

Meaning and Posttraumatic Growth Among Survivors of the September 2013 Colorado Floods

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In the wake of significant adversity, a range of recovery outcomes are possible, from prolonged distress to minimal effects on functioning and even psychological growth. Finding meaning in one's life is thought to facilitate optimal recovery from such adversity. Research on psychological growth and recovery often focuses on the daily hassles or significant traumas of convenience samples or on people's psychological recovery from medical illness. A small body of research is developing to test theories of growth among survivors of natural disasters. The present study of 57 survivors of the 2013 Colorado floods tested the incremental relations between posttraumatic growth (PTG) and dimensions of meaning in life, vitality, and perceived social support. The most consistent relations observed were among the one dimension of meaning—search for meaning—perceived social support, and PTG. Despite the limitations of this study, we conclude that search for meaning in life may be an important part of recovery from natural disasters, floods being one example. © 2016 Wiley Periodicals, Inc. *J. Clin. Psychol.* 72:1247–1263, 2016.

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From 2000 to 2013, 1,823 national disasters were reported in the United States, 27% of which were classified as floods (FEMA; Federal Emergency Management Agency, 2014). In Colorado from September 11, 2013, to September 30, 2013, an unusual series of storms and rainfall triggered floods, landslides, and mudslides that caused the death of eight people and many other injuries, as well as damaging approximately 18,000 houses and 1,000 businesses (Shaw, 2013). Natural disasters such as hurricanes, storms, earthquakes, and flooding are potentially traumatic events that profoundly affect communities by causing death or injury, demolishing physical, economic, and social environments, and negatively affecting both physical and psychological health, commonly causing symptoms of posttraumatic stress (Drescher, Schulenberg, & Smith, 2014; Framingham & Teasley, 2012; Halpern & Tramontin, 2007; Norris, Friedman, Watson, Byrne, & Kaniasty, 2002).

Research on posttraumatic stress symptoms after natural disasters has suggested mixed prevalence rates of posttraumatic stress disorder (PTSD) ranging from 3% (Garrison et al., 1995) to 59% (Madasakira & O'Brien, 1987). As may be reflected in the highly variable prevalence rate,

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natural disasters can manifest in a huge variety of ways. Among their commonalities, however, are feelings of loss and fear, distributed across large geographical areas, and complications related to reaching survivors and getting necessary supplies and aid to those in need (Galea, Nandi, & Vlahov, 2005; Neria, Nandi, & Galea, 2008).

After natural disasters, there is often a shared sense of loss that may take years to subside, particularly given that the pace of recovery can be erratic and slow, and may not focus evenly on all the areas affected. It is unsurprising, then, that signs of posttraumatic stress may emerge even after 3 years postdisaster (Önder, Tural, Aker, Kılıç, & Erdoğan, 2006). Given extreme variations in rates of PTSD after natural disasters, additional data points are required to begin to identify potential risk and resilience factors.

In some cases, even though these traumatic events lead to severe psychological distress, simultaneously they may engender psychological growth. After a traumatic experience, many survivors report the perception that beyond simply returning to their predisaster baselines of psychological functioning, they experience improvements and growth above their baseline in key areas (Cohen, Hettler, & Pane, 2008; Helgeson, Reynolds, & Tomich, 2006; Tedeschi & Calhoun, 2004; Tedeschi, Park, & Calhoun, 2008). This process generally is referred to as posttraumatic growth (PTG), the positive psychological consequences experienced as a result of the struggle in coping with traumatic events (Tedeschi & Calhoun, 1996, 2004). Such positive changes typically occur within five broad domains: greater appreciation of life and changed sense of priority; closer and more intimate relationships with others; a greater sense of personal strength; recognition of new possibilities or paths for one's life; and spiritual development (Tedeschi & Calhoun, 1996).

