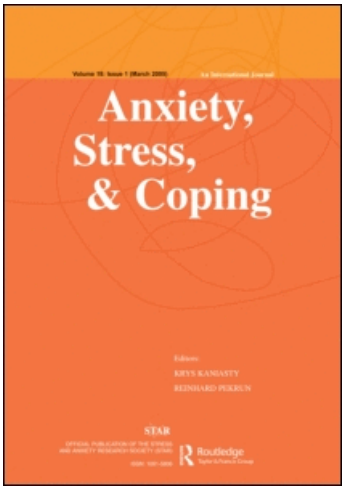

Anxiety, Stress & Coping
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713454398

The Core Beliefs Inventory: a brief measure of disruption in the assumptive world

Arnie Cann [a]; Lawrence G. Calhoun [a]; Richard G. Tedeschi [a]; Ryan P. Kilmer [a]; Virginia Gil-Rivas [a]; Tanya Vishnevsky [ab]; Suzanne C. Danhauer [b]
[a] Department of Psychology Psychology, University of North Carolina Charlotte, Charlotte, NC, USA [b] Wake Forest University School of Medicine, Winston Salem, NC, USA

First published on: 26 March 2009

To cite this Article Cann, Arnie, Calhoun, Lawrence G., Tedeschi, Richard G., Kilmer, Ryan P., Gil-Rivas, Virginia, Vishnevsky, Tanya and Danhauer, Suzanne C.(2009) 'The Core Beliefs Inventory: a brief measure of disruption in the assumptive world', Anxiety, Stress & Coping, 23: 1, 19 — 34, First published on: 26 March 2009 (iFirst)
To link to this Article: DOI: 10.1080/10615800802573013
URL: http://dx.doi.org/10.1080/10615800802573013

Anxiety, Stress, & Coping
Vol. 23, No. 1, January 2010, 19–34

Routledge
Taylor & Francis Group

The Core Beliefs Inventory: a brief measure of disruption in the assumptive world

Arnie Cann[a]*, Lawrence G. Calhoun[a], Richard G. Tedeschi[a], Ryan P. Kilmer[a], Virginia Gil-Rivas[a], Tanya Vishnevsky[a,b] and Suzanne C. Danhauer[b]

[a]*Department of Psychology, University of North Carolina Charlotte, Charlotte, NC, USA;* [b]*Wake Forest University School of Medicine, Winston Salem, NC, USA*

(Received 20 June 2008; final version received 21 October 2008)

Stressful events that disrupt the assumptive world can force people to make cognitive changes to accommodate these highly stressful experiences. As fundamental assumptions are reestablished, many people report changes and experiences that reflect posttraumatic growth (PTG). The present research describes the development of the Core Beliefs Inventory (CBI), a brief measure of disruption of the assumptive world developed for use in applied research and clinical settings. Three studies, two using college samples (Study 1, $n = 181$ and Study 2, $n = 297$ time 1; 85 time 2) and the third using leukemia patients (Study 3, $n = 70$ time 1; 43 time 2), assessed the utility of the CBI to predict PTG in both cross-sectional and longitudinal designs. Relationships between the CBI and measures of self-reported PTG and well-being indicate that the CBI has construct validity, acceptable test-retest reliability, and very good internal consistency. The CBI may be a useful tool in investigating predictions about the effects of stressful experiences on an individual's assumptive world, PTG, and successful adaptation.

Keywords: posttraumatic growth; assumptive beliefs; well-being

Models of the processes of adjusting to highly stressful events (Janoff-Bulman, 1992, 2006; Parkes, 1971) and of the processes by which highly stressful life events result in posttraumatic growth (PTG) (Park & Ai, 2006; Tedeschi & Calhoun, 2004) have focused on the impact these events can have on an individual's assumptive world. The assumptive world is a broad set of fundamental beliefs that include, for example, how we believe people will behave, how events should unfold, and our ability to influence events. These assumptions give structure to events in an individual's world, allow each individual to plan and predict, and contribute to how people and events in the world are perceived and understood. Researchers have theorized that "the essence of trauma is the abrupt disintegration of one's inner world. Overwhelming experiences... shatter... fundamental assumptions" (Janoff-Bulman, 1992, p. 63). Then, "it is the individual's struggle with the new reality in the aftermath of trauma that is crucial in determining the extent to which posttraumatic growth occurs" (Tedeschi & Calhoun, 2004, p. 5).

Thus, highly stressful events are assumed to sometimes, but not always, challenge important components of the assumptive world. When that happens and the

*Corresponding author. Email: acann@uncc.edu

ISSN 1061-5806 print/1477-2205 online

DOI: 10.1080/10615800802573013
http://www.informaworld.com

individual is led to reexamine core beliefs, the cognitive processing involved in dealing with this threat to current beliefs is what makes it possible to recognize positive changes and experience PTG (Calhoun & Tedeschi, 2006; Janoff-Bulman, 1992, 2006; Joseph & Linley, 2008; Linley & Joseph, 2004; Phelps, Williams, Raichle, Turner, & Ehde, 2008). It is not necessarily the inherent "stressfulness" of the event itself that is critical in fostering growth, but rather the challenge to one's world assumptions and the cognitive work entailed in reestablishing a functional set of assumptions. Although there is an existing measure designed to assess an individual's current beliefs about their assumptive world (i.e., World Assumptions Scale; Janoff-Bulman, 1989), it examines one's beliefs about the world, not whether core beliefs have been disrupted. Moreover, there are currently no measures of the degree to which the broad core of assumptions is threatened or disrupted by specific life events. Consequently, even though it is the disruption of, or challenge to, assumptive worlds that is believed to be a critical element in the processes associated with dealing with stressful experiences, no such specific measures of disruption have been used in the research investigating posttraumatic stress and growth.

This report describes research focusing on the development of a brief measure to assess directly the disruption of core beliefs and the evaluation of its usefulness in predicting the impact of potential traumas and PTG. If the models of PTG are valid (Calhoun & Tedeschi, 2006; Janoff-Bulman, 1992, 2006; Joseph & Linley, 2008; Tedeschi & Calhoun, 2004), there should be a strong positive relationship between the extent of disruption of core beliefs and the degree of PTG. Moreover, this relationship, between the measure of disruption of core beliefs and growth, should be independent of the relationship between the stressfulness of the life event and PTG. We assume that any significant stressful life event can lead to some degree of disruption of core beliefs, so we have not limited our analysis to only those events that would meet the Diagnostic and Statistical Manual of Mental Disorders-IV criteria for trauma.

