EVENT CENTRALITY: DEBUNKING THE “BAD SCIENCE” MYTH THAT SELF-REPORTED POSTTRAUMATIC GROWTH DOES NOT REFLECT POSITIVE CHANGE

Stephanie Feil Johnson, B.S.

Thesis Prepared for the Degree of

MASTER OF SCIENCE

UNIVERSITY OF NORTH TEXAS

August 2012

APPROVED:

Adriel Boals, Major Professor
Jennifer L. Callahan, Committee Member
Randall J. Cox, Committee Member
Vicki Campbell, Chair of the Department of Psychology
Mark Wardell, Dean of the Toulouse Graduate School

Despite strong evidence supporting the existence of posttraumatic growth (PTG), some investigators question whether the construct measured by the Posttraumatic Growth Inventory (PTGI) is that of perceived growth or “actual” growth. In a replication of a recent investigation, the present study sought to refine the methodology used by employing the construct of event centrality. Due to its limited sample size, the results of this analysis did not provide strong evidence in support of the hypothesis that limiting analyses to individuals rating their trauma as high in event centrality improves the ability of the PTGI to reflect “actual” growth. However, results did support the idea that investigations of PTG conducted immediately following a trauma may be more reflective of a coping process, rather than growth. Further research is warranted to investigate the role of event centrality in posttraumatic growth, and the effect of time on the progression of growth following trauma.
Copyright 2012

by

Stephanie Feil Johnson
ACKNOWLEDGEMENTS

The author would like to acknowledge the invaluable assistance and support of all of the individuals who either directly or indirectly aided in the completion of this thesis project. Although I cannot thank every person individually, I wish to express my deepest appreciation and gratitude to all of those involved. I would like to give particular acknowledgement to the following people without whom this project would not have been possible.

This thesis would not have been possible without the support and direction of my major professor, Dr. Adriel Boals. I sincerely appreciate your willingness to take a chance on me. To my committee members, Dr. Jennifer L. Callahan and Dr. Randall J. Cox, you have both shaped my educational experience in important and unique ways and for that I thank you.

To my friends and family, your indirect influence was no less valuable than the influence of those who had a direct hand in the completion of this thesis project. Specifically, I would like to thank my parents for always giving me their unconditional and unfailing love and encouragement; I would not be the person I am today if not for you two. To my friends, your support made these waters navigable; I would have been lost without you.

Above all, I would like to thank my generous and loving husband Matt, who has made notable sacrifices during the process of my educational pursuits. Thank you for travelling this long and winding road with me, and providing me with the continued love and support I need to complete this journey.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Trauma Outcomes</td>
<td>1</td>
</tr>
<tr>
<td>Posttraumatic Growth</td>
<td>3</td>
</tr>
<tr>
<td>“Actual” Growth</td>
<td>5</td>
</tr>
<tr>
<td>Event Centrality</td>
<td>8</td>
</tr>
<tr>
<td>RESEARCH QUESTIONS AND HYPOTHESES</td>
<td>12</td>
</tr>
<tr>
<td>METHODS</td>
<td>14</td>
</tr>
<tr>
<td>Participants</td>
<td>14</td>
</tr>
<tr>
<td>Measures</td>
<td>15</td>
</tr>
<tr>
<td>Demographics</td>
<td>15</td>
</tr>
<tr>
<td>Traumatic Events</td>
<td>16</td>
</tr>
<tr>
<td>Event Centrality</td>
<td>17</td>
</tr>
<tr>
<td>Posttraumatic Growth</td>
<td>18</td>
</tr>
<tr>
<td>Actual Posttraumatic Growth on PTGI Domains</td>
<td>19</td>
</tr>
<tr>
<td>Relating to Others</td>
<td>19</td>
</tr>
<tr>
<td>New Possibilities</td>
<td>20</td>
</tr>
<tr>
<td>Appreciation of Life</td>
<td>20</td>
</tr>
<tr>
<td>Spiritual Change</td>
<td>21</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 1  Ethnic Makeup of Time 1 and Time 2 Participants ........................................ 15
Table 2  Descriptive Data on All Measures for Replication Analysis and Full Sample.....28
Table 3  Correlations between the C-PTGI and the PTG-Domain Measures at Time 2 for Replication Analysis................................................................................................. 29
Table 4  Frazier et al. (2009) and Replication Comparison of Correlations between the PTGI at Time 2 and change in C-PTGI and PTG-Domain Measures from Time 1 to Time 2............................................................................................................................ 32
Table 5  Frazier et al. (2009) and Replication Comparison of Correlations of Perceived and Actual Growth with Change in Distress and Coping at Time 2 .................................33
Table 6  Relationship between C-PTGI and Actual Growth measures at T2 in High and Low CES Groups .................................................................................................................................37
Table 7  Relationship between PTGI and Change in Actual Growth measures from Pre-to Post-Trauma in High and Low CES Groups.................................................................38
Table 8  Correlations of Perceived and Actual Growth with Change in Distress and Coping at Time 2 in High and Low CES groups............................................................40
INTRODUCTION

Trauma Outcomes

Trauma is an unfortunate reality in today’s society. According to research, exposure to traumatic events is far from being accurately described as “outside the range of normal human experience,” as the Diagnostic and Statistical Manual of Mental Disorders-III-R (DSM) once indicated (APA, 1987, p. 247). Instead, upwards of 50% - 60% of individuals report being exposed to a traumatic stressor in their lifetime (Ozer, Best, Lispey & Weiss, 2003). In the wake of traumatic stressors, as few as 5% of men and as many as 12.3% of women develop posttraumatic stress disorder (PTSD; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). A more recent investigation by Breslau et al. (1998) utilizing DSM-IV criteria observed a slightly lower lifetime prevalence of 8.3%. These figures, however, do not begin to account for the innumerable individuals who go on to develop subthreshold negative symptomatology following exposure to trauma.

Fortunately, many individuals seem sturdy in the face of trauma. Despite the high incidence of trauma exposure, resilience remains a key factor in trauma outcomes (Bonanno, 2004). An unexpectedly large percentage of individuals seem unaffected by, or are able to cope successfully with, traumatic events to which they are exposed (Bonanno, 2004; 2005). These individuals display neither negative nor positive effects as a result of their traumatic experiences. Research has historically been dominated by negative outcomes including posttraumatic stress disorder, likely as a result of this group’s pathological response and need for intervention. A PsycInfo search (conducted
09/03/2011) dramatically demonstrates the emphasis researchers have placed on these negative outcomes. Using the search terms “PTSD,” “posttraumatic stress disorder,” and “post-traumatic stress disorder,” an astounding 30,459 results were returned of peer reviewed articles. Even accounting for duplicate articles, for example, assuming that each and every article appearing under the headings “PTSD,” and “post-traumatic stress disorder” was also categorized under “posttraumatic stress disorder,” there are as few as 14,834 peer reviewed journal articles on this topic. Posttraumatic growth (PTG), however, is another matter entirely. Using the search terms “PTG,” “posttraumatic growth,” and “post-traumatic growth” a dismal 588 total peer reviewed articles were returned by this search. Given the same assumptions of duplication, there are as few as 359 total articles on this topic written to date. This indicates that of the research conducted regarding trauma related outcomes, approximately 2% focus on positive outcomes, and an astonishing 98% focus on negative outcomes.

Researchers and clinicians alike may scoff at the idea of investigating a group whose outcomes do not require intervention. The sad reality is that this has been an unimaginable missed opportunity to capture vital information about what differentiates these individuals, who develop positive outcomes, from those who go on to experience negative ones. The possibilities of applying that knowledge to the treatment of individuals with PTSD or subthreshold negative symptomatology are endless. Further, as clinicians it is straightforward to focus on the troubles that walk through our door, but it is more important perhaps as researchers to focus on the majority of individuals who do not (Bonanno, 2004). Investigations of the Los Angeles riots and motor vehicle
accident survivors have revealed that the majority of individuals do not go on to develop PTSD, with between 78% - 79% reporting three or fewer symptoms (Hanson, Kilpatrick, Freedy, & Saunders, 1995; Bryant, Harvey, Guthrie, & Moulds, 2000). Additionally, research conducted on Gulf War Veterans and Manhattan residents who survived the terror attacks on September 11, 2001 demonstrated that 62% and 42% experienced no psychological distress or PTSD symptoms, respectively (Sutker, Davis, Uddo, & Ditta 1995; Galea et al., 2002). This overwhelming majority of individuals who endure a trauma, but rebound are an unexpected and inspiring finding. For these reasons, it is vital to investigate individuals who have positive outcomes in the wake of trauma, or who experience outcomes that include both positive and negative elements in concert (Linley, Joseph, Cooper, Harris, & Meyer, 2003). Of the possible positive outcomes, posttraumatic growth is one of the more commonly cited and one of the outcomes that has recently gained recognition among researchers.

