are not military veterans. Perhaps more importantly, combat veterans may differ in their perceptions regarding serious stressors from veterans who never saw combat during their military service. Although exposure to previous stressors was not measured in the present study, future research could clarify whether individuals with a previous trauma history differ from those with no trauma history in their actual and perceived growth and their self-reported posttraumatic growth during cancer treatment.

It is also important to determine whether the autobiographical memory processes found here function similarly when participants undergo more stressful experiences. As mentioned previously, it is possible that people see more sudden personal changes when they experience events that are more life threatening and are thus more likely to perceive change. Future research should assess the perceived stressfulness of a threatening event in order to determine whether degree of threat is associated with perceived and actual change, as well as posttraumatic growth. It is possible that more aggressive cancer treatments, such as hematopoietic stem cell transplantation for example, may produce different patterns of autobiographical recall and posttraumatic growth than that found here.

Finally, it should be noted that the family-wise error rate of this study was not controlled for in the correlational analyses performed in this study. Since 98 correlations were reported in this study, it is likely that some of the significant correlational findings may have been spurious given the significance level of .05 set for this study.

Although this study has several limitations, it is the first study in the posttraumatic growth literature to have measured personal characteristics before and after a stressor and subsequently relate actual change on these measures to self-reported posttraumatic growth. This study suggests that some of the theorizing previously forwarded both in the temporal comparison literature and in the posttraumatic growth literature may be flawed. In regards to the temporal comparison literature, it is possible that previous

research was too focused on individuals who were in a state of rapid life change (i.e., college students). It is possible that the nature of temporal comparisons changes as individuals enter different developmental phases of their lives with older adults valuing stability and younger individuals valuing change. As for posttraumatic growth, it appears clear that the current body of cross-sectional research is insufficient to determine the validity of the posttraumatic growth construct as currently measured by the PTGI. Indeed, the present study offers tentative evidence that personal change during a stressful event is indeed real but that few if any studies in the literature have actually measured actual change by assessing personal characteristics both before and after a stressful event. Instead, present studies on posttraumatic growth may be measuring a biased cognitive construct related to self-perception, not growth per se. This study also suggests that people are inaccurate judges of their personal change. If personal change is indeed the research question of interest in the posttraumatic growth literature, new methodologies, particularly those that rely on longitudinal measurement of current attributes rather than memory and self-report, are required to study it.

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Table 1 - Demographic and Clinical Characteristics

Variable

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Age (mean years $\pm$ standard deviation)	60.5 $\pm$ 12.1
Sex (% female)	68
Race/ethnicity (% white)	85
Marital status (% married)	73
Education (% $\geq$ some college)	77
Income (% $\geq$ \$40,000/year)	59
Disease stage (females – stage 0 or I; males – stage I)	74
Total radiation dose (cgy $\pm$ standard deviation)	6221 $\pm$ 966
Time between assessments (days $\pm$ standard deviation)	67 $\pm$ 18

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Table 2 - Means and Standard Deviations of Study Measures

<u>Variable</u>	Mean	SD	Range
PARS (Time 1)	7.14	0.86	4.7-8.8
PARS (Recalled Time 1)	7.35	0.87	4.9-8.9
PARS (Time 2)	7.28	0.92	5.4-9.0
PMP (Time 1)	5.59	0.81	3.7-7.0
PMP (Recalled Time 1)	5.61	0.81	3.3-6.9
PMP (Time 2)	5.57	0.81	3.2-7.0
PTGI	31.52	25.10	0-105
LOT-R	23.28	4.61	11-30
ITCS	19.57	2.83	10-25
RSE	35.92	4.62	19-40

PARS = Personal Attribute Rating Scale; PMP = Personal Meaning Profile; PTGI = Posttraumatic Growth Inventory; LOT-R = Life Orientation Test-Revised; ITCS = Implicit Theories of Cancer-Related Change Scale; RSE = Rosenberg Self Esteem Scale. Values on the PMP and the PARS assessments represent mean item scores. Values on other measures represent total scale scores.

