Post-Traumatic Growth as Positive Personality Change: Developing a Measure to Assess Within-Person Variability

Laura E. R. Blackie

Eranda Jayawickreme

Wake Forest University & University of Nottingham

Eli Tsukayama

University of Southern California

Marie J. C. Forgeard

McLean Hospital & Harvard Medical School

Ann Marie Roepke

University of Pennsylvania & Veterans Administration Puget Sound Health Care System

William Fleeson

Wake Forest University

Accepted for publication in *Journal of Research in Personality*. Published by Elsevier. This article may not exactly replicate the final version published in the Elsevier journal. A link to the published article: http://dx.doi.org/10.1016/j.jrp.2016.04.001

Author Note: Laura E. R. Blackie, Eranda Jayawickreme and William Fleeson, Department of Psychology, Wake Forest University; Marie J. C. Forgeard, Positive Psychology Center, University of Pennsylvania & McLean Hospital / Harvard Medical School; Ann Marie Roepke, Positive Psychology Center, University of Pennsylvania.

Acknowledgments: This publication was made possible through the support of a grant from the John Templeton Foundation. The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the John Templeton Foundation. Correspondence concerning this article should be addressed to Laura E. R. Blackie, Wake Forest University, Department of Psychology, 415 Greene Hall, P.O. Box 7778, Winston-Salem, NC, 27109. E-mail: blackile@wfu.edu

Abstract

Earlier work has defined post-traumatic growth (PTG) as positive personality change, but measurement of this construct has relied almost exclusively on cross-sectional and retrospective assessments. It is important that researchers demonstrate that PTG is more than a trait-like tendency to identify silver linings in challenging circumstances, and that it is also reflected in the way a person thinks, feels, and acts on a daily basis. The aim of this study was to use an experience-sampling procedure to measure the extent to which PTG manifested in individuals' everyday lives following a recent highly stressful or traumatic adverse event (compared to a control group). In doing so, we developed a new state measure of PTG. Our results indicated that the factor structure of state PTG was comparable to trait PTG, that there was significant variability in individuals' PTG from day-to-day, and that in only one domain (spirituality) did trait PTG predict state PTG.

Post-Traumatic Growth as Positive Personality Change: Developing a Measure to Assess Within-Person Variability

Post-traumatic growth (PTG; Tedeschi & Calhoun, 2004) refers to the potentially transformative and positive impact that significant adversity can have on an individual's personality (Jayawickreme & Blackie, 2014). Although controversy exists over the exact nature of the positive changes included in PTG (Blackie & Jayawickreme, 2014; Miller, 2014), it is most commonly assessed in the following five domains: improved relationships, increased personal strength, identification of new possibilities in life, spiritual growth and greater appreciation of life (Tedeschi & Calhoun, 1996). PTG is frequently reported in survey studies, with as many as 83% of individuals who have survived life-threatening illnesses, natural disasters, and transportation accidents reporting at least one positive change (Affleck, Tennen, Croog, & Levine, 1987; Affleck, Tennen, & Rowe, 1991; McMillen, Smith & Fisher, 1997; Sears, Stanton, & Danoff-Burg, 2003).

Although theories of PTG stipulate that people experience meaningful changes in their characteristic and enduring patterns of thoughts, feelings and behaviors (Tedeschi & Calhoun, 2004)—that is, changes in personality—much of the evidence on this topic has been based on cross-sectional studies utilizing retrospective measures of self-reported growth. These measures only allow for limited tests of meaningful hypotheses on the nature and predictors of growth, given that growth is only measured through subjective perceptions of past changes. Furthermore, these measures cannot rule out other plausible alternatives, such as self-enhancing positive illusions during post-trauma recovery or positive reappraisal as an active coping mechanism (Tennen & Affleck, 2009). In other

words, *in terms of assessing quantifiable personality change,* current measurement strategies for assessing PTG suffer from significant limitations (see Blackie & Jayawickreme, 2014; Jayawickreme & Blackie, 2014). PTG has most frequently been assessed using measures such as the Post-Traumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996), in which participants are asked to recall retrospectively how they were before they experienced the adverse event, to estimate how much they have changed since the event, and to assess the extent to which this change can be attributed solely to the adverse life event (Ford, Tennen, & Albert, 2008). Such a measurement strategy requires participants to undertake a mentally taxing procedure, as participants must attempt the following five steps for each item on the questionnaire: 1) deduce current standing on the dimension, 2) recall prior standing on the dimension before the event had occurred, 3) compare these standings, 4) calculate the degree of change, and finally, 5) evaluate how much of the change was due to the adverse event.

Use of the PTGI and similar scales therefore assumes that people are able to recall their prior trait levels accurately, but as personality psychologists have demonstrated, perceived change is usually only weakly associated with pre-post change; participants' self-reported perceptions of personality change are generally only weakly associated with how they really have changed over time (see Herbst, McCrae, Costa, Feaganes, & Siegler, 2000; Henry, Moffit, Caspi, Langley, & Silva, 1994; Robins, Noftle, Trzesniewski, & Roberts, 2005). For example, Robins et al. (2005) assessed the personality of 290 college students 6 times over the course of 4 years, and at the end of the 4 years asked participants to rate how much they believed their personality had changed. The correlation between pre-post- personality change and participants' perceived change was

modest (around .2). A similar finding has been reported by PTG researchers, as individuals' perceptions of how they had changed over the course of 8 weeks following a traumatic event were also only weakly related (around .2) to how they had actually changed as assessed with a current-standing version of the PTGI (Frazier et al., 2009). Furthermore, although pre-to-post-change in PTG domains was associated with lower distress at time 2 (apart from change in the spiritual domain), retrospective perceptions of PTG were related to greater distress and use of positive reappraisal coping at time 2. Yanez et al. (2011) found no correlation between pre-post PTG and retrospective perceptions of PTG among an undergraduate sample across 6 weeks, and Joseph et al. (2012) found a moderate correlation (.41) among a community sample across 6 months. Based on this growing evidence, some researchers have argued that the PTGI (and similar self-report measures) likely measure global self-perceptions of change rather than quantifiable "growth" (a term which implies measurable pre- to post- change) (Frazier et al., 2009). As a result, some of these researchers have suggested that retrospective self-perceptions of PTG and pre- to post- change in PTG should be separate areas of investigation (Joseph, 2014). Other researchers have taken a stronger stance and called for less, but better quality research into PTG (Frazier, Coyne, & Tennen, 2014).

PTG as Positive Personality Change: The Importance of Assessing Within-Person Variability

One solution to some of the issues faced in PTG research is to conduct additional and longer-scale prospective longitudinal studies (Jayawickreme & Blackie, 2014). Another solution (the one investigated in the present study), is the development of multi-method approaches to study PTG (Frazier et al. 2014). We focus here on the use of time-

sensitive assessments that capture daily manifestations of PTG. Specifically, we believe that daily process methods such as the experience sampling methodology (ESM; Conner, Tennen, Fleeson, & Barrett, 2009; Fleeson, 2007) offer one very promising avenue. In ESM, each participant carries a device (such as a smartphone) and when prompted describes his or her current behavior, thoughts and feelings several times per day for several days. ESM is broadly accepted as a valid self-report behavioral measurement tool, with a number of advantages over other measurement methods (see Furr, 2009; Scallon et al., 2003). Of particular importance, ESM has high ecological validity, since it allows individuals to answer questions while engaging in daily life. Additionally, by asking respondents to describe their experiences on the spot, it reduces memory biases associated with retrospective methods of behavioral measurement (Shiffman, Stone, & Hufford, 2008). This advantage is particularly relevant to addressing concerns with the use of retrospective recall in scales such as the PTGI (Ford, Tennen, & Albert, 2008). Although both the PTGI and ESM are based on self-report, ESM does not require as many complex and bias-prone mental operations (i.e., recalling one's prior personality, assessing one's current personality, computing changes, and deciding how much change to attribute to the trauma). Thus, unlike the PTGI, ESM reports do not ask participants to report on the process of change; only their thoughts, feelings, and behavior in the moment, which participants' should be able accurately able to do.