Posttraumatic Growth

The construct of posttraumatic growth, in its most basic form, can be summarized by the colloquialism *when life hands you lemons, make lemonade*. More scholarly conceptualizations of the PTG construct posit that it is both the process and outcome of an individual experiencing positive psychological change as a result of a traumatic event that affects an individual on a cognitive and emotional level (Tedeschi, Park & Calhoun, 1998; Yalom & Lieberman, 1991). Posttraumatic growth is characterized by increases in personal strength, development of a greater sense of satisfaction with and gratitude for one’s life, a renewed sense of meaning in life, and
improvement in interpersonal relationships (Tedeschi & Calhoun 1996, Schuettler & Boals, 2011).

Recently, work on these positive outcomes has been on the rise. Conceptualizations and theory development began as early as 1964 (Caplan), but the truly concentrated effort to delve into this matter began in the 1980’s (Tedeschi & Calhoun, 1988). Since then researchers have undertaken the vital task of exploring the transformative power of trauma. The robust and continually growing literature base that has resulted has investigated individuals spanning many life stages and a variety of traumatic experiences.

The studies which developed as a result of this positive psychology movement finally gained traction, rapidly increasing the development of the field. In 2006 Helgeson, Reynolds, & Tomich conducted the first of its kind meta-analytic review of the benefit finding and PTG literature. Prior to this point there were an insufficient number of studies to systematically review and analyze the literature in this manner. Unfortunately, the analysis was still limited by the nature of research being conducted in the field, including the fact that too few longitudinal studies had been conducted to adequately analyze outcomes over time, resulting in an analysis limited to cross-sectional data only. Additionally, too few studies examined objective health outcomes and studies that did utilized measures which varied too widely to provide consistent data. The analyses conducted examined the relationship between PTG and eight separate health outcomes including depression, anxiety, positive well-being, distress, intrusive-avoidant thoughts, quality of life, and subjective physical health across 87
studies reported upon in 77 articles. The findings of these analyses indicated findings across studies were at times inconsistent, and demonstrated weak effects. Overall, however, PTG was related to better mental health outcomes including decreased depression and improved well being. However, it was also related to more intrusive and avoidant thoughts, postulated to reflect attempts to process the traumatic event and therefore not in conflict with the aforementioned relationship with depression and well being. In these analyses PTG was demonstrated to be unrelated to anxiety, global distress and quality of life. Time was also demonstrated to moderate these relationships, such that “benefit finding is more likely to be related to a good outcome when a longer time has elapsed since the trauma” (Helgeson et al., 2006, p. 811). Anxiety is an exception to this relationship, such that shorter periods of time reflect reduced anxiety symptomatology. The nature of the trauma was not demonstrated to impact these relationships; however, both gender and race or ethnicity did impact these associations. The Helgeson et al. (2006) meta-analysis served as a great step forward in the PTG literature, however, it also served to illustrate the vast effort that still needs to be invested in future research.

“Actual” Growth

Throughout its history, the construct of posttraumatic growth has been referred to by various names including “positive psychological change,” “stress related growth,” “thriving,” “positive reinterpretation,” and “strength from adversity.” (Tedeschi, Park & Calhoun, 1998). Two of the pseudonyms used to refer to PTG have been criticized for their lack of specificity, and their indication that the changes reportedly experienced in
the aftermath of a trauma do not reflect real growth (Tedeschi, Park & Calhoun, 1998). The terminology “positive illusions” (Taylor & Brown, 1988) and “perceived benefits” or “construing benefits” (Calhoun & Tedeschi, 1991; McMillen, Zuravin, & Rideout, 1995; Tennen, Affleck, Urows, Higgins, & Mendola, 1992), insinuate that the process is a cognitive one, rather than an emotional one. The implication of this phraseology is that the process being experienced by these individuals is one of dissonance reduction, which strikes at the heart of the most recent work by Frazier et al. (2009).

Prior to the work by Frazier et al. (2009), however, other authors provided alternative explanations. Taylor (1983; 1989) put forth the cognitive adaptation model of victimization, which suggested that trauma survivors experience positive change due to their inherent motivation to alleviate feelings of distress. McFarland and Alvaro (2000) provided evidence to support this theory by suggesting that victims derogate their pre-trauma self as a coping strategy, resulting in “perceptions of personal improvement … derive[d] from a distortion of the past rather than a distortion of the present” (p. 340). Further research by McMillen and Cook (2003) found little agreement between injury victims and spouses, family and friends regarding the types of positive consequences of the injury experienced by the victim. The authors suggest these data provide evidence to support the idea that PTG is an illusion or cognitive construction used by victims and loved ones as a coping mechanism. Despite these findings, it is undeniable that a plethora of research studies, utilizing a variety of populations, instruments and methodologies, have demonstrated individuals who report finding benefit from their victimization experience better psychological outcomes than

Following the work of Taylor (1983; 1989), McFarland and Alvaro (2000), and McMillen and Cook (2003), Frazier et al. conducted a critical investigation in 2009 which has rocked the field of positive psychology to its core. This pivotal study assessed the relationship between perceived growth and what the authors termed “actual” growth. Frazier et al. (2009) utilized a design wherein they compared the posttraumatic growth inventory (PTGI; Tedeschi & Calhoun, 1996), the most widely utilized instrument designed to measure PTG (Helgeson, Reynolds, & Tomich, 2006), with instruments selected to represent actual growth on domains assessed by the PTGI. The study findings suggest that the PTGI did not correlate with the measures chosen to represent actual growth in the PTGI domains, with the exception of religious commitment. Furthermore, perceived growth as measured by the PTGI was related to positive reinterpretation coping and increased distress, while actual growth was related to decreased distress. Frazier et al. (2009) interpret these findings as clear evidence that retrospective reports of growth following trauma are the result of a qualitatively different process than that of posttraumatic growth.

While Frazier et al.’s (2009) interpretation of these findings is one explanation, there are alternative ways to interpret the findings. For example, the measures chosen to represent the domains assessed on the PTGI may not adequately represent the actual growth, given that they demonstrated only moderate correlations with the PTGI.
Additionally, not all of the domains on the PTGI were assessed, while others were represented with multiple measures. Noteworthy, too, are the aforementioned findings of the meta-analysis by Helgeson, Reynolds, & Tomich (2006) that time moderates the relationships between PTG and psychological outcomes. When taking into consideration that Frazier et al. (2009) specifically examined traumas that occurred in the preceding two months, it is not surprising to imagine growth did not occur as expected, when research clearly indicates that growth and “good outcomes” are more likely to occur over the course of time (Helgeson et al., 2006, p. 811). Furthermore, the authors acknowledge their sample selection may have resulted in inclusion of individuals who did not truly experience traumatic events. In an attempt to combat this bias, the authors began with a large sample. However, large sample sizes are not an adequate substitute for appropriate methodology. This very concern has recently been presented by Boals, Steward and Schuettler (2010), who provide a sound alternative methodology when conducting PTG research.

**Event Centrality**

Boals et al. (2010) recently displayed concern regarding the often inconsistent findings between different studies that examine the relationships between PTG and various psychological outcomes. Using depression as an example, Boals et al. (2010) successively present a multitude of studies that find evidence for a relationship between PTG and depression (e.g. Tedeschi & Calhoun, 1996; Cobb, Tedeschi, Calhoun, & Cann, 2006), and those that fail to find comparable evidence (e.g. Frazier, Conlon, & Glaser, 2001; Hall et al., 2008). This conflicting data brings into question the validity of each
study, the quality of the research being conducted in this field and, of course, the findings that result. Furthermore, it’s impossible to make informed treatment decisions and educated plans about future research directions when the findings are vague at best, and erroneous, inaccurate or flawed at worst. A meta-analysis conducted in 2006 by Helgeson et al. demonstrated that despite the embarrassing surplus of studies which failed to support this relationship, there is indeed a significant correlation of -.09 between depression and PTG. This analysis further demonstrates that studies within the field of PTG often present findings which are weak, with insufficient effect sizes.

Boals et al. (2010) posit that the weak and conflicting findings result from the method in which the traumatic events are being identified. Various researchers utilize different means and different instruments in order to identify the so-called traumatic events for inclusion in their studies on PTG. Studies include a wide range of events from war trauma and sexual assaults, to natural disasters and motor vehicle accidents. Further, some studies include serious health issues as potentially traumatic. As noted by Boals et al., however, “not all individuals who experience such potentially traumatic events are actually traumatized” (2010, p. 519). As previously noted, many individuals are exposed to events on a daily basis which may be considered traumatic, in fact in the United States alone on average nearly 28,000 individuals were involved in motor vehicle accidents every day in 2008 (U.S. Census Bureau, 2011). Yet, most do not go on to develop a traumatic response, in fact many will be virtually unaffected by such an incident (Bonanno, 2004; 2005). Therefore, studies which include these unaffected individuals have diluted their findings by including individuals unlikely to grow as a
result of their “trauma,” because they did not subjectively experience trauma, despite having objectively experienced an event which could have resulted in a traumatic response.