PTG has been observed in the posttrauma reports of children (e.g., Cryder, Kilmer, Tedeschi, & Calhoun, 2006), adolescents (e.g., Milam, Ritt-Olson, & Unger, 2004), elders (e.g., Park, Mills-Baxter, & Fenster, 2005), parents of hospitalized infants (e.g., Barr, 2011), cancer patients (e.g., Schroevers & Teo, 2008), HIV caregivers (Cadell, 2007), veterans (e.g., Dekel, Mandl, & Solomon, 2011; Moran, Schmidt, & Burkner, 2013), 9/11 terrorist attack survivors (e.g., Ai, Cascio, Santangelo, & Evans-Campbell, 2005; Park, Aldwin, Fenster, & Snyder, 2008; Steger, Frazier, & Zacchanini, 2008), earthquake survivors (e.g., Karanci & Acarturk, 2005; Yu et al., 2010), flood (e.g., Aslam & Kamal, 2013a,b), and hurricane survivors (e.g., Lowe, Manove, & Rhodes, 2013). This line of research suggests that people from a wide range of developmental stages and national backgrounds have reported positive improvements to their lives as a result of surviving a diversity of stressful and traumatic events.

In PTG research, the kinds of "traumatic events" that have been seen to prompt such reported growth may refer to a broad range of highly stressful or unpredicted events evoking emotional pain beyond one's coping mechanisms (Tedeschi & Calhoun, 2004). Because this range of qualifying events is less restrictive than the definition of trauma used in diagnosing posttraumatic stress disorder, the growth phenomenon is often referred to with other terms, such as stress-related growth or even adversarial growth (e.g., Linley & Joseph, 2004; Park, Cohen, & Murch, 1996).

Nevertheless, there is still an ongoing debate about whether these self-reported changes reflect true changes or just people's illusory beliefs that people—themselves included—emerge stronger and better after traumatic tests (e.g., Frazier & Kaler, 2006; Frazier et al., 2009; Hobfoll et al., 2007; Lechner & Antoni, 2004; Linley & Joseph, 2004). Although prospective evidence is scarce, there is some evidence that while people retrospectively report growing in key domains, scores on surveys of corresponding constructs do not appear to show the expected increases from pre- to posttrauma (Frazier et al., 2009). Perhaps reported growth is the result of a contrast effect between the worst level of functioning people experienced after a trauma and functioning at the time of response.

Alternatively, people's beliefs that they have grown might be a result of positive illusions they hold about life always improving or about people rebounding after setbacks (Taylor & Brown, 1988). Nevertheless, in a study of Weinrib, Rothrock, Johnsen, and Lutgendorf (2006) with community-dwelling women, PTG was found not to be associated with social desirability or negative mood. In sum, despite the fact that evidence of objective increases in functioning caused

by trauma survival is difficult to find, people's reports of PTG are correlated to significantly better outcomes and are therefore worth studying. Hence, our focus in this study has been testing the correlates of PTG.

Correlates of PTG

Some people appear more likely to emerge from traumatic events judging that they have grown, such as those who report greater dispositional optimism (Updegraff, Taylor, Kemeny, & Wyatt, 2002), extraversion, agreeableness, conscientiousness, and openness to experiences (Tedeschi & Calhoun, 1996), self-esteem (Abraido-Lanza, Guier, & Colon, 1998; Tedeschi & Calhoun, 1996), psychological hardiness (Waysman, Schwarzwald, & Solomon, 2001), and bravery, honesty, perseverance, beauty, curiosity, learning, religiousness, gratitude, forgiveness, and zest (Peterson, Park, Pole, D'Andrea, & Seligman, 2008). As one would expect, those who report using adaptive coping strategies, primarily positive reinterpretation/reframing, religion, humor, and social support, also are more likely to report PTG (e.g., Büyükaşık-Çolak, Gündoğdu-Aktürk, & Bozo, 2012; Cadell, 2007; Park et al., 2005; Schroevers & Teo, 2008; Sears, Stanton, & Danoff-Burg, 2003; Swickert & Hittner, 2009).