Furthermore, ESM enables the study of interactionism–an approach that maintains that factors associated with the person and the environment interact to produce behavior (Fleeson, 2007). According to this approach, personality can vary from one occasion to another depending on the unique properties of a situation, how an individual interprets a

situation, and the extent to which an individual flexibly adapts their behavior to meet their goals or the social expectations of the situation. ESM therefore allows for the study of situationally-determined personality states – that is, within-person variability (Nezlek, 2007). The study of within-person variability in PTG is important, because it provides an understanding of how PTG manifests within an individual as he or she moves from one situation to another. For example, assume that experiencing PTG in the moment serves to lower an individual's state-level (or momentary-level) of distress; using ESM, researchers can compare the distress of one individual during times that she experiences PTG to the same individual's distress during times that she does not experience PTG (Fleeson, 2007). These within-person analyses complement traditional between-person comparisons, providing a dynamic description of how PTG manifests, and relates to other experiences, in daily life.

In other words, methods like ESM enable researchers to understand and investigate PTG as dynamic personality change. In addition, drawing on the relevant methodologies in the personality science literature will only enrich the study of PTG given that PTG has been defined as positive personality change (Jayawickreme & Blackie, 2014). Personality has generally been conceptualized as the *typical* way that individuals think, feel and act (e.g. Andy is an agreeable person, Lisa is an introverted person). Summarizing general tendencies enables researchers to describe past behavior as well as predict future behavior and a wide range of important life outcomes (see Jayawickreme et al., 2014). However, in recent years it has been shown that people also vary significantly around their own average tendencies (Wilson & Vazire, 2015). Fleeson's (2001) density distribution approach to personality has shown that people's general descriptions of

personality (for example, Andy's agreeableness and Lisa's extraversion) in fact reflect summary descriptions of nuanced distributions of personality states. In fact, most people exhibit almost all levels of a given personality trait over the course of a week as a function of situational contingencies (Fleeson, 2001, 2004, 2007). Moreover, this within-person variability itself is a robust individual difference (Fleeson & Jayawickreme, 2015; Wilson & Vazire, 2015). Some have even argued that information about the stability of a construct is captured through repeated assessment of state-levels that are averaged across time and occasion (e.g., Andy is agreeable insofar as we assess his levels of agreeableness across various situations at home, at work, and at social gatherings over the course of a month and find a high mean; Rocke & Brose, 2013). Thus, although traits are important for understanding long-term consistencies in an individual's personality, state measures can provide insight into the psychological significance of momentary variations caused by environmental factors (Diener, 1996).

Additionally, utilizing methods such as ESM can establish the extent to which the broader beliefs and self-concepts characteristic of PTG translate into meaningful differences in daily life. Assessing an individual's everyday PTG-relevant behavior over time addresses basic questions about the nature of the construct – how does trait-relevant PTG manifest in everyday behavior, and are there individual-differences in this manifestation (Fleeson, 2001)? Is PTG just a reflection of a person's global attitudes about adversity ("what doesn't kill me makes me stronger") and narrative sense of self ("I'm a wise person because of what I went through")? Or do people high in PTG actually think, feel, and act differently in daily life? As pointed out by Fleeson (2014), if a person's broad, trait-level reports of PTG are not instantiated in daily behavior it

suggests that PTG is an illusory belief, as individuals are not enacting the PTG they report (e.g., they describe a sense of changed priorities but do not act in line with these priorities). This would cast doubt on the adaptive significance of PTG and may influence the extent and ways in which PTG-focused interventions are developed. Examining the extent to which PTG manifests in daily life would thus deepen our understanding of how serious adversity impacts personality in the short- and long-term.

Developing a Daily Measure of PTG

The first step in developing a daily measure of PTG involves identifying suitable state analogues of PTG dimensions that capture the construct at a daily or hourly level. In keeping with the density distribution model (Fleeson, 2001, 2004) a state is defined as having the same content as a corresponding trait, but as applying for a shorter duration. For example, an extraverted state has the same content as trait extraversion (talkativeness, energy, boldness, assertiveness, etc.), but applies as an accurate description for only a few minutes to a few hours, whereas a trait applies for months or years. States are qualitatively similar to traits, and both are descriptive of a person's behavior, feelings and thoughts. A state measure of PTG would assess what the individual is concretely doing, thinking or feeling, at the moment he or she is doing it, in real situations, using the same information and numeric rating scales used to assess the PTG constructs at the global "trait" level. Assessing state PTG involves examining the extent to which individuals who have experienced an adverse event may perceive greater appreciation of life, improved relationships, increased personal strength, identification of new possibilities, and spiritual change *in daily life, moment to moment* (Blackie & Jayawickreme, 2014; Fleeson, 2014). To examine whether participants have experienced "improved quality of

relationships," for example, researchers may track the frequency and duration of certain thoughts and feelings associated with relevant social behaviors. Such measures will allow researchers to capture fluctuations in PTG-relevant constructs within an individual, and thus to study important determinants and outcomes of PTG. We describe below the scale we created to capture such fluctuations.

One relevant question in this context is whether the structure of PTG at the trait (between-person) level matches the structure of PTG at the state (within-person) level. That is, do people's broad reports of PTG fall into the same categories as the positive states they may experience on a day-to-day basis? Having scales with adequate psychometric properties is vital for social and behavioral scientific research, and researchers interested in within-person variability have to pay special attention to such issues (Mogle, Almeida, & Stawski, 2015). The goal of the present research is to develop such a measure that investigates within-person variability in PTG, and to further examine the suitability of assessing PTG at the state-level with ESM.

Research Questions

In this study, we developed and assessed the psychometric properties of a new state measure of PTG among a sample of undergraduate students who had recently experienced an adverseevent (compared with a control group). A note on terminology: In this study, we specifically refer to the events experienced by participants as "adversity" (rather than trauma) to prevent confusion and keep in mind that although these events all involved high levels of stress and challenge, not all of them may meet the strict criteria clinicians use to assess trauma.

We sought answers to the following research questions:

- What is the factor structure of state PTG? Is it comparable to trait PTG?

In developing this measure of state PTG, we examined whether the factors found in the trait PTG measure replicated in the state measure. We were additionally interested in examining whether this measure was invariant in samples with and without recent adversity.

- Is there within-person variability in PTG?

We were also interested in examining the extent to which there was significant within-person variability in the state PTG domains across a 9-day period. Moreover, we were also interested in examining whether this variability was comparable to the dynamic patterns observed for other traits such as the Big Five (e.g. Fleeson, 2001). In other words, we were interested in assessing the extent to which PTG functions as a dynamic trait in everyday life.

- Does trait PTG predict averages and variability in state PTG?

Finally, we were interested in examining whether retrospective self-perceived levels of trait PTG predicted daily (state) PTG, as well as variability in state PTG. Fleeson (2014) has argued that experiencing day-to-day PTG following adversity is an important criterion for determining whether individuals' experience of PTG following adversity is "real." In other words, the broad changes people report at the trait level should ideally be instantiated in daily beliefs, behaviors and emotions. Individuals may claim to have changed in their relationships, in their attitudes, and in their emotions when making summary assessments, but those claims may not reflect what people actually experience day to day.

Method

Participants.

We recruited two separate groups of participants to test the research questions outlined above.

