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Intrusive and Deliberate Rumination Predict Posttraumatic Growth in Members Enrolled in a Cardiovascular Rehabilitation Program

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Abstract

Posttraumatic growth (PTG) can be defined as the experience of positive change, or psychological growth, that occurs as a result of a highly challenging life event or crisis (Tedeschi & Calhoun, 2004). Given that over one-third of the American population lives with some form of cardiovascular disease (American Heart Association, 2011), promoting posttraumatic growth in this population may promote more successful adaptation and coping and may serve to reduce morbidity and mortality (Affleck, 1987). Thus, the present study investigated the predictors of posttraumatic growth in a cardiac rehabilitation setting at rehabilitation entrance (PTG1) and exit (PTG2) and examined change in PTG scores over time. Although PTG scores were not significantly different at rehabilitation completion, results of the present study revealed that PTG1 was primarily predicted by deliberate rumination scores and a poorer physical quality of life at rehabilitation entrance and PTG2 was primarily predicted by deliberate rumination scores and greater physical impairment rehabilitation completion. Longitudinally, PTG2 was primarily predicted by intrusive rumination scores and a poorer quality of life at rehabilitation entrance. This study contributes to a deeper understanding of the clinical and behavioral characteristics that are likely to correspond to PTG in cardiac patients.

Intrusive and Deliberate Rumination Primarily Predict Posttraumatic Growth in Members Enrolled in a Cardiovascular Rehabilitation Program

According to the American Heart Association's 2012 statistics, cardiovascular disease (CVD), which encompasses a broad category of cardiac conditions, including hypertension, stroke, heart disease, and peripheral artery disease, is attributable as the underlying cause of death in approximately 32.8% of all deaths in the United States, making it the leading cause of mortality for men and women in the United States. Moreover, CVD accounts for more deaths each year than cancer, chronic lower respiratory disease, and accidents combined (American Heart Association, 2012). In fact, CVD has consistently accounted for more deaths than any other major cause of death in the U.S. every year since 1900 except in the year 1918 (AHA, 2012). Along with many other chronic diseases, CVD risk rises with age and data indicates that men and women at 50 years of age have a 51.7% and 39.2% lifetime risk of developing a CVD, respectively (AHA, 2012). Given that more than 82 million Americans, over one-third of the population, live with one or more forms of CVD (AHA, 2012) it is important to understand an individual's psychological response to a traumatic cardiac event.

It has been long known that the subjective experience of psychological distress has a deleterious effect on recovery from a heart attack (Gruen, 1975; Klein, Kliner, Zipes, Troyer, & Wallace, 1968). Given the high incidence of CVD, more recent research has sought to identify the specific types of cognitive responses associated with increased and reduced rates of morbidity and mortality after experiencing a highly stressful cardiac event (Affleck, Tennen, Croog, & Levine, 1987; Boscarino, 2006; Moser et al., 2011; Meijer et al., 2011). Interestingly, research indicates that nearly 20% of cardiac patients

meet criteria for major depressive disorder (MDD; Thombs et al., 2006), 43.4% experience some form of persistent anxiety (Moser et al., 2011), and an average of 15% experience posttraumatic stress disorder (PTSD; Gander & von Kånel, 2006; Spindler & Pedersen, 2005). These statistics are especially troubling considering that PTSD (Boscarino, 2006), persistent anxiety (Moser et al., 2011), and depression (van Melle, de Jong, & Spikjerman, 2004) have all been linked to increased mortality, where symptoms of depression specifically have been shown to more than double the risk of all-cause mortality and almost triple the risk of cardiac mortality (Meijer et al., 2011). In addition, PTSD, persistent anxiety, and depression have all been linked to a poorer quality of life (Doering & Eastwood, 2011; Mayou et al., 2000; Smith, Schnurr, Rosenheck, 2005) and greater functional impairment (Morone et al., 2010; Rose, Conn, & Rodeman, 1994; Smith et al., 2005). Given the impact of psychological distress on quality of life, morbidity, and mortality after experiencing a cardiac event, it is clear that clinicians are in an important position to assess and treat symptoms of depression, anxiety, and posttraumatic stress in patients with CVD.

In contrast, research has demonstrated that long-term morbidity and a second cardiac event are both less likely to occur when benefits construed from a first-time cardiac event have signaled a change in health-related behaviors (Affleck et al., 1987). Specifically, results from Affleck and colleagues' (1987) study indicates that those who reported experiencing gains from an initial cardiac event most frequently cited understanding the advantages of preventative health behaviors as the greatest benefit gained from their cardiac experience. Similarly, Petrie and colleagues (1999) found that those who recently experienced a myocardial infarction most frequently reported a

greater appreciation for life and health as the greatest benefit construed from the trauma with a corresponding healthy lifestyle change as the most common response following the event. Perhaps actual modifications in health-related behaviors and lifestyle changes are more likely to occur when these changes are viewed within the context of learning a valued lesson about health promotion. Given these findings, it has been demonstrated that perceiving benefits within adversity or experiencing some form of personal growth following a highly stressful event, can promote better coping, adaptation, and increased survival (Affleck et al., 1987; Petrie, Buick, Weinman & Booth et al., 1999).

Although there have been a number of studies exploring the features that characterize those who are able to find benefits within the face of adversity (Hefferon, Grealy, & Mutrie, 2009; Helgeson, Reynolds, & Tomich, 2006; Linley & Joseph, 2004), there is a need for a common language to refer to the different types of psychological processes that occur in response to highly challenging life circumstances. In conceptualizing the term posttraumatic growth (PTG), Tedeschi and Calhoun (2004) acknowledge that previous studies have used a broad range of similar terms, such as adversarial growth (Linley & Joseph, 2004) or stress-related growth (Park, Cohen, & Murch, 1996), to conceptualize similar processes of benefit finding and positive change. Underlying all of these processes, however, is the same paradox that profound personal value and growth can arise out of distressing personal tragedy and despair (Sheikh, 2008). Tedeschi and Calhoun (2004) posit that the term posttraumatic growth best depicts this unique phenomenon as it distinguishes itself as an ongoing evolutionary process, rather than merely a short-term coping mechanism used in order to process lower levels of chronic life stress.

Posttraumatic Growth

Distinct from the concept of resiliency, which refers to one's ability to resist or bounce back from adversity (Nelson, 2011), posttraumatic growth can be described as the experience of positive life change or transformation that occurs as a result of a highly challenging life event or crisis (Tedeschi & Calhoun, 2004). Whereas the term resiliency indicates the power to return to the pre-trauma level of functioning and move on with life (Nelson, 2011), PTG refers the ability to surpass what was already present before the life event (Tedeschi & Calhoun, 2004). It can be said that those who experience posttraumatic growth experience a qualitative change similar to a life transformation that is distinguishable from similar concepts such as thriving (Tedeschi & Calhoun, 2004).

Posttraumatic growth is conceptualized as a distinguishable phenomenon in that it is unlikely to take place unless a rattling of one's assumptive world has occurred, where one's safety or ability to control a highly aversive experience has been challenged (Tedeschi & Calhoun, 2004). From this perspective, however, growth does not manifest simply because a significant life event or crisis has occurred, but rather, it is the individual's struggle and processing in the aftermath of the trauma that determines if PTG will occur and to what extent it will be experienced. Therefore, posttraumatic growth is the result of a highly emotional psychological process where individuals are able to value their experiences in their attempts to cope or survive (Tedeschi & Calhoun, 2004). This is not to assume, however, that those who experience PTG do so only in the absence of distress or negative impact from loss. But rather, in coping with loss and in rebuilding their lives, some individuals may arrive at a new level of life meaning or a redefined sense of self (Sheikh, 2008). In fact, according to Tedeschi and Calhoun

(2004), it should be assumed that any person facing a serious trauma will likely experience at least some kind of psychological distress, most typically in the form of sadness, guilt, irritability, intrusive thoughts, depression, anxiety, or physical symptomology. It should be noted then that posttraumatic growth can coexist with psychological distress, and for some, PTG may require some level of persisting distress to continue serving as an impetus for further growth (Tedeschi & Calhoun, 2004).

The occurrence of posttraumatic growth ranges widely – from 3% in a sample of bereaved individuals (Davis, Nolen-Hoeksema, & Larson, 1998) to 98% in a sample of women with breast cancer (Weiss, 2002) – and the literature generally suggests the notion that there is meaningful positive change that characterizes those who experience PTG when compared to those who do not (Tedeschi & Calhoun, 1996). As stated by Calhoun and Tedeschi (1999), those who have faced highly challenging life events and experience growth might also develop

> the ability to balance reflection and action, weigh the known and the unknowns of life, be better able to accept some of the paradoxes of life, and to more openly and satisfactorily address the fundamental questions of human existence (Calhoun & Tedeschi, 1999, p.21).

This experience of posttraumatic growth is capable of affecting various domains of interpersonal functioning (Tedeschi & Calhoun, 1996). Specifically, posttraumatic growth has the potential to correspond with: more intimate and meaningful relationships with others; a greater appreciation for life that often corresponds with a reorganized sense of priorities and appreciation for the smaller aspects of life; enhanced spiritual development and engagement in existential exploration; an opportunity for new

possibilities in life or a change in life path; and an overall greater sense of personal strength and ability to overcome life struggles (Tedeschi & Calhoun, 1996).

The phenomenon of posttraumatic growth is especially relevant to CVD as the research collectively indicates that the greatest benefit construed from having a heart attack was reported to be a greater appreciation for life (Petrie et al., 1999) and that those who perceived benefits from a first heart attack were less likely to suffer from another attack at eight-year follow-up (Affleck et al., 1987). Therefore, promoting PTG in the CVD population may help to reduce recurrence of disease, prevent further impairment, and increase survival among cardiac patients (Sheikh, 2004). Moreover, there is little doubt that psychologists within the health field are in an important position to promote positive behaviors and attitudes in patients suffering from a variety of medical conditions. In order to do so, however, a clearer understanding of the psychological processes underlying PTG and further research distinguishing why only a subset of those who experience a traumatic event experience PTG are needed. Results up until this time have been inconsistent (Helgeson et al., 2006) which may be partially accounted for by the various concepts used interchangeably to refer to PTG (Tedeschi & Calhoun, 2004) or by the differences in items across the various benefit-finding measures used between studies (Barskova & Oesterreich, 2009). Thus, it is noteworthy to review the literature in order to gain more insight into the purpose of the present study.