Table 3 - Demographic and Clinical Correlates of Primary Study Outcomes

	PARS			PMP		PTGI	
	PARS Actual	Perceived	PARS Biased	Actual	Perceived		PMP Biased
	Change	Change	Recall	Change	Change		Recall
Age	-.17	.20	.29***	-.08	-.11	.06	-.12
Sex (1 = Female, 2 = Male)	-.20	.18	.31***	-.03	-.01	-.01	-.10
Race/Ethnicity (1 = White, 2 = Non-White)	-.06	.16	.17	-.05	-.08	-.01	.30**
Marital Status (1 = Non-Married, 2 = Married)	-.02	.06	.06	.06	.23*	.03	.04
Education	.02	-.09	-.08	-.08	-.04	.01	.05
Income	.04	-.15	-.14	-.10	-.18	-.06	-.02
Disease Stage	-.19	-.01	.17	.00	.14	.08	.12
Radiation Dose	-.10	.13	.18	-.06	-.06	.02	-.21
Delay Between Assessments	-.12	-.17	-.02	.08	.13	-.01	.02
Time 2 Assessment Order (1 = T2 first, 2 = R-T1 first)	-.02	.11	.10	-.06	.11	.15	.06

Table 4 - Comparison of Pre-Radiation, Post-Radiation, and Recall Assessments of PARS

<u>Variable</u>	Time 1	Time 2	recalled Time 1
Positive attributes	7.14 <sup>ab</sup>	7.33 <sup>a</sup>	7.26 <sup>b</sup>

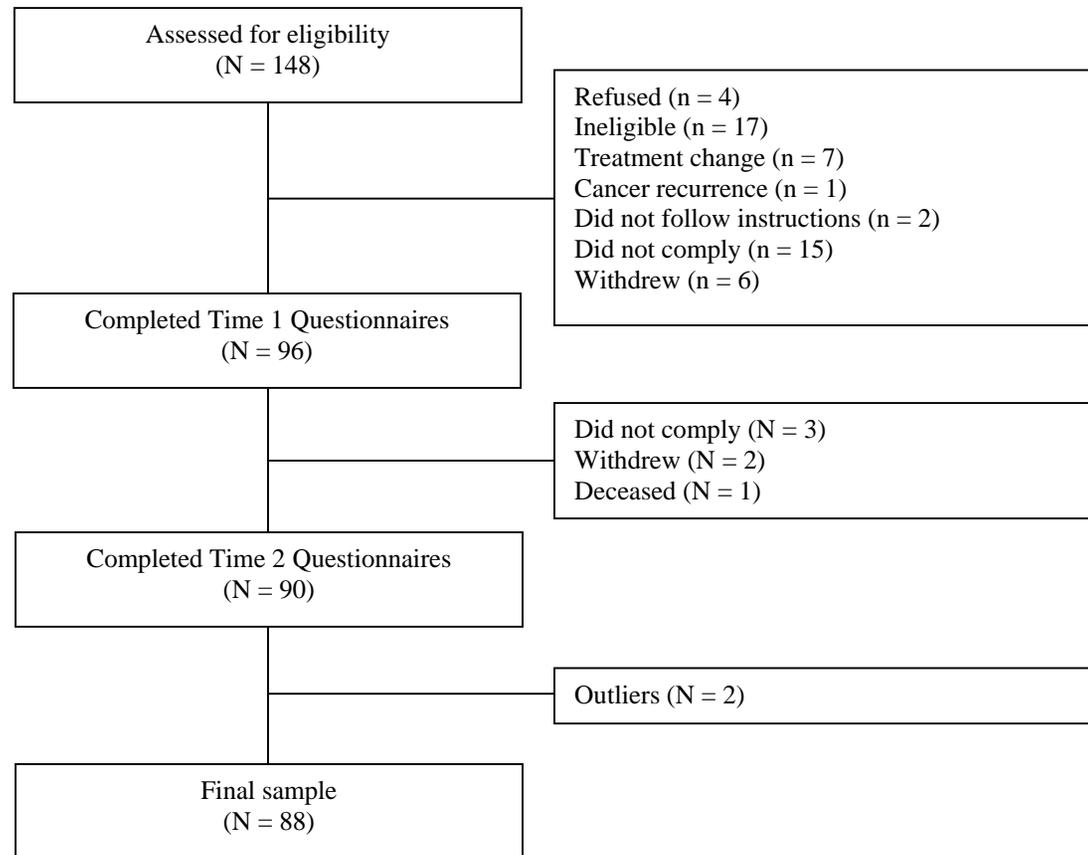
Values represent the mean item score on the Positive Attributes Rating Scale (range = 1-9). Items sharing a superscript differ at  $p < .05$ .