Of particular interest to the present study is the role of subjective vitality in serving as a psychological resource in times of adversity. Subjective vitality is similar to zest (cf. Peterson et al., 2008), and refers to feeling alive, positively energetic, dynamic, spontaneous, enthusiastic, self-motivated, and fully absorbed with life rather than feeling only physical energy (Nix, Ryan, Manly, & Deci, 1999; Ryan & Frederick, 1997). In a theoretical sense, both happiness and vitality describe pleasant states and belong to the family of positive affects. Vitality refers to more highly activated states than happiness, such as peppiness and enthusiasm (Nix et al., 1999). No research to date has linked vitality and PTG, but one study of survivors of a severe ice storm found that higher levels of vitality predicted lower levels of negative health symptoms (Tremblay, Blanchard, Pelletier, & Vallerand, 2006).

Within the limited research on vitality and well-being, a study with French physical education students, Salama-Younes (2011) found that vitality is positively and significantly related to emotional, social, and psychological well-being and life satisfaction levels of students. Such an active, positive state should be strongly indicative of recovery from traumatic events and may suggest growth as well. Nevertheless, the relationship between PTG and well-being has also been complicated because growth includes both a process and an outcome and coexists with distress.

Moreover, research examining associations between PTG and posttraumatic stress (PTS) spans several inconsistent findings, with some studies displaying a negative relationship (e.g., Kimhi, Eshel, Zysberg, & Hartman, 2010), in some studies a positive relationship (e.g., Dekel et al., 2011; Lowe et al., 2013), and in other studies a curvilinear relationship with moderate levels of PTS producing the highest level of PTG (e.g., Butler et al., 2005; McCaslin et al., 2009) or no relationship at all (e.g., Powell, Rosner, Butollo, Tedeschi, & Calhoun, 2003). It seems that both positive and negative experiences contribute to the occurrence of growth. Because previous studies indicate inconsistent results with the association between PTS and PTG (Park & Lechner, 2006) and there is little research available with respect to vitality in this context, we have a limited idea as to the actual role of vitality, which theoretically would be an essential component with respect to well-being and PTG. On this basis, the current study seeks to be the first of its kind in assessing whether subjective vitality also corresponds to better psychological outcomes such as PTG after natural disaster.

Beyond personal attributes and resources, PTG appears to be enhanced when people are able to draw upon social support, including positive family environment, community resources, and social networks (e.g., Kaniasty & Norris, 1995; Norris & Kaniasty, 1996; Hobfoll et al., 2007; Vranceanu, Hobfoll, & Johnson, 2007). One of the challenges of natural disasters is that their widespread effect may limit the ability of community and family members to provide emotional and material support because potential support providers themselves are dealing with the aftermath (Schaefer & Moos, 2008; Schulenberg et al., 2008). Because social support is

both important to recovery and placed under immense pressure during natural disasters, it was included as a variable in the present study.

PTG and Meaning in Life

Theorists often propose that PTG occurs via people's efforts to rebuild their goals and beliefs, or more broadly their mental models of the world (Janoff-Bulman, 1992; Park, 2010; Triplett, Tedeschi, Cann, Calhoun, & Reeve, 2011). It is argued that trauma so severely challenges these psychological assets that they must be replaced with mental models that can accommodate or explain the trauma. Some argue that the degree to which a trauma challenges a person's core beliefs or world assumptions is more critical to PTG than simple distress level or exposure of a negative event (Cann, Calhoun, Tedeschi, Kilmer et al., 2010).

When people are challenged to reinvestigate or question their assumptions and beliefs then the process serves to encourage growth even if it also causes great pain. For example, someone who loses a home to a flood may struggle to persist in believing that home means safety, that life will be predictable, or that harm can be averted with sufficient planning. After the flood, that person's mental model of the world might be rebuilt to account for risk and uncertainty, to recognize that others are available to provide assistance, and that failsafe security cannot be guaranteed. These theories of PTG are consistent with, and draw upon, the psychological concept of meaning (e.g., Park & Folkman, 1997; Schulenberg, Drescher, & Baczwaski, 2014).