Recent Adversity Group. First, 22 undergraduate students who had recently experienced a significant adverse life event (i.e., highly stressful or traumatic life event) were recruited from a larger college sample during 2013-2014 in the United States, according to the procedure described below. There were 15 women and 7 men with a mean (SD) age of 19.95 (1.21) years in this group. The majority of the participants in this group identified as Caucasian (82%) followed by Asian (14%) with the remaining participants' race unspecified.

Control Group. Next, 35 undergraduate students were recruited during the spring semester of the 2016 academic year from the same university These individuals had not experienced an adverse event in the past 12 months, nor were they experiencing adverse effects from any such event experienced in the past 5 years. Participants who reported experiencing an adverse event within the 5 year period and reported that the event was still highly distressing were excluded. This resulted in the exclusion of 15 participants. There were 18 men and 17 women with a mean (SD) age of 18.63 (0.73) years in this group. The majority of the participants in this group identified as Caucasian (69%) followed by Asian (29%) and the remaining participants' (2%) race was unspecified.

Procedure.

As part of a larger research study in collaboration with the Office of Campus Life at Wake Forest University, the whole undergraduate student body (with the exception of

students who were studying abroad) was invited to participate in an online survey "about personality and well-being" over the course of the 2013-2014 academic year. The research study was a prospective longitudinal design, involving a number of different components that are not reported here. The students who chose to participate (Wave 1, N = 542; Wave 2, N = 272; Wave 3, N = 399; Wave 4, N =171) were sent an online survey about their experiences on campus, well-being, and personality at up to four time points during the academic year.

Recent Adversity Group. Of relevance to the current study, participants were asked to report the most stressful event that had happened in their lives to date (wave 1) or since their last assessment (waves 2 to 4) using the Life Events Checklist (Gray, Litz, Hsu, & Lombardo, 2004). Students recruited into the Recent Adversity group were asked to participate in the ESM study if they had experienced an adverse event since wave 1 of the online survey and they had not experienced any other significantly adverse event in the last year prior to participating in the study.

We contacted all eligible participants one month after wave 2 and wave 3 of the online surveys and those who responded were invited to come into the psychology department in small groups of between one and ten to complete a baseline questionnaire and receive information on the ESM procedure. Out of the 70 total eligible participants contacted, 25 participants completed the baseline survey and 22 of participants went on to complete the ESM. Participants were compensated with a $20 Amazon gift card for completion of the baseline questionnaire. Those who chose to participate in the experience-sampling phase of the study were sent an email containing a link to an online survey every three hours between 10AM and 10PM for 9 consecutive days. Each survey

asked participants to indicate the extent to which their behavior and thoughts reflected different domains of PTG in the past 30 minutes. Participants were compensated with a $70 Amazon gift card and received an additional $5 bonus if they completed all 45 reports.

Control Group. In the spring semester of 2016 a control group of 35 participants were recruited from Wake Forest University, as noted above. The participants were undergraduate psychology students who received course credit for their participation. They received 4 credits for completing the baseline survey and ESM. Participants were recruited to participate if they had not experienced an adverse event within the last 12 months, as assessed by the Life Events Checklist (as we explain below, however, some participants in this group had experienced such events within the past 5 years). All participants in the control group completed the ESM portion of the study.

Materials.

Participants completed the following measures.

Adverse Events. Participants in the Recent Adversity Group completed the Life Events Checklist (Gray et al., 2004) again as part of the baseline questionnaire in relation to the ***last two months*** in order to ensure their eligibility and collect further detail about the event they had experienced. Students reported the event, the number of days since it had occurred, how distressing it was when it first happened, and how distressing it was at the time of the questionnaire on a Likert scale from "1" ("*not at all"*) to "5" ("*extremely distressing"*). Participants in the Control Group completed this measure in reference to the ***last 5 years*** (as explained above, none of the participants in the Control Group had experienced an adverse event in the 12 months preceding participation in this study). In

addition, participants were given the option of selecting an "Other" option if they had not experienced any of the events listed in this checklist in the past five years, and to briefly describe the most stressful event they had experienced within this timeframe (to be used as reference for other measures, see below).

PTG. Participants then completed the Post-Traumatic Growth Inventory – 42-item version (PTGI-42; Cann, Calhoun, Tedeschi, & Solomon, 2010). The PTGI-42 asked participants to report the degree to which they had experienced each positive and negative change on the inventory as result of the adverse life event they recently experienced[1]. The PTGI-42 asked about changes in relationships, spirituality, new possibilities, personal strength, and appreciation of life. Each item was presented as a pair of statements. For example, participants responded to the following pair of statements: "I have a diminished feeling of self-reliance" and "I have a greater feeling of self-reliance." Participants answered using a 6-point Likert scale from "0" ("*I did not experience this change as a result of this event")* to "5" ("*I experienced this change to a very great degree as a result of this event").* Participants in the Recent Adversity Group completed this measure in reference to the adverse event they reported. Participants in the Control Group completed this measure in reference to the most stressful adverse event identified on the checkliststhey deemed to have had the most impact on them within the past 5 years.

ESM. In the ESM portion of the study, participants in both groups were asked whether they had experienced PTG-related states in the past 30 minutes. We programed the online-survey software "Qualtrics" to send an email to all participants at the specific intervals, outlined above. Participants completed the survey either on their school laptop

[1] The present study will only report results pertaining to positive changes (PTG).

or their cell phones. Participants could answer the survey up to one hour after the email alert. Responses after this time were considered incomplete and excluded from analysis. We included 3-4 items reflecting each of the 5 PTG domains: PTG Relationships, PTG Appreciation, PTG New Possibilities, PTG Personal Strength and PTG Spirituality. In addition, we also included items measuring positive and negative affect to compare state PTG to a more general measure of subjective well-being. Items were presented in the order described below.Participants answered all ESM questions using a 5-point Likert scale from "1" (strongly disagree) to "5" (strongly agree).

PTG Relationships. First, participants indicated whether they had had a social interaction in the last 30 minutes. Those who responded 'yes' were asked four questions related to the PTG domain of relationship quality (e.g., "I felt in tune with this person," & "I felt close to this person"). Any participant who responded 'no' was asked to answer four questions about state openness to experience, to prevent participants from responding 'no' to answer fewer questions on subsequent reports (Fleeson, 2007). These results are not reported in this study.

PTG Personal Strength. Next, participants indicated whether they had experienced a stressful event in the last 30 minutes. Those who responded 'yes' were asked to indicate what had caused them stress (i.e., work/school/family/friends/financial situation/other), and then responded to 4 questions about the PTG domain of personal strength (e.g., "I stayed calm" & "I felt overwhelmed and unable to cope"). Similarly, any participant who responded 'no' answered 4 items about state neuroticism to prevent participants from answering no on subsequent reports to answer fewer questions.

Positive/Negative Affect. Participants reported the extent to which they had felt

happy and sad within the last 30 minutes.

PTG Spirituality, PTG Appreciation, and PTG New Possibilities. Finally, participants reported the extent to which they felt spiritually connected (3 questions; e.g., *In the last 30 minutes, I felt connected to a spiritual power greater than myself*), appreciative of life (3 questions; e.g., *In the last 30 minutes, I felt grateful to be alive*), and keen to pursue new opportunities (3 questions; e.g., *In the last 30 minutes, I thought about new directions for my life*) in the last 30 minutes.

Results

Preliminary Data Analysis

Participants' exposure to adverse events is reported in Table 1. In the Recent Adversity Group, the most frequently endorsed event on the checklist was the 'Other' category (61%), which included events such as the following: parents divorced, family member attempted suicide, family member had serious medical issues, and a romantic partner was diagnosed with a life-threatening illness. The next commonly experienced events in this group were sudden and unexpected death of a loved one (7%) and unwanted sexual experience (4%).. On average, participants in this group reported that the adverse event occurred 36.13 (SD = 41.92) days prior to the survey and they rated the experience as highly distressing when it happened (M = 4.04, SD = 0.82) and somewhat less distressing at that point in time when taking the survey, (M = 2.70, SD = 0.76).