Three studies are described that provide an initial evaluation and validation of the proposed Core Beliefs Inventory (CBI). The first study is cross-sectional, and examines the internal reliability of the measure, and its relationship to reported PTG. In the second study, the relationships between the disruption of core beliefs, traumatic stress reactions, and well-being are examined in a cross-sectional sample, and then, using a longitudinal assessment of a sub-sample, the CBI responses and ratings of psychological impact in the immediate aftermath of a stressful event are used to predict subsequent reports of PTG and well-being. The third study is a conceptual replication of the second study using a sample of acute leukemia patients undergoing chemotherapy. The longitudinal data of Studies 2 and 3 also allow for a consideration of the reliability of responses to the CBI over time. The prediction is that CBI scores will predict PTG, and that they will account for variance in growth not captured by measures of stressfulness of the event.

Study 1

Method

Core Beliefs Inventory (CBI)

Potential items for the CBI were generated based on a consideration of a broad range of beliefs thought to comprise the assumptive world (e.g., Janoff-Bulman, 1989;

Koltko-Rivera, 2004). The intent was to capture a range of assumptions, but in a very brief inventory that could be used efficiently in applied research and clinical settings. Items were developed by investigators with clinical and research experience in trauma and growth. A final set of nine items resulted, focusing on religious and spiritual beliefs, human nature, relationships with other people, meaning of life, and personal strengths and weaknesses. The instructions indicated that participants should reflect upon the event about which they were reporting and indicate the extent to which it led them to seriously examine each core belief. The items and verbatim instructions are provided in Table 1. Responses were made on a six-point scale ranging from "not at all" (0) to "a very great degree" (5).

Other measures

Posttraumatic Growth Inventory (PTGI). The Posttraumatic Growth Inventory (PTGI) (Tedeschi & Calhoun, 1996) is a 21-item scale that assesses positive changes experienced in the aftermath of highly stressful life experiences. A total score can be used, but the scale also yields five subscores (Morris, Shakespeare-Finch, Rieck, & Newbery, 2005; Taku, Cann, Calhoun, & Tedeschi, 2008; Tedeschi & Calhoun, 1996), reflecting different domains of growth (Relating to others, RO; Personal strength, PS; New possibilities, NP; Appreciation of life, AL; and Spiritual change, SC). Ratings are

Table 1. Instructions and individual items included in the Core Beliefs Inventory.

Some events that people experience are so powerful that they 'shake their world' and lead them to seriously examine core beliefs about the world, other people, themselves and their future.

Please reflect upon the event about which you are reporting and indicate the extent to which it led you to seriously examine each of the following core beliefs.

1. Because of the event, I seriously examined the degree to which I believe things that happen to people are fair.
2. Because of the event, I seriously examined the degree to which I believe things that happen to people are controllable.
3. Because of the event, I seriously examined my assumptions concerning why other people think and behave the way that they do.
4. Because of the event, I seriously examined my beliefs about my relationships with other people.
5. Because of the event, I seriously examined my beliefs about my own abilities, strengths and weaknesses.
6. Because of the event, I seriously examined my beliefs about my expectations for my future.
7. Because of the event, I seriously examined my beliefs about the meaning of my life.
8. Because of the event, I seriously examined my spiritual or religious beliefs.
9. Because of the event, I seriously examined my beliefs about my own value or worth as a person.

Responses are on a six-point scale (0–5):

not at all	to a very small degree	to a small degree	to a moderate degree	to a great degree	to a very degree

made on a six-point scale (0, no change – 5, very great change). The total score and subscales all have good internal reliability and acceptable test-retest reliability (Tedeschi & Calhoun, 1996). In the current study the internal reliability of the PTGI, assessed using alpha, was .90.

Satisfaction with Life Scale (SWLS). The Satisfaction with Life Scale (SWLS) (Diener, Emmons, Larsen, & Griffin, 1985) was designed to assess global life satisfaction. The scale has five items, each rated on a seven-point scale (1 strongly disagree – 7 strongly agree). The scale has been found to have good validity and reliability (Diener et al., 1985; Pavot & Diener, 1993). The reliability in the current study was acceptable ($\alpha =$ .78).

Demographic information. Demographic questions assessed age, gender, race, and information about the stressful event experienced. Participants indicated the nature of the stressful event, the months since the event, and the stressfulness of the event at the time it happened and the stressfulness they were currently experiencing (1 "not at all stressful" to 7 "extremely stressful").

Procedure

Participants were recruited on a university campus to describe their experience with the most stressful life event that had occurred within the past three years. Although a majority of the participants were university students, research indicates that within this sample the prevalence of highly stressful events is quite high, and common psychological responses to these events are equivalent to those in the broader population (Lawler, Ouimette, & Dahlstedt, 2005; Vrana & Lauterbach, 1994). They met in small groups at scheduled times and completed study measures. The data reflect responses of a subset of participants within a larger sample reporting on various experiences with stressful life events; these participants were the only ones who completed the CBI.

From the 188 participants who volunteered, seven were excluded because they failed to report the date of the event (3), reported on an event that occurred more than three years ago (2), or rated the event below four on the seven-point stress rating scale (2). The 181 participants (88% undergraduate students: 133 females and 48 males) who met all criteria ranged in age from 18 to 62 years ($M = 22.8$, SD $= 7.4$). The sample was 77% Caucasian and 12% African-American; no other group comprised as much as 5% of the sample. Stressful events reported included death of a close relative/friend (24%), serious relationship issue (23%), school problems, typically involving academic probations, suspensions, or failure to be admitted to a desired college (15%), serious medical issues (9%), relocation transitions, typically involving moving out of state to begin college (8%), motor vehicle accidents (5%), and a variety of other events ($<5\%$). The time since the stressful event ranged from one month to 36 months, with a mean of 14.2 months (SD $= 10.3$). All ratings of the event's stressfulness at the time of the event were four or higher on the seven-point scale ($M = 6.20$, SD $= .84$); thus, it would appear that participants reported on significant life experiences. Current ratings of stress were lower, and were more normally distributed ($M = 3.5$, SD $= 1.61$, range 1–7).