In order to better assess the effect one’s exposure to a traumatic event has had a new gate-keeper must be established. Prior research has utilized the DSM-IV Criterion A1 as the benchmark by which participants are deemed as having experienced trauma. While this benchmark has served its purpose diagnostically, the scrutiny which surrounds it clinically is well known, and has spread to the research community as well (Breslau & Davis, 1987; McNally, 2003; 2009; Young 1995; Rosen & Lillenfeld, 2008; Rosen, Spitzer & McHugh, 2008).

One construct that may be considered as an alternative method for classifying trauma survivors is that of event centrality. In 2001 Berntsen speculated that a traumatic event may become a reference point in the life of an individual in much the same way that a positive event such as a wedding or graduation might. This theory was expanded through further work by Bernsten and Rubin (2006) with the development of the Centrality of Events Scale (CES). The measure seeks to quantify the degree to which an individual has integrated an event into his/her identity, making it a part of his/her life story. Studies utilizing the CES have demonstrated that centrality of events are correlated with negative psychological outcomes such as depression, dissociation and PTSD symptom severity (Berntsen & Rubin, 2007), PTSD symptomatology controlling for depression in combat veterans (Brown, Antonius, Kramer, Root, & Hirst, 2010), and increased pain intensity and life interference in
chronic pain patients (Perri & Keefe, 2008). Findings also demonstrate that females are more prone to integrate negative events into their identity than their male counterparts (Boals, 2010).

The centrality literature was expanded to the field of posttraumatic growth by two pivotal studies (Boals et al., 2010; Schuettler & Boals, 2011). These investigations demonstrated that relationships between psychological outcomes and PTG can more accurately be examined when limited to victims who have identified with their trauma. More specifically, previously nonsignificant or inconsistently demonstrated effects were demonstrated to have stronger relationships if the analyses were limited to victims who made the trauma part of their life story. Given these and the aforementioned findings, it seems clear that identifying trauma survivors who identify their trauma as central to their life story is a superior method of identifying individuals with a significant and relevant trauma history.

The purpose of the current study is to conduct a direct replication of the Frazier et al. (2009) study that asserts the PTGI does not measure actual growth. However, based on the findings by Boals et al. (2010) that the PTGI appears to be a more valid measure of PTG when events that are not high in event centrality are removed, we will conduct the same analyses as Frazier et al. (2009), but limit inclusion in the analyses to events high in event centrality. Through a replication of Frazier et al.’s 2009 investigation, this study will aim to determine whether the Posttraumatic Growth Inventory is measuring PTG as actual change, or a construct more similar to dissonance reduction.
RESEARCH QUESTIONS AND HYPOTHESES

Following a traumatic event, there is a genuine possibility that an individual can change in a profound way. The manner in which this growth is assessed may determine the difference between identifying that growth or missing it completely. This actual growth may occur, however, in the absence of the perception of growth. Alternately, an individual may perceive they have grown, when in fact the process experienced is more consistent with dissonance reduction. This study will attempt to investigate this issue through several research questions.

The first research question examines whether or not the measures chosen to represent the PTGI domains are representative of the general constructs they were chosen to represent. It is hypothesized that, consistent with Frazier et al. (2009), the domain measures will moderately represent the PTG domains they were chosen to represent.

The second research question investigates whether perceived growth following a traumatic event is associated with actual growth from pre- to post-trauma. The research question will further investigate if these relationships are significantly stronger when the sample is limited to traumatic events high in event centrality (as measured by the Centrality of Events Scale; CES). I hypothesized that when events are limited to those high in event centrality, perceived growth (as measured by the posttraumatic growth inventory; PTGI) would be associated with actual growth from pre- to post-trauma (on the current standing posttraumatic growth inventory and on the five measures chosen to assess the general PTGI domains).
The third research question was an exploratory analysis of how perceived and actual growth correlate with change in distress from pre- to post-trauma, and positive reinterpretation coping following a trauma. Because Frazier et al. (2009) had such unexpected findings, this exploratory analysis had no hypothesized findings.
METHODS

Participants

Participants were undergraduate students at the University of North Texas (UNT), recruited through the UNT participant pool. Students were compensated for their participation with partial class credit. Undergraduate students were chosen as the study sample in an attempt to most precisely replicate the study conducted by Frazier et al. (2009). Furthermore, studies indicate that compared to other age groups, those in late adolescence and early adulthood are more likely to be exposed to trauma (Breslau et al., 1998).

The final sample consisted of 505 respondents who completed online surveys at Time 1 (T1), with 396 returning to complete an additional set of surveys 8 weeks later at Time 2 (T2). The 78% retention rate of participants is only slightly lower than the 84% retention achieved by Frazier et al. (2009). At both time points most participants were female (69%) and Caucasian (57-59%), with an average age of 21. (More detailed information about participants’ ethnic breakdown is available in Table 1.)

An a priori power analysis, conducted via the statistical package G*Power (Faul, Erdfelder, Lang, & Buchner, 2007), indicated that a T2 sample size of 84 would maintain the desired power of .80. Unfortunately, despite achieving a T1 sample size of over 500 participants, following all data cleaning procedures and after conducting the quartile split, centrality analyses had as few as 69 participants and the replication analyses had as few as 20 participants.
Table 1

*Ethnic Makeup of Time 1 and Time 2 Participants*

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Time 1</th>
<th></th>
<th>Time 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent</td>
<td>N</td>
<td>Percent</td>
<td>N</td>
</tr>
<tr>
<td>White (not of Hispanic origin)</td>
<td>56.5%</td>
<td>286</td>
<td>58.7%</td>
<td>233</td>
</tr>
<tr>
<td>African American/Black</td>
<td>11.9%</td>
<td>60</td>
<td>10.3%</td>
<td>41</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>7.9%</td>
<td>40</td>
<td>6.8%</td>
<td>27</td>
</tr>
<tr>
<td>Hispanic</td>
<td>17.8%</td>
<td>90</td>
<td>18.4%</td>
<td>73</td>
</tr>
<tr>
<td>Native American</td>
<td>1.8%</td>
<td>9</td>
<td>0.8%</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>4.2%</td>
<td>21</td>
<td>5.0%</td>
<td>20</td>
</tr>
</tbody>
</table>

*Measures*

*Demographics*

A brief demographics questionnaire captured information regarding the participants’ gender, age, and race. The questionnaire also assessed respondents’ interest in, and solicited contact information to facilitate, participation in future studies. This form was administered following presentation of the informed consent form, approved by the University of North Texas Institutional Review Board (see Appendix). Participants’ expressed an understanding of the terms of participation, including study purpose, risks and benefits, and participant rights, such as the right to withdraw participation at any time.
The Stressful Life Events Screening Questionnaire (SLESQ; Goodman, Corcoran, Turner, Yuan and Green, 1998) is a measure designed to assess exposure to a number of traumatic events in non-treatment seeking individuals, especially college students. The thirteen item questionnaire, which was specifically designed for use in research settings with large subject pools, quickly identifies traumatic events, discarding subthreshold events that would not qualify as traumatic based on Criterion A1 of the posttraumatic stress disorder (PTSD) diagnosis set out in the *DSM-IV-TR* (APA, 2000). The questionnaire elicits minimal information, obtaining a yes or no response to eleven specific events, and two more general or “other” categories. These categories were developed based on a review of existing traumatic event questionnaires and pilot testing of the measure. Follow-up questions asked following event nomination include a brief description of the nature of the incident, the age at which the event occurred, the frequency or duration of the event, if a death occurred during the traumatic event, and the relationship of the deceased or perpetrator. Test-retest reliability for the measure is reported as .89 and the median kappa for the occurrence of specific events is .73. Convergent validity was established for the measure through a trauma interview condition, with a reported median kappa of .64 (Goodman et al., 1998).

In order to remain consistent with the study conducted by Frazier et al. (2009), participants were also asked to rate on a scale of 1 (*no distress*) to 5 (*extreme distress*) the amount of distress any endorsed item caused them at the time it occurred.
Event Centrality

The Centrality of Events Scale (CES; Berntsen & Rubin, 2006) is a measure designed to determine the extent to which a particular event an individual has experienced is central to, or integrated into, their identity. It does so by measuring the extent to which a memory becomes (1) a reference point for everyday behavior, (2) a turning point in the individual’s life story and (3) a central component of the person’s identity. The questionnaire first developed and described by Berntsen and Rubin (2006) has been used with various populations, but was specifically designed for use in trauma research. The measure contains 20 items rated on a 5-point Likert type scale ranging from 1 (totally disagree) to 5 (totally agree), with 3 representing a neutral response. Example items include “This event has become a reference point for the way I understand myself and the world” and “I feel that this event has become a central part of my life story.” Two additional questions, designed to assess the A1 and A2 diagnostic criteria for PTSD from the *DSM-IV-TR*, were rated as yes or no with regard to the event. The scale has good psychometric properties, with a reported alpha of .94. In the current sample, the reliability was .80.