In the Control Group, the most frequently endorsed events that occurred in the past 5 years were transportation accidents (46%), natural disasters (28%) and the 'other' category (28%), which included events such as injury/illness of a family member,

personal injury, and the dissolution of a romantic relationship (see Table 2). On average, participants in this group reported that the most stressful event endorsed occurred 35.92 (17.64) months ago and they rated the experience as moderately distressing when it happened (M = 3.68, SD = 1.39) and mildly distressing at that point in time when taking the survey (M = 1.76, SD = 0.74). As explained above, participants in the Control Group had not experienced any adverse events in the past 12 months prior to participating in the study.

For each participant in both groups, we calculated trait PTG scores by summing the corresponding items on each domain of the PTGI-42 (Cann et al., 2010). Means, standard deviations and reliabilities for participants are reported in Table 2.

Research Question 1: Is the factor structure of state PTG similar to trait PTG?

State PTG and trait PTG showed similar factor structures. To arrive at this result, we employed a multilevel confirmatory factor model approach using Mplus 7 (Muthén & Muthén, 2010). Due to the relatively small sample size at Level 2 (i.e., the number of participants; n = 22 in the Recent Adversity group and n = 35 in the control group), the multilevel confirmatory factor models encountered convergence issues, as the number of parameters being estimated at Level 2 was greater than the number of cases.

We therefore focused on the Level 1 - within-person variability (based on n = 191 observations in the Recent Adversity group and n = 314 in the Control Group). We person-mean centered the state PTG items to remove between-individual variance, and then conducted confirmatory factor analyses on the person-centered items in separate models for each group. We specified 5 factors—Relationships, Spirituality, Appreciation, New Possibilities, and Personal Strength—corresponding to factors found in the trait-

level PTG scale. Item loadings were freely estimated on their respective factor, the factor loadings with other factors were set to zero, and the covariances between the factors were freely estimated. Full information maximum likelihood was used to handle missing data, and 95% confidence intervals were computed using bias-corrected bootstrapping with 10,000 draws.

The hypothesized model (see Tables 3 and 4) fit the data well (according to guidelines for model fit outlined by Kline, 2005): in both the Recent Adversity Group, $\chi^2(109) = 187.55$, $p < .001$; CFI = .94; RMSEA = .061 [90% CI = .046, .076]; and SRMR = .082, and in the Control Group, and $\chi^2(109) = 315.45$, $p < .001$; CFI = .91; RMSEA = .078 [90% CI = .068, .088]; and SRMR = .068 in the control group. All factor loadings were large (> .40) and significant (*p*s < .001). Descriptive statistics for the state PTG domains are reported in Table 2.

We established measurement invariance by conducting a series of multigroup confirmatory factory analyses and constraining parameters across groups. First, we assessed configural invariance by imposing the same factor loading pattern in each group. Next, we evaluated metric invariance by constraining the factor loadings to be equal. Finally, we tested for scalar invariance by constraining the item intercepts to be equal. We used ΔCFI < .01 as a criterion for measurement invariance (see Cheung & Rensvold, 2002). The configural invariance model served as a baseline and fit the data well: $\chi^2(218) = 503.01$, $p < .001$; CFI = .92, RMSEA = .072 [90% CI = .064, .080], and SRMR = .074. The metric (CFI = .914) and scalar (CFI = .919) invariance models had ΔCFI < .01, suggesting that the same factor structure held across the two groups. In other words, results suggested that the same constructs are being measured in the two groups.

Research Question 2: Is there significant within-person variability in state PTG?

If PTG is suitable for measurement with state-like questions, we would expect significant within-person variability over time, that is, one's level of PTG would fluctuate substantially on a day-to-day basis. Indeed, this is what we found: participants' experience of PTG fluctuated moment-to-moment In order to formally test this, we estimated unconditional (i.e., no predictors) multilevel means models that partition the total variance into within- and between-individual components. We ran separate models for each of the five PTG domains for each of the two groups. In each model, the PTG subscale was the outcome. The following equation represents the unconditional means multilevel model:

Level 1 (within individual):
PTG Subscale$_{it} = \pi_{0i} + \varepsilon_{it}$

Level 2 (between individuals):
$\pi_{0i} = \beta_{00} + \zeta_{0i}$

Combined Model:
PTG Subscale$_{it} = \beta_{00} + \zeta_{0i} + \varepsilon_{it}$

Here, "PTG Subscale$_{it}$" represents the PTG Subscale score for individual *i* at time *t*; "π_{0i}" is individual *i*'s mean (across time); "ε_{it}" is the residual for individual *i* at time *t*; (i.e., the individual and time-specific deviation from the individual's mean); "β_{00}" is the grand mean; and "ζ_{0i}" is individual *i*'s residual (i.e., deviation from the grand mean).

For all of the five state PTG subscales, there was significant within- and between-individual variance (see Table 5 & 6). The intraclass correlations (ICCs) — representing the proportion of variance that is between individuals – ranged from .09 for PTG

Personal Strength in the Recent Adversity Group to .88 for PTG Spirituality in the Control Group.

We used Wald tests in multiple-group models to test for group differences in the grand mean, between-person variance, and within-person variance estimates for each subscale. However, only the within-individual variance for PTG New Possibilities was significantly different between the two groups(p = .01), and this result might have occurred due to chance since it would not be significant if we adjusted for multiple comparisons.

Research Question 3: Discriminant Validity: Is state PTG different to State Affect?

In addition, we assessed within-person correlations between state measures of PTG and state measures of positive and negative affect, in order to assess whether our state measures of PTG were able to discriminate this construct from more general facets of subjective well-being. Correlations between state PTG and positive affect ranged from low (e.g., r = .13 for Personal Strength in the Control Group) to moderate/high (e.g., r = .65 for Appreciation in the Recent Adversity Group), with most correlations falling within the low to moderate range. Correlations between state PTG and negative affect ranged from low (e.g., r = .00 for Spirituality in the Control group) to moderate (e.g., r = -.48 for Appreciation in the Recent Adversity Group), with most correlations falling within the low range. Thus, PTG appears related but distinct from positive/negative affect.

Research Question 4: Does trait PTG predict means and variability in state PTG?

Next we examined the relationship between measures of trait and state PTG. Theoretically we might expect measures of trait PTG to predict the means and variance in the corresponding domains of state PTG. For example, a participant high in trait PTG

Relationships might also have a high state PTG Relationships mean and low variability in state PTG Relationships. We did not find strong support for this prediction (see Tables 7& 8). Of the five PTG domains that we examined, trait PTG and state PTG means were only significantly correlated in the Spirituality domain for both groups (Recent Adversity Group r = .49, 95% CI [.15, .74], p = .022, Control Group r = .40, 95% CI [.20, .58], p = .03), as well as in the New Possibilities domain for the Control Group only (r = .37, 95% CI [.04, .67], p = .046).

We included confidence intervals for all findings to help readers interpret coefficients and highlight the need to interpret our results with caution given the small sample size in this study. In particular, it is important to note that significant correlations related to Spirituality could be at least partially accounted for by the higher reliability of the within-person mean for this subdomain.