Sociodemographic Factors

Previous research has examined the relationship between PTG and various demographic correlates, including that of gender, age, educational status, marital status, and ethnicity (Barskova & Oesterreich, 2009; Helgeson et al., 2006). Posttraumatic

growth has been noted in both men and women (Tedeschi & Calhoun, 1996) and across the lifespan (Bellizzi, 2004). However, neither gender nor age has been universally linked with PTG across studies (Helgeson et al., 2006). While studies find that women generally report higher levels of PTG than men (Leung et al., 2012; Helgeson et al., 2006; Sheikh, 2004; Tedeschi & Calhoun, 1996; Weiss, 2004), these findings are less consistent in relation to age, where research generally suggests that older adults tend to experience less growth than younger adults (Helgeson et al., 2006; Leung et al., 2012; Manne et al., 2004; Sheikh, 2004). It has been hypothesized, however, that this finding might be due to potential confounds in age (Linley & Joseph, 2004). These results have been found to vary by trauma group and even though this finding was also observed in a recent secondary analysis of cardiac inpatients (Leung, et al., 2012), other studies of cardiac samples have generally found no relationship between age or gender and PTG (Affleck et al., 1987; Garnefski, Kraaij, & Schroevers, 2008 Petrie et al., 1999).

Although PTG has not been consistently linked to level of education or income in any trauma group (Barskova & Oesterreich, 2009), more consistent are the findings that being an ethnocultural minority is related to posttraumatic growth, with African American and Hispanic participants commonly reporting higher levels of growth than Caucasians (Barskova & Oesterreich, 2009; Hefferon et al., 2009; Helgeson et al., 2006; Leung, et al., 2010). It has been hypothesized that these findings could be due to a greater cultural emphasis on religion and spirituality, better enabling this population to reevaluate threatening situations as an opportunity for positive development (Park, 1998) and therefore affording a greater opportunity to experience personal growth (Barskova & Oesterreich, 2009). In contrast, it has also been hypothesized that minority group

members may be more likely to be socio-economically disadvantaged and may have more experience dealing with life stress, resulting in a greater acquired skill set for dealing with highly challenging life events (Barskova & Oesterreich, 2009).

Illness Factors and Subjective Stress

Most of the research examining trauma characteristics has centered around the type of trauma (Barskova & Oesterreich, 2009; Hefferson et al., 2009; Helgeson et al., 2006; Linley & Joseph, 2004), the severity of the trauma (Barskova & Oesterreich, 2009; Helgeson et al., 2006; Leung et al., 2010; Petrie et al., 1999), and the time elapsed since the trauma (Barkova & Oesterreich, 2009; Helgeson et al., 2006). Positive outcomes have been observed in samples who have experienced a range of traumatic events, including that of various health traumas (e.g., HIV and AIDS, cancer, chronic illness, heart attacks), interpersonal abuse or loss (e.g., sexual assault, death of a child, death of a spouse), natural disasters (e.g., tornadoes, floods, plane crashes), war (e.g., military combat, refugee experiences), and other adverse life events (Calhoun & Tedeschi, 2006; Helgeson et al., 2006; Linley & Joseph, 2004). Research, however, has not consistently found a significant relationship between growth outcomes as predicted by event type (Cummings & Swickert, 2010; Linley & Joseph, 2004). In addition, PTG appears to be generally unrelated to the amount of time passed since the time of the trauma (Helgeson et al., 2006; Linley & Joseph, 2004; Tedeschi & Calhoun, 1996). Although these findings may be attributable to insufficient amounts of research in these areas, it is probably more likely that individual appraisals might play a more important role in predicting posttraumatic growth than the objective classification of the traumatic event or the time elapsed since the trauma occurred (Sheikh, 2008).

In a recent meta-analysis consisting of survivors from diverse trauma backgrounds, Helgeson and colleagues (2006) found subjective ratings of threat severity and perceived stress to be predictive of more posttraumatic growth following a traumatic event. Consistent with this finding, in a large review of cardiac outpatients by Leung and colleagues (2010), posttraumatic growth was found to be related to lower functional status, a marker of disease severity, with lower functional capacity indicating a more severe illness. Although findings are inconsistent across studies (Helgeson et al., 2006), these results oppose previous findings indicating a non-significant relationship when disease severity was objectively operationalized by factors like length of hospital stay and physician rating of disease severity (Petrie et al., 1999) or objective classifications of the illness, such as cancer stage or tumor size (Barskova & Oesterreich, 2009).

Results across studies generally indicate that posttraumatic growth may be more closely related to perceptions of subjective stress and perceived risk rather than objective measures of stress severity (Helgeson et al., 2006). Supporting this notion, in a large study of cardiac inpatients, Leung and colleagues (2012) found PTG to be positively related to a greater perceived risk of morbidity but not the actual occurrence of a Major Adverse Cardiac Event (MACE) over the course of one-year follow up. Considering these results, when applied to the CVD population, it might be expected that those with both the greatest functional impairment as a result of a cardiac event along with the highest levels of perceived stress and threat as a result, may be the most likely to experience PTG. This would be consistent with Tedeschi and Calhoun's (2004) conceptualization of posttraumatic growth in which it is believed that PTG cannot occur outside the realm of a psychologically seismic event. Moreover, it can be assumed that if

the traumatic event were not severe enough to be perceived by the individual to be a true threat to one's assumptive world, then posttraumatic growth is unlikely to occur, regardless of the context in which it happens.

Psychological Response and Cognitive Coping

In a large study of cardiac outpatients, Leung and colleagues (2010) found PTG to be related to more positive illness perceptions, greater perceived personal control over the illness, and better perceived recovery. In addition, research has found PTG to be related to positive well-being (Helgeson et al., 2006), less depression (Barskova & Oesterreich, 2009; Garnefski et al., 2008; Helgeson et al., 2006; Leung et al., 2010; Linley & Joseph, 2004) and unrelated to symptoms of anxiety (Helgeson et al., 2006; Linley & Joseph, 2004) and global distress (Barskova & Oesterreich, 2009; Helgeson et al., 2006). Collectively, these findings indicate that PTG is associated with better mental health, and perhaps as a result, better cognitive coping in response to the event.

Generally speaking, PTG has been found to be related to more adaptive forms of coping (Garnefski et al., 2008; Linley & Joseph, 2004), which typically involve a higher persistence of cognitive processing (Tedeschi & Calhoun, 2004). For instance, problem-focused coping, which involves trying to understand the traumatic event and putting into place cognitive strategies to avoid it in the future, has been linked to PTG in various trauma samples (Helgeson et al., 2006; Schuettler & Boals, 2011), including that of CVD (Linley & Joseph, 2004; Sheikh, 2004). Similarly, PTG has been correlated with coping in the form of positive reappraisal (Barskova & Oesterreich, 2009; Garnefski et al., 2008; Helgeson et al., 2006) or the process of attaching positive meaning to the trauma in terms of growth (Carver, Scheier, & Weintraub, 1989), positive refocusing (Garnefski et al.,

2008), the process of engaging in other, pleasant thoughts instead of those about the event (Endler & Parker, 1990), and putting into perspective (Garnefski et al., 2008; Schuettler & Boals, 2011), the act of playing down the seriousness of the event (Allan & Gilbert, 1995). Interestingly, although there has been a consistent relationship demonstrated between PTG and rumination (Helgeson et al., 2006; Linley & Joseph, 2004; Stockton, Hunt, & Joseph, 2011), this finding was not present in the aforementioned study of cognitive coping (Garnefski et al., 2008). Although Garnefski and colleagues (2008) acknowledge that only those who used "positive" coping strategies experienced PTG, it should be noted that their method to identify cognitive coping did not measure separately for intrusive rumination and deliberate rumination – two processes that tend to lead to very different outcomes (Calhoun, Cann, & Tedeschi, 2010).

Although ruminating thoughts about a traumatic event are usually considered markers of distress, some argue that a period of contemplation may be necessary in order to work through and make sense of the traumatic event (Helgeson et al., 2006). Whereas the term rumination often implies a negative connotation, some forms of rumination may include problem-solving, making sense of the experience, or exploring one's existentialism (Cann et al., 2011). Cann and colleagues (2011), posit that when investigating cognitive coping strategies, it is imperative to assess rumination in a neutral way where one can distinguish between intrusive and deliberate types of the behavior. This has high implications given that Calhoun and colleagues (2010) model of PTG holds that intrusive and deliberate rumination influence adjustment outcomes in different ways, where excessive intrusive rumination that is uncontrollable by the individual is likely to be related to posttraumatic distress and deliberate rumination that is voluntary and not

negatively focused is likely to lead to PTG. Given the previous research indicating that problem-focused coping, positive reappraisal, positive refocusing, and putting into perspective are related to PTG (Garnefski et al., 2008; Helgeson et al., 2006; Linley & Joseph, 2004), it is of interest whether the deliberate ruminating processes that often correspond with these coping strategies that may be what actually contributes to PTG.

Consistent with Tedeschi and Calhoun's (2004) conceptualization of posttraumatic growth, it is not acceptable for clinicians to assume that those who experience PTG do so only in the absence of distress. Although the experience of PTG may rely heavily on the experience of deliberate rumination, this does not suggest that it occurs only in the absence of intrusive rumination. In fact, in Calhoun and colleague's (2010) model of posttraumatic growth, it is posited that the experience of intrusive rumination often precedes the process of deliberate rumination. Within this conceptualization, the presence of intrusive thoughts may initiate the process of seeking to understand the impact of a stressful experience in order to justify its meaning (Calhoun et al., 2010). Thus, both rumination styles may correlate strongly with PTG, with higher levels of deliberate and intrusive rumination likely corresponding with higher levels of posttraumatic growth.

