

# Posttraumatic Growth, Meaning in Life, and Life Satisfaction in Response to Trauma

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A model of the processes leading to posttraumatic growth and to life satisfaction following exposure to trauma was tested. Two types of repeated thought, deliberate and intrusive, posttraumatic symptoms, posttraumatic growth, and meaning in life, were assessed as predictors of general life satisfaction. Challenges to core beliefs were shown to be related to both intrusive and deliberate rumination. The two forms of rumination were in turn differentially related to posttraumatic growth and posttraumatic distress. Distress and posttraumatic growth were independently and oppositely related to meaning in life and to life satisfaction. Overall, the best fitting model was supportive of proposed posttraumatic growth models. Additional exploratory analyses examined participant groupings, based of self-reported category of resolution of the traumatic experience, and differences supportive of proposed underlying processes were found.

*Keywords:* posttraumatic growth, resolution, life satisfaction

The struggle with trauma can produce not only psychological distress, but it can also provide the opportunity for the experience of posttraumatic growth (PTG; Joseph & Linley, 2008; Tedeschi & Calhoun, 1995). The processes that could lead to eventual growth, even independently of experienced distress, have been described in a number of theoretical models. It has been assumed that the experience of trauma often threatens or challenges the core beliefs individuals hold that define their assumptive worlds. Posttraumatic growth is a potential consequence of the cognitive effort to redefine those beliefs and to rebuild the assumptive world (Calhoun & Tedeschi, 2006; Janoff-Bulman, 1992, 2006). In the process of rebuilding the assumptive world, individuals may reexamine many aspects of their lives and might recognize growth on domains such as personal strength, relationships with others, appreciation of life, spirituality, and new possibilities (Tedeschi & Calhoun, 1996). Many people who are forced into the struggle to deal with trauma ultimately find meaning in their suffering, and experience both growth and enhanced life satisfaction (Calhoun, Cann, & Tedeschi, 2010; Calhoun & Tedeschi, 2004, 2006; Janoff-Bulman, 1992, 2006).

Recent research has begun to examine the various steps in the underlying processes that represent the path from experiencing trauma to posttraumatic growth. For the purpose of this paper, traumas are considered to be events which have negative consequences such as causing persons to fear for their lives or the lives of loved ones, causing physical or emotional distress, and/or causing major disruption in their lives. Traumas can significantly

challenge and cause a serious reexamination of the major elements of a person's core beliefs that define the assumptive world. The degree to which the traumatic event challenges core beliefs has been shown to be a key element in making the experience of posttraumatic growth possible. The greater the felt need to reexamine the core beliefs, the higher the likelihood of experienced growth (Cann, Calhoun, Tedeschi, Kilmer, et al., 2010).

The current research examined many of the central elements of models of PTG such as the challenge to core beliefs (Calhoun & Tedeschi, 2006; Janoff-Bulman, 2006; Joseph & Linley, 2005) by looking at the relationship of the elements to each other and to PTG, and also by looking at the relationships involving meaning in life (feeling that life is meaningful and has purpose) and well-being (feeling satisfied with life and that life is close to ideal). Challenge to core beliefs (ideas about how the world works), intrusive rumination (automatic thoughts about the event), deliberate rumination (intentionally thinking about the event), and distress (mental, physical, and emotional) were examined in relation to PTG, meaning in life, and life satisfaction. The hypothesized causal model is shown in Figure 1.

## The Process of Posttraumatic Growth

Between the initial challenge to core beliefs and the subsequent experience of posttraumatic growth, the individual needs to engage in appropriate cognitive work. Thus, a significant factor in the path from cognitive threat to the assumptive world, to growth, is assumed to be the degree to which the person engages in repeated thinking about the event, since repeated thought may lead to the accommodation of the assumptive world to the changed reality or to the assimilation of the event into the existing cognitive structures (Janoff-Bulman, 1992). Repeated thinking about the event likely has various components (Calhoun, Cann, Tedeschi & McMillan, 2000; Smith & Alloy, 2009), some of which may be more crucial for the development of PTG at various points after experiencing traumatic events.

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This article was published Online First July 4, 2011.

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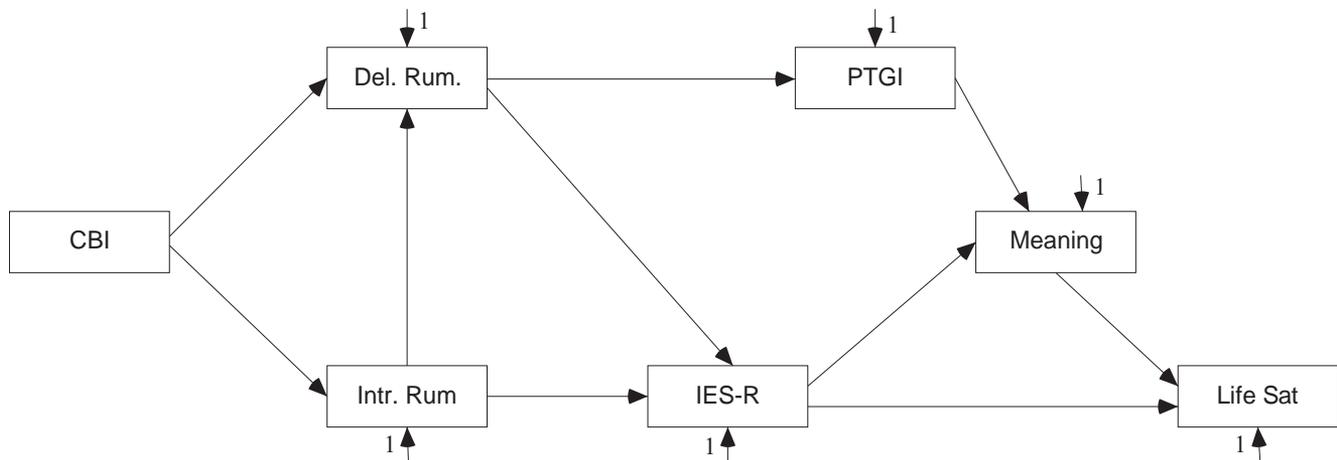


Figure 1. Hypothesized causal model.