General Discussion

Earlier work has defined PTG as positive personality change (see Jayawickreme & Blackie, 2014), but the measurement of this construct has relied almost exclusively on cross-sectional and retrospective assessments. Little is known about the stability of self-reported PTG, or the extent to which individuals' reports of change manifest in their daily behavior. Given that some scholars (Coyne & Tennen, 2010) doubt that the current evidence sums to little more than positive illusion on the part of the participants, it is important that researchers demonstrate whether PTG is more than a trait-like tendency to perceive positive change following adversity. As Fleeson (2014) argued, showing that the changes people report at the trait level manifest in daily beliefs, behaviors and emotions is an important criterion for demonstrating that trait PTG reflects pre-post personality

change. The aim of this study was to use an experience-sampling procedure to measure the extent to which PTG manifested in individuals' everyday lives.

Given that this study was to our knowledge the first of its kind, we needed to develop a state measure of PTG that was suitable for hourly assessment. The results of the factor analysis indicated that we were successful in developing a measure that was comparable to trait measures of PTG. We replicated five of the PTGI domains – appreciation of life, improved relationships, spiritual growth, identification of new possibilities, and personal strength. While the Level 2 person-level sample size was relatively small ($N = 22$), the Level 1 within-person sample size, which the factor analysis focused on, was relatively large ($N = 193$) giving us reasonable confidence that the observed factor structure was not due to sampling error. In addition, the factor loadings were large (all greater than .50) and highly significant (all ps $< .001$), and the hypothesized model fit the data well.Similar to Taku, Cann, Calhoun, and Tedeschi's (2008) factor analysis of the trait PTGI scale, we observed that our state PTG factors were inter-correlated, indicating that individuals who report experiencing PTG in one domain are likely to report PTG in other domains on the same days. The fact that a 5-factor structure fit the data despite these high inter-correlations demonstrates that state PTG (like trait PTG) is a multidimensional measure. As such, relationships between specific PTG domains and daily process and outcome variables may differ. Future research is needed to identify the situational triggers, processes, and outcomes associated with each domain of state PTG (Jones, Brown, Serfass, & Sherman, 2014), because an understanding of these daily relationships may lead to the development of tailored interventions that promote PTG (Blalock, Calton, & Kashdan, 2014).

Moreover, using our newly developed state measure of PTG, we found significant variability not only between participants, but also within participants for all five state PTG domains. The finding that participants' state PTG fluctuated on a day-to-day basis is important, because it implies that the daily manifestations of PTG are a function of specific situational processes. If PTG researchers can identify and isolate these daily processes, as personality psychologists have done for the big five (see Fleeson, 2001; 2007), then they would gain valuable information into the social and intra-individual factors that promote (and hinder) the daily expression of PTG. This information is of critical importance, given the increased focus in the field of designing interventions that facilitate PTG (Roepke, 2015) in the absence of understanding how it unfolds in individuals' daily lives.

Although we found significant variability for state PTG, we should also note here a number of limitations. First, the PTG scales indeed show less within-person variance than do other scales for other constructs in prior research. For appreciation, spirituality, and new possibilities, the intraclass correlations were .60 to 86 for the Recent Adversity Group , whereas they are often .5 or higher for the Big 5 and for affect (e.g. Fleeson, 2001). This is still arguably a large amount of within-person variability, as the within-person standard deviation is 35-80% the size of the between-person standard deviation.

Second, we acknowledge that it could be that the smaller intra-individual variation observed here could be a substantive feature of these constructs. That is, people are varying quite a bit in these constructs from moment to moment. Thus, people's appreciation, spirituality, and orientation towards new possibilities are higher some moments than other moments. At the same time, they do not vary as much as Big 5 trait

manifestations do, so it possible that a baseline degree of these constructs is present to some extent all the time, so most people do not deviate too far from their baseline.

Third, it could also be that the smaller variation within people in these constructs could result from less salience of these constructs at most points of their daily life. For example, it might be that people are not actively feeling grateful to be alive very often, are not actively aware of their connections to their faith, and are not actively thinking about new directions for their lives. The state measure asked people to rate degree of agreement with each of these statements. If an individual does not actively feel grateful to be alive most of the time, she would probably rate "neither agree nor disagree" (3) most of the time (and variance would be lowered). The means of the state scales were right around 3, so this possibility is a reasonable one. Putting these together, it could be that the lowered variance is a combination of people not actively thinking about these constructs very often, plus varying a lot in how they think about them when they *do* come to mind.

One noteworthy finding was the association between trait PTG spirituality and state PTG spirituality in the Recent Adversity Group. Theoretically, if an individual were able to accurately summarize how an adverse event had changed them, then we would expect their trait reports of self-perceived PTG to be correlated with their daily (or state) reports of PTG. For example, an individual who believes they have closer and more intimate social relationships would likely be experiencing thoughts, emotions, and behaviors consistent with this belief in everyday life. We found this to be the case for spirituality: people who believe they have become more spiritual indeed describe having more spiritual thoughts, feelings, and behaviors every day. It is however unclear why we

did not find support for this hypothesis for the other domains. These null findings may simply reflect our small sample size (n = 22 in the Recent Adversitygroup). However, it is also possible that trait and state PTG scales are measuring different constructs (Joseph, 2014). The few studies that have used current-standing measures of PTG (which are more state-like) have found small to moderate correlations with retrospective self-reports of PTG (which are more trait-like) (Frazier et al., 2009; Joseph et al., 2012; Yanez et al., 2011). In other words, the state PTG measure assesses how much individuals enact each domain of PTG in their daily lives, whereas the PTGI assesses how much they perceive themselves to have changed on that domain because of adversity. The latter measure might be subject to more memory biases, and perhaps to additional influences or demand characteristics, such as cultural scripts about how adversity is supposed to change us (Lindstrom, Cann, Calhoun, & Tedeschi, 2013).

.We also entertain the possibility that ESM may be too broad a method to capture the specificity of change noted by some of the PTG domains. For examples, people may experience positive changes in the quality of their relationships as reflected by the PTGI, but only some relationships may have changed for the better, whereas state PTG as assessed by ESM would not discriminate between those relationships, leading to a lack of relationship between trait and state PTG. It is also possible that only spiritual change was actually instantiated in daily life out of the five domains (Fleeson, 2014).

Our findings provide support for the claim that PTG can be defined and measured as positive personality change (Jayawickreme & Blackie, 2014), and have further shown that there is significant variability in individuals' reports of state PTG at the daily level. In other words, these findings show that whether an individual has benefited from the

struggle with adversity may vary from day to day, and therefore may have important situational determinants.

However, our results should be interpreted with caution, given the small sample size and relatively short timeframe of the ESM portion of the study (9 days).. Further studies should replicate these findings, as well as investigate best practices for recruitment and participation into studies with intensive data collection. Larger sample sizes may also allow researchers to investigate the role of other variables, such as the effect of the type of adversity experienced on state PTG, which could not be assessed in the present study. Longer timeframes for ESM assessments (or, more realistically, multiple waves of ESM assessments) could help address the ongoing question of understanding the timecourse of PTG. To date, little empirical data speak to overall as well as individual trajectories in the development of PTG.

Nonetheless, we consider our findings to be an initial demonstration of the feasibility and suitability of studying PTG at the state (or daily) level. Although we argue that daily methodologies are the gold standard for research in this field (Jayawickreme & Blackie, 2014), we also acknowledge the challenges of recruiting participants into this type of intensive study design as they come to terms with a potentially adverse/traumatic experience. We note that our final yield of 22 participants in the ESM study was the results of a process that began with a study that invited the whole student body of an undergraduate institution to participate. Individuals who agree to take part might be those who are the best-adjusted, and perhaps therefore the most likely to have experienced PTG.