Results

All scale scores are reported as means on the scales used to rate the individual items (CBI and PTGI on 0–5 scale, SWLS and stress on 1–7 scale). Mean ratings on the CBI indicated a moderate amount of disruption of core beliefs ($M = 3.03$, SD $= 1.06$; a rating of three on the response scale is labeled "moderate"). The internal reliability of the CBI was good ($\alpha = .82$) and the reliability would not be improved by deleting any of the items. This brief inventory appears to provide a coherent assessment of the impact of a stressful event on basic world assumptions.[1]

CBI scores were positively correlated (only p's $<.001$ are considered significant) with PTGI total ($r = .57$, PTGI $M = 2.68$, SD $= 1.00$), with stressfulness at the time ($r = .24$) and current stressfulness ($r = .30$). The CBI was negatively correlated with SWLS ($r = -.30$, $M = 4.52$, SD $= 1.21$) and uncorrelated with time since the event ($r = -.01$). Although not directly relevant to the predictions tested, it is worth noting that CBI scores were significantly correlated with each of the five separate PTGI domains (RO $r = .41$, NP $r = .49$, PS $r = .38$, AL $r = .47$, SC $r = .42$). PTGI total and SWLS were uncorrelated ($r = .05$). A comparison of women ($M = 3.13$, SD $= 1.05$) and men ($M = 2.75$, SD $= 1.05$) on the CBI revealed a statistically reliable, $t(179) = 2.13$, $p = .04$, but potentially trivial difference (95% CI $= .02$–$.73$).

To evaluate the usefulness of the CBI for explaining PTG, a regression analysis using CBI, time since the event, stressfulness of the event at the time it happened, and gender, to predict PTG (PTGI total), was conducted. Gender differences were examined since they have sometimes been found in PTG (Helgeson, Reynolds, & Tomich, 2006), and gender differences were found on the CBI. All predictors were entered at once. The regression model explained a significant amount of the variance in PTGI scores, $F(4, 176) = 22.74$, $p < .001$, $R^2_{adj} = .33$. CBI scores ($\beta = .571$, $p < .001$) and time since the event ($\beta = .121$, $p = .05$) were significant predictors of growth, but stressfulness at the time of the event ($\beta = .007$) and gender ($\beta = -.004$) were not. Thus, as expected, a greater disruption of the assumptive world, as captured by the CBI, was associated with greater PTG. The disruption is assumed to set in motion the cognitive work of trying to rebuild the assumptive world, ultimately leading to personal growth. The failure of the stress rating to contribute could be due to the relatively restricted range of scores, since all participants rated the event at four or higher on the seven-point scale.

A second regression analysis, predicting well-being, included the previous predictors, but substituted current stress for stress at the time of the event, and added total scores on the PTGI. Current life satisfaction would be expected to be related to the "success" of the cognitive work done to respond to the event (stressfulness now and PTG). Higher levels of current stress should be negatively related to life satisfaction, although experienced growth could be predictive of higher levels of life satisfaction. The expected relationship of CBI to current life satisfaction is less clear, since it could depend upon the degree to which the initial disruption is currently experienced. The predictors were all entered in a single step. The model was significant, $F(5, 175) = 9.27$, $p < .001$, $R^2_{adj} = .19$, and CBI ($\beta = -.422$, $p < .001$), stressfulness now ($\beta = -.224$, $p < .01$), and PTGI ($\beta = .303$, $p < .001$) were individually significant, but gender ($\beta = .113$) and time since the event ($\beta = -.076$) were not. More current residual stress due to the event, and greater recalled disruption of the assumptive world, were associated with lowered life satisfaction, but PTG was

positively related to life satisfaction. Note that the simple bivariate relationship between PTG and SWLS was not significant, but within the regression model they were significantly associated ($sr = .24$, $p < .001$).

Study 2

Study 2 was designed to assess the relationship between the CBI and a more comprehensive and clinically relevant measure of the impact of a stressful event than the simple global assessment of stressfulness employed in Study 1. In addition, a subset of participants was reassessed about two months after the first data collection. This allowed for a test-retest evaluation of CBI scores, and for a longitudinal assessment of CBI scores and stress scores as predictors of PTG and psychological well-being at time 2. The longitudinal data eliminate the potential bias introduced by relying solely on participants' ability to recall how they were affected by the stressful event in the immediate aftermath of the event.

Procedure

Undergraduate students enrolled in introductory level psychology courses participate in a research requirement as part of their courses (alternative ways of fulfilling the requirement are available). At the beginning of each semester, they are provided with the opportunity to complete a variety of measures that determine their eligibility for certain studies. A question was included in this screening which asked participants if they had experienced any of a number of significant stressful events "in the past 30 days." The list included events such as the death of a close friend or family member, a medical problem experienced by themselves or a close other, being a victim of an assault, being an accident victim, a divorce/separation/infidelity, and work/financial stressors. All students who responded "yes" to at least one event were sent an email inviting them to complete an on-line survey about how they dealt with a recent stressful event. Those who completed the first on-line survey were contacted two months later and invited to complete a second on-line survey as a follow-up to the first.

Materials

The CBI, PTGI, SWLS, and the demographics questions used in Study 1 were also used in Study 2. The CBI and SWLS were administered at time 1 and time 2, but the PTGI was used only at time 2. Internal reliabilities remained good for the SWLS (alpha, time 1 = .85, time 2 = .90) and the PTGI ($\alpha = .94$). CBI analyses will be presented with the results.

Impact of Events Scale-Revised (IES-R)

The Impact of Events Scale-Revised (IES-R) (Weiss & Marmar, 1997) is a 22-item self-report measure of three major symptom clusters associated with posttraumatic stress disorder. Separate scores are provided for avoidance (eight items), intrusion (eight items), and hyperarousal (six items). Despite the attempt to separate the three symptom clusters, a factor analysis revealed a single dominant factor (Weiss &

Marmar, 1997). More recent data also support treating the scores as a single measure of general traumatic stress (Creamer, Bell, & Failla, 2003). In the current study, a single score was used as the indicator of stress experienced, but correlations with the separate clusters were also examined. Responses are made on a five-point scale (0 "not at all" to 4 "extremely"). Participants were asked to consider the items in the context of the stressful event described, and to report on their experiences in the past week. The IES-R was administered at time 1, and again at time 2. The internal reliabilities for the total scores were very good (alpha, time 1 = .93, time 2 = .94).