Meaning in life has been defined as people's comprehension of their lives (achieving a consistent understanding of one's self, world, and fit) and their possession of a purpose in life to pursue (having an overarching set of goals or missions one strives to accomplish; Steger, Frazier, Oishi, & Kaler, 2006; Steger, Bundick, & Yeager, 2014). A distinction is made between the experience of meaning in life (referred to as presence of meaning by Steger et al., 2006) and searching for meaning in life. Although presence of meaning is more frequently the target of research, search for meaning appears to have different correlates and often is an indicator of ill-being rather than well-being (Schulenberg, Strack, & Buchanan, 2011; Steger, Kashdan, Sullivan, & Lorenz, 2008).

Whereas presence of meaning is regarded as a trait-like and relatively stable resource that plays a protective and rehabilitative role in helping people cope with adversity (Aiena, Buchanan, Smith, & Schulenberg, 2015; Park, 2010; Schulenberg, Smith, Drescher, & Buchanan, 2015; Steger & Frazier, 2005; Steger & Kashdan, 2007; Steger, Oishi, & Kashdan, 2009; Steger, Owens, & Park, 2015), search for meaning may indicate unresolved coping with adversity or the persistence of efforts to make sense of the event and rebuild mental models (Davis, Nolen-Hoeksema, & Larson, 1998; Steger & Park, 2012). Thus, presence of meaning should be positively correlated with reports of PTG. It is less clear whether search for meaning should be positively correlated with PTG (indicating that an event of sufficient magnitude occurred to trigger rebuilding of mental models) or negatively correlated with PTG (indicating that PTG has not yet been achieved; Steger et al., 2015).

Although search for meaning has been infrequently researched in the context of PTG, research has provided consistent empirical support for the relation between presence of meaning (meaning in life) and PTG (e.g., Cann, Calhoun, Tedeschi, & Solomon, 2010; Frazier et al., 2009; Schulenberg et al., 2014). For example, a cross-cultural study conducted in the United States after the 9/11 terrorist attack and in Spain after the 2003 Madrid bombings demonstrated that in both cultures, greater positive life changes were associated with higher scores on presence of meaning in life (Steger et al., 2008). Similarly, both predisaster and postdisaster meaning, in this case measured as purpose in life, positively predicted PTG scores in survivors of Hurricane Katrina (Lowe et al., 2013). One study assessed both presence of meaning and search for meaning, reporting that presence corresponded with positive life changes, whereas search corresponded with negative changes among three different samples, including those dealing with death and bereavement (Linley & Joseph, 2011).

The Present Study

The present study sought to extend our understanding of the factors that facilitate people's perceptions that they have grown psychologically as a result of surviving the disastrous 2013 floods in Colorado. We investigated the roles of vitality, social support, and dimensions of meaning in life in PTG after controlling for some demographics and PTS. Of these variables, social support is well established in survivors of personal traumas, but less well understood in the context of natural disasters that affect multiple, entire communities. Whereas research consistently reports positive correlations among presence of meaning and PTG, less research is available regarding the relation between search for meaning and PTG. In a similar vein, vitality seems very likely to correlate positively with PTG, but no research has examined this relationship. Thus, the present study offers an assortment of established and emerging constructs of relevance to posttraumatic adjustment in the context of a unique sample of natural disaster survivors. We hypothesized that social support, vitality, and presence of meaning would be positively correlated with PTG. We tentatively hypothesized that search for meaning would be negatively correlated with PTG.