An important distinction has been proposed between two types of repeated thinking about the event, also known as rumination, as follows: deliberate rumination and intrusive rumination (Cann, Calhoun, Tedeschi, Triplett, et al., 2010). Persons engaging in event-related deliberate rumination intentionally think about the event and its aftermath whereas persons engaging in event-related intrusive rumination experience thoughts and images about the event that occur automatically. For example, when thinking about the stressful event, survivors may first attempt to comprehend what happened. It is during this time that they begin to struggle with their new reality such as, “My child really did die.” This part of the rumination process may be associated with intrusive thoughts and/or images and is likely a natural reaction to a major life event (Cann, Calhoun, Tedeschi, Triplett, et al., 2010). On the other hand, intrusive thoughts that persist and/or become “obsessive” might be reflective of unresolved issues, or a failure to deal with concerns, and may be predictive of psychological distress (Affleck & Tennen, 1996; Cann, Calhoun, Tedeschi, Triplett, et al., 2010; Taku, Cann, Tedeschi, & Calhoun, 2009). Thus, it follows that persons reporting high levels of intrusive rumination would report also high levels of posttraumatic stress symptoms (Taku, Calhoun, Cann, & Tedeschi, 2008). It is important to manage the emotional distress associated with the event so that they may more deliberately address this experience rather than ruminate in a way that is not very constructive. However, some distress may provide an impetus to continued useful attention to the event.

Once they manage emotional distress more effectively and develop some comprehension of the event, many trauma survivors may begin to actively process information in a manner that helps them cope with the reality of what happened and is more reflective and more deliberate than automatic and intrusive (Tedeschi & Calhoun, 1995). Such deliberate thinking focuses on understanding the experience, finding meaning, and ultimately producing a revised life narrative (Calhoun et al., 2010) and, therefore, may be more conducive to growth than intrusive rumination. Research has begun to examine this distinction in rumination styles and has supported the potentially different roles for intrusive and deliberate rumination (Cann, et al., in press; Cann, Calhoun, Tedeschi, & Solomon, 2010; Taku et al., 2009).

When rumination leads to the development of core beliefs that accommodate the stressful experience (Newman, Riggs, & Roth, 1997), a significant degree of resolution may be experienced by the individual. The revised system of core beliefs can be developed through disclosures to supportive others that encourage deliberate processing of the event, and that bring the person into closer contact with sociocultural models for resolution (Calhoun et al., 2010). The term “resolution” suggests that an attempt to make sense of the traumatic event has been “cleared away” and the event makes sense (Tedeschi & Calhoun, 2008). However, even as some people may be able to resolve what has happened, it is likely that many survivors of traumatic experiences cannot find a resolution. A recent study illustrates the varying kinds of resolution in individuals who had lost loved ones in a mine disaster (Davis, Wohl, & Verberg, 2007). Eight years after the event, researchers identified clusters of individuals who appeared to represent different categories of resolution or of making sense of their loss. One cluster included people who had been able to make sense of, and find meaning in, their experience. A second cluster included people who had searched for meaning and had tried to make sense of the loss, but had not yet reached a good resolution. The third group was no longer dwelling on the loss, but had not found any real meaning in their experience. We would propose a fourth group—people who do not see their initial core beliefs as challenged by the event, so there is no need to either assimilate or accommodate the assumptive world. Thus, it would seem that people can be categorized, based on their search for a resolution, as (a) feeling no need to make sense or find a resolution; (b) having started but given up the attempt to make sense of the event; (c) still engaged in the attempt to make sense of the event, but without success yet; and (d) having achieved some resolution and made sense of the experience. To our knowledge, no research has directly examined how people in these four different groups may differ in their initial experience, current distress, and potential growth.

Depending on the type of resolution one has found and the degree of PTG experienced, changes in well-being may be expected. Challenge to core beliefs, as well as reports of PTG, have been related to life satisfaction (Lindstrom, Vishnevsky, Cann, Calhoun, Tedeschi, & Kelly, 2007; Pakenham, 2005). However, the direct relationship between PTG and life satisfaction has failed to emerge in other studies

(Stanton, Bower, & Low, 2006). It is possible that another link in the chain of events leading to a greater feeling of well-being is the sense that the struggle with the stressful experience, and the recognition of PTG, has also led to a change in the sense of meaning in one's life (Park, 2010; Tedeschi & Calhoun, 1995). The new-found sense of meaning in life can be attributed to the major disruption of people's understanding of the world and their place in it, triggered by the highly challenging event, perhaps even a sense that life is meaningless; this fear leads them to search for meaning in their lives. Survivors may first ruminate about questions regarding the meaning of life, but may later shift to ruminating about questions regarding meaning in their own lives (Janoff-Bulman, 2006). Finding benefits in the encounter with illness was positively correlated with finding meaning in life in one study (Park, Edmondson, Fenster, & Blank, 2008), and in another, the presence of meaning in life was related strongly to life satisfaction whereas the continued search for meaning in life was not (Steger, Frazier, Oishi, & Kaler, 2006). The presence of overall meaning in life may indicate that some degree of resolution (making sense of or finding meaning in the stressful event) has been reached about how to proceed with a life changed by trauma, perhaps by arriving at a set of core beliefs that accommodate the events and will be useful. It was expected that degree of challenge to core beliefs would be positively related both to intrusive and deliberate rumination in the weeks following the event, which would be positively related to distress currently experienced (in the past seven days). Although a measure of core belief challenge was not included in a previous study of posttraumatic growth, results did find intrusive rumination leading to both deliberate rumination and distress (Taku et al., 2008). The current study aims to expand on those findings.

Intrusive rumination was expected to predict deliberate rumination, since intrusive thoughts may stimulate the more deliberate cognitive work. The level of deliberate rumination, but not intrusive rumination, should be positively related to growth. Ultimately, both PTG and distress were expected to be related, although in opposite directions, to found meaning in life. Because we assume that PTG and distress can exist independently, they should each have a role in determining life satisfaction, with PTG being mediated by the found meaning, but distress directly, and negatively, related to satisfaction.

The implications of the perception that the traumatic experience has been resolved were also examined in separate analyses. Individuals were asked to indicate the category of psychological resolution of the event which best described their current state, based on the four groupings described above. Because the resolution grouping is a new variable that has not been examined in relation to other variables in the process, these are exploratory investigations looking at how the groups might differ. Some predictions seem obvious, such as the expectation that those who report having achieved a resolution will report higher PTG, lower distress, and greater meaning. Other potential differences among the resolution categories are less clear.