This study utilized a slightly expanded version of the instrument, including several exploratory questions developed by measure author David Rubin. Included were three items previously discarded for ambiguity or their introduction of alternate themes (Items 4, 15, 23) including “If someone made a two hour movie about my life, this event would be in the movie.” An additional five items were added, which were rated on a 7-point Likert type scale ranging from 1 (negligible) to 5 (as much as any
event I could imagine), with 4 representing a neutral response. These items assessed the amount of physical, emotional and financial damage done by the event, as well as the effect the event had on the individual’s future. Example items include “Overall, I believe that if the event happened to most people, they would consider the severity of the event as:” and “How much emotional damage did the event do to you or others very close to you?” One additional question was added to the portion of the measure designed to assess the PTSD diagnostic criteria, such that this assessment included criteria A1 and A2, as well as the F criterion – The disturbance causes clinically significant distress or impairment in social, occupational, or other important area of functioning.

Posttraumatic Growth

The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) is a measure of perceived personal growth that results from experiencing a trauma. The PTGI contains 21 items divided into 5 subscales which are rated on a scale from 0 (I did not experience this change as a result of my crisis) to 5 (I experienced this change to a very great degree as a result of my crisis). Example items include “I changed my priorities about what is important in life” and “I established a new path for my life.” Tedeschi and Calhoun (1996) report the measure’s internal consistency reliability as .90, with the five subscale alphas ranging from .67 to .85. In the current sample, the reliability was .78. Consistent with its use in the Frazier et al. (2009) study, the PTGI was administered to assess perceived change from pre- to post-trauma. At T2 participants were asked to complete the PTGI with regard to the traumatic event they
experienced between T1 and T2. As with all measures, participants were instructed to complete the measure for the preceding two week interval, with the intention of assessing current rather than global functioning.

“Actual” posttraumatic growth was measured using a modified version of the PTGI developed by Frazier et al. (2009). The “current-standing” version of the PTGI or C-PTGI (Frazier et al., 2009) assesses actual change from pre- to post-trauma utilizing the same 21 items rephrased “to reflect participants’ feelings over the past 2 weeks” (Frazier et al., 2009, p. 914). Frazier et al. (2009) reported alphas for the full scale measure, as well as all five subscales, as .77 or greater at both T1 and T2. In the current sample, at both T1 and T2, the C-PTGI obtained an alpha reliability of .77.

**Actual Posttraumatic Growth on PTGI Domains**

To assess what Frazier et al. (2009) refer to as “actual change” from pre- to post-trauma five measures, designed to correspond to the five domains assessed by the PTGI, were administered at T1 and T2. All of the measures demonstrate good evidence of reliability and validity.

**Relating to Others**

The PTGI domain of Relating to Others was represented by relationship quality, and was assessed using the Positive Relations with Others Subscale of the Psychological Well Being scale (PWB; Ryff, 1989). This nine item subscale includes items such as “I have not experienced many warm and trusting relationships with others” and “People would describe me as a giving person, willing to share my time with others.” Participants rate items on a 6-point Likert type scale, which ranges from 0 (Strongly
Disagree) to 5 (Strongly Agree). Test-retest reliability for the positive relations with others subscale is reported as .83, with an internal consistency coefficient of .91. Use of this subscale in isolation is not well established, but the PWB is a well established, well respected, and oft utilized measure of psychological well being and functioning. In the current sample, the reliability was .78 for the two time points measured.

New Possibilities

The Presence of Meaning subscale from the Meaning in Life Questionnaire (MLQ-P; Steger, Frazier, Oishi, & Kaler, 2006) was chosen to reflect the New Possibilities subscale of the PTGI. This 5-item subscale included items such as “My life has a clear sense of purpose” and “I have a good sense of what makes my life meaningful,” which are rated on a 7-point Likert type scale ranging from 1 (Absolutely Untrue) to 7 (Absolutely True). The presence of meaning subscale has a test-retest stability coefficient of .73 over a one month period, and an internal consistency reliability coefficient of .82. In the current sample, the reliability was .78. The MLQ-P has also demonstrated superior discriminant validity to other frequently used meaning measures, as well as good convergent validity (Steger et al., 2006). The psychometric properties of the MLQ-P support its use in the absence of the measure’s five item Search for Meaning subscale.

Appreciation of Life

Gratitude and Life Satisfaction were chosen to represent the PTGI domain of Appreciation of Life. The Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen & Griffin, 1985) is a five item scale that includes items such as “I am satisfied with my
life” and “If I could live my life over, I would change almost nothing.” Items are rated on a 7-point Likert type scale which ranges from 1 (Strongly Disagree) to 7 (Strongly Agree). The scale’s test-retest reliability over a two-month period was .82 and the alpha coefficient was .87. In the current sample, the reliability of the SWLS was .78.

The Gratitude Questionnaire-6 (GQ-6; McCullough, Emmons, & Tsang, 2002) is a six item scale chosen to reflect gratitude. Statements are rated on a 7-point Likert type scale that ranges from 1 (Strongly Disagree) to 7 (Strongly Agree). Examples of items include “I have so much in life to be thankful for” and “If As I get older I find myself more able to appreciate the people, events, and situations that have been part of my life history.” This scale’s internal consistency reliability is reported as .82. In the current sample, the GQ-6 had an alpha reliability coefficient of .78 across both time points measured.

**Spiritual Change**

The PTGI domain of Spiritual Change was reflected by Frazier et al.’s (2009) domain of religiosity-spirituality. This domain was assessed using the Religious Commitment Inventory (RCI-10; Worthington et al., 2003). This ten-item inventory assesses one’s level of religiosity and the extent to which individuals interpret life events based on their religious views on two subscales, the intrapersonal religious commitment subscale and interpersonal religious commitment subscale. Example items include “My religious beliefs lie behind my whole approach to life” and “Religious beliefs influence all my dealings in life.” Reported internal consistency reliability alpha for the
Psychometric information on the use of the five-item inventory could not be identified, outside of its use in the Frazier et al. (2009) investigation, thus this study utilized the full ten-item scale as the measure in its entirety is still a brief questionnaire.

**Personal Strength**

The PTGI domain of Personal Strength is not represented in the Frazier et al. (2009) study. Because this investigation sought to be an exact replication of that study, no measure matching up to the personal strength domain of the PTGI was administered.

**Coping**

The COPE (COPE; Carver, Scheier, and Weintraub, 1989) is a well-known and oft utilized multidimensional measure of coping behaviors. The complete instrument contains sixty items divided into thirteen subscales, each represented by four items. The instrument contains five scales designed to assess problem focused coping (such as active coping and planning), five scales that measure emotion focused coping (such as seeking emotional social support), and three scales that assess less adaptive coping responses (such as venting emotions). One of the five subscales represented on the emotion focused coping scale is the positive reinterpretation coping subscale. This subscale, which was developed based on the work of Lazarus and Folkman (1984), looks at an individual’s ability to manage distressing emotions, rather than the stressor which causes them. The subscale’s reported alpha reliability is .68 and the reported
test-retest reliability across two samples was .48 and .63 respectively (Carver et al., 1989). In this sample, the alpha reliability of the positive reinterpretation subscale was .79. For the purposes of this investigation the four item positive reinterpretation subscale from the COPE was administered at T2 to measure positive reinterpretation coping employed for the trauma experienced between T1 and T2. Participants rated statements on a four point scale which ranged from 1 (I haven’t been doing this at all) to 4 (I’ve been doing this a lot). Examples of items included are “I try to see it in a different light, to make it seem more positive” and “I try to grow as a person as a result of the experience.”

Distress

The Short-form Depression Anxiety Stress Scales (DASS21; Lovibond & Lovibond, 1995) were utilized to assess participants’ overall levels of distress. The brief 21-item measure assessed symptoms on the subscales of depression, anxiety and stress. Participants ranked items on a scale of 0 (did not apply to me at all) to 3 (applied to me very much or most of the time). The DASS21 has demonstrated good psychometric properties, and thus is a measure frequently used to assess distress. Subscale alphas are reported as .91 for the depression subscale, .81 for the anxiety subscale and .89 for the stress subscale respectively. The instrument also demonstrated respectable correlations to the Beck Depression Inventory and the Beck Anxiety Inventory, $r = 0.81$ and $r = 0.74$ respectively, well respected measures of distress. In this sample, the alpha reliability for the DASS21 was .83.
Debriefing

A debriefing disclaimer (see Appendix) was created to be displayed following administration of all measures. This statement explained the multifaceted purposes of the study and again provided contact information should the participant have questions or concerns regarding the study or their participation therein.

Procedure

This investigation sought to replicate the analysis conducted by Frazier et al. (2009). Participants were asked to complete online surveys at two time points. At the time of consent, participants registered for a Time 1 (T1) participation slot and a participation slot that fell 8 weeks in the future, denoted as Time 2 (T2). In an effort to minimize attrition between T1 and T2, participants were contacted via the system used to sign up for the survey in order to remind them to complete the T2 survey. Participants who did not complete the survey in a timely manner received an additional email reminding them to participate. Student participants were given partial credit in their psychology course for each administration in which they participated.