Well-being

The General Public-Clinical Outcomes in Routine Evaluation scale (GP-CORE: Sinclair, Barkham, Evans, Connell, & Audin, 2005) was used as a measure of psychological well-being. The GP-CORE was derived from the Clinical Outcomes in Routine Evaluation-Outcome Measure (CORE-OM) which was designed to provide a common metric for assessing well-being for widespread usage in clinical settings and which has been extensively assessed for psychometric reliability and validity (Evans et al., 2000; Evans et al., 2002). The GP-CORE has been validated on a college student population, and is effective in identifying varying degrees of psychological well-being in non-clinical populations. Sinclair et al. (2005) report good internal and test-retest reliability, and convergence with the broader CORE-OM and other measures of adjustment. There are 14 items on which participants indicate their experiences in the last week (e.g., I have felt tense anxious or nervous, I have felt unhappy, I have felt optimistic about my future, I have felt able to cope when things go wrong). Responses are made on a five-point scale (0 "not at all" to 4 "most or all of the time"). The GP-CORE was administered at both time 1 and time 2. In the current sample the internal reliabilities were good (alpha, time 1 = .84, time 2 = .85).

Participants

At time 1, 297 participants (69 men and 228 women) completed the on-line survey. The mean age of participants was 20.40 years (SD = 4.94, range 18–51), and the sample was predominantly Caucasian (79%, with 10% African-American, 5% Asian, and no other group representing at least 5%). The stressful events reported included deaths (42), medical issues (58), work issues (56), relationship issues (73), accidents (17), relocation issues (30), financial issues (13), assaults (four), legal problems (three), and exposure to natural disasters (one). The stressfulness ratings indicate a high level of stress ($M = 5.7$, SD = 1.18), and 96% of the participants rated their experience at least four on the seven-point scale. Time since the event was not considered, since all events had to have occurred in the previous 30–40 days.

At time 2, 60–74 days after time 1, a sub-sample of 85 participants (18 men and 67 women) responded to the follow-up on-line survey. A comparison of this sub-sample to those who only participated at time 1, revealed no reliable differences between the two groups on gender, age, or any of the measures completed at time 1 (CBI, IES-R, SWLS, GP-CORE).

Results

The internal reliability for the CBI at time 2 continued to be good (alpha, time 1 = .82, time 2 = .87) and the test-retest reliability was acceptable ($r = .69$). The means for all measures taken at time 1 and the relevant correlations are in Table 2. As evidence of the breadth of the CBI assessment, the CBI was correlated with each subscale of the IES-R (Avoidance $r = .39$, Intrusions $r = .46$, Hyperarousal $r = .40$, p's $< .001$, as well as with the IES-R total score. As in Study 1, a gender difference existed for the CBI, with women scoring slightly higher ($M = 2.91$, SD = 1.04) than men ($M = 2.48$, SD = .98), $t(295) = 3.06$, $p < .01$, but the difference again could be quite minimal (95% CI = .15–.71). The participants reported a moderate amount of disruption, and moderate levels of traumatic stress symptomology. These levels are not unreasonable in the current non-clinical sample. Thus, even though the events were rated as highly stressful (on the seven-point stress rating), they have not led to levels of symptomology associated with PTSD. As would be predicted, the degree to which the event was associated with a disruption of core beliefs was correlated with the levels of symptomology reported. More significant stressful life experiences force individuals to examine their core beliefs, and these events are associated with higher levels of reported symptomatology.

Although the simple bivariate correlations between CBI and the well-being measures were significant, suggesting that disruption of core beliefs might be negatively related to well-being, regression analyses predicting well-being from CBI and IES-R Total scores (and including gender as a predictor), all entered at once, indicated that it is the IES-R that predicts well-being. For SWLS, the model was significant, $F(3, 293) = 13.72$, $p < .001$, $R^2_{adj} = .11$, but only IES-R Total ($\beta = -.345$, $p < .001$) was individually significant (CBI; $\beta = -.007$; gender $\beta = -.018$). A similar pattern was found for GP-CORE, with a significant model, $F(3, 293) = 50.43$, $p < .001$, $R^2_{adj} = .33$, but only IES-R ($\beta = -.587$, $p < .001$) as a significant contributor (CBI; $\beta = .026$; gender $\beta = -.059$).

The results for the sub-sample ($n = 85$) reassessed at time 2, two months after the initial session, and about three months after the stressful event being examined, are shown in Table 3. The correlations reported are between CBI at time 1 and the other outcome variables at time 2. CBI scores continued to be correlated with PTGI, IES-R indicator of symptomatology, and with the more comprehensive measure of well-being (GP-CORE), but not with the global assessment of life satisfaction. As in Study 1, CBI scores also were correlated with each of the five PTGI factor scores

Table 2. Study 2 descriptive statistics and correlations with CBI scores for Time 1 measures.

Measure	*M*	SD	*r*
CBI	2.81	1.04	
IES-R Total	1.43	.80	.47
SWLS	4.89	1.26	−.17
GP-CORE	2.56	.65	−.26

Note: All correlations are significant at $p < .01$. CBI, the Core Beliefs Inventory. IES-R, the Impact of Events Scale (Revised). SWLS, the Satisfaction with Life Scale. GP-CORE, the General Public Clinical Outcomes in Routine Evaluation scale. CBI scores are on a 0–5 scale, IES-R and GP-CORE are on a 0–4 scale, and SWLS is on a 1–7 scale.

Table 3. Study 2 descriptive statistics for follow-up sample and correlations of CBI scores from Time 1 with other measures from Time 2.