## Method

### Overview

Data were collected from two samples. The procedures followed, and the measures collected, were identical in both samples except for the substitution of the short form of the Posttraumatic

Growth Inventory (Cann, Calhoun, Tedeschi, Taku, et al., 2010) for the full version of the Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996) in the second sample. The data from the second sample also were used to conduct a confirmatory factor analysis as part of developing the PTGI-SF as reported in Cann, Calhoun, Tedeschi, Taku et al. (2010).

### Participants

The two samples were recruited from the undergraduate psychology pool at a state-supported university in the southeastern United States. Students were offered research credit to help fulfill an introductory psychology class requirement for their participation. Data were collected using an online survey format where students eligible to participate in research could take a pretest on the online research participation web site. Participants indicating they had experienced at least one of nine possible traumatic events within the past two and one half years were eligible to participate in the research. For participants indicating they experienced multiple events, they were instructed to select the *most* stressful event and to keep that experience in mind when responding. The time frame of two and one half years was chosen for two reasons: (a) to examine the effect of time since the event on growth (no significant effects were found), and (b) to ensure participants could remember the event since they were required to think about it retrospectively. Participants who indicated that they experienced multiple traumatic events were instructed to select the most stressful event and to keep that experience in mind when responding.

In the first sample, 165 participants initially completed the online survey with 17 participants excluded due to their reporting about traumatic events older than the specified limit. One participant included an invalid age which was replaced with the mean age of the sample ( $M = 22.26$  years,  $SD = 6.64$ , ranging from 18 to 56 years). Thus, the final sample consisted of 148 participants with 53 men (35.8%) and 95 women (64.2%). The mean number of days since the event was 380.33 ( $SD = 252.62$ ), ranging from 8.67 to 918.70 days. The racial composition of the sample was: 15.5% African American, 6.8% Asian, 66.2% Caucasian, 4.1% Hispanic, 2.7% Native American, and 4.7% other.

Sixty-three participants reported the most traumatic event they experienced over the past two and one half years was the death of a close loved one (42.9%), 10 reported a very serious medical problem (6.8%), 34 had a close friend, significant other, or family member experience a serious medical condition (23.1%), six experienced an accident that led to serious injury to themselves or someone close to them (4.1%), one experienced their place of residence being damaged by fire or other natural causes (0.7%), eight endured a divorce (5.4%), 12 were physically or sexually assaulted (8.1%), nine were victims of a crime such as a robbery or mugging (6.1%), and four reported being stalked (2.7%). Twelve participants (8.11%) rated the severity of the event as "small," 58 participants (39.18%) rated severity as "moderate," 58 participants (39.18%) rated severity of the event as "great," and 20 participants (13.5%) rated severity as "extreme." None of the participants endorsed the options of severity of the event as "not at all" severe or being severe to a "very small" degree. Thus, the events were considered "severe" enough to challenge core beliefs.

The second sample was recruited in the same manner as the first. Initially, 215 participants completed the online survey. However,

30 participants were excluded due to their reporting about traumatic events older than the specified limit. The final sample consisted of 185 participants ( $M$  age = 21.78 years,  $SD$  = 5.71) with 45 men (24.3%) and 140 women (75.7%). The mean number of days since the event was 330.41 ( $SD$  = 224.01), ranging from 8.77 to 878.76 days. The racial composition of the sample was: 15.7% African American, 7.0% Asian, 68.1% Caucasian, 5.4% Hispanic, .5% Native American, and 6.5% other.

Eighty-five participants reported experiencing the death of a close loved one (46.0%), 13 had experienced a very serious medical problem (7.0%), 38 had a close friend, significant other, or family member experience a medical condition (21.0%), 10 had experienced an accident that led to serious injury to themselves or someone close to them (5.4%), one experienced their place of residence being damaged by fire or other natural causes (0.5%), 10 endured a divorce (5.4%), 10 were physically or sexually assaulted (5.4%), six were victims of a crime such as a robbery or mugging (3.2%), and eight were stalked (4.3%). One participant who did not indicate which of multiple events was the most stressful was included in all analyses (0.5%). Four participants (2.1%) rated the severity of the event as "very small", 14 participants (7.5%) rated the severity of the event as "small," 58 participants (31.4%) rated severity as "moderate," 77 participants (41.6%) rated severity of the event as "great," and 32 participants (17.3%) rated severity as "extreme." None of the participants endorsed the options of severity of the event as "not at all" severe and severity of the event was again considered large enough to cause core belief challenge in participants.

A major limitation of the overall sample is that participants were undergraduate students from the southeastern United States reporting largely on the death of loved ones and major illness (of self or loved ones) within the previous two and one half years. However, because participants were screened to ensure that their responses were based on experiences recognized as serious life challenges and rated the severity of the events, it is likely that the traumatic events they experienced reflects that of the general population (Vrana & Lauertebach, 1994). Although it would be desirable to replicate these findings with a more diverse age group, and generalizations to other groups must be made with caution, the types of events experienced, and the rated severity of the events, suggest that the sample was dealing with challenging life traumas.

## Procedure

To be invited to participate in the research, students had to indicate on the pretest that they had endured at least one of nine traumatic events in the previous two and one half years. Eligible participants were sent an e-mail and entry code inviting them to participate in a study looking at how people deal with traumatic experiences. Participants were directed to the web site where the online survey could be accessed. When participants logged onto the survey they first provided demographic information. Then the seven measures described below were randomized for each participant to reduce the possibility that order effects would influence the results. In addition, the survey software allowed the order of items within a particular measure to be presented in a random order for each participant.

## Measures

**Demographic information.** Participants first provided demographic information such as their age, gender, ethnicity, religion, education of parents, and the date of stressful event. Participants also rated the severity of their traumatic event on a scale ranging from 0 (*not severe*) to 5 (*extremely severe*) to provide a subjective assessment of the severity of the event.

**Posttraumatic Growth Inventory.** Participants in the first sample completed the Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) which includes 21 items assessing the extent to which individuals believe they have grown positively from the struggle with the traumatic experience. However, in order to combine data from the two samples, only the 10 items that comprise the short form (PTGI-SF), described below, were used in the analyses. Research has indicated that using the items from the full PTGI compared to using the PTGI-SF alone leads to similar results (Cann, Calhoun, Tedeschi, Taku, et al., 2010).