While this study seeks to replicate the Frazier et al. (2009) study, there are two key differences in the present study. For the purpose of another study being conducted simultaneously, the trauma history questionnaire utilized in this investigation, though conceptually similar, was different than the one used by Frazier et al. (2009). The investigators are confident this did not confound study results, because although the SLESQ is not identical to its counterparts, it “elicit[s] information about some important details” for nominated traumatic events (Goodman et al., 1998). It is of note, however,
that this measure is less frequently utilized in the trauma literature than the trauma history questionnaire utilized by Frazier et al. (2009), though their instrument is by no means the gold standard for trauma research. Additionally, due to the aforementioned alternative investigation being conducted, participants were required to complete additional questionnaires not included in these analyses. Although there is no indication that completing these questionnaires affected participants’ responses on the relevant surveys, it is worth noting that the protocol did include other measures not relevant to this investigation.
RESULTS

Data Cleaning

Due to the large sample size and the online method of data collection, data cleaning procedures were implemented prior to analyses being conducted. In order to preserve subjects’ ability to participate without coercion, participants were permitted to skip questions on each measure. However, for the purpose of data analysis, observations were discarded if a participant failed to answer a sufficient number of items on an individual measure, as defined by approximately 90% of the total items on any one measure. Hence, observations were discarded if a participant skipped more than 3 of the 23 items on the Centrality of Events Scale (CES), more than 2 of the 21 items on the Posttraumatic Growth Inventory (PTGI) or the “current-standing” PTGI (C-PTGI), more than 1 item on the 9 item Psychological Well Being scale (PWB) Positive Relations with Others subscale, more than 1 of the 5 items on the Presence of Meaning subscale from the Meaning in Life Questionnaire (MLQ-P), more than 1 of the 5 items on the Satisfaction with Life Scale (SWLS), more than 1 item on the Gratitude Questionnaire-6 (GQ-6), more than 2 of the 10 items on the Religious Commitment Inventory (RCI-10), more than 1 item representing any subscale on the short form Depression Anxiety Stress Scales (DASS21), or more than 1 of the COPE positive reinterpretation coping subscale items.

Cases were then individually coded based on the trauma the participant reported experiencing. Participants who completed the questionnaires based on a trauma which occurred outside of the time frame of interest were discarded from the analysis (i.e.
participants who nominated events which occurred prior to Time 1). Further, respondents who reported they had experienced no stressful life event in the intervening time since the previous survey were discarded from all analyses. In the sample, 53 participants reported a total of 58 traumatic events identified by the SLESQ measure. Events identified ranged from being emotionally abused \((n = 28)\) or physically \((n = 7)\) or sexually assaulted by a friend or family member \((n = 4)\), to experiencing the death of a loved one \((n = 7)\), to witnessing \((n = 4)\) or experiencing a life-threatening accident \((n = 4)\) or illness \((n = 3)\). One respondent reported experiencing an “other” event described as a physical and verbal assault by a stranger on a train. The average distress rating noted in response to these events was 3.74 on a scale of 5. In order to conduct the replication analyses participants who did not nominate a trauma identified by the trauma history questionnaire, and those who did not rate their subjective level of distress experienced in response to the trauma as at least a 4 on a scale of 5 were dismissed from the replication analyses. The resulting sample consisted of 23 participants utilized for all replication analyses.

Descriptive Data

Table 2 presents descriptive data for all measures, including the mean change score obtained by participants from Time 1 (T1) to Time 2 (T2). Data is presented for the sample utilized for the replication analyses \((n = 23)\), as well as for the full sample utilized for all other analyses. As noted in Table 2, participants’ reported change from T1 to T2 was minimal.
Table 2

Descriptive Data on All Measures for Replication Analysis and Full Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Instrument</th>
<th>Replication Analysis</th>
<th>Full Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean at T1</td>
<td>Mean at T2</td>
</tr>
<tr>
<td>Event Centrality</td>
<td>CES</td>
<td>-</td>
<td>3.01 (.102)</td>
</tr>
<tr>
<td>Posttraumatic Growth (PTG)</td>
<td>PTGI</td>
<td>-</td>
<td>2.80 (.151)</td>
</tr>
<tr>
<td>&quot;Current Standing&quot; PTG</td>
<td>C-PTGI</td>
<td>4.12 (.104)</td>
<td>4.12 (.89)</td>
</tr>
<tr>
<td>Positive Relationships</td>
<td>PWB</td>
<td>3.94 (.89)</td>
<td>3.79 (.96)</td>
</tr>
<tr>
<td>Meaning in Life</td>
<td>MLQ-P</td>
<td>5.04 (1.52)</td>
<td>5.02 (1.33)</td>
</tr>
<tr>
<td>Life Satisfaction</td>
<td>SWLS</td>
<td>4.03 (1.51)</td>
<td>3.81 (1.53)</td>
</tr>
<tr>
<td>Gratitude</td>
<td>GQ-6</td>
<td>5.73 (.97)</td>
<td>5.45 (1.05)</td>
</tr>
<tr>
<td>Religious Commitment</td>
<td>RCI-10</td>
<td>2.09 (1.13)</td>
<td>2.18 (1.08)</td>
</tr>
<tr>
<td>Distress</td>
<td>DASS21</td>
<td>2.00 (.65)</td>
<td>2.15 (.71)</td>
</tr>
<tr>
<td>Coping</td>
<td>COPE</td>
<td>-</td>
<td>2.77 (.96)</td>
</tr>
</tbody>
</table>

Note. Replication Analysis n = 21-23. Full Sample Analysis n = 283-416. Standard deviations are given in parentheses. Higher values indicate higher levels of the measured construct. The PTGI, C-PTGI, and PWB are rated on a scale of 1 to 6, the MLQ-P, SWLS 1-7, and GQ-6 are rated on a scale of 1 to 7, the RCI-10 on a scale of 1 to 5, the DASS21 on a scale of 0 to 3, and the COPE on scale of 1 to 4.
Table 3

*Correlations between the C-PTGI and the PTG-Domain Measures at Time 2 for Replication Analysis*

<table>
<thead>
<tr>
<th>PTG-domain measure</th>
<th>Positive Relationships (PWB)</th>
<th>Meaning in Life (MLQ-P)</th>
<th>Life Satisfaction (SWLS)</th>
<th>Gratitude (GQ-6)</th>
<th>Religious Commitment (RCI-10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-PTGI score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Score</td>
<td>.84***</td>
<td>.75***</td>
<td>.67***</td>
<td>.80***</td>
<td>.25</td>
</tr>
<tr>
<td>Relating to Others</td>
<td>.79***</td>
<td>.71***</td>
<td>.59**</td>
<td>.77***</td>
<td>.25</td>
</tr>
<tr>
<td>Personal Strength</td>
<td>.86***</td>
<td>.80***</td>
<td>.69***</td>
<td>.75***</td>
<td>.07</td>
</tr>
<tr>
<td>New Possibilities</td>
<td>.59**</td>
<td>.54**</td>
<td>.39</td>
<td>.67***</td>
<td>.23</td>
</tr>
<tr>
<td>Appreciation of Life</td>
<td>.70***</td>
<td>.62**</td>
<td>.44*</td>
<td>.66***</td>
<td>.18</td>
</tr>
<tr>
<td>Spiritual Change</td>
<td>.67***</td>
<td>.69***</td>
<td>.76***</td>
<td>.45*</td>
<td>.39</td>
</tr>
</tbody>
</table>

Note. n = 22-23

* p < .05; ** p < .01; *** p < .001
Frazier Replication

The initial aim of this investigation was to determine whether or not the results of the 2009 investigation conducted by Frazier et al. could be replicated.

Relationship between C-PTGI and Domain Measures

The first research question sought to examine whether the measures chosen to represent the PTGI domains were truly representative of the general constructs embodied by the PTGI. This analysis was further conducted in an effort to determine whether or not the sample was an adequate comparison to the Frazier et al. (2009) sample. The total C-PTGI score and C-PTGI subscale scores at T2 were correlated with the scores on the five domain measures at T2 (see Table 3). The analyses revealed large, significant correlations between domain measures and the C-PTGI, with the notable exception of the Religious Commitment domain. These findings were not consistent with those of Frazier et al. (2009), who found moderate correlations between religious commitment and all of the PTG domains.

A careful analysis of the relationship between the domains and the measures chosen to reflect them further revealed each of the C-PTGI subscales correlated at .67 with at least one domain measure. In many cases, the domain measure with which C-PTGI subscales were most highly correlated was not the domain measure chosen to represent that subscale. For example, the Presence of Meaning subscale from the Meaning in Life Questionnaire (MLQ-P) was chosen to reflect the New Possibilities domain of PTG ($r = .54, p = .008$). However, analyses revealed that this measure more strongly represented the personal strength domain ($r = .80, p < .0001$), a domain
not specifically represented by another domain measure. These findings were not consistent with those of Frazier et al. (2009), who found no notable difference between the MLQ-P’s correlation with the New Possibilities and Personal Strength domains.