Table 5 - Correlations Between Difference Scores and Primary Study Outcomes

	PARS Actual Change	PARS Perceived Change	PARS Biased Recall	PMP Actual Change	PMP Perceived Change	PMP Biased Recall	PTGI
Posttraumatic Growth	.06	.23*	.07	.05	.10	.01	—
Optimism	.01	-.07	-.11	-.04	-.07	-.05	-.20‡
Self-esteem	.05	-.09	-.09	.01	-.07	-.10	-.13
Implicit theories of change (pos.)	.00	-.11	-.06	-.07	-.10	-.05	.26*

‡ p < .06; \* p < .05

Figure 1 - Flow Diagram of Participant Progression Through the Study



## Appendices

# Informed Consent

Social and Behavioral Sciences  
University of South Florida

## Information for People Who Take Part in Research Studies

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Researchers at the University of South Florida (USF) study many topics. We would like to understand how people see themselves before and after undergoing radiotherapy. To do this, we need the help of people who agree to take part in a research study.

**Title of research study:** Personal attributes of persons with cancer

**Person in charge of study:** Paul B. Jacobsen, Ph.D.

**Study staff who can act on behalf of the person in charge:** Sean Ransom, M.A., Erin Winters, M.A., Iryna Watson, B.A., Lori Dietz, B.A., Babu Zachariah, M.D.

**Where the study will be done:** H. Lee Moffitt Cancer Center, James A. Haley Veterans Administration Hospital

### Should you take part in this study?

This form tells you about this research study. You can decide if you want to take part in it. You do not have to take part. Reading this form can help you decide.

### Before you decide:

- Read this form.
- Talk about this study with the person in charge of the study or the person explaining the study. You can have someone with you when you talk about the study.
- Find out what the study is about.

### You can ask questions:

- You may have questions this form does not answer. If you do, ask the person in charge of the study or study staff as you go along.
- You don't have to guess at things you don't understand. Ask the people doing the study to explain things in a way you can understand.

### After you read this form, you can:

- Take your time to think about it.
- Have a friend or family member read it.
- Talk it over with someone you trust.

## Appendix A: (Continued)

It's up to you. If you choose to be in the study, then you can sign the form. If you do not want to take part in this study, do not sign the form.

### **Why is this research being done?**

The purpose of this study is to find out how people perceive themselves and the world both before and after radiotherapy for cancer.

### **Why are you being asked to take part?**

We are asking you to take part in this study because you are scheduled to undergo radiotherapy to treat breast, prostate, colorectal, or a gynecological cancer.

### **How long will you be asked to stay in the study?**

You will be asked to fill out two packets of questionnaires over a period of about six weeks. One questionnaire packet will be given before radiotherapy, the second will be given after.

### **How often will you need to come for study visits?**

A study visit is one you have with the person in charge of the study or study staff. You will not have to come in for any visits just for this study. A staff member will give you the questionnaire packet when you come in for your regularly scheduled medical treatment at Moffitt. If the staff member is unable to see you when you come in for your regular medical appointment, you will be sent the questionnaire in the mail.

As mentioned before, you will be asked to fill out one packet of questionnaires before radiotherapy and a second packet after radiotherapy.

The first packet should take about 15 minutes to complete, and the second should take about 45. Some people may take longer or shorter.

At the first visit, the person in charge of the study or staff will give you a packet of questionnaires to complete. This packet will include forms that ask questions about your background (for example, age and marital status), as well as questions about how you view yourself (positive and negative aspects of your personality). In addition, you will be asked questions about your satisfaction with life and your beliefs about how people deal with cancer.

At the second visit, the person in charge of the study or staff will again give you a packet of questionnaires to complete. The packet will include several of the forms you completed at the first visit. In addition, you will be given forms to complete that ask questions about your perceptions of life, positive and negative changes in your life since cancer diagnosis, and your perceptions of why good and bad events occur in people's lives.

**How many other people will take part?**

About 190 people will take part in this study at the Moffitt Cancer Center and at the James A. Haley Veterans Administration Hospital.

**What other choices do you have if you decide not to take part?**

Your decision to participate in this research study is completely voluntary. You are free to participate in this research study or withdraw at any time. If you choose not to participate, or if you withdraw, there will be no penalty or loss of benefits that you are entitled to receive.

**How do you get started?**

If you decide to take part in this study, you will need to sign this consent form, then fill out the packet of questionnaires. You will be contacted in person during your last radiotherapy visit to fill out the second packet of questionnaires. If your last radiotherapy visit is not done at Moffitt, the packet may be sent to you by mail.