Participants in the second sample completed the PTGI-Short Form (PTGI-SF; Cann, Calhoun, Tedeschi, Taku, et al., 2010). The PTGI-SF consists of 10 items, two from each of the five factors captured by the PTGI. The response scale ranges from 0 (*I did not experience this change*) to 5 (*I experienced this change to a great deal*). Although the PTGI-SF has the same five factor structure as the PTGI, only the total score is used to assess growth. Scores are reported as means across the ten items. The PTGI-SF total score has shown good internal reliability ( $\alpha$ s around .90) across multiple samples (Cann, Calhoun, Tedeschi, Taku, et al., 2010), a value consistent with that found in both samples ( $\alpha$ s = .90).

**Core Beliefs Inventory.** Participants completed the Core Beliefs Inventory (CBI; Cann, Calhoun, Tedeschi, Kilmer, et al., 2010) which consists of nine items designed to measure the degree to which a specific traumatic event challenged participants' core beliefs about the world. Responses are made on a scale from 0 (*not at all*) to 5 (*to a very great degree*). The measure has shown good internal reliability ( $\alpha$  = .82) and acceptable test-retest reliability over a 60 to 74 day time period ( $r$  = .69) (Cann, Calhoun, Tedeschi, Kilmer, et al., 2010). In the current two samples, reliabilities were acceptable ( $\alpha$  = .87 in both samples).

**Event Related Rumination Inventory.** The Event Related Rumination Inventory (ERRI; Cann, Calhoun, Tedeschi, Triplett, et al., 2010) includes 10 items assessing intrusive thoughts related to the event and 10 items assessing deliberate thinking about the event. The intrusive rumination items gauge whether during the weeks immediately after the event, participants thought about the event when they did not mean to or want to. Examples of intrusive items include, "I thought about the event when I did not mean to," and "I could not keep images or thoughts about the event from entering my mind". The deliberate rumination items gauge whether during the weeks immediately after the event, survivors intentionally reflected and thought about the event. Sample items of deliberate rumination include, "I forced myself to think about my feelings about my experience," and "I thought about whether I have learned anything as a result of my experience". All items were designed to be neutral in tone, to avoid any evaluative bias. The two factor structure of the ERRI has been supported in both exploratory and confirmatory factors analyses, and both factors have good internal reliability (Cann, Calhoun, Tedeschi, Triplett, et al., 2010). Responses to both the deliberate and intrusive rumi-

nation items range from 0 (*not at all*) to 3 (*often*). Cronbach's alpha in sample 1 for the intrusive rumination items was .93 and for the deliberate rumination items was .89. In sample 2 the alphas were comparable (intrusive, .94; deliberate, .90).

**The Impact of Events Scale–Revised.** The Impact of Events Scale–Revised (IES-R; Weiss & Marmar, 1997) was utilized to assess distress associated with posttraumatic stress symptoms during the past seven days. The scale consists of 22 questions and can be used to produce a total score or scores can be calculated for three symptom subscales: intrusion, avoidance, and hyperarousal. Responses are on a 0 (*not at all*) to 5 (*often*) scale. The internal consistency of the measure ranges from .79 to .92 for the three subscales with test–retest reliability ranging from .51 to .94 (Weiss & Marmar, 1997). In the current samples the overall total scores were used and showed very good reliability (sample 1  $\alpha = .94$ ; sample 2  $\alpha = .93$ ).

**The Meaning in Life Questionnaire.** The Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006) consists of 10 items assessing two dimensions related to whether the participant currently believes his or her life is meaningful and has purpose. The presence of meaning (MLQ-P) is assessed by five items, and it indicates the degree to which a person feels meaning has been achieved in life. The other five items assess the search for meaning (MLQ-S), indicating the degree to which a person is continuing to seek an understanding of life's meaning. The MLQ has been reported to have good reliability and stability (Steger & Kashdan, 2007). In the current samples, the presence of meaning showed good internal reliability (sample 1  $\alpha = .87$ ; sample 2  $\alpha = .85$ ), however the search subscale was found to have poor internal reliability (sample 1  $\alpha = .53$ ; sample 2  $\alpha = .52$ ). Given the low reliabilities, and the absence of any specific predictions regarding the search for meaning, the MLQ-S variable was not considered in any analyses.

**Well-being.** Well-being was assessed using the Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985). The Satisfaction with Life Scale (SWLS) is a 5-item measure of current global life satisfaction. The questions utilize a scale of 1 (*strongly disagree*) to 7 (*strongly agree*). The scale has good internal reliability ( $\alpha = .87$ ) and good test–retest reliability over a 2-month interval ( $r = .82$ ; Diener et al., 1985). The internal reliability was good in both samples of the current study (sample 1  $\alpha = .90$ ; sample 2  $\alpha = .86$ ).

**Resolution.** Four options, based in part on the research by Davis and colleagues (2007), were developed to gauge participants' progress in reconstructing their assumptions about the world and finding meaning in life in the aftermath of the traumatic event. Participants were instructed to read the four descriptions and choose the one that currently described them best: "I felt no need to try to find meaning in or to make sense of the event"; "I tried to find meaning in or to make sense of the event, but I could not and I have given up trying"; "I am still trying to find meaning in or to make sense of the event"; "I believe that I have been able to find meaning in or to make sense out of the event." Participants endorsing the fourth option were considered to have cognitively "resolved" their struggle with the stressful event. The other options were assumed to represent the most likely alternatives for dealing with a traumatic event. The first option would imply either that the person was resilient, or that the event was not a challenge to their core beliefs. The second option reflects a failed effort to find a

resolution, whereas participants endorsing option 3 were viewed as still struggling with the event with a possibility of eventual resolution. Although these represent broad categories; our main concern is with the differences between those who perceive a successful resolution versus those who have not reached that point or sought that end. Differences across the four categories were assessed in an exploratory examination of how individuals in these categories might differ on the variables under investigation.