The results of the present study supported the hypothesis that the domain measures would moderately correlate with the domains they were chosen to represent, and further demonstrated these relationships to be stronger than anticipated. However, the findings were not a duplication of the findings of Frazier et al. (2009). As noted above, some inconsistencies were noted, specifically as they related to the Religious Commitment Inventory (RCI-10), which was not significantly related to either total C-PTGI scores or any of the PTG domain scores. One possible explanation for this discrepancy is the geographic differences between the samples collected in various regions of the United States.

*Relationship between Measures of Perceived and "Actual" Growth*

The second research question examined whether perceived growth following a traumatic or stressful life event, as measured by the PTGI, is associated with actual growth that occurs during the time from pre- to post-trauma. Actual growth was assessed using the current-standing PTGI, adapted from the PTGI, and five instruments chosen to represent the domains of posttraumatic growth. To quantify the amount of actual growth achieved from pre- to post-trauma, change scores were derived by subtracting from T2 scores the T1 scores on the C-PTGI and each of the five domain measures. The resulting change scores were then correlated with the total PTGI score at T2 and each of the PTG-domain scores.
Table 4

Frazier et al. (2009) and Replication Comparison of Correlations between the PTGI at Time 2 and change in C-PTGI and PTG-Domain Measures from Time 1 to Time 2

<table>
<thead>
<tr>
<th>PTGI score</th>
<th>Change measures</th>
<th>C-PTGI</th>
<th>PWB</th>
<th>MLQ-P</th>
<th>SWLS</th>
<th>GQ-6</th>
<th>RCI-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Score</td>
<td></td>
<td>.22*</td>
<td>-.41</td>
<td>-.15</td>
<td>-.09</td>
<td>.03</td>
<td>.15</td>
</tr>
<tr>
<td>Relating to Others</td>
<td></td>
<td>.21*</td>
<td>-.33</td>
<td>-.10</td>
<td>-.09</td>
<td>.04</td>
<td>.21</td>
</tr>
<tr>
<td>Personal Strength</td>
<td></td>
<td>.29***</td>
<td>-.33</td>
<td>-.14</td>
<td>-.20</td>
<td>.05</td>
<td>-.00</td>
</tr>
<tr>
<td>New Possibilities</td>
<td></td>
<td>.10</td>
<td>-.40</td>
<td>-.24**</td>
<td>-.17</td>
<td>.07</td>
<td>.08</td>
</tr>
<tr>
<td>Appreciation of Life</td>
<td></td>
<td>.22*</td>
<td>-.32</td>
<td>-.04</td>
<td>.23</td>
<td>.01</td>
<td>.11</td>
</tr>
<tr>
<td>Spiritual Change</td>
<td></td>
<td>.03</td>
<td>-.31</td>
<td>-.09</td>
<td>-.08</td>
<td>-.13</td>
<td>.26</td>
</tr>
</tbody>
</table>

Note. *n = 20-23. Left columns represent Frazier et al. (2009) study and columns to the right represent replication analysis.

*p < .05, **p < .01, ***p < .001
Table 5

*Frazier et al. (2009) and Replication Comparison of Correlations of Perceived and Actual Growth with Change in Distress and Coping at Time 2*

<table>
<thead>
<tr>
<th></th>
<th>Change in Distress</th>
<th>Coping at T2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frazier</td>
<td>Replication</td>
</tr>
<tr>
<td>Perceived Growth (PTGI)</td>
<td>.26**</td>
<td>-.07</td>
</tr>
<tr>
<td>Actual Growth (change in C-PTGI)</td>
<td>-.10</td>
<td>-.16</td>
</tr>
<tr>
<td>Positive Relationships (change in PWB)</td>
<td>-.43***</td>
<td>.00</td>
</tr>
<tr>
<td>Meaning in life (change in MLQ-P)</td>
<td>-.24**</td>
<td>-.06</td>
</tr>
<tr>
<td>Life Satisfaction (change in SWLS)</td>
<td>-.22*</td>
<td>-.09</td>
</tr>
<tr>
<td>Gratitude (change in GQ-6)</td>
<td>-.28**</td>
<td>-.21</td>
</tr>
<tr>
<td>Religious Commitment (change in RCI-10)</td>
<td>.28**</td>
<td>.31</td>
</tr>
</tbody>
</table>

Note. n = 20-23. Left columns represent Frazier et al. (2009) study and columns to the right represent replication analysis.

* p < .05; ** p < .01; *** p < .001
As Table 4 demonstrates the correlation between perceived growth and actual growth reported by participants from pre- to post-trauma on the C-PTGI was not significant. The only exception was a small negative correlation between perceived growth in perception of New Possibilities and the Positive Relations subscale of the Psychological Well Being Scale (PWB). Self-reported posttraumatic growth was not related to pre- to post-trauma changes in participants’ meaning in life, life satisfaction, gratitude, or religious commitment.

With respect to the findings of Frazier et al. (2009), the present study was unable to replicate the pattern of small positive correlations between change in C-PTGI and PTGI, or the pattern of small to moderate correlations between change in religious commitment and perceived growth. These findings are not surprising given that in this analysis the RCI-10 was not shown to be representative of the PTG domain of spiritual change.

**Relationship of Posttraumatic Growth with Distress and Coping**

The third exploratory research question sought to examine the relationship between perceived and actual growth with changes in distress and coping. Frazier et al. (2009) found that growth as measured by the PTGI was associated with increased distress, and actual growth was correlated with reductions in distress from pre- to post-trauma. However, the present study did not replicate these findings. The present analysis did not identify any relationship between distress and actual or perceived growth.
With regard to coping, the present study replicated Frazier et al.’s (2009) finding that perceived growth was strongly associated with positive reinterpretation coping, while actual growth was not. Again, the present study did not replicate the Frazier et al. (2009) finding of Religious Commitment being an exception.

Centrality

The primary purpose of this study was to examine the role of event centrality in the relationship between perceived and actual growth. The investigators’ aim was to assess whether or not utilizing this construct as a means by which to identify individuals who have truly experienced an event that caused them distress, would result in stronger relationships between perceived and actual growth than those evidenced in a sample watered down by events low in event centrality. Each of the analyses previously conducted with the limited sample was again conducted following a quartile split based on participants’ scores on the CES. This methodology was identified in previous literature as a reliable means by which to differentiate high from low centrality individuals (Boals et al., 2010; Schuettler & Boals, 2011). Thus, participants who scored 70 or greater on the CES (i.e. those within the upper quartile) were identified as the high CES group. Individuals scoring less than 70 (i.e. those within the lower three quartiles) were identified as the low CES group. Results for the two groups on each analysis were compared.

Relationship between C-PTGI and Domain Measures

As was done previously, in order to examine whether or not the PTGI domain actual growth measures accurately reflected the PTGI, a correlational analysis was
conducted. As can be seen in Table 6, the analysis revealed that the low and high CES groups both had significant relationships between the C-PTGI at T2 and the actual growth measures. As predicted the correlations within the high CES group were stronger than those in the low CES group in every domain, with two exceptions in the C-PTGI spiritual change domain.

**Relationship between Measures of Perceived and "Actual" Growth**

The next research question addressed whether self-reported growth, as measured by the PTGI, is more strongly correlated with actual growth when individuals with high event centrality are compared to those with low event centrality. As seen in Table 7, some results demonstrated patterns similar to those expected.

For example, the high CES group had consistently stronger correlations in their pre- to post-trauma change in C-PTGI scores. Other actual change domains, including the meaning in life, life satisfaction, and gratitude domains, also demonstrated results indicative of stronger, yet still small, relationships to the PTGI in the high CES group. Further, when analyses for the high CES group are compared to the low CES group in these domains the results, despite being non-significant, now reflect the expected direction. These results provide weak evidence in support of the hypothesis. It is of note that, as previously stated, the high CES group analyses were limited to $n = 69-73$, which was slightly lower than the recommended amount required to maintain the necessary power.
Table 6

*Relationship between C-PTGI and Actual Growth measures at T2 in High and Low CES Groups*