Physical Activity and Quality of Life

In terms of post-trauma behavior, physical activity level has been found to be related to posttraumatic growth in groups of cancer survivors (McDonough, Sabiston, & Ullrich-French, 2011; Sabiston, McDonough, & Crocker, 2007). Although the nature of the relationship is not quite clear, these results are not too surprising given the robust evidence indicating that physical activity, including that performed in secondary

preventative programs such as cardiac rehabilitation (Ades, 2001; Artham, Lavie, & Milani, 2008; Milani & Lavie, 2007), has a salutary effect on certain emotions, including that of depression (Blumenthal, Williams, Needels, & Wallace, 1982; Lavie & Milani, 2001; Stern & Cleary, 1981), thereby providing a greater opportunity for PTG to occur. It has been posited that the physical exertion that corresponds with exercise may serve to assist in promoting PTG as one's perception shifts from viewing the body the focus of the trauma to viewing it as a source of renewal as one reconnects with the body during recovery (Hefferon, Grealy, & Mutrie, 2010). In addition, it has been found that taking on physical challenges together, with other survivors, may aid in facilitating posttraumatic growth (Sabiston et al., 2007), especially if there is an opportunity to develop a positive support system consisting of mutual disclosure and role modeling ways to positively rebuild one's life (Hefferon, Grealy, & Mutrie, 2008).

Interestingly, although research has demonstrated that attending cardiac rehabilitation strongly correlates with an overall improved quality of life (Leung et al., 2011), there has been no previous research demonstrating a relationship between PTG and quality of life (QoL; Linley & Joseph, 2004). Although a recent meta-analysis (Helgeson et al., 2006) of diverse trauma samples demonstrated no relationship between PTG and QoL, it should be noted that this review examined QoL in global terms, not accounting for the different relationships that might exist between physical and mental QoL and PTG. Thus, research is needed in order to investigate whether a relationship between QoL and posttraumatic growth exists when quality of life is separated into distinguishable physical and mental components.

PTG and Rehabilitation

There is a growing body of literature which indicates that secondary preventative programs like cardiac rehabilitation (CR) have been associated with a significant reduction in the prevalence of depressive symptoms (Ades, 2001; Milani & Lavie, 2007; Artham, Lavie, & Milani, 2008), corresponding to an overall decrease in all-cause and cardiac mortality, even after only a modest increase in exercise regimen (Milani & Lavie, 2007). These findings supplement the robust evidence indicating that exercise has a favorable effect on certain emotions, including that of depression (Stern & Cleary, 1981; Blumenthal, Williams, Needels, & Wallace, 1982) and results in an improved quality of life (Leung et al., 2011). Few studies, however, have been conducted on the prevalence of posttraumatic growth in cardiac patients attending a cardiac rehabilitation program (Leung et al., 2011; Leung et al., 2012; Sheikh, 2004). Prior research indicates that greater PTG may motivate cardiac patients to pursue more preventative healthcare services (Affleck, 1987), including cardiac rehab enrollment (Leung et al., 2011), suggesting that PTG may precede rehab enrollment. In contrast, however, one recent study indicated that not only does attending cardiac rehabilitation strongly correlate with an improved quality of life over time but it was also found to be predictive of PTG (Leung et al., 2011) as measured by the Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996). Thus, due to the inconsistent findings on the nature of the PTG-rehabilitation relationship, more research exploring its directionality is warranted. In addition, given the decreased cardiac mortality that typically accompanies finding benefit in adversity (Affleck et al., 1987), it is of great importance to identify the individual factors that are predictive of posttraumatic growth.

Present Study

In light of previous empirical findings, the present study sought to examine the clinical and behavioral predictors of posttraumatic growth in a sample of cardiac patients enrolled in a cardiac rehabilitation program. More specifically, the current study focused on the contributions of quality of life, mental health, functional capacity, and forms of cognitive coping to posttraumatic growth over the course of enrollment at a 36-session cardiac rehabilitation program. Thus, the main goal of the present study was to identify which factors are predictive of higher levels of growth at rehabilitation entrance and completion.

As a secondary objective, this study sought to investigate the relationship between various forms of cognitive coping, rumination, PTG, and the separate components of quality of life. To our knowledge, this study was the first of its kind to examine both deliberate and intrusive forms of rumination as correlates of PTG and cognitive coping. Moreover, it was of interest whether deliberate rumination is a process that corresponds with coping strategies that have been previously shown to correlate with PTG, specifically that of positive reappraisal, positive refocusing, and putting into perspective. In addition, to the best of our knowledge, this study was the first of its kind to examine relationships between posttraumatic growth and the separate component summaries on the QoL measure. Although previous research has demonstrated no relationship between PTG and QoL (Helgeson et al., 2006; Linley & Joseph, 2004), these previous studies measured QoL in global terms, not accounting for the different relationship that might exist between physical and mental QoL and PTG. The present study utilized a commonly used global assessment of QoL and computed summary measures of physical and mental

health referred to as the Physical Component Summary (PCS) and the Mental Component Summary (MCS), where higher scores on each component indicates better QoL in that domain. Given that PTG has different relations to mental and physical health (Helgeson et al., 2006), it made sense to measure QoL this way.

While the main focus of this study was on factors predictive of and related to posttraumatic growth, given that data was collected over the course of enrollment in a rehabilitation setting, it was of interest whether individuals will report having experienced more PTG by rehabilitation completion. The purpose of this was to shed light on the directionality of the PTG-CR relationship, where some evidence indicates that the experience of PTG leads individuals to seek out more preventative healthcare services (Affleck et al., 1987) while other research has demonstrated that attending a rehabilitation program is predictive of more growth (Leung et al., 2011). Thus, due to the multifaceted purpose of this study, the following hypotheses were proposed:

Hypothesis 1. It is hypothesized that there will be a significant difference in the amount of posttraumatic growth (as measured by the PTGI) reported when scores measured at baseline (PTG1) and rehabilitation completion (PTG2) are compared. Specifically, it is expected that individuals will report having experienced greater levels of PTG by the completion of rehabilitation program as they will have had more time to deliberately ruminate and more time to engage in rehabilitation exercise. Although time elapsed since trauma has not been previously associated with PTG (Barkova & Oesterreich, 2009; Helgeson et al., 2006), this hypothesis is based on the research which demonstrates that exercise, including that performed in secondary preventative programs like cardiac rehabilitation (Ades, 2001; Artham et al., 2008; Milani & Lavie, 2007), has a

salutary effect on certain emotions, including that of depression (Blumenthal et al., 1982; Lavie & Milani, 2001; Stern & Cleary, 1981) and improves quality of life (Leung et al., 2011), both factors that are related to PTG.

Hypothesis 2. It is hypothesized that posttraumatic growth (as measured by the PTGI) will be significantly predicted by rumination scores (as measured by the ERRI), cognitive coping strategies (as measured by the CERQ), functional capacity (as measured by the DASI), quality of life component scores (as measured by the SF-36), and depression scores (as measured by the BDI). That is, the ability to experience psychological growth following a highly challenging life event is expected to be predicted by whether the individual has engaged in exploring the meaning of the event, whether the individual has used cognitive coping strategies to process the event, the subjective severity of the trauma, and whether the individual experiences elevated symptoms of depression. This hypothesis is based on previous research that has demonstrated a relationship between posttraumatic growth and deliberate rumination (Calhoun et al., 2010; Stockton et al., 2011), positive coping strategies (Garnefski et al., 2008), functional capacity (Helgeson et al., 2006; Leung et al., 2010), and depression (Barskova & Oesterreich, 2009; Garnefski et al., 2008; Helgeson et al., 2006; Leung et al., 2010; Linley & Joseph, 2004).

Method

Participants

This study utilized a convenience sample of 80 individuals (56 men and 24 women) enrolled in the 12-week cardiac rehabilitation program located at the University of South Carolina-Aiken Wellness Center, ranging in age from 43 to 89 (M = 66.98; SD =

10.70). It should be noted, however, that only 45 of these individuals (33 men and 12 women), ranging in age from 43 to 89 (M = 68.51; SD = 10.00), completed the rehabilitation program and both data collections. Rehabilitation members were not offered any compensation for participating in the study, but rather, data was collected through the standard protocol utilized by the cardiac rehabilitation program.

Measures

Demographics Questionnaire (see Appendix A). A questionnaire was developed in order to ascertain important demographic information about each participant (i.e., gender, age, ethnocultural background, socioeconomic status, etc.) and the type of cardiac trauma experienced that led to enrollment in the cardiac rehabilitation program. Demographic information was assessed through forced-choice response options and the individual was asked to describe the cardiac event experienced and the date at which it occurred in an open-ended response.

The 36-Item Short-Form Health Survey – 1-year and 3-month form (SF-36; Ware & Sherbourne, 1992; see Appendix B, C). The SF-36 is a 36-item survey of patient health consisting of a multi-item scale that assesses eight health-related quality of life domains: limitations in physical functioning (PF), limitations in usual role functioning because of physical health problems (RP), bodily pain (BP), general health perceptions (GH), vitality (VT), limitations in social functioning because of physical or emotional problems (SF), limitations in usual role functioning because of emotional health problems (RE), and general mental health (MH). Each subscale contains statements relevant to a particular domain that are rated differently, depending on the domain being measured. For instance, questions assessing for limitations in physical activity are rated on a 3-point Likert scale

where the individual is to indicate whether one's health limits one's physical activities (e.g., 1 = Yes, limited a lot, 2 = Yes, limited a little, 3 = No, not limited at all); in contrast, questions measuring vitality and mental health are to be rated on a 6-point Likert scale where feelings are to be rated in frequency over the past four weeks (e.g., 1 = All of the time, 2 = Most of the time, 3 = A good bit of the time, 4 = Some of the time, 5 = A little of the time, 6 = None of the time). The SF-36 has elicited high internal consistency when used with MI patients with Cronbach alphas ranging from .72 to .92 (Failde & Ramos, 2000). Under each of the eight dimensions measured, item scores were coded, summed, and transformed to a scale ranging from 0 (worst health status) to 100 (best health status). For the purposes of this study, rated items were entered into a Microsoft Excel program designed to be used at the rehabilitation center to easily weight and sum scores.