Method

Participants and Procedure

Recruitment for the present study occurred during April and May of 2014. Participants were recruited through the use of public outreach recovery teams in Colorado and social network websites for flood survivors. Prospective participants were provided with a link to a web-hosted survey by e-mail or direct links through social media sites. On the welcome webpage, prospective participants were provided with an explanation of the study and the opportunity to provide informed consent and participate. It was not possible to determine how many potential participants had been contacted through recovery teams and social media, and thus the overall response rate is not known. The questionnaires were presented in randomized order. A total of 121 people entered the website. However, of this initial pool of respondents, only 57 participants (25 males, 32 females), with a mean age of 39.63 years (standard deviation [SD] = 5.67), completed the entire range of scales, and thus these individuals comprise the sample on which the statistical analysis was based.

These participants were primarily White/Caucasian (83.9%) and married (50%) or single/never married (26.8%). Almost half had a 4-year university degree (48.2%), with equal numbers of those who had some college (16.1%) or a master's degree (19.6%). Most were employed full-time (73.7%). All the participants indicated they were either nonreligious (66.7%) or Christian (33.3%), and politically liberal (39.3%) or moderate (37.5%). The figures for political affiliation are similar to the profile of Coloradans. Figures for religious affiliation, or lack thereof, deviate from the general profile of the United States and of Colorado, but are somewhat more in line with the profile of the areas affected. All the participants were living in areas affected by the September floods such as Boulder (36.8%), Longmont (21.1%), Glen Haven (8.8%), and Loveland (5.3%).

Measures

In addition to demographics items, participants completed measures of PTS symptoms, PTG, meaning in life, social support, and vitality. The means and standard deviations for these measures are found in Table 1.

PTS. The Brief Screening Instrument for Post-traumatic Stress (TSQ; Brewin et al., 2002) is a short, symptom-based 10-item self-report scale with a yes/no response (yes = 1, no = 0) format designed to investigate the presence of PTS through mainly focusing on reexperiencing and arousal symptoms. Data suggest that endorsing six or more symptoms could be an indicator

Table 1
Correlation Matrix and Descriptive Data of the Variables

Measures	1	2	3	4	5	6
1. Posttraumatic growth	1	.46***	.26 [†]	.31*	.37**	-.06
2. Posttraumatic stress		1	.04	-.02	-.08	-.14
3. Presence of meaning			1	-.12	.39**	.71***
4. Search for meaning				1	.06	-.31*
5. Perceived social support					1	.32*
6. Subjective vitality						1
<i>M</i>	3.87	2.46	22.14	18.18	60.96	29.38
<i>SD</i>	2.31	2.81	7.86	8.82	16.58	9.64

Note. *M* = mean; *SD* = standard deviation.

* $p < .05$. ** $p < .01$. *** $p < .001$. [†] $p = .063$.

of clinically significant symptoms of PTS (Brewin et al., 2002)¹. The TSQ has shown evidence of good reliability and validity in previous research (e.g., Brewin, 2005; Galea et al., 2007; Walters, Bisson, & Shepherd, 2007). In this study, Cronbach's alpha coefficient was determined to be 0.87.

PTG. The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) is a 21-item self-report scale that measures the extent to which change occurs as a result of a traumatic experience. Participants respond using a 6-point Likert-type scale ranging from 0 (I did not experience this change) to 9 (I experienced this change to a very great degree). The PTGI has five subscales or domains: Relating to Others, New Possibilities, Personal Strength, Spiritual Change, and Appreciation of Life. Subscale scores can be calculated or items may be summed for total scores that vary from 0 to 105. Greater scores indicate greater levels of growth. Cronbach alpha values were reported as ranging from 0.93 to 0.96 for the total score in a number of studies with different samples of survivors (e.g., Engelkemeyer & Marwit, 2008; Peterson et al., 2008; Taku, Cann, Calhoun, & Tedeschi, 2008; Tedeschi & Calhoun, 1996; Weiss, 2008). In this study, Cronbach's alpha coefficient was calculated to be 0.97 for the total score.