## Path Analyses

All path analyses were conducted using the AMOS software (Arbuckle & Wothke, 1996) with maximum-likelihood estimation. To statistically evaluate the fit of the models, we computed and report the  $\chi^2$ , however given its drawbacks four indices were used for the primary evaluation: the  $\chi^2/df$  ratio, the comparative fit index (CFI; Bentler, 1990), the Tucker-Lewis index (TLI; Tucker & Lewis, 1973), and the root mean square error of approximation (RMSEA; Steiger & Lind, 1980). The latter three in particular are thought to have preferable properties compared to other indices (e.g., not biased by sample size, do not inappropriately penalize model complexity; Marsh, Balla, & Hau, 1996; Medsker, Williams, & Holahan, 1994). The TLI and CFI assess the fit of a hypothesized model by comparing it against an arbitrary baseline model. When the typical null model is specified as the baseline model, values at or above .90 are generally considered indicative of appropriate fit (Bentler & Bonett, 1980). With respect to the RMSEA, .08 has been posited as a reasonable critical value for indicating good fit (Browne & Cudeck, 1992).

## Results

### Descriptive Statistics and Correlations Among Measures

The descriptive statistics and correlations among the various measures shown in Figure 1, for the combined sample ( $N = 333$ ) are presented in Table 1. As expected, PTGI scores were positively and strongly related to both CBI scores and Deliberate Rumination scores. Greater experience of a challenge to core beliefs and more constructive deliberate rumination was expected to facilitate growth. Well-being, as assessed by life satisfaction, was positively related to the presence of meaning in life and negatively related to current distress (IES-R). As predicted, both intrusive and deliberate rumination were positively related to both disruption of core beliefs and the distress measure. Thus, the first order correlations are all in line with the predictions.

In addition, analyses of variance (ANOVA) were calculated to assess differences between outcome measures by trauma type (death of a family member, serious medical problem, etc.) for the combined sample ( $N = 333$ ). No significant differences existed between type of trauma and any of the outcome measures.

### Path Analyses

The model to be tested first assumes that disruption of core beliefs will be associated with higher levels of both styles of rumination, since the assumptive worlds have been threatened, and cognitive work must be done. The level of intrusive rumination

Table 1  
Descriptive Statistics and Zero-Order Correlations Among Measured Variables in the Path Model

	M	SD	Skew	Kurt	1	2	3	4	5	6
1. Core Beliefs Inventory	2.86	1.09	-.54	-.13						
2. Intrusive Rumination	17.95	7.30	-.26	-.43	.42**					
3. Deliberate Rumination	18.37	7.00	-.44	-.26	.55**	.59**				
4. Posttraumatic Growth	2.54	1.24	-.08	-.93	.55**	.33**	.54**			
5. Impact of Events Scale	39.14	24.64	.26	-.65	.39**	.56**	.44**	.25**		
6. Presence of Meaning	4.56	1.25	-.36	.11	-.06	-.09	.00	.27**	-.20*	
7. Life Satisfaction	4.79	1.30	-.59	-.14	-.06	-.12*	-.05	.20*	-.27**	.54**

Note. N = 333.  
\* indicates  $p < .05$ . \*\*  $p < .01$ .

should also be related to the level of deliberate rumination, since unwanted thoughts will encourage more constructive efforts to understand what has happened. The level of distress reported also should be related to both styles of rumination, since the level of rumination is based on the degree to which one's world has been upset. However, it is the deliberate rumination that will allow for posttraumatic growth, while the presence of intrusive ruminations will be more strongly related to ongoing distress. Posttraumatic growth may be related to life satisfaction, but the more likely alternative is that growth that provides meaning that will be associated with greater life satisfaction, a mediation relationship. On the other side of the equation, ongoing distress should be negatively related to both meaning and life satisfaction. The proposed model is presented in Figure 1.

Our analytic strategy involved testing the initial baseline model as hypothesized in Figure 1. However, as is appropriate, we then tested competing models by adding theoretically viable paths and examining both the significance of the path as well as the overall fit of each model. The initial path model diagramed in Figure 1 was fitted to the combined data set. The fit statistics for this initial model, shown in the top line of Table 2, are mixed. All of the paths specified were significant at  $p < .01$  and the CFI exceeded the traditional .90 cut-value for acceptable fit. However, the TLI and the RMSEA both suggest the model is ill fitting.

Next we tested alternative models by adding additional direct paths. We added one path at a time, testing the significance of the path as well as the overall fit of the model. The first step was to add a direct path from posttraumatic growth to life satisfaction. That is, rather than restricting PTGI to have only an indirect effect via meaning, we tested a model allowing PTGI to have both direct and indirect effects on life satisfaction. This additional path was also

significant at the  $p < .01$  level indicating it is a viable path; however, the overall model fit did not improve substantively (see Model 2 in Table 2). Continuing, we added a third theoretically viable path in which CBI has a direct impact on PTGI in addition to its indirect effects via intrusive and deliberate rumination. In addition to the significance of this additional path ( $p < .01$ ), the third model showed a significant improvement in overall fit. Two additional models were tested in which a direct effect of deliberate rumination on meaning in life (Model 4) and a direct effect of intrusive rumination on PTGI (Model 5) were specified; however, neither of these paths was significant and, therefore, these models were rejected. As no other paths were theoretically viable, we, therefore, selected Model 3 as the best fitting model.

The standardized solution for Model 3 is shown in Figure 2. A summary of each variable's standardized effects are shown in Table 3. CBI had a *positive* total effect on all endogenous variables in the model, although its effects generally decrease in size as one moves through the model. For example, CBI's total effect on PTGI is .55 (i.e., 30% of PTGI's variance was explained by variance in CBI), whereas the total effect on life satisfaction was only .06 (3.6% of the variance explained). As hypothesized, intrusive rumination (IR) had strong positive effects on deliberate rumination (DR) and IES-R and a small positive effect on PTGI, while having negative effects on meaning in life and life satisfaction. Likewise, IES-R showed negative effects on both meaning and life satisfaction as hypothesized. In fact, it is for this reason that some of CBI's total effect on meaning in life and life satisfaction was suppressed when estimated with zero-order coefficients (suppressed effects are .17 and .12, respectively). That is, IR and IES-R acted as suppressor variables with respect to the influence of CBI on life satisfaction. A disruption of core beliefs led to an increase in IR