Scores on the SF-36 were grouped in order to compute summary measures of physical and mental health referred to as the Physical Component Summary (PCS) and the Mental Component Summary (MCS), where higher scores on each component indicated better QoL in that domain. The Physical Component Summary consisted of scores measuring for the presence and intensity of bodily pain (BP), the extent to which health limits physical functioning (PF), perceptions of physical health (GH), and the extent to which physical health interferes with daily activities or responsibilities (RP). In comparison, the Mental Component Summary consisted of scores measuring for the presence of depression, anxiety, and feelings of control (MH), the extent to which physical health or emotional problems interfere with social functioning (SF), the extent to

which one feels worn out (VT), and the extent to which emotional problems interfere with daily activities or responsibilities (RE).

Consistent with rehabilitation regulations, in order to compare quality of life at entrance to that at exit of the program, two different forms of the SF-36 (1-year; 3-month) were administered to all rehabilitation members with the 1-year form being given at entrance and the 3-month form being administered at rehabilitation completion. These forms are identical except for one survey item, which is stated differently between measures. On the 1-year form, question two reads, "Compared to 1 year ago, how would you rate your health in general now?" and on the 3-month form it reads, "Compared to 3 months ago, how would you rate your health in general now?" This difference allows for the direct comparison of subjective reports of perceived health at entrance into the rehabilitation program and upon completion of the program.

Duke Activity Status Inventory (DASI; Hlatky & Mark, 1989; see Appendix D). The Duke Activity Status Inventory is a 12-item questionnaire developed to measure functional status while also providing insight into selected aspects of quality of life. This scale uses the individual's capacity in daily living activities in order to gauge functional capacity. These activities represent major aspects of physical functioning including: personal care, ambulation, ability to carry out household tasks, ability to engage in recreational activities, and ability to engage sexually. Participants were asked to indicate if and how well they could engage in each task, given one of four options, (1 = Yes, with no difficulty, 2 = Yes, but with some difficulty, 3 = No, I can't do this, or 4 = Don't do this for other reasons). The DASI has elicited high internal consistency when used with patients who have chronic coronary disease, with Cronbach alphas ranging from .81 to

.89, while there were no statistically significant differences for stable patients in the 2-week re-test period (Alonso et al., 1997).

For every item listed on this measure, there is a corresponding weighted value (e.g., ability to walk around the house = 1.75; ability to run a short distance = 8.00) used for scoring purposes. In order to score the DASI, the total number of corresponding weighted values to all questions where the rater answered one (Yes, with no difficulty) is summed. In order to get the estimated peak oxygen uptake score, the summed number was entered into the following equation (0.43*(duke status index)) + 9.6 and then divided by 3.5 to convert it into metabolic equivalents. Scores on the DASI may range from 0 – 52.8, with metabolic equivalent scores ranging from 0 – 9.89. Higher metabolic equivalent scores are indicative of a more physically active person with a corresponding higher functional capacity. In contrast, a low score on this measure indicates significant deficits in the ability to engage in physical activity and an overall poorer quality of life.

Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996; see Appendix E). The PTGI is the most commonly used standardized measurement of personal growth following a highly stressful traumatic event. Consisting of a total of 21 items, participants were asked to indicate levels of life change as a result of their cardiac event on a six-point Likert scale (0 = No change, 1 = A very small degree of change, 2 = A small degree of change, 3 = A moderate degree of change, 4 = A great degree of change, and 5 = A very great degree of change) in the areas of New Possibilities (five items), Relating to Others (seven items), Personal Strength (four items), Appreciation of Life (three items), and Spiritual Change (two items). The PTGI total score was computed by summing item responses and ranges in total from 0 – 105, where a higher score on the

measure indicated more personal growth. Due to small sample size, however, only the total PTGI score was used. Tedeschi and Calhoun (1996) reported the internal consistency coefficient (α) of the PTGI to be .90. Each subscale has moderate to high internal consistency with Cronbach alphas ranging from .67 to .85 and moderate test-retest reliability of .71 after a 2-month interval.

Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij, & Spinhoven, 2002; see Appendix F) The CERQ is a 36-item form that can be used to measure either a general cognitive coping style or a specific cognitive response to a specific event. Measured on a 5-point Likert scale ranging from 1 (Almost never) to 5 (Almost always), all questions belong to one of nine conceptually distinct subscales including Rumination (e.g., "I often think about how I feel about what I have experienced"), Catastrophizing (e.g., "I continually think how horrible the situation has been"), Self-blame (e.g., "I feel that I am the one who is responsible for what has happened"), Other-blame (e.g., "I feel that others are to blame for it"), Putting into Perspective (e.g., "I tell myself that there are worse things in life"), Positive Refocusing (e.g., "I think of pleasant things that have nothing to do with it"), Positive Reappraisal (e.g., "I think I can learn something from the situation"), Acceptance (e.g., "I think that I must learn to life with it"), and Planning (e.g., "I think about how I can best cope with the situation"). Each of the nine subscales consists of four items and each refers to what someone thinks after the experience of a stressful life event, in this case, a major cardiac event. Individual scores were obtained by summing up the scores belonging to each particular subscales (ranging from 4 – 20). The CERQ has demonstrated good to very good psychometric properties with Cronbach alphas ranging from .68 to over .80

(Garnefski et al., 2002) and test-retest reliablities of the CERQ scales ranging from .48 (refocus on planning) to .65 (other-blame).

State-Trait Anxiety Inventory-Y-2 Form (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983; see Appendix G). The STAI Y-Form serves as a measure of two types of anxiety, state (Y-1) and trait (Y-2) anxiety, and assesses the overall severity of anxiety in adults. Individuals rate on a 4-point Likert scale how intensely they experience symptoms of anxiety at that moment while taking the assessment (e.g., 1 = Not at all, 2 = Somewhat, 3 = Moderately so, 4 = Very much so) and also generally speaking under normal circumstances (e.g., 1 = Almost never, 2 = Sometimes, 3 = Often, 4 = Almost always). The instrument is divided into two sections, with each form having a total of twenty questions. The range of scores is 20-80, with a higher score indicating greater anxiety. Some of the questions assess for the absence of anxiety and therefore must be reverse-scored. For the purposes of this study, consistent with rehabilitation procedures, only the trait (Y-2) form was used. The test-retest reliability of the STAI was reported by Spielberger and colleagues (1970) to be .54 for the state measure and .86 for the trait measure. The STAI is considered a valid scale, with Cronbach's alphas ranging from 0.87 to 0.92 (Van der Ploeg, Defares, & Spielberger, 1970).

Beck Depression Inventory – II (BDI-II; Beck, Steer, & Brown, 1996; see Appendix H). The Beck Depression Inventory – II is a 21-item survey used to assess for symptoms of depression. Using a forced-choice format, individuals were asked to rate on a 4-point Likert scale how intensely they experienced symptoms of depression (e.g., 0 = I do not feel sad, 1 = I feel sad, 2 = I am sad all the time and I can't snap out of it, 3 = I am so sad or unhappy that I can't stand it). The BDI-II has elicited high internal consistency

reported at .91 (Beck, Steer, Ball, & Ranieri, 1996) and high one-week test-retest reliability at .93 (Beck et al., 1996). To score the BDI-II, items were summed across the entire measure. Scores used to differentiate varying levels of depression differ from the original inventory: 0-13: minimal depression; 14-19: mild depression; 20-28: moderate depression; and 29-63: severe depression.

Event Related Rumination Inventory (ERRI; Cann, Calhoun, Tedeschi, Triplett, Vishnevsky, & Lindstrom, 2011; see Appendix I). The Event Related Rumination Inventory was designed to measure and differentiate between intrusive rumination and deliberate rumination. Given the negative connation typically associated with the concept of rumination, Cann and colleagues (2011) constructed the ERRI in a neutral tone, making it a more desirable and applicable research tool. The ERRI is composed of two subscales that contain ten statements relevant to either intrusive rumination (e.g., "I could not keep images or thoughts about the event from entering into my mind") or deliberate rumination ("I thought about whether I could find meaning from my experience"). Responses were recorded on a 4-point Likert scale (0 = Not at all, 1 = Rarely, 2 = Sometimes to 3 = Often). To score this measure, each individual subscale score was calculated by summing up all of the items contained within each subscale, resulting in separate scores for intrusive and deliberate rumination. Scores on both subscales were used in the present study. Both the intrusive and deliberate subscales demonstrate high internal consistency with Cronbach alphas ranging from 0.88 to 0.94 (Cann et al., 2011). While Cann and colleagues (2011) found that both factors distinctly emerged, they were also found to be intercorrelated ($r = 0.60$), suggesting that individuals who experience intrusive thoughts may also tend to engage in deliberate rumination (Cann et al., 2011).

Procedure

It should be noted that all data was gathered through the 36-session cardiac rehabilitation program located at the USC Aiken Wellness Center. Within their first six sessions enrolled in the program, all rehabilitation participations were asked to complete routine assessments for the purposes of tracking rehabilitation progress (Time 1). These routine assessments included a demographic questionnaire, the one-year 36-Item Short Form Health Survey (SF-36; Ware & Sherbourne, 1992), the Duke Activity Status Inventory (DASI; Hlatky & Mark, 1989), the Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996), the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski et al., 2002), the State-Trait Anxiety Inventory Y-1 form (STAI; Van der Ploeg, Degares, & Spielberger, 1980), the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996), and the Event Related Rumination Inventory (ERRI; Cann et al., 2011). Rehabilitation members were given the option to complete the assessments during one interview session or two, depending on their preference. Upon having completed the assessment paperwork, rehabilitation members were provided feedback regarding their scores and were offered appropriate referrals and supportive services, as deemed necessary. Upon having completed the interview, all rehabilitation members were informed that they would be asked to return to fill out the routine exit assessments required by the rehabilitation program upon having completed the program.

Consistent with rehabilitation regulations, during their last six rehabilitation sessions, all members enrolled in the rehabilitation program were asked to complete routine exit measures in an effort to track rehabilitation progress (Time 2). These routine assessments included the three-month 36-Item Short Form Health Survey (SF-36; Ware

& Sherbourne, 1992), the Duke Activity Status Inventory (DASI; Hlatky & Mark, 1989), the Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996), the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski et al., 2002), the State-Trait Anxiety Inventory Y-1 form (STAI; Van der Ploeg, Degares, & Spielberger, 1980), the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996), and the Event Related Rumination Inventory (ERRI; Cann et al., 2011). Once again, rehabilitation members were given the option to complete the assessments in one session or two, depending on their preference. Upon having completed the exit assessment paperwork, rehabilitation members were provided feedback regarding their rehabilitation progress and were offered appropriate referrals, as deemed necessary.