	Time 1		Time 2		
Measure	*M*	SD	*M*	SD	*r*
CBI	2.88	1.10	2.70	1.07	
IES-R Total	1.53	.86	1.08	.76	.45**
SWLS	4.84	1.31	5.03	1.29	−.07
GP-CORE	2.57	.58	2.64	.64	−.24*
PTGI Total			2.17	1.14	.58**

Note: CBI, the Core Beliefs Inventory. IES-R, the Impact of Events Scale (Revised). SWLS, the Satisfaction with Life Scale. GP-CORE, the General Public Clinical Outcomes in Routine Evaluation scale. CBI and PTGI scores are on a 0–5 scale, IES-R and GP-CORE are on a 0–4 scale, and SWLS is on a 1–7 scale. *$p < .03$; **$p < .001$. $N = 85$.

(RO $r = .46$, PS $r = .50$, AL $r = .59$, NP $r = .48$, SC $r = .40$, p's $< .001$). The initial assessment of CBI remained correlated with each subscore of the IES-R (Avoidance $r = .33$, Intrusions $r = .44$, Hyperarousal $r = .40$, p's $< .001$) measured at time 2. These data support the expectation that the disruption of core beliefs in the immediate aftermath of a stressful event relates to later reports of PTG. As might be expected, the IES-R scores declined over time, $t(84) = 5.38$, $p < .001$. There were no reliable changes for the CBI scores or for the two measures of well-being. For CBI reported at time 2, there was no significant difference between women and men (women $M = 2.79$, SD $= 1.04$; men $M = 2.36$, SD $= 1.17$: $t(83) = 1.53$, $p = .13$). As was found in Study 1, PTGI was uncorrelated with the measures of well-being (SWLS: $r = .15$; GP-CORE: $r = -.06$, p's $> .05$).

To determine whether CBI and the stressful impact of the event at the time it happened make independent contributions to PTG, a regression analysis similar to that conducted in Study 1 was performed. In contrast to Study 1, it was possible to examine the impact of the event on CBI very soon after the event (time 1 CBI score) to see if it predicted later experience of PTG (PTGI at time 2). The IES-R total score from time 1 was used to represent the immediate traumatic impact of the event, rather than the more global single item rating of stress experienced. In addition, time since the event was not included, since all events happened within the same limited time frame. Gender was included in the regression, since we did find gender differences for CBI at time 1. All predictors were entered in a single step. The model was significant, $F(3, 81) = 21.16$, $p < .001$, $R^2_{adj} = .42$, and both CBI ($\beta = .395$, $p < .001$) and IES-R ($\beta = .376$, $p < .001$) were significant individual predictors, but gender ($\beta = -.002$) was not. Thus, both the stressfulness of the experience, and the degree of disruption of core beliefs were independent predictors of later PTG. Note that the alternative model, including time since the event, and the single item measure of stress, would not change the conclusions since neither variable was significant, while both CBI and IES-R remained significant.

Well-being is assumed to be related to both the current stress remaining due to the stressful life event, and the PTG that has been experienced. The PTG model (Calhoun & Tedeschi, 2006; Tedeschi & Calhoun, 2004) assumes that distress and growth can coexist, so both could independently affect well-being. Regression

analyses were conducted predicting the two measures of well-being using CBI, IES-R at time 2 (current level of stress), PTGI, and gender. In Study 1, CBI was found to be a significant predictor, but it was based on recalling disruption of core beliefs well after the event. In the current analyses, CBI was assessed soon after the event, and two months before assessments of well-being. In each model, all predictors were entered in a single step. For SWLS the model was significant, $F(4, 80) = 5.22$, $p < .001$, $R^2_{adj} = .17$, and both PTGI ($\beta = .452$, $p < .001$) and IES-R ($\beta = -.449$, $p < .001$) were significant predictors. Neither CBI ($\beta = -.139$) nor gender ($\beta = .087$) were significant. The same pattern was found when predicting GP-CORE. The model was significant, $F(4, 80) = 5.58$, $p < .001$, $R^2_{adj} = .18$, and both PTGI ($\beta = .303$, $p < .02$) and IES-R ($\beta = -.464$, $p < .001$) were significant predictors. Neither CBI ($\beta = -.188$) nor gender ($\beta = -.087$) were significant. So, well-being is negatively related to stress levels currently experienced, and positively related to the degree of PTG reported.

In Study 1, CBI also was related to SWLS in the regression model. To determine if that might be because the recalled CBI was used in Study 1, the single step regression analyses were rerun using the CBI scores collected at time 2. For both SWLS and GP-CORE, the models remained significant and PTGI and IES-R remained significant, but for GP-CORE the CBI score was now also significant. These results suggest that being asked to recall disruption of core beliefs, at the same time one is asked about well-being, may alter reports of well-being. To determine if recalling disruption of core beliefs also might change the nature of the relationship between CBI and PTGI scores, the model described above, using IES-R from time 1, CBI from time 1 and gender was repeated using the CBI time 2 score. The identified relationships were unchanged. The model was significant, $F(3, 81) = 23.60$, $p < .001$, $R^2_{adj} = .45$, and both time 2 CBI ($\beta = .424$, $p < .001$) and time 1 IES-R ($\beta = .387$, $p < .001$) were significant individual predictors, while gender ($\beta = -.004$) was not. Apparently, recalling core beliefs disruption, rather than using reports collected in the immediate aftermath of a stressful event, does not alter the relationship of CBI to reported growth (PTGI).

Study 3

The samples used to evaluate the CBI in the first two studies were mostly college students and had experienced a wide variety of events that they rated as stressful. Study 3 was intended to validate the relationships between core beliefs, impact of the event, and PTG using a homogeneous sample of individuals coping with a life-threatening illness who were assessed at multiple points during their treatment. These data come from a broader investigation of psychosocial and physical outcomes in adult patients undergoing treatment for acute leukemia.

Participants and procedure

Study participants were 81 newly diagnosed (82.2%) and relapsed (16.8%) acute leukemia patients. The mean age was 49.4 years (SD = 14.6, range 19–81). Eighty-two percent were diagnosed with acute myelogenous leukemia and 18% with acute lymphocytic leukemia. Most of the patients were Caucasian (90.1%; 7.4% African-American; 1% other) and married/partnered (76.5%); 10.5% never married and

9.5% were divorced/widowed. The sample was evenly divided by sex (41 females and 40 males). Because of the intense chemotherapy treatment regimen, some of the patients preferred to have the measures administered verbally; however, the method of administration (verbal vs. written) was not formally documented. Of the 81 patients who completed baseline measures, 70 had complete data on all three measures at baseline and 43 patients had complete data at Time 2. Of the 38 patients who did not complete Time 2 measures, five patients (13.2%) had incomplete data, 15 (39.4%) refused/were not interested, nine (23.7%) died as a result of complications from treatment or the disease, six (15.8%) were too sick to complete the measures, and three patients (7.9%) did not complete the measures for other reasons.