Table 2  
Summary Statistics for Models Tested

Model	df	$\chi^2$	$\chi^2/df$	CFI	TLI	RMSEA	RMSEA 90% CI	
							Lo	Hi
1. Initial Model	11	75.36	6.85	.915	.837	.133	.105	.162
2. Add PTGI to Life Sat	10	68.46	6.85	.922	.837	.133	.104	.163
3. Add CBI to PTGI	9	21.78	2.42	.983	.960	.065	.030	.101
4. Add DR to Meaning								
5. Add IR to PTGI								
Alt 3 (using IES_AH)	9	24.13	2.68	.979	.968	.071	.038	.106

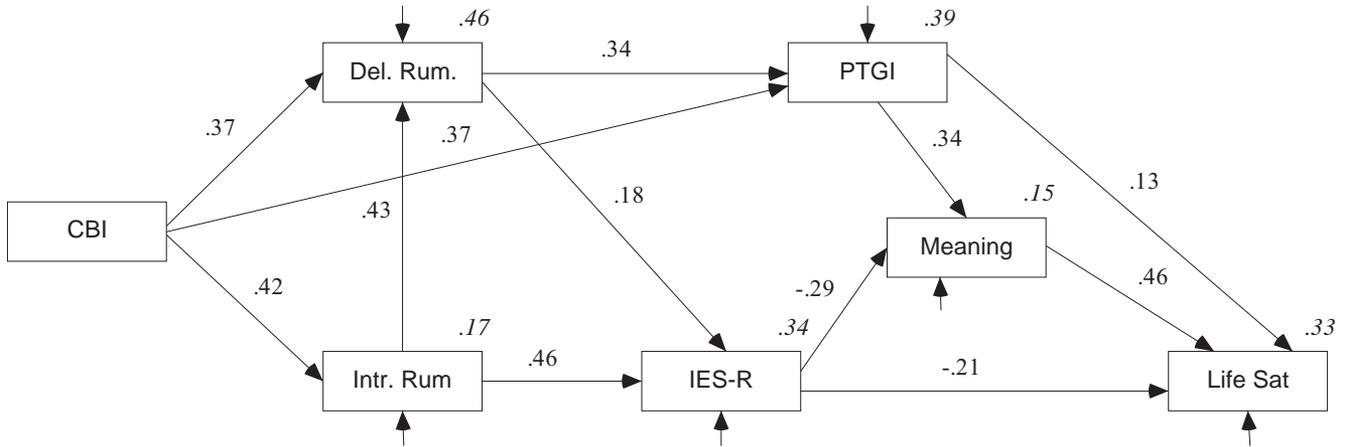


Figure 2. Standardized solution for the final path model (Model 3). All paths shown are significant,  $p < .01$ .  $R^2$  for each endogenous variable shown in italics.

which in turn had a negative impact on life satisfaction (via IES-R). However, disruption of core beliefs also had a positive effect on DR and PTGI which in turn had positive effects on life satisfaction. As the model shows (and as listed in Table 3), the net effect of disruption of core beliefs on life satisfaction was positive, albeit small.

Additionally, the results show, as expected, that PTGI was well predicted by the model ( $R^2 = .39$ ). Most of the explained variance in PTGI stemmed from the influence of CBI (both directly and indirectly) and DR (directly). PTGI in turn had a significant positive total effect on life satisfaction explaining 8.4% of the

variance, with roughly half of the effect being direct and half being indirect via an increase in meaning in life.

Finally, because the IES-R scale includes an intrusion subscale and thus might be confounded with the Intrusive Rumination scale, we retested Model 3 (the best fitting model) using an IES variable comprised of only the avoidance and hyper-arousal subscales. The fit of this alternative model was highly similar to the initial Model 3 (see last line in Table 2). Additionally, the path coefficients associated with the IES-R variable did not change significantly between the two versions.

### Differences Across Resolution Groups

In this section we explore some of the differences on the main study variables as a function of resolution group. One way analyses of variance, with resolution self-categorization as the grouping variable, were conducted for each of the other variables: PTGI, CBI, IES-R, Life Satisfaction (SWLS), and the presence of meaning (MLQ-P). The results for the analyses are presented in Table 4. LSD post hoc comparisons were conducted when the overall test was statistically reliable. All of the variables yielded reliable differences across the resolution groups.

Although these analyses are exploratory, some reasonable predictions can be made for differences between some of the groups. For example, CBI scores and IES-R ratings of distress should be lowest in resolution Group 1, the group that felt no need to make sense of the event. Also, since these individuals did not process the event to resolve the disruption of core beliefs, they should report the lowest level of PTG. Overall, the results supported these predictions. The lowest reported CBI, IES-R, and PTGI scores were in Group 1, with the only overlap involving the IES-R, where the group that believed they had resolved the experience reported a comparable level of current distress. Presumably, individuals in Group 1 never experienced much distress, while those in Group 4 did since they had the highest challenge to their core beliefs, but have now lowered their distress by successfully working through the experience. On the other measures, it is less clear where Group 1 participants should fall, since we cannot know why they did not experience a serious disruption of core beliefs. Are they highly

Table 3  
Summary of Effects (Standardized Units) for Final Model (Model 3)

	Outcomes					
	IR	DR	PTGI	IES-R	MiL	LifeSat
<b>Core Beliefs Inventory</b>						
Total Effect	.42	.55	.55	.29	.11	.06
Direct Effect	.42	.37	.37			
Indirect Effect		.18	.19	.29	.11	.06
<b>Intrusive Rumination</b>						
Total Effect		.43	.15	.53	-.10	-.14
Direct Effect		.43		.46		
Indirect Effect			.15	.08	-.10	-.14
<b>Deliberate Rumination</b>						
Total Effect			.34	.18	.07	.04
Direct Effect			.34	.18		
Indirect Effect					.07	.04
<b>PTGI</b>						
Total Effect				.34	.29	
Direct Effect				.34	.13	
Indirect Effect					.16	
<b>Impact of Events Scale</b>						
Total Effect				-.29	-.34	
Direct Effect				-.29	-.21	
Indirect Effect					-.13	
<b>Meaning in Life-Presence</b>						
Total Effect						.46
Direct Effect						.46

Table 4  
Differences in PTG, Meaning in Life, Satisfaction With Life, CBI Scores, and IES-R by Resolution Category