Results

Demographics

A total of 81 individuals were enrolled in the cardiac rehabilitation program located at the USCA Wellness Center during data collection procedures. Of these individuals, 1 participant was excluded from the present study after demonstrating signs of hallucinations and delusional thinking. Although 80 individuals were enrolled in the cardiac rehabilitation program, only 45 of them completed the program and both data collections. Of the 45 individuals who completed the rehabilitation program, 73.3% were male (n = 33) and 26.7% (n = 12) were female. There were 82.2% (n = 37) individuals who reported their ethnicity as Caucasian, 15.6% (n = 7) who reported their ethnicity as being African American, and 2.2% (n = 1) who reported their ethnicity as being “Other”. The participants’ ages ranged from 43-89 (M = 68.51, SD = 10.00).

Of the 45 individuals who completed the rehabilitation program, 77.8% (n = 35) reported attending the cardiac rehabilitation program after having suffered a first time cardiac event and 22.2% (n = 10) reported having suffered one or more events prior to rehab enrollment. In regards to event type, 20% (n = 9) reported having a coronary stent implanted, 20% (n = 9) reported having bypass surgery, 20% (n = 9) reported having a valve replaced, 6.7% (n = 3) reported being diagnosed with angina, 2.2% (n = 1) reported suffering a stroke, and 31.1% (n = 14) reported having suffered multiple events. Demographic information describing rehabilitation members, separated by those who completed the program and those who dropped out, can be found in Table 1. Means, standard deviations, and other descriptive statistics for data collected at entrance (Time 1) and exit (Time 2) can be found in Table 2 and Table 3, respectively.

Preliminary Analyses

Gender differences. Of the 80 individuals enrolled in the cardiac rehabilitation program, 56 were male. A series of between groups one way ANOVAs were conducted to examine differences between men and women (Table 4) on all measures completed at Time 1 and Time 2. Results reveal that there were significant differences between men and women on Time 1 measures assessing for physical quality of life [$F(1, 78) = 5.27$, $p < .024$], functional capacity [$F(1, 78) = 7.00$, $p < .010$], anxiety [$F(1, 72) = 15.51$, $p < .000$], depression [$F(1, 72) = 11.69$, $p < .001$], intrusive rumination [$F(1, 72) = 9.67$, $p < .003$], and deliberate rumination [$F(1, 72) = 4.32$, $p < .041$]. These findings indicate that at upon entering cardiac rehabilitation, men were less limited in their physical functioning and abilities, they experienced less frequent and less intense pain, and had overall better perceptions of their physical health when compared to women. In addition,

results indicate that women were more likely to enter into the rehabilitation program experiencing higher levels of anxiety, depression, intrusive ruminative thoughts, and deliberate ruminative thoughts when compared to men. There were no significant differences between men and women on measures completed at Time 2.

In order to determine if there was a significant relationship between gender and rehabilitation completion, a chi-square test of independence was conducted. Results of this test revealed that the percentage of participants who finished the program did not differ significantly by gender, χ^2 (2, N = 80) = .55, p = .76, indicating that gender was independent of completion status.

Racial group differences. A series of between groups one way ANOVAs were also conducted to examine racial group differences on all measures completed (Table 5). It should be noted that given the small size of the Asian (n = 1) and "Other" (n = 2) racial groups, these groups were combined with the African American group to represent minorities for the purposes of conducting analyses on these individuals. Results of ANOVAs revealed no significant differences across races on any measure at Time 1 or Time 2. In addition, in order to determine if there was a significant relationship between race and rehabilitation completion, a chi-square test of independence was conducted. Results of this test revealed that the percentage of participants who finished the program did not differ by race, χ^2 (2, N = 80) = .96, p = .62, indicating that race was independent of completion status.

Cardiac history differences. A series of between groups one way ANOVAs were used to examine differences between those who had entered the cardiac rehabilitation program having experienced a first time cardiac event and those who had

entered rehab with a history of at least one or more cardiac events (Table 5 and Table 6). In regards to coping, there were significant differences between these groups on scores measuring acceptance [$F(1, 72) = 4.35$, $p < .041$], positive reappraisal [$F(1, 72) = 4.32$, $p < .041$], planning [$F(1, 72) = 5.23$, $p < .025$], and rumination [$F(1, 72) = 9.17$, $p < .003$]. In addition, there were significant differences between groups on intrusive rumination scores at Time 1 [$F(1, 72) = 7.45$, $p < .008$], deliberate rumination scores at Time 1 [$F(1, 72) = 7.57$, $p < .007$], PTG1 [$F(1, 78) = 10.71$, $p < .002$], and PTG2 [$F(1, 43) = 4.93$, $p < .032$]. These findings indicate that compared to individuals with a cardiac history, those who enrolled in the rehabilitation program after having experienced a first time event entered into the program endorsing a significantly greater use of coping in the form of acceptance, positive reappraisal, planning, and rumination in response to their cardiac event. In addition, individuals who had experienced a first time event reported experiencing significantly higher levels of intrusive and deliberate rumination and they reported experiencing significantly higher levels of posttraumatic growth at both rehabilitation entrance and exit as a result of the event.

In addition, in order to determine if there was a significant relationship between cardiac history and rehabilitation completion, a chi-square test of independence was conducted. Results of this test indicated that the percentage of participants who finished the program differed significantly by cardiac history, $\chi^2(2, N = 80) = 7.72$, $p = .02$. Specifically, those who entered the program having experienced a first time event were more likely to complete the program compared to those who entered into the program with a cardiac history.

Completion status differences. A series of between groups one way ANOVAs were also used to examine differences between individuals who completed the cardiac rehabilitation program and those who dropped out before finishing (Table 7). The results of this test revealed that there were significant differences between groups on intrusive rumination scores at Time 1 [$F(1, 69) = 3.16$, $p < .048$]. These findings indicate that non-completers reported experiencing significantly lower levels of intrusive rumination at rehabilitation entrance when compared to completers. There were no other significant group differences across measures, including PTG1 scores.

Hypothesis 1: PTG1 and PTG2 would be significantly different.

It was hypothesized that individuals enrolled in the cardiac rehabilitation program would report higher levels of posttraumatic growth at Time 2 when compared to scores measured at Time 1. To test this hypothesis, a paired samples *t*-test was performed comparing PTG scores at rehabilitation entrance to scores collected at exit. Contrary to hypotheses, the result of this test revealed that PTG1 scores ($M = 38.76$, $SD = 26.38$) and PTG2 scores ($M = 39.16$, $SD = 30.28$) were not significantly different from each other ($t = -.13$, $p = .900$).

Hypothesis 2: PTG would be predicted by deliberate and intrusive rumination, the use of cognitive coping strategies, functional capacity, quality of life, and depression.

The second hypothesis stated that PTG (as measured by the PTGI) would be predicted by deliberate rumination scores (as measured by the ERRI), intrusive rumination scores (as measured by the ERRI), the use of cognitive coping strategies (as measured by the CERQ), functional capacity (as measured by the DASI), quality of life (as measured by the SF-36), and depression (as measured by the BDI). It should be noted

that although the CERQ produces nine distinct scaled scores measuring various coping styles, due to the small sample size and the finding that most of the coping strategies measured were not related to PTG at entrance or at rehabilitation completion, the single coping strategy with the strongest relationship to PTG (Planning for Regression 1, Rumination for Regression 2, and Rumination for Regression 3) was selected and entered into each regression.

To examine the value of Time 1 and Time 2 characteristics in predicting posttraumatic growth scores at the start of cardiac rehabilitation and at program completion, three Stepwise Regression Analyses were performed. The first regression investigated entrance variables that predicted PTG at entrance. The second regression investigated entrance variables that predicted PTG at exit. The third regression investigated exit variables that predicted PTG at exit. Previous event, gender, rumination scores, functional capacity scores, physical quality of life scores, depression scores, and the most strongly related coping score were entered into all regressions. A correlation matrix outlining the relationships between study variables and PTG1 and PTG2 can be found in Table 8. For all regression analyses, previous event and gender were entered into the first block and all other predictor variables were entered in the second block.

Regression 1. For this regression, data from all 80 participants, including those who did not finish the rehabilitation program, were included. Regression results revealed three significant entrance predictors of PTG1. Model 1 (with previous event and gender entered alone) produced an Adjusted R^2 of .09 [F (2, 71) = 4.70, p = .012]. Model 2 (which added deliberate rumination) produced an Adjusted R^2 of .31 with an R^2 Change of .22 [F (1, 70) = 23.03, p = .000], significantly improving the predictive power of the

analysis. Model 3 (which added physical quality of life scores) produced an Adjusted R^2 of .37 with an R^2 Change of .07 [F (1, 69) = 7.58, p = .008], also significantly improving the prediction. Thus, of the eight main predictors measured at Time 1, only previous event (β = -.22), deliberate rumination (β = .49) and physical quality of life (β = -.27) emerged as significant predictors of PTG1, where deliberate rumination emerged as the primary predictor. This model, which included previous event, gender, deliberate rumination scores, and physical quality of life scores, accounted for 40% of the total variable variation. These results are depicted in Table 9. It should be noted that in an effort to support this finding, an additional regression was performed, but only including those who completed the rehabilitation program. This analysis revealed that deliberate rumination and physical quality of life were the only significant predictors of PTG1, where deliberate rumination emerged as the primary predictor.

Regression 2. Regression results revealed two significant Time 1 predictors of PTG2. Model 1 (with previous event and gender entered alone) produced an Adjusted R^2 of .08 [F (1, 41) = 2.96, p = .063]. Model 2 (which added intrusive rumination) produced an Adjusted R^2 of .23 with an R^2 Change of .15 [F (1, 40) = 8.52, p = .006], significantly improving the predictive power of the analysis. Model 3 (which added physical quality of life scores) produced an Adjusted R^2 of .29 with an R^2 Change of .07 [F (1, 39) = 4.36, p = .043], also significantly improving the prediction. Thus, of the eight main predictors measured at Time 1, only intrusive rumination (β = .41) and the physical quality of life (β = -.29) emerged as significant predictors of PTG2, where intrusive rumination emerged as the primary predictor. This model, which included previous event, gender,

intrusive rumination, and physical quality of life scores, accounted for 35% of the total variable variation. These results are depicted in Table 10.