**What will happen during this study?**

Whether or not you choose to participate in this study, you will receive all the normal care that any other patient would receive at Moffitt. If you do decide to participate in the study, you will fill out one packet of questionnaires today. You will then be contacted about the time of your final radiotherapy visit and asked to fill out a second packet of questionnaires.

**Here is what you will need to do during this study**

Answer the questionnaires honestly and completely.

**Will you be paid for taking part in this study?**

We will not pay you for the time you volunteer in this study.

**What will it cost you to take part in this study?**

It will not cost you anything to take part in the study.

**What are the potential benefits if you take part in this study?**

We don't know if you will get any benefits by taking part in this study, however, some of the questionnaires ask about positive things you may have experienced recently in your life. Many people say that focusing on positive experiences puts them in a better mood.

**What are the risks if you take part in this study?**

There are no known risks to those who take part in this study.

**What will we do to keep your study records private?**

Federal law requires us to keep your study records private. Your records will be kept in a secure area of Moffitt Cancer Center and locked in a file cabinet.

## Appendix A: (Continued)

However, certain people may need to see your study records. By law, anyone who looks at your records must keep them confidential. The only people who will be allowed to see these records are:

- The study staff.
- People who make sure that we are doing the study in the right way. They also make sure that we protect your rights and safety:
  - The USF Institutional Review Board (IRB), its staff, and other individuals working on behalf of USF.
  - The United States Department of Health and Human Services (DHHS)
  - Moffitt Cancer Center's Research Compliance Office

They may look at the study records to make sure the study is done in the right way.

We may publish what we find out from this study. If we do, we will not use your name or anything else that would let people know who you are.

### **What happens if you decide not to take part in this study?**

You should only take part in this study if you want to take part.

If you decide not to take part:

- You won't be in trouble or lose any rights you normally have.
- You will still get the same services you would normally have.
- You can still get your regular medical care.

### **What if you join the study and then later decide you want to stop?**

If you decide you want to stop taking part in the study, tell the study staff as soon as you can.

- If you decide to stop, you can go on getting your regular medical care.

### **Are there reasons we might take you out of the study later on?**

Even if you want to stay in the study, there may be reasons we will need to take you out of it.

You may be taken out of this study:

- If you are not coming for your study visits when scheduled.
- If for any reason you stop radiotherapy treatment.

You can get the answers to your questions.

If you have any questions about this study, call Dr. Paul Jacobsen at (813) 632-1810.

If you have questions about your rights as a person who is taking part in a study, call USF Research Compliance at (813) 974-5638.

You can also call the Moffitt Research Compliance office at (813) 632-1869.

Appendix A: (Continued)

**Consent to Take Part in this Research Study**

It's up to you. You can decide if you want to take part in this study.

**I freely give my consent to take part in this study. I understand that this is research. I have received a copy of this consent form.**

<b>Signature of Person taking part in study</b>	<b>Printed Name of Person taking part in study</b>	<b>Date</b>

**Statement of Person Obtaining Informed Consent**

I have carefully explained to the person taking part in the study what he or she can expect.

The person who is giving consent to take part in this study

- Understands the language that is used.
- Reads well enough to understand this form. Or is able to hear and understand when the form is read to him or her.
- Does not have any problems that could make it hard to understand what it means to take part in this study.
- Is not taking drugs that make it hard to understand what is being explained.

To the best of my knowledge, when this person signs this form, he or she understands:

- What the study is about.
- What needs to be done.
- What the potential benefits might be.
- What the known risks might be.
- That taking part in the study is voluntary.

Signature of Investigator or authorized research investigator designated by the Principal Investigator	Printed Name of Investigator	Date

### About the Author

Sean Ransom received a bachelor's degree in psychology from Brigham Young University-Hawaii in 1999 and a master's degree in journalism from the University of Missouri in 2001. He is married to the former Elena Papilenkova.

Mr. Ransom aspires to become a member of the world's scalawaggiest krewe of pirates, the VeggieTales' "Pirates Who Don't Do Anything." In this regard, Mr. Ransom points out he has never guzzled bee's wax and has never hugged a wombat, and has never climbed a flagpole more than 50-meters tall, and has never shaved a musk ox and does not like pickled pig's feet. And he has never been to Bangkok in the fall.

The krewe would march in next year's Gasparilla parade, except they don't do anything.