Meaning in life. The Meaning in Life Questionnaire (MLQ; Steger et al., 2006) is a 10-item self-report scale designed to measure two dimensions of meaning in life using five items in each dimension. The Presence of Meaning (MLQ-P) subscale measures the degree to which people feel their lives are meaningful. The Search for Meaning (MLQ-S) subscale measures how much people are actively searching for meaning in their lives. Participants are asked to rate each item from 1 (*Absolutely Untrue*) to 7 (*Absolutely True*). Scores range from 5 to 35 on each subscale. Higher scores indicate a higher sense of meaning and search for meaning, respectively. MLQ scores have been demonstrated to have good reliability and structural, convergent, and discriminant validity in a range of studies from around the world (e.g., Brandstätter, Baumann, Borasio, & Fegg, 2012; Schulenberg et al., 2011; Steger et al., 2006; Steger & Kashdan, 2007; Steger, Kawabata, Shimai, & Otake, 2008; Steger et al., 2009). In this study, Cronbach's alpha coefficient was calculated to be 0.93 for MLQ-P scores and 0.95 for MLQ-S scores.

¹Eight of the 57 study participants scored a 6 or greater with respect to the TSQ's established cutoff criteria. In other words, 14% of respondents reported experiencing intense levels of posttraumatic stress associated with the floods. However, it should be noted that while a number of participants reported significant levels of posttraumatic stress, we are not able to speak in terms of a diagnosis of posttraumatic stress disorder (PTSD) per se, as comprehensive assessment tools such as the Structured Clinical Interview (SCID) or the Clinician Administered PTSD Scale (CAPS) were not administered during the course of this study.

Perceived social support. The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988) is a 12-item self-report scale assessing perceived social support from three sources: family, friends, and significant others. Items are rated from 1 (*very strongly disagree*) to 7 (*very strongly agree*). Total scores range from 12 to 84. Greater scores indicate greater perceived support. Research has reported satisfactory psychometric properties of the MSPSS (e.g., Canty-Mitchell & Zimet, 2000; Dahlem, Zimet, & Walker, 1991; Zimet et al., 1988; Zimet, Powell, Farley, Werkman, & Berkoff, 1990). In this study, Cronbach's alpha coefficient was calculated to be 0.92.

Vitality. The Subjective Vitality Scale (SVS; Ryan & Frederick, 1997) is a seven-item self-report scale measuring the subjective perception of vitality or sense of aliveness and energy. Items are rated from 1 (*not at all true*) to 7 (*very true*). The total scores range from 7 to 49, with a higher score indicating a higher vitality level. The SVS is reported to have satisfactory reliability and validity (e.g., Gagne, Ryan, & Bargmann, 2003; Nix et al., 1999; Reinboth, Duda, & Ntoumanis, 2004; Salama-Younes, Montazeri, Ismail, & Roncin, 2009). In this study, Cronbach's alpha coefficient was reported to be 0.92.

Results

Prior to statistical analyses, scores on all questionnaires were examined for skewness and kurtosis. PTG total scores were positively skewed and hence were transformed through the square root transformation procedure, yielding normally distributed scores. All regression assumptions were checked and found to be satisfactory.

Pearson product-moment correlations were computed among independent and dependent variables of PTG (see Table 1). As hypothesized, both perceived social support ($r = .37$, Cohen's $d = .79$) and search for meaning ($r = .31$, Cohen's $d = .65$) were moderately and positively correlated with overall PTG scores. Presence of meaning ($r = .26$, Cohen's $d = .53$) was marginally related to PTG scores. Contrary to hypotheses, vitality was not significantly related to PTG scores. PTS ($r = .46$, Cohen's $d = 1.03$) was moderately and positively correlated with PTG scores. Based on criteria for Cohen's d (1992), all of the bivariate correlation coefficients ranged from moderate to large effect size.

Perhaps the most interesting results from the correlational analysis was the positive relationship between PTG total scores and MLQ-S scores, which was stronger than the relationship between PTG scores and MLQ-P scores. From a theoretical standpoint, the significant correlations of search for meaning with overall PTG scores makes sense as a reflection of people's efforts to rebuild their mental models and meaning systems. They may be still in the process of reorganizing schemas based on their experience with the flood. However, the only prior study to examine this dimension of meaning found it to be indicative of negative, rather than positive, life changes (Linley & Joseph, 2011).