Variable	Resolution				F(3, 329)	$\eta^2$
	Group 1	Group 2	Group 3	Group 4		
Posttraumatic Growth	1.57 <sup>a</sup> (1.14)	2.15 <sup>b</sup> (1.07)	2.55 <sup>c</sup> (1.07)	2.97 <sup>d</sup> (1.25)	17.66*	.14
Presence of Meaning	4.64 <sup>a,b</sup> (1.22)	4.25 <sup>b,c</sup> (1.05)	4.12 <sup>c</sup> (1.35)	4.96 <sup>a</sup> (1.12)	10.93*	.09
Search for Meaning	4.18 (1.09)	4.35 (0.94)	4.41 (0.95)	4.21 (1.02)	0.99	.01
Life Satisfaction	4.46 <sup>a</sup> (1.44)	4.52 <sup>a</sup> (1.08)	4.44 <sup>a</sup> (1.30)	5.23 <sup>b</sup> (1.22)	10.05*	.08
Core Beliefs	2.20 <sup>a</sup> (1.30)	2.64 <sup>b</sup> (1.06)	3.00 <sup>c</sup> (0.99)	3.04 <sup>c</sup> (1.02)	7.96*	.07
IES-R	28.38 <sup>a</sup> (25.07)	39.38 <sup>b,d</sup> (23.47)	49.27 <sup>c</sup> (24.45)	34.82 <sup>a,d</sup> (22.69)	10.51*	.09

Note. Group 1 ( $N = 40$ ) No Need to Resolve; Group 2 ( $N = 52$ ) Tried to Resolve, but Gave Up; Group 3 ( $N = 101$ ) Still Trying to Resolve; Group 4 ( $N = 140$ ) Resolved. Means sharing a superscript are not significantly different ( $p > .05$ ).

\* indicates  $p \leq .01$ .

resilient individuals, who are not distressed by their experience, or are they less psychologically healthy and simply avoiding or denying their experience? Some individuals who experience uncomfortable levels of intrusive thoughts may be among those in resolution Group 1 and are using avoidance to cope with the event.

Individuals in Group 4, who perceive that they have achieved a resolution, should score higher on PTG, presence of meaning, and life satisfaction. Again, the pattern of results is generally supportive. Group 4 participants have the highest PTGI, presence of meaning, and life satisfaction scores. They do overlap with Group 1 on the MLQ-P, suggesting that at least some of those in Group 1 may have core beliefs that give meaning to their lives, even in the face of a major stressor, allowing them to experience the stressor without having their beliefs threatened.

For those who categorized themselves into Group 2, who tried to make sense of the event, but quit, lower PTG would be expected, and lower CBI might occur indicating less disruption to beliefs. It also is possible that they report less distress than individuals in Group 3, since they were able to cease processing since a minor disruption of core beliefs did not demand resolution. Once again, the pattern of results is generally supportive. Group 2 participants tended to report less disruption of core beliefs and lower PTG than participants in Groups 3 or 4. On the measure of distress, they tend to report currently experiencing less than individuals in Group 3, but not consistently less than other groups.

Predictions for individuals in Group 3 are more difficult to make, since they could be at various stages in the ongoing process of working through their experience and trying to rebuild their assumptive worlds. If they are close to achieving a sense of resolution, they could look very much like those who have reached a resolution. Alternatively, they could resemble Group 2 participants, if they are not making progress toward resolution. They should have experienced reasonably high levels of disruption, to initiate the cognitive processing, but depending on how far they have progressed, they may or may not have experienced much PTG or found meaning. They likely are still experiencing distress, since they continue to work toward a resolution. The data indicate that Group 3 experienced disruption of beliefs equivalent to those in Group 4, but that they have much higher current distress, and significantly lower PTG. They also reported the lowest level of found meaning in life, indicating that they continue to struggle with distress, and have also been unable to find meaning in their experience. Obviously, over time, some of these people may move

into either Group 4 or Group 2, depending on their success in rebuilding core beliefs and identifying positive changes associated with their struggle. Although these analyses provide a picture of the process that can unfold following trauma, the ideal strategy would be to follow individuals over time to see the changes as they unfold. This cross-sectional study did not allow changes in distress or other variables over time to be examined—at this point our conclusions as to why resolution groups differ are only hypotheses.

## Discussion

The primary purpose of this research was to examine components of a model of posttraumatic growth by looking at how the initial disruption of the assumptive world is processed through two styles of ruminative cognitive work to then predict current distress, experienced growth, and, ultimately, well-being. The links between these variables have been hypothesized in various models of the processes involved in posttraumatic growth (Calhoun, Cann, & Tedeschi, 2010; Calhoun & Tedeschi, 2006; Joseph & Linley, 2008). Although discrete segments of models of growth have been examined in earlier research, this is the first effort to trace the process from the initial experience of the stressor, and the corresponding challenge to core beliefs, through the cognitive work that the challenge stimulates, to the growth and distress that are currently experienced, and then to the sense of meaning and life satisfaction that may result. By employing a path analysis approach, alternative models could be created and evaluated to determine the most appropriate links among the variables involved in the process of reacting to threats to core beliefs.

The present findings provide support for models of posttraumatic growth that hypothesize that challenges to the assumptive world serve as a departure point for eventual growth (Calhoun et al., 2010; Janoff-Bulman, 2006). Scores on the CBI were reliably associated with both intrusive and deliberate rumination. Threats to core beliefs should lead to both intrusive and deliberate rumination and there is some indication that intrusive rumination, which tends to occur in the immediate aftermath of trauma, can serve as an impetus for subsequent deliberate rumination. Deliberate rumination was in turn connected to posttraumatic growth, indicating that challenges to the assumptive world that lead to constructive cognitive efforts are more likely to produce growth. Intrusive rumination, unwanted thoughts about the trauma, was more likely to be associated with ongoing distress. The need to

distinguish between these two very different forms of cognitive work, which has been noted in other recent studies (Cann, Calhoun, Tedeschi, & Triplett, 2010; Cann, Calhoun, Tedeschi, & Solomon, 2010; Taku et al., 2009), is reinforced by these findings.