Regression 3. Regression results indicated two significant Time 2 predictors of PTG2. Model 1 (with previous event and gender entered alone) produced an Adjusted R^2 of .04 [F (1, 38) = 1.85, p = .170]. Model 2 (which added deliberate rumination) produced an Adjusted R^2 of .49 with an R^2 Change of .44 [F (1, 37) = 34.94, p = .000], significantly improving the predictive power of the analysis. Model 3 (which added the DASI score) produced an Adjusted R^2 of .54 with an R^2 Change of .05 [F (1, 36) = 4.35, p = .044], also significantly improving the prediction. Thus, of the eight main predictors measured at Time 2, only deliberate rumination (β = .62) and DASI score (β = -.24) emerged as significant predictors of PTG2, where deliberate rumination alone added a large increase in predictive power. This model, which included previous event, gender, deliberate rumination, functional capacity, accounted for 58% of the total variable variation. These results are depicted in Table 11.

Exploratory Analyses

In accordance with the third objective of this study, the interrelationships among deliberate rumination, PTG, and various forms of cognitive coping were examined for exploratory purposes. To this end, a series of Pearson's r product-moment correlations were conducted (Table 12). Across the nine distinct coping styles measured by the CERQ, PTG1 was significantly related to Planning and Rumination measured at Time 1. Further, PTG2 was related to Putting into Perspective (r = .33, p < .05), Rumination (r = .43, p < .01), and Other-blame (r = -.36, p <.05) measured at Time 2. Contrary to previous research, PTG was not related to Positive Reappraisal or Positive Refocusing at

either time nor was it related to Acceptance, Self-blame, or Catastrophizing. Interestingly, a positive relationship was found between deliberate rumination scores and Acceptance ($r = .27$, $p < .05$), Positive Reappraisal ($r = .38$ $p < .05$), Planning ($r = .45$, $p < .01$), Putting into perspective ($r = .68$, $p < .01$), and Rumination ($r = .38$, $p < .05$). Deliberate rumination was not related to Positive Refocusing, Self-blame, Catastrophizing, or Other-blame.

Discussion

This study aimed to identify the predictors of posttraumatic growth in individuals enrolled in a cardiac rehabilitation program. Furthermore, given the inconsistent findings regarding the directionality of the PTG-rehabilitation relationship, the present study sought to examine significant differences between posttraumatic growth scores at rehabilitation entrance compared to those endorsed at completion. The results of the present study indicate that there are clinical and behavioral characteristics that appear to play an important role in predicting posttraumatic growth.

The first prediction of the present study was that there would be significantly greater posttraumatic growth reported at rehabilitation completion when compared to that measured at entrance, indicating that greater PTG may impel or be the result of rehabilitation completion. Results of the present study, however, revealed that there were no significant differences between PTG scores over time. In addition, PTG scores at rehabilitation entrance were not significantly different between completers and non-completers. Interestingly, however, intrusive rumination scores at rehabilitation entrance were significantly different between completers and non-completers, indicating a relationship between intrusive rumination and rehabilitation completion. As such, these

results are contradictory to previous research which has indicated that attending rehabilitation, regardless of program duration, is predictive of greater PTG (Leung et al., 2011). Rather, this non-significant finding is in line with research conducted by Affleck (1987) and Leung and colleagues (2011) which suggested that the experience of PTG precedes and motivates rehabilitation enrollment. To this end, this research has theorized that PTG in the aftermath of a cardiac event prompts individuals to utilize preventative healthcare services in order to improve health and reduce the probability of suffering another event. This may be especially true for individuals who have suffered a first time cardiac event, as results indicate that individuals who experienced a first time event endorsed significantly greater PTG at both rehabilitation entrance and completion when compared to those with a cardiac history. Thus, more research is needed in order to shed light on the directionality of the rehabilitation-PTG relationship and the motivating forces underlying rehab enrollment and completion.

The second prediction of the present study was that posttraumatic growth would be predicted by higher levels of deliberate and intrusive rumination, greater use of cognitive coping strategies in response to the event, a greater overall functional impairment, and lower depression scores. Results of the three regressions performed provided partial support for this supposition. Specifically, results of the first regression indicated that PTG reported at rehabilitation entrance (PTG1) was predicted by higher levels of deliberate rumination and a poorer physical quality of life. Results of the second regression revealed that PTG endorsed at rehabilitation completion (PTG2) was predicted by higher levels of intrusive rumination and a poorer physical quality of life at rehabilitation entrance. Further, results of the third regression revealed that deliberate

rumination and a greater functional impairment at rehabilitation exit predicted greater posttraumatic growth endorsed at rehabilitation completion (PTG2). Collectively, these results indicate that deliberate and intrusive rumination are primary predictors of PTG but at different phases of rehabilitation enrollment, indicating that they may play independently distinct functions. These findings are consistent with previous theoretical (Calhoun et al., 2010; Tedeschi & Calhoun, 2004) and empirical research (Cann et al., 2011; Linley & Joseph, 2004; Stockton et al., 2011) which have indicated that the occurrence of intrusive and deliberate rumination are related to PTG in different ways. Generally, this research has suggested that intrusive thoughts are considered a normal by-product following a major life event and are indicative of cognitive processing (Cann et al., 2011). Furthermore, the results of the present study are consistent with posttraumatic growth theory which assumes that the level of intrusive thoughts experienced will be predictive of levels of deliberate thoughts experienced and further that intrusive thoughts are a precursor to PTG, leading the individual to seek meaning and a better understanding of the stressful event (Calhoun et al., 2010). With this said, however, further research investigating the relationship between the separate rumination styles and PTG is warranted as there is little extant literature, aside from theoretical suppositions, supporting the present findings.

The finding that a poorer physical QoL and functional capacity emerged as secondary predictors of PTG provides support for previous research which has generally indicated that PTG is closely related to subjective perceptions of stress and disease severity (Helgeson et al., 2006; Leung et al., 2010). To the best of our knowledge, this is the first study that has investigated the relationship between PTG and quality of life in

separate mental and physical components. In interpreting the results of the present study, it appears as though PTG at rehabilitation entrance is predicted by higher levels of perceived stress and disability (as a result of poor physical quality of life) and PTG upon rehabilitation completion is predicted by greater physical impairment. This supposition is consistent with the current model of posttraumatic growth (Tedeschi & Calhoun, 2004) in which it is assumed that PTG cannot occur outside the realm of a threatening and seismic event. Interestingly, though, PTG was not related to mental quality of life at either time, despite the fact that PTG was positively correlated with symptoms of depression and anxiety at both entrance and rehabilitation completion. Further research on the separate components of quality of life and posttraumatic growth is warranted to support the present findings as this is the first study, to the best of our knowledge, that has examined the relationship between PTG and both physical and mental quality of life.

In accordance with the last objective of the present study, the relationships between PTG, deliberate rumination, and forms of cognitive coping were examined. Contrary to previous research that has demonstrated a relationship between PTG and coping in the form of positive reappraisal (Barskova & Oesterreich, 2009; Garnefski et al., 2008; Helgeson et al., 2006) and positive refocusing (Garnefski et al., 2008), these findings were not supported in the current study. In fact, across the nine distinct coping styles measured, PTG was found only to be related to putting into perspective, rumination, and other-blame at rehabilitation completion. Interestingly, however, results indicate that deliberate rumination was significantly related to acceptance, positive reappraisal, planning, rumination, and putting into perspective. Thus, it appears as though deliberate rumination corresponds with coping strategies that in other research have been

related to PTG (Garnefski et al., 2008; Helgeson et al., 2006; Linley & Joseph, 2004). It is uncertain, however, whether the act of deliberate rumination is what drives the use of these coping strategies or if the ruminative processes that underlie these coping strategies is what is contributing to PTG. Thus, more research is needed in this area to shed light on the relationship between deliberate rumination, PTG, and forms of cognitive coping.

Although there were several novel findings within the present study, there were also several limitations, which should be addressed in future studies. One limitation was regarding the limited demographic makeup. For example, the sample was comprised of individuals enrolled in a cardiac rehabilitation program located in a small southeastern community, and thus may not be fully representative of the full range of beliefs and experiences of those differing in geographic region or trauma type. Moreover, while the results of the present study may be generalizable to populations who have experienced a cardiac event, caution should be taken in generalizing the results to other types of medical illness or the larger population due to representativeness issues.

While demographic makeup in the present study was comparable to that observed in other cardiac rehabilitation samples (Leung et al., 2011; Sheikh, 2004), individuals enrolled in the cardiac rehabilitation program were more likely to be older, married, retired, and with higher income when compared to the general population. These limitations make it difficult to determine whether the present findings are generalizable to the majority of individuals across trauma types who experience PTG. Moreover, ethnic and racial diversity was not fully representative or diverse enough to be considered generalizable to the population. Caucasian participants made up over 80% of those enrolled in the cardiac rehabilitation program. Thus, future studies should make a more

concerted effort to increase the number of racially diverse respondents as it is necessary to determine whether patterns established in the empirical findings in the present study may pertain more so to non-minorities than they do to minorities.

It should be noted that the degree of PTG in the current cardiac outpatient population was lower than that previously reported in other cardiac populations (Leung et al., 2011; Sheikh, 2004), breast cancer populations (Weiss, 2004), and HIV/AIDS populations (Milam, 2004). This discrepancy could be due to a number of factors including that of age, gender, ethnicity, perceived severity of threat and harm, life impact, or degree of controllability. For instance, previous research has demonstrated that greater PTG is related to being female, younger, and non-white (Leung et al., 2011). Thus, the relatively low levels of PTG may be due to the fact that the present sample consisted mostly of Caucasian men with a mean age over sixty years old. Furthermore, it should be noted that rehabilitation members typically enter into the rehabilitation program one to four months after suffering a cardiac trauma, which could potentially account for lower PTG scores. Although PTG appears to be generally unrelated to the amount of time passed since the time of the trauma (Helgeson et al., 2006; Linley & Joseph, 2004; Tedeschi & Calhoun, 1996), it is possible that PTG scores at program entrance may not be fully representative of PTG experienced in the immediate aftermath of the trauma. With this said, however, the reasons for differences in PTG in cardiac populations and other medical populations are unknown and should form the basis for future research.