Hierarchical Regression Analysis With PTG Total Scores

To examine how well meaning in life dimensions and perceived social support predict PTG total scores after controlling for some demographics and PTS, one hierarchical multiple regression analysis was conducted. Additional regression analyses were not conducted with respect to the five individual PTG domains because of our insufficient sample size and concern over the potential for a Type-1 error (Hair, Anderson, Tatham, & Black, 1995). Hence, sex, religious status, and PTS scores were entered as the first block in the regression model, with the step accounting for demographics and the effects of the disaster. Both meaning in life dimensions (presence and search for meaning) and perceived social support were entered as a second block, accounting for personal resources (see Table 2). Because vitality was not significantly correlated

Table 2

Summary of Hierarchical Regression Analysis of Sex, Religion, Posttraumatic Stress, Meaning in Life Dimensions, and Perceived Social Support in Overall PTG Scores

Steps	Predictors	PTG total score					Adj R ²
		ΔR^2	β	p	b (SE _b)	95% CI for b	
1	<i>Demographic and disaster step</i>	.35		.001			.30
	Sex (male = 0, female = 1)		.14	.307	.64 (.62)	[-.61, 1.88]	
	Religious status (Christian = 1, not religious = 0)		.35	.014	1.70 (.66)	[.36, 3.03]	
	Posttraumatic stress		.31	.034	.25 (.12)	[.02, .48]	
2	<i>Personal resources step</i>	.21		.002			.48
	Presence of meaning		.09	.430	.03 (.04)	[-.04, .10]	
	Search for meaning		.32	.007	.08 (.03)	[.02, .14]	
	Perceived social support		.29	.023	.04 (.02)	[.01, .07]	

Note. PTG = posttraumatic growth; ΔR^2 = change in R^2 ; b = unstandardized beta; SE_b = standard error of unstandardized beta; β = standardized beta; 95% CI = confidence interval at 95% level.

with PTG scores, it was not taken into account in the regression model². According to the regression analysis, the variables in the model explained 56% of the variance in the total PTG score, $F(6, 37) = 7.717, p < .001; R = .75, R^2 = .56, \text{Adjusted } R^2 = .48$. As presented in Table 2, after controlling for the effects of sex, religious status, and PTS scores, search for meaning and perceived social support explained a significant proportion of the variance.

Discussion

The general aim of this study was to explore the contributory roles of meaning in life dimensions—presence of meaning and search for meaning—along with other personal resources in predicting PTG among September 2013 flood survivors. The results revealed that while controlling for sex and religious status of the participants and symptoms of PTS, search for meaning and perceived social support were important ingredients in the prediction of PTG total scores. Surprisingly, presence of meaning did not predict total PTG scores. Perceived social support predicted PTG total scores. Unexpectedly, we did not find any statistically significant associations when considering subjective vitality scores in relation to the PTG total score.

There have been previous investigations of PTG among natural disaster survivors, as well as some previous research linking PTG to meaning in life after other forms of trauma or adversity (e.g., Linley & Joseph, 2011; Steger et al., 2015). However, natural disasters, such as the floods studied in this paper, essentially are both highly pervasive and highly idiosyncratic. They are pervasive because they often affect large geographical areas and many of the people who live there, which means that one's neighbors and other proximal sources of potential support may themselves need support. Natural disasters are also highly idiosyncratic. One

²We agreed with the suggestions of the reviewer that the relationship between age and vitality could contribute to the regression model. Thus we re-ran the analysis by adding age and vitality scores into the first block of the regression analysis. According to the regression analysis, after adding age and vitality in the first block, all variables explained 58% of the variance in PTG scores. $F(8,35) = 5.951, p < .001, R = .76, R^2 = .58, \text{Adjusted } R^2 = .48$. Both age and vitality did not uniquely contribute to the prediction of PTG scores (see Table 3).