One of the general unanswered questions in the literature on posttraumatic growth, and an area where findings have been inconsistent, is the relationship between posttraumatic growth and general psychological well-being. In the best fitting model supported by the current data, posttraumatic growth had a statistically significant, but weak, direct relationship with life satisfaction. However, the indirect path from growth to life satisfaction, via the presence of meaning in life, was also significant, suggesting that posttraumatic growth will not necessarily be strongly associated with current levels of life satisfaction in a simple way. Present findings suggest the possibility that growth can indeed influence well-being in a positive way, but its effects may be primarily indirect, through the influence that posttraumatic growth has on providing an increased sense of meaning and purpose in life, and perhaps more broadly on the reconstructed life narrative (McAdams, 2006; Neimeyer, 2001; Tedeschi & Calhoun, 1995).

These findings, then, suggest a general pattern for the occurrence of posttraumatic growth and post trauma psychological well-being. To set in motion the processes that may lead eventually to growth, life crises must create significant challenges to the individual's current assumptive world. That challenge leads to intrusive forms of rumination. Both the original challenge to core beliefs and the subsequent intrusive rumination can encourage more deliberate forms of rumination. Intrusive ruminations, not surprisingly, are correlated with an array of forms of posttraumatic disruption; intrusive ruminations and posttraumatic distress tend to be related to lower levels of meaning in life and to lower levels of life satisfaction.

More deliberate forms of rumination, however, characterized by specific attempts to understand what has happened, and which may include instances of "benefit reminding" (Affleck & Tennen, 1996, p. 901), are more directly linked to subsequent growth. Posttraumatic growth, in turn, may provide the opportunity for the discovery of new forms of meaning in life, and those additions or revisions to one's sense of purpose may in turn lead to higher levels of life satisfaction and psychological well-being. Present findings, although cross-sectional, provide some intriguing suggestions for more focused longitudinal examinations of the process of posttraumatic growth and of the achievement of psychological well-being in the wake of trauma.

The model identified in the present study also supports the proposal that posttraumatic growth and event related distress can coexist, and can independently affect levels of life satisfaction (Wild & Paivio, 2003). Although simple correlations indicate that posttraumatic growth and distress are positively (significantly, but weakly) correlated, when examined in the context of the multiple factors included in the current model, these two variables have opposite relationships with the outcome variables of meaning in life and life satisfaction. Even as people are appreciating how they have been positively changed by their struggle with a traumatic experience, they still may be dealing with the distress associated with the event itself. For example, I may realize that I am stronger than I thought, and have better relationships that I have recognized as I have dealt with my disease, but I still can be distressed at the unpleasant turn of events that a serious disease can present.

The exploratory examination of differences based on how people categorized their current efforts at resolving the event, that is, finding meaning or making sense of their experience, provides some additional insights into how people may change as they make progress in rebuilding an assumptive world that accommodates the major life stressor. Dealing with a threat to core beliefs, and the distress associated with a traumatic experience, is a process that appears to take time and that may take considerable cognitive effort. Ultimately, the desired outcome would be a sense of understanding and resolution that allows the event to be incorporated into one's core beliefs and that allows the person to recognize how the challenge may have revealed areas of growth. Those who categorize themselves as having been able to make sense of the traumatic experience report more PTG, a higher level of meaning in life, and greater life satisfaction. Individuals who either did not feel a need to find meaning, or who gave up trying to find meaning, reported lower levels of perceived threat to their core beliefs, and correspondingly, lower levels of PTG. Present results suggest that it is through the process of trying to make sense of a traumatic experience, and achieving some understanding, that people may come to recognize the positive impact that wrestling with the experience has had on them. For those who did experience a serious threat to their core beliefs, but who continue to struggle to try to make sense of their experience, distress remains high, yet they still report more PTG than individuals who gave up or never tried to make sense. These results further support the possibility that PTG and ongoing distress can coexist, at least until some clear resolution has been achieved.

The introductory findings with the resolution items suggest some interesting areas for possible investigation. Participants reporting they did not try to make sense of the event (Group 1 of resolution categories) reported lower core belief challenge and lower PTG. This finding raises the question why did they not attempt to make sense of the event? Did the event not "shake" their beliefs about the world sufficiently; did they already have an understanding of why traumatic events occur due to their experiences with previous life challenges, or were questions about why major life challenges occur simply not of interest to them?

There have been previous discussions of clinical methods to facilitate PTG (Calhoun & Tedeschi, 1999; Tedeschi & Calhoun, 2006) that these findings support. Given that interventions have been generally based on the PTG model first published in 1995 and successively revised into its current iteration (Calhoun et al., 2010), following the model in promoting PTG appears to be a valid strategy. For example, based on the model and findings of this study, clinicians should encourage enough emotional regulation to allow for deliberate rumination about shattered core beliefs, and explicitly discuss emerging PTG in order to promote a sense of well-being and life satisfaction. Although PTG interventions have been described as integrations of cognitive, narrative, and existential therapies, they may also have some resemblance to dynamic models such as mentalization, that consider how people become able to engage in deep attachments through empathic understanding of themselves and others' processes of perception, thinking, feeling, imagination, and the like (Fonagy, Gergely, Jurist & Target, 2002). This may involve a metacognitive activity during deliberate reflective rumination that allows those surviving trauma to grasp their own psychological development and a greater sense of what it means to live as a human being. These intrapersonal and

interpersonal achievements may bring about a good deal of life satisfaction.

Although offering some intriguing findings and suggesting some areas for further inquiry, this study has some limitations. One limitation is that these analyses are cross-sectional; however, they do provide support for the proposed underlying changes that are expected as people process their experience of a trauma, and seek to integrate the experience into a revised set of beliefs that comprise their assumptive worlds. We also recognize that this study focuses on particular traumatic events rather than possible cumulative effects of trauma over longer periods. Furthermore, even though participants were asked to focus on a particular traumatic event that they judged to be the most stressful in responding to the measures, we do not know if a cumulative effect of trauma might still have influenced their decision. Considerable research data suggests that successive (or chronic) traumas or chronically traumatic situations generate different effects as compared to more circumscribed traumatic events; however, it is unknown how or if such effects are implicated in the comparisons of traumatic impact. Future research that can track changes longitudinally will be important in validating the sequence of changes identified here. Despite its limitations, the current study provides a good examination of some of the complex processes that have been proposed to operate when people find their lives disrupted by events that challenge their core beliefs and threaten their well-being.

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Received June 7, 2010

Revision received January 21, 2011

Accepted February 7, 2011 ■