Materials

The CBI, Profile of Mood States Short Form (POMS-SF) and PTGI were the primary measures. They were administered during a baseline assessment (week 0, $\leq$7 days of admission for treatment) and then approximately 5–6 weeks after admission. Responses on the CBI were made on a four-point scale (“not at all” (0), “a little” (1), “quite a bit” (2) “to a great extent” (3)) because pretesting indicated that for those who completed the measures orally, the six-point scale used before was difficult to apply. The PTGI ratings were the same as in Studies 1 and 2. The CBI once again showed very good internal reliability (alpha at baseline = .89; alpha at follow-up = .86). The total score for the PTGI also demonstrated very good internal reliability on this sample (alpha at baseline = .95; alpha at follow-up = .93).

The POMS-SF (Shacham, 1983) was used to assess the current emotional state of the participants. The POMS-SF was developed for use with cancer patients and provides an assessment of mood. The 37 items are rated on a five-point scale (ranging from (0) “not at all” to (4) “extremely”), with participants indicating how strongly they have felt the various mood descriptors during the past week. Composites can be created to represent six mood states (depression, confusion, tension, anger, fatigue, and vigor). A single total score was used to assess overall negative mood in the current analyses, and it was created by reverse scoring the vigor composite and then averaging that with the five negative mood categories. The POMS total score showed very good internal reliability (alpha at baseline = .97; alpha at follow-up = .98). Unlike the IES-R used in Study 2, the POMS-SF captures current mood, but not the event specific emotions indicative of symptomatology.

Results

The descriptive statistics for the samples at baseline and time 2 are shown in Table 4, along with the correlations between CBI at baseline and the other measures at both time points. It should be noted that there was, not unexpectedly given the nature of the sample, a smaller sample size at time 2. However, a comparison of the scores at baseline for those who were and those who were not in the sample at time 2 revealed no significant differences on the three measures (CBI, POMS-SF, PTGI; all t's <1.20, p's $>.25$). At both times, the disruption of core beliefs, PTG and POMS-SF were at moderate levels (CBI's about 1.5 on a 0–3 scale, PTGI around three on a 0–5 scale, and POMS-SF around 1.5 on a 0–4 scale). CBI at

Table 4. Study 3 descriptive statistics and correlations with baseline CBI scores.

	Baseline ($n=70$)			Time 2 ($n=43$)		
Measure	*M*	SD	*r*	*M*	SD	*r*
CBI	1.48	.86		1.59	.82	
POMS-SF	1.48	.81	.44*	1.61	.74	−.01
PTGI	2.91	1.21	.64*	3.16	1.05	.38*

Note: CBI, the Core Beliefs Inventory was measured on a 0–3 scale. POMS-SF, the Profile of Mood State Short Form was measured on a 0–4 scale. PTGI, the Posttraumatic Growth Inventory was measured on a 0–5 scale. *$p<.001$.

baseline was positively correlated with PTGI at both baseline and at time 2, but was only correlated with POMS-SF at baseline. Again, as evidence that the CBI is broadly related to PTGI, it was correlated with all five subscales of PTGI at baseline (RO $r=.60$; NP $r=.64$; PS $r=.52$; AL $r=.59$; SC $r=.46$, p's $<.001$), and with four of five subscales at time 2 (RO $r=.34$; NP $r=.45$; PS $r=.31$; AL $r=.31$; p's $<.05$; SC $r=.19$, ns), even with the much smaller sample. POMS-SF was uncorrelated with PTGI at baseline ($r=.09$). For the baseline sample, CBI and POMS-SF, entered in a single step, were used to predict PTGI. Time since the event was not used because the time frames were equivalent for all participants, and gender was not included because it has not been found to be relevant in any previous analyses. The regression model was significant, $F(2, 67)=28.92$, $p<.001$, $R^2_{adj}=.45$, and both CBI ($\beta=.751$, $p<.001$) and POMS-SF ($\beta=-.243$, $p<.02$) were individually significant. In this cross-sectional analysis, greater disruption of core beliefs was, once again, associated with greater PTG. The negative relationship between POMS-SF and PTGI indicates that less negative mood was associated with greater PTG.

In an effort to assess initially reported disruption of core beliefs on subsequent PTG, Baseline CBI and POMS-SF were also used to predict PTGI scores at time 2. Once again the predictors were entered at once and the overall model was significant, $F(2, 40)=5.99$, $p<.01$, $R^2_{adj}=.19$, with baseline CBI continuing as a significant contributor ($\beta=.513$, $p<.01$), but POMS-SF ($\beta=-.289$) no longer individually significant. As was found in Study 2, CBI scores were useful in predicting subsequent levels of reported PTG.

Discussion

What is it that facilitates the processes that ultimately lead to the experience of PTG? The unpleasant psychological consequences of the stressful event undoubtedly encourage coping efforts to reduce the distress experienced. In addition, however, models of PTG (Calhoun & Tedeschi, 2006; Janoff-Bulman, 1992, 2006; Joseph & Linley, 2008; Linley & Joseph, 2004) propose that stressful events can also initiate a process of examining basic assumptions that are challenged when the unexpected and negative happens. Stressful events that disrupt fundamental assumptions about the world can force people to reexamine their assumptions and consider how to accommodate the unexpected experience. Although Calhoun and Tedeschi (1998) referred to the potentially "seismic" impact of traumatic events, highly stressful

events at any level have the potential to lead to some degree of disruption of world assumptions. The analogy of an earthquake implies that one's world is dramatically shaken by the traumatic experiences, but even tremors, lower on the "psychological" Richter Scale, could lead to an examination of one's core beliefs. During this process of reexamining fundamental assumptions, the opportunity exists for the recognition of the positive, as well as the negative, implications of a stressful experience. As the fundamental assumptions are reestablished, many people report the positive changes and realizations that have been labeled PTG. Although events that are more "seismic" are likely to be associated with greater opportunities for growth, even psychological tremors might bring to awareness some positive changes. The current findings demonstrate that people experiencing a wide range of stressful life events, from relocation and school issues to facing a diagnosis of a potential terminal illness, do report being motivated to reexamine core beliefs.