Another limitation to the present study pertains to the use of self-report measures. It is possible that participants responded to items in a manner that was exaggerated or socially desirable given that measures were completed at rehabilitation entrance and exit.

Moreover, it is possible that participants did not respond in a forthright manner given that measures were first completed upon entrance into the program, when participants may have felt particularly self-conscious about their physical abilities or symptoms of distress, and then again upon rehabilitation completion, when participants may have felt compelled to report improvements in their physical or mental well-being. Therefore, future research may benefit from the use of alternative measurement techniques, such as personal interviews. With this said, however, participants provided information voluntarily and were able to leave blank any question or form they felt uncomfortable answering. Thus, this limitation is not seen as particularly problematic, given that data was collected through standard protocol, as utilized by the cardiac rehabilitation program.

Finally, another limitation relates to the fact that previous non-cardiac traumas were not assessed for. While all individuals in the present study share a cardiac history, it should be noted that we cannot rule out the effects of other potential traumas or stressors on reports of posttraumatic growth or the overall findings.

In conclusion, this study provided an in-depth examination of the characteristics associated with and predictive of posttraumatic growth in a cardiac rehabilitation sample. To the best of our knowledge, this was the first study to examine the relationship between PTG and separate components of quality of life. This study also investigated changes in PTG from rehabilitation entrance to exit, however, results revealed that this change was non-significant. Furthermore, results of the present study indicate that intrusive and deliberate rumination served as primary predictors of PTG but at different phases of the cardiac rehabilitation program, indicating that they may serve distinct functions. In addition, physical quality of life and functional capacity emerged as secondary predictors,

providing support for previous research that has indicated that PTG is closely related to subjective disease severity and disability. Finally, as there is limited research on the interrelationships between deliberate rumination, positive forms of coping, and PTG, exploratory analyses were conducted to examine the nature of these potential interrelationships. The results of these analyses revealed that deliberate rumination, but not PTG, was related to various forms of cognitive coping that have previously been shown to relate to PTG. Thus, future research should consider exploring whether the act of deliberate rumination is what drives the use of these coping strategies or if the ruminative processes that underlie these coping strategies is actually what is contributing to PTG.

Given the association between PTG and different forms of rumination, the use of therapeutic strategies aimed at targeting intrusive rumination as an opportunity to turn towards active engagement in deliberate rumination may help facilitate PTG. This notion is supported by research which indicates that active, approach-related coping methods are likely to lead an individual to engage in cognitive and emotional processes that are necessary in order to better cope with distress (e.g., Smith, Ruiz, & Uchino, 2000) and furthermore lead to better adjustment outcomes (Pakenham, 1999). For example, clients who are struggling in the aftermath of their event may be encouraged to write about their experience and explore whether they feel there have been any changes to their sense of self, their relationships, or their perception of priorities since the event. Further, a comparison of the pre-event and post-event self may be explored on a range of factors, such as self-efficacy, and may provide clients an opportunity to realize positive changes. This type of therapeutic activity is supported by previous research that has indicated that

emotion-focused coping, which encompasses ruminating, clarifying, and working through the thoughts and emotions experienced as a result of a stressor, improves adjustment to chronic conditions (Smith, Lumley & Longo, 2002). Assisting clients in these activities may be especially important given previous research that has indicated that chronically ill individuals tend to report fewer active coping methods compared to passive coping strategies (Pakenham, 1999).

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Table 1

Participant Demographics for Finished Group (N=45) and Dropped Out Group (N=35)

Variables	Finished		Dropped Out	
	n	Percent	*n*	Percent
Gender				
Male	33	73.3	23	65.7
Female	12	26.7	12	34.3
Race/Ethnicity				
Caucasian	37	82.2	31	88.6
African American	7	15.6	2	5.7
Asian	0	0	1	2.9
Other	1	2.2	1	2.9
Marital Status				
Single	2	4.3	2	5.7
Married	33	73.3	28	80.0
Divorced	3	6.7	4	11.4
Widowed	6	13.3	1	2.9
Separated	1	2.2	0	0.0
Employment Status				
Employed	8	17.8	14	40.0
Unemployed	1	2.2	0	0.0
Retired	35	77.8	19	54.3
Unable to work	1	2.2	2	5.7
Income				
$0 – 19,999	2	4.4	4	11.4
$20 – 39,999	10	22.2	8	22.9
$40 – 59,999	7	15.6	7	20.0
$60 – 79,999	11	24.4	5	14.3
$ 80,000+	12	26.7	10	28.6
N/A	3	6.7	1	2.9

Table 1

Participant Demographics for Finished Group (N=45) and Dropped Out Group (N=35)

Variables	Finished		Dropped Out	
	n	Percent	*n*	Percent
Type of Event				
Myocardial Infarction	0	0.0	3	8.6
Stent	9	20.0	9	25.7
Bypass Surgery	9	20.0	8	22.9
Valve Replacement	9	20.0	4	11.4
Angina	3	6.7	3	8.6
Stroke	1	2.2	0	0.0
Congestive Heart Failure	0	0.0	1	2.9
Multiple Events	14	31.1	7	20.0
Rehab History				
No previous rehab	34	75.6	26	74.3
Yes completed program	10	22.2	8	22.9
Yes but dropped out	1	2.2	1	2.9
Previous Event				
No, no previous event	35	77.8	17	48.6
Yes, cardiac history	10	22.2	18	51.4

Table 2

Descriptive Statistics for All Time 1 Study Variables (N = 80)

Measures	*M*	*SD*	Minimum	Maximum
PCS – SF-36	38.49	10.19	15.39	57.87
MCS – SF-36	52.29	8.53	31.96	63.91
DASI	5.40	1.78	2.74	9.89
PTGI	38.29	27.17	0.00	103.00
CERQ - Acceptance	12.31	3.83	4.00	20.00
CERQ – Reappraisal	14.07	3.83	5.00	20.00
CERQ - Refocusing	12.81	3.49	4.00	20.00
CERQ - Planning	12.69	3.67	4.00	20.00
CERQ – Perspective	14.14	3.77	5.00	20.00
CERQ - Self-Blame	8.88	4.35	4.00	19.00
CERQ - Rumination	7.38	2.69	4.00	15.00
CERQ - Catastrophizing	5.34	1.83	4.00	12.00
CERQ - Other-Blame	4.84	1.75	4.00	12.00
STAI	32.45	8.74	20.00	59.00
BDI	5.37	5.14	0.00	22.00
ERRI – Intrusive	1.62	.56	1.00	3.50
ERRI – Deliberate	2.07	.64	1.00	3.20

Note: PCS – SF-36: Physical Component Summary computed from The 36-Item Short-Form Health Survey, MCS – SF-36: Mental Component Summary computed from The 36-Item Short-Form Health Survey, DASI: Duke Activity Status Inventory, PTGI: Posttraumatic Growth Inventory, CERQ –Cognitive Emotion Regulation Questionnaire, STAI: State-Trait Anxiety Inventory Y-2 Form, BDI: Beck Depression Inventory, ERRI – Intrusive: Event Related Rumination Inventory – Intrusive Score, ERRI – Deliberate: Event Related Rumination Inventory – Deliberate Score

Table 3

Descriptive Statistics for All Time 2 Study Variables (N=45)

Variables	*M*	*SD*	Minimum	Maximum
PCS – SF-36	45.80	9.48	18.76	57.02
MCS – SF-36	55.86	7.97	34.19	70.79
DASI	6.03	1.97	2.74	9.89
PTGI	39.16	30.28	0.00	94.00
CERQ - Acceptance	13.10	4.03	5.00	20.00
CERQ – Reappraisal	13.56	4.13	7.00	20.00
CERQ - Refocusing	13.66	4.00	6.00	20.00
CERQ - Planning	12.17	3.89	4.00	20.00
CERQ – Perspective	13.80	3.98	6.00	20.00
CERQ - Self-Blame	8.10	4.41	4.00	19.00
CERQ - Rumination	6.63	2.22	4.00	13.00
CERQ - Catastrophizing	5.17	1.45	4.00	9.00
CERQ - Other-Blame	4.56	1.14	4.00	9.00
STAI	29.80	7.23	20.00	48.00
BDI	4.63	4.45	0.00	17.00
ERRI – Intrusive	1.62	.50	1.00	2.90
ERRI – Deliberate	2.11	.67	1.00	3.90

Note: PCS – SF-36: Physical Component Summary computed from The 36-Item Short-Form Health Survey, MCS – SF-36: Mental Component Summary computed from The 36-Item Short-Form Health Survey, DASI: Duke Activity Status Inventory, PTGI: Posttraumatic Growth Inventory, CERQ –Cognitive Emotion Regulation Questionnaire, STAI: State-Trait Anxiety Inventory Y-2 Form, BDI: Beck Depression Inventory, ERRI – Intrusive: Event Related Rumination Inventory – Intrusive Score, ERRI – Deliberate: Event Related Rumination Inventory – Deliberate Score

Table 4

Descriptive Statistics for Time 1 Gender Differences

	Male		Female	
Variables	*M*	*SD*	*M*	*SD*
PCS – SF-36	40.16	10.05	34.60	9.61
MCS – SF-36	53.27	8.06	49.99	9.32
DASI	5.73	1.84	4.63	1.36
PTGI	35.41	26.67	45.00	27.71
CERQ - Acceptance	12.46	4.08	11.90	3.09
CERQ - Reappraisal	14.06	3.98	14.10	3.51
CERQ - Refocusing	12.67	3.69	13.20	2.95
CERQ - Planning	12.30	3.75	13.75	3.31
CERQ - Perspective	13.76	3.88	15.15	3.33
CERQ - Self-Blame	9.07	4.39	8.35	4.31
CERQ - Rumination	7.19	2.70	7.90	2.67
CERQ - Catastrophizing	5.44	1.95	5.05	3.09
CERQ - Other-Blame	4.96	1.94	4.50	1.05
STAI	30.22	7.05	38.45	10.13
BDI	4.20	3.43	8.50	7.38
ERRI – Intrusive	1.51	.45	1.94	.70
ERRI – Deliberate	1.98	.63	2.32	.60