We also acknowledge that although daily methodologies such as ESM offer substantial advantages over current assessments, ESM nevertheless remains a self-report

methodology and, in this study, did rely on retrospection (though using the much shorter timeframe of 30 minutes). In addition, reports of PTG may be biased by strong cultural expectations as well as personal motivations to report growth. As a result, it is possible that participants' answers may have been influenced by demand characteristics once they were aware that we were assessing them for PTG. We should note, however, that this study was framed as an inquiry on student well-being supported by the university's Office of Campus Life, and not as a study on PTG per se. That said, future research could utilize other, less obtrusive and non self-report assessments of PTG, such as the Electronically Activated Recorder (EAR; Bollich et al.; 2015), which may be able to successfully track behavior and emotion associated with PTG (e.g. gratitude, positive affect, warm relational interactions, etc.).

Our findings nevertheless raise some interesting questions for the future study of PTG: What are the situational triggers that promote (or hinder) PTG (Wilson & Vazire, 2015)? Are there individual differences in personality states or coping strategies that make PTG more likely to manifest on a day-to-day basis? When and for whom does broad self-perceived PTG translate into daily experience of PTG? Rigorous methodology from personality psychology, including ESM, can provide unique opportunities to explore such questions.

References

Affleck, G., Tennen, H., & Rowe, J. (1991). *Infants in crisis: How parents cope with newborn intensive care and its aftermath*. New York: Springer-Verlag Publishing.

Affleck, G., Tennen, H., Croog, S., & Levine, S. (1987). Causal attribution, perceived benefits, and morbidity after a heart attack: An 8-year study. *Journal of Consulting and Clinical Psychology*, *55*, 29–35. doi:10.1037/0022-006X.55.1.29

Blackie, L. E. R., & Jayawickreme, E. (2014). Promoting change in post-traumatic growth research: Response to commentaries. *European Journal of Personality*, *28*, 351-361. DOI: 10.1002/per.1970.

Blalock, D.V., Calton, J.M., & Kashdan, T.B. (2014). Understanding post-traumatic growth by attending to contextual influences, and developing wise interventions to promote it. *European Journal of Personality*, *28*, 333-334. DOI: 10.1002/per.1970

Cann, A., Calhoun, L. G., Tedeschi, R. G., & Solomon, D. T. (2010). Posttraumatic growth and depreciation as independent experiences and predictors of well-being. *Journal of Loss and Trauma*, *15*, 151–166. doi:10.1080/15325020903375826

Conner, T. S., Tennen, H., Fleeson, W., & Barrett, L. F. (2009). Experience sampling methods: A modern idiographic approach to personality research. *Social and personality psychology compass*, *3*(3), 292-313.

Coyne, J. C., & Tennen, H. (2010). Positive psychology in cancer care: Bad science, exaggerated claims, and unproven medicine. *Annals of Behavioral Medicine*, *39*(1), 16–26. doi:10.1007/s12160-009-9154-z

Fleeson, W. (2001). Toward a structure- and process-integrated view of personality: Traits as density distributions of states. *Journal of Personality and Social Psychology*, *80*(6), 1011–1027. doi:10.1037/0022-3514.80.6.1011

Fleeson, W. (2004). Moving personality beyond the person-situation debate. The challenge and the opportunity of within-person variability. *Current Directions in Psychological Science, 13*, 83-87.

Fleeson, W. (2007). Using experience sampling and multilevel modeling to study person-situation interactionist approaches to positive psychology. In A. D. Ong & M. H. M. van Dulmen (Eds.), *Oxford handbook of methods in positive psychology.* (pp. 501–514). New York, NY US: Oxford University Press.

Fleeson, W. (2014). Four ways of (not) being real, and whether they are essential for post-traumatic growth. *European Journal of Personality*, *28*, 336-337. DOI: 10.1002/per.1970

Fleeson, W. & Jayawickreme, E. (2015). Whole trait theory. *Journal of Research in Personality*, 56, 82-92.

Ford, J. D., Tennen, H., & Albert, D. (2008). A contrarian view of growth following adversity. In S. Joseph., & P. A. Linley, (Eds.), Trauma, recovery, and growth: Positive psychological perspectives on posttraumatic stress. (pp. 297-324). Hoboken New Jersey: John Wiley & Sons, Inc.

Frazier, P., Tennen, H., Gavian, M., Park, C., Tomich, P., & Tashiro, T. (2009). Does self-reported posttraumatic growth reflect genuine positive change? *Psychological Science*, *20*(7), 912–919. doi:10.1111/j.1467-9280.2009.02381.x

Furr, R. M. (2009). Personality psychology as a truly behavioural science. *European Journal of Personality, 23,* 369-401.

Gray, M. J., Litz, B. T., Hsu, J. L., & Lombardo, T. W. (2004). Psychometric properties of the Life Events Checklist. Assessment, 11, 330–341. doi:10.1177/1073191104269954

Hefferon, K., Grealy, M., & Mutrie, N. (2009). Post-traumatic growth and life threatening physical illness: A systematic review of the qualitative literature. *British Journal of Health Psychology*, *14*, 343–378. doi:10.1348/135910708X332936

Helgeson, V. S. (2010). Corroboration of growth following breast cancer: Ten years later. *Journal of Social and Clinical Psychology*, *29*, 546–574. doi:10.1521/jscp.2010.29.5.546

Helgeson, V. S., Reynolds, K. A., & Tomich, P. L. (2006). A meta-analytic review of benefit finding and growth. *Journal of Consulting and Clinical Psychology*, *74*(5), 797–816. doi:10.1037/0022-006X.74.5.797

Henry, B., Moffitt, T. E., Caspi, A., Langley, J., & Silva, P. A. (1994). On the" remembrance of things past": a longitudinal evaluation of the retrospective method. *Psychological Assessment, 6(2),* 92-101.

Herbst, J. H., McCrae, R. R., Costa, P. T. J., Feaganes, J. R., & Siegler, I. C. (2000). Self-perceptions of stability and change in personality at midlife: The UNC Alumni Heart Study. *Assessment*, *7*(4), 379–388. doi:10.1177/107319110000700406

Jayawickreme, E., & Blackie, L. E. R. (2014). Post-traumatic growth as positive personality change: Evidence, controversies and future directions. *European Journal of Personality*, *28*, 312–331. doi:10.1002/per.1963

Jones, A.B., Brown, N.A., Serfass, D.G., & Sherman, R.A. (2014). Traumatic Experiences Yield Changes in the Situation Experience. *European Journal of Personality*, *28*, 339-340. DOI: 10.1002/per.1970

Joseph, S. (2014). Assessment of Post-traumatic Growth. *European Journal of Personality*, *28*, 340-341. DOI: 10.1002/per.1970

Joseph, S., Maltby, J., Wood, A. M., Stockton, H., Hunt, N., & Regel, S. (2012). The Psychological Well-Being—Post-Traumatic Changes Questionnaire (PWB-PTCQ): Reliability and validity. *Psychological Trauma: Theory, Research, Practice, and Policy*, *4*, 420-428. doi: http://dx.doi.org/10.1037/a0024740Lindstrom, C. M., Cann, A., Calhoun, L. G., & Tedeschi, R. G. (2013). The relationship of core belief challenge, rumination, disclosure, and sociocultural elements to posttraumatic growth. *Psychological Trauma: Theory, Research, Practice, and Policy*, *5*, 50-55.

McMillen, J. C., Smith, E. M., & Fisher, R. H. (1997). Perceived benefit and mental health after three types of disaster. *Journal of Consulting and Clinical Psychology*, *65*, 733–739. doi:10.1037/0022-006X.65.5.733

Miller, C. B. (2014). A Satisfactory Definition of "Posttraumatic Growth" Still Remains Elusive. *European Journal of Personality*, 344-346.

Mogle, J., Almeida, D. M., & Stawski, R. S. (2015). Psychometric properties of micro-longitudinal assessments: Between- and within-person reliability, factor structure and discriminate validity of cognitive interference. In M. Diehl, K. Hooker & M. Sliwinski (Eds.), *Handbook of intraindividual variability*.Pals, J. L., & McAdams, D. P. (2004). The transformed self: A narrative understanding of posttraumatic growth. *Psychological Inquiry*, 65-69.