Researchers examining PTG have assumed that the disruption and reexamination of core beliefs followed highly stressful events (Janoff-Bulman, 1992, 2006; Joseph & Linley, 2008; Tedeschi & Calhoun, 2004), but the actual disruption had never been quantified. The development of the CBI provides a means to assess these potentially important cognitive processes associated with PTG. The CBI is designed to assess efficiently the individual's examination of core beliefs in the aftermath of a significant life experience. According to theory and current models of the growth process, the thoughtful reexamination of core beliefs should be related to reports of PTG and should explain variability in growth not associated with the stressfulness associated with the experience or current levels of mood. The present findings indicate the CBI is a reliable measure of the disruption of the assumptive world that includes reasonably broad content, and its brevity has the potential to make it a useful tool in a variety of research and applied settings addressing posttraumatic psychological responses.

The internal reliability of the CBI was consistently strong across the separate samples. In addition, the reliability of the total score over time was verified. The validity of the CBI would be demonstrated by (a) its expected relationship with the overall psychological impact of the event experienced, given that more stressful events should be more likely to initiate an examination of core beliefs; and (b) the ability of the CBI to independently predict differences in PTG. The present results are consistent with these predictions, as higher scores on the CBI were associated with higher scores on the IES-R and the PTGI. Less has been theorized about the specific relationship of disruption of the assumptive world and later well-being (Janoff-Bulman, 2006). A likely expectation is that the experience of PTG, and the successful reduction of negative symptoms due to the stressful event, would each contribute to improved well-being. Because stress and growth are assumed to be independent and can coexist, it is not the case that increased growth alone will necessarily be associated with decreased stress.

The pattern of relationships identified in the three studies described demonstrates that the CBI has construct validity and that it should be useful in investigating predictions about the effects of highly stressful events on the individual's assumptive world, as well as the consequences of the disruption of the assumptive world both for PTG and for successful adaptation. As predicted by models of PTG (Janoff-Bulman, 1992, 2006; Joseph & Linley, 2008; Tedeschi & Calhoun, 2004), disruption of core beliefs, as indicated by reported reexamination of these beliefs, was strongly related

to reported PTG. This was true for the PTGI total score, and, in support of the breadth of the CBI, it was true for each of the five factors of the PTGI in all but a single instance across all three studies. In all samples, higher reported levels of examining core beliefs were predictive of greater experiences of PTG even when controlling for other variables. The results from the longitudinal parts of Studies 2 and 3 are especially encouraging because the potential bias associated with attempting to recall one's experience examining core beliefs was eliminated, as was the issue of being asked to report both examination of core beliefs and PTG at the same time. Reported examination of core beliefs in the time soon after the stressful experience was reliable as a predictor of PTG experienced later.

As expected, CBI scores also were related to indicators of the negative effects of the stressful event. In Study 1, CBI was correlated with a global assessment of stress, in Study 2 it was related to the more clinically relevant IES-R, and in Study 3 CBI was related to a standardized assessment of mood. The correlations with the indicators of stress were reliable, but only moderate. Stronger relationships would not be expected since some highly stressful events might lead to a questioning of one's assumptions, but this is not necessarily the case. That is, a stressful experience might be consistent with some world assumptions, and thus require no reexamination (Janoff-Bulman, 1992). In fact, the results of the regression analysis in Study 2 demonstrate that both higher levels of negative symptomatology following a stressful experience, and higher levels of core beliefs examination were associated with increased experience of PTG.

Although extent of reexamination of core beliefs related negatively to adjustment following a highly stressful event, as assessed by current levels of well-being, in the longitudinal regression analysis in Study 2, CBI was not a reliable predictor of well-being. Both PTGI and current levels of symptomatology were predictive, so it seems possible that the impact of disruption of core beliefs on well-being may be dependent upon the "success" in rebuilding world assumptions. Higher reports of PTG, and lower reports of symptoms associated with a stressor, were associated with higher levels of well-being. This was the case even though the simple bivariate relationships between PTGI and well-being were not significant. Only in the context of current levels of symptomatology, and earlier disruption of core beliefs, did PTGI predict well-being. The future research might examine more closely the actual changes in reports of PTG and symptomatology over time to see if these changes are predictive of changes in well-being.

Overall, these results indicate that the CBI may be a useful measure to help understand the conditions under which growth follows stressful life experiences and the possible relationship between growth and subsequent psychological well being. The utility of the CBI scores for predicting growth, especially with the longitudinal data, provides important, and previously missing, support for theories proposed to explain the impact of traumatic events (Janoff-Bulman, 1992, 2006; Joseph & Linley, 2008; Linley & Joseph, 2004; Park & Ai, 2006; Phelps et al., 2008) and the processes that facilitate PTG (Calhoun & Tedeschi, 2006; Tedeschi & Calhoun, 2004). Although disruption of core beliefs was assumed to occur following a stressful life event, and to be related to eventual PTG, the current results are the first to assess this particular sequence of responses, using reported reexamination of core beliefs to predict subsequent PTG. In the immediate aftermath of the stressful event, level of reexamination of core beliefs was correlated with the severity of the psychological

impact of the event, and after the passage of time, the initial reexamination of core beliefs did, in fact, predict PTG. These results fall short of demonstrating a causal relationship. An ideal test of the proposed models would require assessment of the disruption of core beliefs almost immediately after the experience of a serious stressor, and subsequent assessments of disruption and growth over time. However, the present results do provide strong supportive evidence that an assessment of the disruption of core beliefs can explain later variability in PTG.

A goal in developing the CBI also was to have a very brief, but broadly based, instrument that could be used in applied research or in clinical settings. The results support the success of this effort. The CBI scores were correlated with all five factors of the PTGI and all three symptom clusters of the IES-R. Although it is likely that different life experiences will encourage examination of different world assumptions, the CBI was effective in samples of individuals experiencing a wide range of stressful events with a range of psychological responses. The internal reliability remained strong across all samples. The use of the CBI may help to appreciate more fully the experiences of individuals dealing with stressful life events. For those who report higher levels of disruption of core beliefs, a clinical focus on the accommodation of the assumptive world to incorporate the needed changes may be useful in reducing distress and also may enhance the likelihood of the experience of growth. For those with lower levels of disruption of the assumptive world, they may be best aided by assistance with assimilating the event into an essentially unchanged assumptive world and helping them deal directly with the symptoms they are experiencing as the result of an event that was fundamentally consistent with their existing world assumptions.