Note: PCS – SF-36: Physical Component Summary computed from The 36-Item Short-Form Health Survey, MCS – SF-36: Mental Component Summary computed from The 36-Item Short-Form Health Survey, DASI: Duke Activity Status Inventory, PTGI: Posttraumatic Growth Inventory, CERQ –Cognitive Emotion Regulation Questionnaire, STAI: State-Trait Anxiety Inventory Y-2 Form, BDI: Beck Depression Inventory, ERRI – Intrusive: Event Related Rumination Inventory – Intrusive Score, ERRI – Deliberate: Event Related Rumination Inventory – Deliberate Score

Table 5

Descriptive Statistics for 1st Time Event Group and Cardiac History Group – Time 1

	1st Time Event		Previous Cardiac History	
Variables	*M*	*SD*	*M*	*SD*
PCS – SF-36	39.44	10.09	36.75	10.33
MCS – SF-36	52.12	8.35	52.59	9.01
DASI	5.63	1.98	4.97	1.25
PTGI	45.17	26.30	25.50	24.36
CERQ - Acceptance	12.96	3.81	11.04	3.61
CERQ - Reappraisal	14.71	3.94	12.80	3.34
CERQ - Refocusing	13.22	3.44	12.00	3.54
CERQ - Planning	13.37	3.56	11.36	3.60
CERQ - Perspective	14.43	3.85	13.56	3.61
CERQ - Self-Blame	8.92	4.42	8.80	4.32
CERQ - Rumination	8.02	2.73	6.12	2.15
CERQ - Catastrophizing	5.33	1.65	5.36	2.18
CERQ - Other-Blame	5.02	1.93	4.48	1.29
STAI	32.49	8.62	32.36	9.14
BDI	5.78	5.44	4.56	4.50
ERRI – Intrusive	1.74	.59	1.38	.39
ERRI – Deliberate	2.21	.58	1.80	.67

Note: PCS – SF-36: Physical Component Summary computed from The 36-Item Short-Form Health Survey, MCS – SF-36: Mental Component Summary computed from The 36-Item Short-Form Health Survey, DASI: Duke Activity Status Inventory, PTGI: Posttraumatic Growth Inventory, CERQ –Cognitive Emotion Regulation Questionnaire, STAI: State-Trait Anxiety Inventory Y-2 Form, BDI: Beck Depression Inventory, ERRI – Intrusive: Event Related Rumination Inventory – Intrusive Score, ERRI – Deliberate: Event Related Rumination Inventory – Deliberate Score

Table 6

Descriptive Statistics for 1st Time Event Group and Cardiac History Group – Time 2

	1st Time Event		Previous Cardiac History	
Variables	*M*	*SD*	*M*	*SD*
PCS – SF-36	46.19	9.44	44.46	10.02
MCS – SF-36	55.69	8.41	56.46	6.57
DASI	6.15	2.10	5.59	1.42
PTGI	44.29	29.48	21.20	27.15
CERQ - Acceptance	13.09	4.09	13.13	4.05
CERQ - Reappraisal	13.94	4.18	12.00	3.74
CERQ - Refocusing	14.12	3.73	11.75	4.74
CERQ - Planning	12.21	3.93	12.00	4.00
CERQ - Perspective	13.85	4.15	13.63	3.46
CERQ - Self-Blame	8.52	4.72	6.38	2.26
CERQ - Rumination	6.70	2.27	6.38	2.13
CERQ - Catastrophizing	5.27	1.55	4.75	.89
CERQ - Other-Blame	4.55	1.23	4.63	.74
STAI	28.48	7.40	31.13	6.73
BDI	4.61	4.53	4.75	4.43
ERRI – Intrusive	1.67	.53	1.40	.31
ERRI – Deliberate	2.17	.68	1.86	.58

Note: PCS – SF-36: Physical Component Summary computed from The 36-Item Short-Form Health Survey, MCS – SF-36: Mental Component Summary computed from The 36-Item Short-Form Health Survey, DASI: Duke Activity Status Inventory, PTGI: Posttraumatic Growth Inventory, CERQ –Cognitive Emotion Regulation Questionnaire, STAI: State-Trait Anxiety Inventory Y-2 Form, BDI: Beck Depression Inventory, ERRI – Intrusive: Event Related Rumination Inventory – Intrusive Score, ERRI – Deliberate: Event Related Rumination Inventory – Deliberate Score

Table 7

Descriptive Statistics for Completers and Non-completers at Time 1

	Completers		Non-completers	
Variables	*M*	*SD*	*M*	*SD*
PCS – SF-36	39.07	9.25	38.36	11.07
MCS – SF-36	52.24	8.25	52.71	8.62
DASI	5.29	1.68	5.60	1.93
PTGI	38.76	26.38	39.16	28.56
CERQ - Acceptance	12.73	3.83	11.93	3.50
CERQ - Reappraisal	14.59	3.76	13.41	3.66
CERQ - Refocusing	13.18	3.53	12.52	3.23
CERQ - Planning	13.21	3.70	11.70	3.00
CERQ - Perspective	14.52	3.64	13.67	3.71
CERQ - Self-Blame	8.43	4.17	9.56	4.65
CERQ - Rumination	7.89	2.71	6.56	2.28
CERQ - Catastrophizing	5.39	1.79	5.33	2.00
CERQ - Other-Blame	4.96	1.80	4.59	1.65
STAI	32.00	8.61	32.63	8.50
BDI	5.59	5.44	4.56	4.04
ERRI – Intrusive	1.74	.58	1.47	.49
ERRI – Deliberate	2.19	.64	1.99	.56

Note: PCS – SF-36: Physical Component Summary computed from The 36-Item Short-Form Health Survey, MCS – SF-36: Mental Component Summary computed from The 36-Item Short-Form Health Survey, DASI: Duke Activity Status Inventory, PTGI: Posttraumatic Growth Inventory, CERQ –Cognitive Emotion Regulation Questionnaire, STAI: State-Trait Anxiety Inventory Y-2 Form, BDI: Beck Depression Inventory, ERRI – Intrusive: Event Related Rumination Inventory – Intrusive Score, ERRI – Deliberate: Event Related Rumination Inventory – Deliberate Score

Table 8

Correlations of Time 1 and Time 2 variables and PTG2

Variables	Time 1	Time 2
PCS – SF-36	-.35*	-.20
MCS – SF-36	-.09	-.18
DASI	-.34*	-.35*
CERQ - Acceptance	.06	- .03
CERQ - Reappraisal	.15	.23
CERQ - Refocusing	.02	.16
CERQ - Planning	.29	.24
CERQ - Perspective	.16	.33*
CERQ - Self-Blame	.10	-.16
CERQ - Rumination	.16	.43**
CERQ - Catastrophizing	.03	.22
CERQ - Other-Blame	-.11	-.36*
STAI	.31*	.31*
BDI	.37*	.34*
ERRI – Intrusive	.51**	.52**
ERRI – Deliberate	.42**	.71**

**. Correlation is significant at the 0.05 level (2-tailed).*

***. Correlation is significant at the 0.01 level (2-tailed)*

Table 9

Stepwise Regression Analysis for Time 1 Variables Predicting PTG1

Variables	B	SE B	β
Model 1			
Previous Event	-17.13	6.22	-.31**
Gender	6.84	6.63	.12
Model 2			
Previous Event	-9.17	5.68	-.17
Gender	.73	5.93	.01
Deliberate Rumination	20.88	4.35	.50**
Model 3			
Previous Event	-12.15	5.54	-.22*
Gender	-3.27	5.85	.06
Deliberate Rumination	20.13	4.17	.49**
PCS – SF-36	-.71	.26	-.27**

Note: R^2 = .12* for Model 1; R^2 = .33** for Model 2; R^2 = .40** for Model 3.

Note: *p<.05. **p<.01.

Table 10

Stepwise Regression Analysis for Time 1 Variables Predicting PTG2

Variables	B	SE B	β
Model 1			
Previous Event	-18.80	11.06	-.26
Gender	12.00	10.70	.17
Model 2			
Previous Event	-9.65	10.64	-.13
Gender	.34	10.62	.01
Intrusive Rumination	24.17	8.28	.46**
Model 3			
Previous Event	-13.85	10.41	-.19
Gender	-5.25	10.54	.08
Intrusive Rumination	21.81	8.04	.41**
PCS – SF-36	-.98	.47	-.29*

Note: R^2 = .13 for Model 1; R^2 = .28** for Model 2; R^2 = .35** for Model 3.

Note: *p<.05. **p<.01.

Table 11

Stepwise Regression Analysis for Time 2 Variables Predicting PTG2

Variables	B	SE B	β
Model 1			
Previous Event	-12.46	12.13	-.17
Gender	13.55	10.85	.20
Model 2			
Previous Event	-4.91	8.91	-.07
Gender	7.70	7.95	.12
Deliberate Rumination	30.61	5.18	.68**
Model 3			
Previous Event	-8.77	8.73	-.12
Gender	4.77	7.74	.07
Deliberate Rumination	27.64	5.16	.62**
DASI	-3.67	1.77	-.24*

Note. R^2 = .09 for Model 1; R^2 = .53** for Model 2; R^2 = .58** for Model 3.

Note: *p<.05. **p<.01.

Table 12

Correlations between Cognitive Coping Styles, Deliberate Rumination, and PTG2

Variables	PTG	Deliberate Rumination
CERQ - Acceptance	.03	.27*
CERQ - Reappraisal	.23	.38*
CERQ - Refocusing	.16	.20
CERQ - Planning	.24	.45**
CERQ - Perspective	.33*	.68**
CERQ - Self-Blame	- .16	-.08
CERQ - Rumination	.43**	.38*
CERQ - Catastrophizing	.22	.26
CERQ - Other-Blame	-.36*	-.17

**. Correlation is significant at the 0.05 level (2-tailed).*

***. Correlation is significant at the 0.01 level (2-tailed)*