<table>
<thead>
<tr>
<th>PTG-domain measure</th>
<th>C-PTGI score</th>
<th>PWB Low</th>
<th>PWB High</th>
<th>MLQ-P Low</th>
<th>MLQ-P High</th>
<th>SWLS Low</th>
<th>SWLS High</th>
<th>GQ-6 Low</th>
<th>GQ-6 High</th>
<th>RCI-10 Low</th>
<th>RCI-10 High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Score</td>
<td></td>
<td>.44***</td>
<td>.64***</td>
<td>.46***</td>
<td>.57***</td>
<td>.48***</td>
<td>.53***</td>
<td>.45***</td>
<td>.55***</td>
<td>.35***</td>
<td>.38***</td>
</tr>
<tr>
<td>Relating to Others</td>
<td></td>
<td>.48***</td>
<td>.70***</td>
<td>.38***</td>
<td>.55***</td>
<td>.48***</td>
<td>.47***</td>
<td>.45***</td>
<td>.57***</td>
<td>.20**</td>
<td>.26*</td>
</tr>
<tr>
<td>Personal Strength</td>
<td></td>
<td>.41***</td>
<td>.64***</td>
<td>.49***</td>
<td>.60***</td>
<td>.50***</td>
<td>.59***</td>
<td>.47***</td>
<td>.60***</td>
<td>.21**</td>
<td>.27*</td>
</tr>
<tr>
<td>New Possibilities</td>
<td></td>
<td>.26***</td>
<td>.48***</td>
<td>.32***</td>
<td>.47***</td>
<td>.30***</td>
<td>.41***</td>
<td>.26***</td>
<td>.41***</td>
<td>.25***</td>
<td>.36**</td>
</tr>
<tr>
<td>Appreciation of Life</td>
<td></td>
<td>.42***</td>
<td>.61***</td>
<td>.46***</td>
<td>.57***</td>
<td>.49***</td>
<td>.56***</td>
<td>.52***</td>
<td>.63***</td>
<td>.25***</td>
<td>.30*</td>
</tr>
<tr>
<td>Spiritual Change</td>
<td></td>
<td>.34***</td>
<td>.38***</td>
<td>.40***</td>
<td>.37**</td>
<td>.41***</td>
<td>.33**</td>
<td>.30***</td>
<td>.30*</td>
<td>.50***</td>
<td>.51***</td>
</tr>
</tbody>
</table>

Note. Low reflects low event centrality group, n = 199-204, High reflects high event centrality group, n = 69-71
*p < .05; ** p < .01; *** p < .001
Table 7

*Relationship between PTGI and Change in Actual Growth measures from Pre- to Post-Trauma in High and Low CES Groups*

<table>
<thead>
<tr>
<th>PTGI score</th>
<th>C-PTGI</th>
<th>PWB</th>
<th>MLQ-P</th>
<th>SWLS</th>
<th>GQ-6</th>
<th>RCI-10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Total Score</td>
<td>.09</td>
<td>.24*</td>
<td>.16*</td>
<td>.18</td>
<td>.09</td>
<td>.24*</td>
</tr>
<tr>
<td>Relating to Others</td>
<td>.09</td>
<td>.25*</td>
<td>.14*</td>
<td>.20</td>
<td>.05</td>
<td>.23</td>
</tr>
<tr>
<td>Personal Strength</td>
<td>.09</td>
<td>.26*</td>
<td>.15*</td>
<td>.08</td>
<td>.09</td>
<td>.26*</td>
</tr>
<tr>
<td>New Possibilities</td>
<td>.07</td>
<td>.18</td>
<td>.13</td>
<td>.14</td>
<td>.10</td>
<td>.22</td>
</tr>
<tr>
<td>Appreciation of Life</td>
<td>.10</td>
<td>.19</td>
<td>.14*</td>
<td>.16</td>
<td>.10</td>
<td>.20</td>
</tr>
<tr>
<td>Spiritual Change</td>
<td>.14</td>
<td>.19</td>
<td>.21**</td>
<td>.20</td>
<td>.09</td>
<td>.22</td>
</tr>
</tbody>
</table>

Note. Low reflects low event centrality group, n = 199-204, High reflects high event centrality group, n = 69-71
*p < .05; ** p < .01; *** p < .001
**Relationship of Posttraumatic Growth with Distress and Coping**

The final research question investigated the relationships between perceived and actual growth with distress and coping, comparing the difference between individuals with high CES scores and low CES scores. As seen in Table 8, the results indicated that when limiting analyses to individuals who demonstrated high event centrality for their nominated trauma, a trend emerged of lower distress in both perceived and actual growth. However, despite this trend, all of the correlations were small and non-significant. Furthermore, comparison analyses did not display the anticipated pattern of stronger correlations for individuals with high CES scores.

With regard to coping, the results of this exploratory analysis supported the tenet that participants high in event centrality will have a stronger relationship between coping and growth than those low in event centrality. Both perceived growth and actual growth, as measured by the PTGI and C-PTGI respectively, demonstrated stronger correlations with positive reinterpretation coping in individuals with high CES scores (PTGI $r = .49$, $p < .001$; C-PTGI $r = .40$, $p < .001$) than in those with low CES scores (PTGI $r = .43$, $p < .001$; C-PTGI $r = .02$, $p = .74$).
Table 8

Correlations of Perceived and Actual Growth with Change in Distress and Coping at
Time 2 in High and Low CES groups

<table>
<thead>
<tr>
<th></th>
<th>Change in Distress</th>
<th>Coping at T2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low CES</td>
<td>High CES</td>
<td>Low CES</td>
<td>High CES</td>
</tr>
<tr>
<td>Perceived Growth (PTGI)</td>
<td>.06</td>
<td>-.06</td>
<td>.43***</td>
<td>.49***</td>
</tr>
<tr>
<td>Actual Growth (change in C-PTGI)</td>
<td>-.11</td>
<td>-.10</td>
<td>.02</td>
<td>.40***</td>
</tr>
<tr>
<td>Positive Relationships (change in PWB)</td>
<td>-.36***</td>
<td>-.35</td>
<td>.09</td>
<td>.08</td>
</tr>
<tr>
<td>Meaning in life (change in MLQ-P)</td>
<td>-.23**</td>
<td>-.07</td>
<td>.11</td>
<td>.40***</td>
</tr>
<tr>
<td>Life Satisfaction (change in SWLS)</td>
<td>-.21**</td>
<td>-.25</td>
<td>-.00</td>
<td>.10</td>
</tr>
<tr>
<td>Gratitude (change in GQ-6)</td>
<td>-.05</td>
<td>-.21</td>
<td>.04</td>
<td>.17</td>
</tr>
<tr>
<td>Religious Commitment (change in RCI-10)</td>
<td>-.12</td>
<td>-.21</td>
<td>-.02</td>
<td>.11</td>
</tr>
</tbody>
</table>

Note. Low reflects low event centrality group, n = 199-204, High reflects high event centrality group, n = 69-71
*p < .05; ** p < .01; *** p < .001
DISCUSSION

This study sought to examine whether or not the relationship between perceived growth and actual growth occurring in the wake of a stressful life event differed based on the extent to which individuals identified the event as central to their identity. The first aim was to complete a replication of the analysis conducted by Frazier et al. (2009), who utilized a self-reported distress rating as the benchmark for inclusion into analyses.

Overall, this study was only marginally able to replicate the findings of Frazier et al. (2009). Results did demonstrate that many of the measures chosen to reflect actual change were strongly correlated with the PTG domains, and therefore a good representation of the PTG construct. A notable exception was the measure chosen to reflect Spiritual Change, which was not related to any of the PTG domains.

Similar to the findings of Frazier et al. (2009), the present investigation found no relationship between perceived growth and change in actual growth measures over time in the domains of relationship quality, meaning in life, gratitude, and life satisfaction. Contrary to the findings of Frazier et al. (2009), the present analysis revealed perceived growth did not correlate with change in religious commitment. The authors of the current study speculate that the geographic regions from which the sample represented in the Frazier et al. (2009) analysis were recruited may have differed sufficiently in religious makeup to account for these findings. The present study was also unable to replicate the unexpected findings by Frazier et al. (2009) that actual growth is related to reduction in distress, while perceived distress is related to
increased distress. The present study found no relationship between distress and perceived growth, which is consistent with previous literature that indicates these findings are often inconsistent and weak (Helgeson et al., 2006).

The second aim of this investigation was to expand upon our understanding of posttraumatic growth by utilizing event centrality, rather than self-reported distress, as the inclusion criteria for analyses. When comparing participants with high versus low levels of event centrality for their nominated traumatic event, results revealed a pattern reminiscent of previous event centrality literature (Boals et al., 2010) suggesting the direction and strength of relationships would be more intuitive and consistent with expectations when analyses are limited to individuals with high event centrality. These analyses, however, did not demonstrate the strong and significant relationships found in previous literature (Boals et al., 2010). One possible explanation for this is the limited sample size. A number of participants dropped out of the study and still others were dismissed from analyses because they did not experience a trauma during the 8 week interval between Time 1 (T1) and Time 2 (T2), or completed the measures based on a previous trauma. The researchers feel that these promising results may be strengthened by the addition of more participants.

Perhaps the most notable finding of the present investigation was that of the relationship between posttraumatic growth and positive reinterpretation coping. The relationship was consistently present, regardless of the selection criteria used to identify trauma survivors. The present findings provide further evidence in support of the idea that recent traumas may not immediately reflect posttraumatic growth processes.
Previous analyses have suggested that not only is time a critical factor in the development of posttraumatic growth, but that positive outcomes cannot be expected until approximately two years following a trauma (Helgeson et al., 2006). Prior to this, outcomes may be more reflective of various coping processes (Helgeson et al., 2006; Schuettler & Boals, 2011). This finding may also provide a basis of understanding for the lack of relationship observed between perceived growth and distress in the immediate aftermath of trauma, in that individuals experiencing increased distress may have more need of engaging in a coping process. As previous literature has demonstrated, there is a strong positive relationship between PTG and symptoms of PTSD, thus distress and growth are not mutually exclusive outcomes of trauma.