Robins, R. W., Noftle, E. E., Trzesniewski, K. H., & Roberts, B. W. (2005). Do People Know How Their Personality Has Changed? Correlates of Perceived and Actual Personality

Change in Young Adulthood. *Journal of Personality*, *73*(2), 489–521. doi:10.1111/j.1467-6494.2005.00317.x

Roepke, A. M. (2015) Psychosocial interventions and posttraumatic growth: A meta-analysis. *Journal of Consulting and Clinical Psychology*, *83*, 129-142 doi:http://dx.doi.org/10.1037/a0036872

Shiffman, S., Stone, A. A., & Hufford, M. R. (2008). Ecological momentary assessment. *Annual Review of Clinical Psychology*, *4*, 1-32.

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. DOI: 10.1002/jts.20305

Tedeschi, R. G., & Calhoun, L. G. (1996). The Posttraumatic Growth Inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress*, *9*(3), 455–472. doi:10.1002/jts.2490090305

Wilson, R. & Vazire, S. (2015). Taking Personality to the Next Level: What Does It Mean to Know a Person? *Emerging Trends in the Social and Behavioral Sciences: An Interdisciplinary, Searchable, and Linkable Resource*. 1–13.

Yanez, B. R., Stanton, A. L., Hoyt, M. A., Tennen, H., & Lechner, S. (2011). Understanding perceptions of benefit following adversity: How do distinct forms of growth relate to coping and adjustment to stressful events? *Journal of Social and Clinical Psychology, 30(7),* 699-721. doi: 10.1521/jscp.2011.30.7.699

Table 1

Most Commonly Experienced Adverse Events on the Life Events Checklist for Recent Adverse Event Group (within last 2 months) and Control Group (within last 5 years)

Adverse Event:	**% Reported** ***In Adversity Group:***	**% Reported** ***In Control Group***
Sudden, unexpected death of someone close to you.	39	14
Unwanted sexual experience	13	6
Life threatening illness or injury	7	3
Transportation accident.	4	46
Serious accident at work or home	4	11
Physical assault	4	8
Sexual assault	4	0
Other stressful experience	61	28
Natural disaster	0	28

NB: The total exceeds 100%, because some participants had experienced multiple events.

Table 2
Descriptive statistics for the PTGI-42 and State PTG Domains

Variable	Group	Reliability	Mean	*SD*	*N*
Appreciation of Life (Trait PTG)	Recent Adversity	0.82	8.55	2.74	22
Appreciation of Life (Trait PTG)	Control	0.58	8.14	2.98	29
New Possibilities (Trait PTG)	Recent Adversity	0.80	9.23	3.95	22
New Possibilities (Trait PTG)	Control	0.94	10.14	6.26	29
Personal Strength (Trait PTG)	Recent Adversity	0.87	9.77	4.60	22
Personal Strength (Trait PTG)	Control	0.80	9.86	4.37	29
Spiritual Change (Trait PTG)	Recent Adversity	0.76	3.45	1.65	22
Spiritual Change (Trait PTG)	Control	0.89	4.38	2.81	29
Relationships (Trait PTG)	Recent Adversity	0.83	16.82	6.15	22
Relationships (Trait PTG)	Control	0.87	16.21	6.93	29

State PTG Relationships	Recent Adversity	0.85	3.44	0.70	172
State PTG Relationships	Control	0.79	3.55	0.68	280
State PTG Appreciation of Life	Recent Adversity	0.87	3.46	0.67	191
State PTG Appreciation of Life	Control	0.85	3.44	0.73	314
State PTG Spirituality	Recent Adversity	0.81	2.51	0.88	191
State PTG Spirituality	Control	0.87	2.66	0.83	314
State PTG New Possibilities	Recent Adversity	0.80	2.70	0.78	191
State PTG New Possibilities	Control	0.79	2.83	0.83	314
State PTG Personal Strength	Recent Adversity	0.72	3.16	0.71	79
State PTG Personal Strength	Control	0.74	3.18	0.68	129

Table 3

Confirmatory Factor Analysis Loadings for State PTG Items in the Recent Adversity Group

	Factor				
Items	Relationships	Spirituality	Appreciation	New Possibilities	Personal Strength
I felt close to this person	.94 [.84, 1.10]				
I felt affectionate toward this person	.81 [.65, .99]				
I felt in tune with this person	.76 [.62, .92]				
I intentionally sought out this person for a meaningful interaction	.60 [.45, .74]				
I felt aware of my connection to my faith or spiritual beliefs		.92 [.78, 1.08]			
I felt connected to a spiritual power greater than myself		.92 [.75, 1.10]			
I thought about spiritual issues		.53 [.34, .74]			
I felt grateful to be alive			.87 [.72, 1.04]		
I felt thankful for what I have in life			.81 [.63, 1.01]		
I appreciated the value of my own life			.80 [.67, .94]		
I sought out information about new opportunities				.83 [.67, .98]	
I tried new or different activities				.78 [.61, .93]	
I thought about new directions for my life				.67 [.52, .81]	
I stayed calm					.88 [.58, 1.57]
I felt in control of my emotions					.68 [.34, .94]
I felt angry or frustrated					.50 [.09, .78]
I felt overwhelmed and unable to cope					.46 [.10, .78]

NB:95% confidence intervals computed with bias-corrected bootstrapping with 10,000 draws are reported in the brackets. $n = 191$.

Table 4
Confirmatory Factor Analysis Loadings for State PTG Items in the Control Group

	Factor				
Items	Relationships	Spirituality	Appreciation	New Possibilities	Personal Strength
I felt close to this person	.95 [.82, 1.10]				
I felt affectionate toward this person	.71 [.57, .87]				
I felt in tune with this person	.79 [.60, .99]				
I intentionally sought out this person for a meaningful interaction	.42 [.23, .60]				
I felt aware of my connection to my faith or spiritual beliefs		.92 [.78, 1.07]			
I felt connected to a spiritual power greater than myself		.92 [.78, 1.07]			
I thought about spiritual issues		.68 [.54, .83]			
I felt grateful to be alive			.75 [.59, .96]		
I felt thankful for what I have in life			.86 [.72, 1.02]		
I appreciated the value of my own life			.82 [.66, 1.00]		
I sought out information about new opportunities				.87 [.73, 1.01]	
I tried new or different activities				.75 [.62, .87]	
I thought about new directions for my life				.68 [.54, .82]	
I stayed calm					.81 [.61, 1.05]
I felt in control of my emotions					.86 [.61, 1.16]
I felt angry or frustrated					.57 [.24, .80]
I felt overwhelmed and unable to cope					.41 [.08, .70]

NB: 95% confidence intervals computed with bias-corrected bootstrapping with 10,000 draws are reported in the brackets. $n = 314$.