Note

1. To further evaluate the internal consistency of the CBI, the data from all three studies ($n = 548$) were used to conduct an exploratory factor analysis. For studies 2 and 3, only the data from the first administration of the CBI were used. Also, because the response metric used for the CBI was shortened in study 3, all scores were first standardized. The SCREE plot clearly indicated a single dominant factor was present. In fact, separate exploratory factor analyses on the data from each study consistently indicated a single dominant factor, accounting for between 42 and 53% of the variance. There was no evidence across these studies for a consistent alternative factor structure beyond the single factor model.

References

Calhoun, L.G., & Tedeschi, R.G. (1998). Posttraumatic growth: Future directions. In R.G. Tedeschi, C.L. Park, & L.G. Calhoun (Eds.), *Posttraumatic growth: Positive changes in the aftermath of crisis* (pp. 215–238). Mahwah, NJ: Lawrence Erlbaum.

Calhoun, L.G., & Tedeschi, R.G. (2006). The foundations of posttraumatic growth: An expanded framework. In L.G. Calhoun & R.G. Tedeschi (Eds.), *Handbook of posttraumatic growth* (pp. 3–23). Mahwah, NJ: Lawrence Erlbaum.

Creamer, M., Bell, R., & Failla, S. (2003). Psychometric properties of the Impact of Events Scale-Revised. *Behaviour Research and Therapy*, *41*, 1489–1496.

Diener, E., Emmons, R.A., Larsen, R.J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment*, *49*, 71–75.

Evans, C., Connell, J., Barkham, M., Margison, F., McGrath, G., Mellor-Clark, J., et al. (2002). Toward a standardized brief outcome measure: Psychometric properties and utility of the CORE-OM. *British Journal of Psychiatry*, *180*, 51–60.

Evans, C., Mellor-Clark, J., Margison, F., Barkham, M., Audin, K., Connell, J., et al. (2000). CORE: Clinical Outcomes in Routine Evaluation. *Journal of Mental Health*, *9*, 247–255.

Helgeson, V.S., Reynolds, K.A., & Tomich, P.L. (2006). Benefit-finding: A meta-analytic review of benefit finding and growth. *Journal of Consulting and Clinical Psychology*, *74*, 797–815.

Janoff-Bulman, R. (1989). Assumptive worlds and the stress of traumatic events: Applications of the schema construct. *Social Cognition*, *7*, 113–136.

Janoff-Bulman, R. (1992). *Shattered assumptions*. New York: Free Press.

Janoff-Bulman, R. (2006). Schema-change perspectives on posttraumatic growth. In L.G. Calhoun & R.G. Tedeschi (Eds.), *Handbook of posttraumatic growth* (pp. 81–99). Mahwah, NJ: Lawrence Erlbaum.

Joseph, S., & Linley, P.A. (2008). Positive psychological perspectives on posttraumatic stress: An integrative psychosocial framework. In S. Joseph & P.A. Linley (Eds.), *Trauma, recovery, and growth: Positive psychological perspectives on posttraumatic stress* (pp. 3–20). Hoboken, NJ: John Wiley & Sons.

Koltko-Rivera, M.E. (2004). The psychology of worldviews. *Review of General Psychology*, *8*, 3–58.

Lawler, C., Ouimette, P., & Dahlstedt, D. (2005). Posttraumatic stress symptoms, coping, and physical health status among university students seeking health care. *Journal of Traumatic Stress*, *18*, 741–750.

Linley, P.A., & Joseph, S. (2004). Positive change following trauma and adversity: A review. *Journal of Traumatic Stress*, *17*, 11–21.

Morris, B.A., Shakespeare-Finch, J., Rieck, M., & Newbery, J. (2005). Multidimensional nature of posttraumatic growth in an Australian population. *Journal of Traumatic Stress*, *18*, 575–585.

Park, C.L., & Ai, A.L. (2006). Meaning making and growth: New directions for research on survivors of trauma. *Journal of Loss & Trauma*, *11*, 389–407.

Parkes, C.M. (1971). Psycho-social transitions: A field study. *Social Science and Medicine*, *5*, 101–115.

Pavot, W., & Diener, E. (1993). Review of the Satisfaction with Life Scale. *Psychological Assessment*, *52*, 164–172.

Phelps, L.F., Williams, R.M., Raichle, K.A., Turner, A.P., & Ehde, D.M. (2008). The importance of cognitive processing to adjustment in the 1st year following amputation. *Rehabilitation Psychology*, *53*, 28–38.

Shacham, S. (1983). A shortened version of the Profile of Mood States. *Journal of Personality Assessment*, *47*, 305–306.

Sinclair, A., Barkham, M., Evans, C., Connell, J., & Audin, K. (2005). Rationale and development of a general population well-being measure: Psychometric status of the GP-CORE in a student sample. *British Journal of Guidance and Counseling*, *33*, 153–173.

Taku, K., Cann, A., Calhoun, L.G., & Tedeschi, R.G. (2008). The factor structure of the Posttraumatic Growth Inventory: A comparison of five models using confirmatory factor analysis. *Journal of Traumatic Stress*, *21*, 158–164.

Tedeschi, R.G., & Calhoun, L.G. (1996). The Posttraumatic Growth Inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress*, *9*, 455–471.

Tedeschi, R.G., & Calhoun, L.G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry*, *15*, 1–18.

Vrana, S., & Lauterbach, D. (1994). Prevalence of traumatic events and post-traumatic psychological symptoms in a nonclinical sample of college students. *Journal of Traumatic Stress*, *7*, 289–302.

Weiss, D.S., & Marmar, C.R. (1997). The Impact of Events Scale-Revised. In J.P. Wilson & T.M. Keane (Eds.), *Assessing psychological trauma and PTSD: A handbook for practitioners* (pp. 399–411). New York: Guilford Press.