Limitations

This study was limited in a number of ways. As a replication analysis, many of the parameters of this study – sample recruitment, measures used, time between T1 and T2 – were determined by the study upon which its design was based (Frazier et al., 2009). The researchers find that many of these parameters functioned as limitations of this study, and could be improved upon in future investigations.

For example, one limitation of the present investigation was the use of a nonclinical university student sample. Although studies indicate that the age group the sample is comprised of is more likely to be exposed to a trauma, a sample recruited from a different (i.e. clinical) source may have presented with a greater percentage of traumas during the 8 week timeframe between T1 and T2 (Breslau et al., 1998). The findings were limited by the necessity to dismiss from the analyses 15% of the sample
(n = 64) due to their inability to identify any stressful or traumatic events occurring during the intervening 8 weeks, and another 14% of the sample (n = 56) for failure to comply with the directions, identifying traumatic events occurring prior to their completion of the T1 survey. The nature of the sample also resulted in an overall reduced sample size, which ultimately fell below the number required to achieve the desired power.

A second not unrelated limitation of the present investigation was the restricted values of event centrality on events nominated by participants. In a previous investigation, where lifetime events were nominated, the same sample reported a higher average CES score (M = 65.01, SD = 25.32, Q3 = 85) as compared to this investigation of traumatic events occurring within the last 8 weeks (M = 52.44, SD = 25.38, Q3 = 70). Therefore, the lack of a predetermined, and standardized, cut off score to define “high” event centrality versus “low” event centrality makes it possible to compare participants within the study to one another, but makes it difficult to generalize these findings and compare this sample to others, even those with similar characteristics.

The study was also limited by the use of various scales and subscales not specifically designed to measure actual growth following trauma. The scales utilized in this study to represent the domains of posttraumatic growth were chosen by the authors of a previous investigation, who did not provide justification for their choice in measures, nor alternate measures investigated for use. Although each individual measure demonstrates good psychometric properties, the use of individual subscales in
isolation and their use in conjunction to represent the construct of actual growth following a trauma has not been validated.

A final limitation of the present study was the limited amount of time that elapsed between the T1 data collection and T2 data collection. Although ambitious to conduct a prospective study among this population, as previously noted, Helgeson et al. (2006) revealed in their meta-analysis that time is a critically important factor in the development of positive outcomes following trauma. Furthermore, the authors speculate that when assessed shortly after a trauma findings may reflect a cognitive strategy used to reduce distress, whereas after a sufficient amount of time has passed results will more accurately reflect actual change or growth (Helgeson et al., 2006, p. 798). Results of their meta-analysis indicate that in order to expect positive outcomes two years must have elapsed since the time of the trauma (Helgeson et al., 2006), this suggests that investigating traumas occurring within the last two months are unlikely by their very nature to reveal significant growth reflective of actual change.

Future Directions

Future studies should address the aforementioned limitations of this study. Studies aiming to investigate the role of event centrality should focus on identifying and validating a cut off point for the CES to define high versus low event centrality. This will ensure that findings can be generalized across samples. Future investigations specifically designed to examine the validity of the PTGI, by comparing perceived and actual growth, should consider the use of alternate populations for their investigation. They may also investigate the use of alternative measures validated for this purpose.
The contribution of time emphasized by Helgeson et al. (2006) must be seriously considered by any future researchers who use longitudinal methods to examine this construct. Specifically, longitudinal studies should consider a two year follow-up if they seek to understand whether there is truly a difference between the growth identified by the PTGI and actual growth.

Conclusions

One of the primary aims of this investigation was to shed light on whether or not the Posttraumatic Growth Inventory is measuring a construct reflective of actual change, or one more akin to dissonance reduction. The findings were unable to provide a robust and declarative elucidation to the existing literature in support of the PTGI’s validity as a measure representative of actual growth. However, the authors posit that the results of the present study provide evidence that investigations utilizing the PTGI within the weeks following a trauma are reflective of coping, while those conducted two or more years following a trauma more accurately reflect the process of actual growth.

Clinicians and researchers alike should heed these findings. Identifying the trajectory of posttraumatic growth will likely provide clinicians with invaluable direction in the room, direction that may well facilitate the process of growth in clients during the immediate aftermath of a trauma. Likewise, the researchers who investigate and develop interventions would do well to understand the growth process individuals are actually experiencing following a trauma. Perhaps researchers’ focus need not be on the difference between perception and measurable change, but instead on trauma survivors’ experiences of growth. If an individual reports experiencing growth, do they
reap fewer psychological benefits if their measurable growth is not comparable to their perception of growth? Positive psychology provides ample evidence in support of the idea that optimism is related to positive health and psychological outcomes (see review of literature and thoughtful commentary by Aspinwall & Tedeschi, 2010). Therefore, I urge the positive psychology community to avoid hastily dismissing the perception of growth by a trauma survivor. Perceived change may be equally as valuable as actual change.
APPENDIX

CONSENT AND DEBRIEFING FORMS
Title of Study: Coping with Trauma
Principal Investigator: Adriel Boals, University of North Texas, Department of Psychology.

Purpose of the Study:
You are being asked to participate in a research study in which we examine the effects of experiencing stressful or traumatic events over time.

Study Procedures:
There are two sessions involved in this study. During today's session, we will ask you to complete some standard personality measures. In addition, we will ask you to complete a trauma history questionnaire that asks you to indicate whether you have experienced any stressful or traumatic events during your lifetime and how this event has affected you. At the end of the study, you will have the opportunity to provide your contact information if you would like to be contacted about a possible follow-up study. However, you may choose to not provide us with your contact information with no consequences. The second session will take place approximately 3 months from today. This session will also take place online. During the second session we will ask you to complete a series of questionnaires concerning any stressful or traumatic events you may have experienced in the time since today's session and the effect this event may have had on you.

Foreseeable Risks:
There is some potential risk for emotional distress as a result of involvement in this study. As stated above, you will be asked to indicate whether you have experienced any stressful or traumatic events and the effect that this event has had on you. You may withdraw from this study at any time without negative consequence.

Benefits to the Subjects or Others:
This study is expected to allow us to better understand how stressful experiences can affect psychological functioning and what types of coping strategies are most effective.

Compensation for Participants:
You will receive 6 credits (3 credits for today's session and 3 credits for the second session) as compensation for your participation. Your decision to decline or stop participation in this or any other research study will have no effect on your standing in any psychology course. See your course syllabus or speak with your instructor about
the alternative research-related activities available to you to fulfill course requirements or earn extra credit.

**Procedures for Maintaining Confidentiality of Research Records:**
Your participation in this study will be confidential. You will be assigned a study ID number which will be linked to your responses. Your name and any contact information you provide will be stored on a secure server. As soon as the researchers have contacted all participants eligible for the follow-up studies and all data collection is complete, all names and identifying information will be deleted. The confidentiality of your individual information will be maintained in any publications or presentations regarding this study.

**Questions about the Study**
If you have any questions about the study, you may contact Dr. Adriel Boals at telephone number [redacted].

**Review for the Protection of Participants:**
This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

**Research Participants’ Rights:**
Your clicking on the box below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.
- You understand why the study is being conducted and how it will be performed.
- You understand your rights as a research participant and you voluntarily consent to participate in this study.
- You may print a copy of this form for your records.

☐ Yes, I agree to participate
Debriefing Form

Thank you for participating in our research study. In this study, we are interested in how individuals are affected by the experiencing of stressful or traumatic events. We hope to learn several things based on the results of this study.

First, we asked what stressful or traumatic events you have experienced. Our past research has consistently found that the more an individual perceives a stressful event as central to their identity (as measured by the questionnaire that asked you questions like “I feel that this event has become part of my identity” is related to worse outcomes. We specifically asked participants in this study if they have experienced a sexual assault. Since a woman’s sexuality is often a central piece of her identity, we have reason to believe that the relationship between perceiving an event as central to identity if the stressful event is a sexual assault may be particularly toxic to mental health.

Second, we are interested in what personality types are more likely to be traumatized after experiencing a stressful or traumatic event. This is why we asked participants in this study to complete a number of personality questionnaires.

Third, we are interested in what personality types are more likely to experience growth after a trauma, as measured by the questionnaire that included items such as “As a result of my crisis, I have a greater appreciation for the value of my own life”. This is referred to as “Posttraumatic Growth”.

51
Fourth, there have been very few studies that examined the above research questions using a longitudinal approach. A longitudinal approach in this instance means we measure personality traits before a stressful or traumatic event occurs. Then after a stressful event occurs, we then examine the effects of that event on the individual. This is why we asked you to complete personality questionnaires during the first session at the beginning of the semester. Then today we asked you if you experienced any stressful or traumatic events during the semester and how this event has affected you.

Thank you again very much for your participation in this study. If you have any questions, please email Dr. Adriel Boals at [redacted].
REFERENCES


Boals, A. (2010). Events that have become central to identity: Gender differences in the centrality of events scale for positive and negative events. *Applied Cognitive Psychology, 24*(1), 107-121. Doi:10.1002/acp.1548