Table 5

Within-Person Correlations in the Recent Adversity Group (Below Diagonal) and Control Group (Above Diagonal)

	1	2	3	4	5	6	7
1. Relationships	-	.24** [.08, .41]	.13 [-.01, .29]	.17* [.00, .33]	.10 [-.11, .30]	.36*** [.22, .54]	-.19* [-.36, -.05]
2. Appreciation	.16* [.01, .32]	-	.22* [.07, .41]	.38*** [.23, .56]	.07 [-.14, .26]	.60*** [.43, .83]	-.30*** [-.46, -.14]
3. Spirituality	.19* [.05, .35]	.47*** [.28, .72]	-	.57*** [.39, .80]	-.03 [-.17, .11]	.20* [.06, .38]	.00 [-.14, .13]
4. Possibilities	.12 [-.03, .26]	.40*** [.24, .60]	.44*** [.27, .68]	-	.12 [-.04, .28]	.32*** [.17, .49]	-.02 [-.14, .11]
5. Personal Strength	-.12 [-.41, .14]	.16 [-.09, .43]	.12 [-.10, .32]	.13 [-.08, .35]	-	.13 [-.04, .30]	-.27*** [-.42, .13
6. Positive Affect	.28** [.12, .46]	.65*** [.47, .87]	.37*** [.21, .58]	.33*** [.16, .51]	.19 [-.05, .42]	-	-.49*** [-.72, -.31]
7. Negative Affect	-.05 [-.20, .12]	-.48*** [-.73, -.29]	-.08 [-.25, .06]	-.13† [-.28, .02]	-.27* [-.50, -.04]	-.54*** [-.78, -.35]	-

NB: 95% confidence intervals computed with bias-corrected bootstrapping with 10,000 draws are reported in the brackets. $n = 191$ in the Recent Adversity Group and $n = 314$ in the Control Group.

Table 6
Estimates from Multilevel Unconditional Means Models on the PTG State Subdomains

	PTG Relationships	PTG Appreciation	PTG Spirituality	PTG New Possibilities	PTG Strength
			Trauma Group		
Grand Mean	3.44*** [3.27, 3.61]	3.46*** [3.23, 3.69]	2.52*** [2.18, 2.86]	2.72*** [2.46, 2.98]	3.16*** [2.98, 3.34]
Between-Person Variance	.123* [.019, .227]	.269*** [.173, .365]	.665*** [.332, .998]	.372** [.131, 613]	.065 [-.049, .179]
Within-Person Variance	.364*** [.258, .470]	.170*** [.097, .243]	.110*** [.075, .145]	.224*** [.157, .291]	.439*** [.312, .566]
Intraclass Correlation	.25	.61	.86	.63	.13
Between-Person *n*	22	22	22	22	19
Within-Person *n*	172	191	191	191	79
			Control Group		
Grand Mean	3.54*** [3.38, 3.70]	3.44*** [3.22, 3.66]	2.70*** [2.44, 2.96]	2.83*** [2.58, 3.08]	3.18*** [3.05, 3.31]
Between-Person Variance	.211** [.074, .348]	.405** [.125, .685]	.631*** [.349, .913]	.565*** [.246, .884]	.041 [-.041, .123]
Within-Person Variance	.243*** [.159, .327]	.119*** [.068, .170]	.085*** [.048, .122]	.117*** [.072, .162]	.418*** [.267, .569]
Intraclass Correlation	.46	.77	.88	.83	.09
Between-Person *n*	35	35	35	35	33
Within-Person *n*	280	314	314	314	129

NB: 95% confidence intervals are reported in the brackets.

Table 7
Correlations between Trait PTG and State PTG Means

	PTG Subdomain (*M*)				
	Relationships	Spirituality	Appreciation	New Possibilities	Strength
	Trauma Group (*N* = 22)				
Trait PTG Relationships	.07 [-.42, .43]	.17 [-.27, .53]	-.06 [-.46, .35]	.13 [-.33, .48]	.07 [-.30, .49]
Trait PTG Spirituality	-.01 [-.29, .25]	.49* [.15, .74]	-.05 [-.39, .30]	.38† [.01, .64]	-.06 [-.53, .40]
Trait PTG Appreciation	.12 [-.38, .63]	.24 [-.24, .57]	-.12 [-.54, .27]	.37† [-.06, .67]	.34 [-.04, .73]
Trait PTG New Possibilities	.06 [-.50, .37]	.04 [-.30, .42]	-.03 [-.52, .26]	.08 [-.36, .48]	-.01 [-.43, .57]
Trait PTG Strength	.03 [-.35, .42]	.40† [-.07, .77]	.14 [-.23, .50]	.38† [-.12, .75]	.16 [-.30, .60]
	Control Group (*N* = 29)				
Trait PTG Relationships	.10 [-.28, .45]	.17 [-.20, .49]	.39* [.00, .71]	.39* [.01, .68]	.26 [-.18, .53]
Trait PTG Spirituality	-.13 [-.40, .15]	.40* [.20, .58]	.15 [-.15, .49]	.20 [-.12, .51]	-.11 [-.44, .17]
Trait PTG Appreciation	.01 [-.42, .40]	.07 [-.21, .31]	.28 [-.17, .65]	.17 [-.23, .49]	.22 [-.28, .52]
Trait PTG New Possibilities	.02 [-.31, .34]	.32† [.03, .59]	.32† [-.05, .65]	.37* [.04, .67]	.20 [-.21. .47]
Trait PTG Strength	-.03 [-.36, .27]	.20 [-.13, .52]	.23 [-.14, .57]	.29 [-.03, .59]	.20 [-.18, .48]

Note. 95% confidence intervals computed with bias-corrected bootstrapping with 10,000 draws are reported in the brackets. Correlations involving PTG Strength had *n* = 19 in the Recent Adversity Group and n = 27 in the Control Group.

Table 8

Partial Correlations between Trait PTG and Variability (SD) in State PTG, Controlling for Mean State PTG Levels

	PTG Subdomain (M)				
	Relationships	Spirituality	Appreciation	New Possibilities	Strength
	Recent Adversity Group (N = 22)				
Trait PTG	-.16 [-.42, .19]	.25 [-.12, .61]	.05 [-.33, .42]	-.11 [-.45, .23]	-.25 [-.57, .10]
Trait PTG Relationships	-.01 [-.34, .40]	.28 [-.23, .67]	-.04 [-.42, .39]	-.10 [-.47, .23]	-.06 [-.57, .46]
Trait PTG Spirituality	.19 [-.33, .59]	.14 [-.38, .51]	.26 [-.18, .65]	.17 [-.22, .53]	-.13 [-.57, .45]
Trait PTG Appreciation	-.24 [-.55, .19]	.42 [-.05, .84]	-.01 [-.39, .41]	-.26 [-.51, .02]	-.34 [-.60, -.10]
Trait PTG New Possibilities	-.15 [-.44, .13]	.08 [-.28, .50]	.06 [-.38, .39]	-.10 [-.37, .21]	-.26 [-.58, -.06]
Trait PTG Strength	-.32 [-.68, .20]	.08 [-.31, .45]	.06 [-.31, .43]	-.07 [-.39, .25]	-.23 [-.62, .31]
	Control Group (N = 29)				
Trait PTG	.28 [-.28, .59]	.32 [-.01, .61]	.14 [-.26, .44]	.13 [-.28, .49]	.34 [-.14, .68]
Trait PTG Relationships	.35 [-.24, .67]	.42* [.08, .67]	.20 [-.23, .52]	.27 [-.19, .59]	.51* [.17, .74]
Trait PTG Spirituality	.24 [-.08, .55]	.17 [-.13, .48]	.19 [-.10, .45]	-.01 [-.35, .28]	.08 [-.40, .51]
Trait PTG Appreciation	.08 [-.30, .56]	.21 [-.17, .61]	.09 [-.27, .53]	-.04 [-.40, .41]	.10 [-.38, .54]
Trait PTG New Possibilities	.27 [-.30, .63]	.27 [-.05, .56]	.07 [-.33, .40]	.15 [-.28, .51]	.30 [-.08, .62]
Trait PTG Strength	.17 [-.41, .49]	.18 [-.14, .44]	.04 [-.35, .34]	.03 [-.36, .33]	.24 [-.15, .55]

Note. 95% confidence intervals computed with bias-corrected bootstrapping with 10,000 draws are reported in the brackets. *Correlations involving PTG Strength had n = 19 in the Recent Adversity Group and n = 27 in the Control Group.*