Table 3

Summary of Hierarchical Regression Analysis of Sex, Religion, Posttraumatic Stress, Age, Vitality, Meaning in Life Dimensions, and Perceived Social Support in Overall PTG Scores

Steps	Predictors	PTG total score					Adj R ²
		ΔR^2	β	p	b (SE _b)	95% CI for b	
1	<i>Demographic and disaster step</i>	.35		.005			.26
	Sex (male = 0, female = 1)		.14	.318	.66 (.65)	[-.65, 1.96]	
	Religious status (Christian = 1, not religious = 0)		.35	.016	1.71 (.68)	[.33, 3.09]	
	Posttraumatic stress		.32	.064	.27 (.14)	[-.02, .55]	
	Age		-.03	.857	-.14 (.79)	[-1.74, 1.46]	
	Vitality		.00	.980	.00 (.03)	[-.06, .07]	
2	<i>Personal resources step</i>	.23		.001			.48
	Presence of meaning		.22	.218	.06 (.05)	[-.04, .16]	
	Search for meaning		.31	.017	.08 (.03)	[.02, .15]	
	Perceived social support		.31	.016	.04 (.02)	[.01, .08]	

Note. PTG = posttraumatic growth; CI = confidence interval; ΔR^2 = change in R²; b = unstandardized beta; SE_b = standard error of unstandardized beta; β = standardized beta.

person's property may be destroyed, while another's stands untouched. Given the often poorly understood limitations of homeowner's insurance in cases of flooding, two people who have lost their houses may have drastically diverging levels of financial effect depending on whether they have specific flood insurance or not (Carr et al., 1995; Galea, Tracy, Norris, & Coffey, 2008; Lindell & Prater, 2003; Masozera, Bailey, & Kerchner, 2007).

Furthermore, disasters are multifaceted and complex, varying in speed of onset, duration of impairment, and breadth of effect. As there is a science behind meaning and PTG (e.g., Joseph & Linley, 2008; Wong, 2012), there is also a science behind disaster mental health, which has come into its own as a field over the past 25 years (e.g., Neria, Galea, & Norris, 2009; Schulenberg et al., 2008, 2014). No two disasters are alike because they take place in unique contexts; so to truly understand the consequences of natural disasters, dedicated investigations are needed in each incident, and there are various complexities that one encounters when conducting research in these areas (see, for example, Norris, Galea, Friedman, & Watson, 2006). One contribution of the present study is to provide a snapshot of the lingering wounds, and signs of healing, within the population of people affected by the 2013 flooding in Colorado.

The reported prevalence of traumatic stress after natural disasters is often lower than rates often reported after manmade disasters (Galea et al., 2005). Based on the cutoff criteria of the TSQ, the prevalence of flood-related stress reported within this sample was found to be 14% (scores of 8 out of 57 participants met the cutoff criteria on the TSQ). This rate is somewhat higher than the 8% prevalence rate that would be expected among the general population (Tolin & Foa, 2006). However, different studies report varying prevalence rates after natural disasters, ranging from 3% (Garrison et al., 1995) and 8% (Liu et al., 2006) to 16% (North, Kawasaki, Spitznagel, & Hong, 2004) and 59% (Madakasira & O'Brien, 1987). Our results might reflect the idea that natural disasters such as floods do not affect all members of society equally. Risks of losses by natural disasters increase among more vulnerable, socially disadvantaged people (Cutter, Boruff, & Shirley, 2003).

More importantly, socioeconomic factors such as income, savings, and insurance coverage play a crucial role, not only before and during a disaster but also during the postdisaster recovery process (Fothergill & Peek, 2004). The sample in the present study reported experiencing an average of 2.4 PTS symptoms in the aftermath of the floods. At the same time, 40.7% of the sample reported no symptoms and another 11.1% reported only a single symptom, suggesting that the

level of psychological distress for many of the flood survivors was low. Indeed, encouraging levels of PTG were reported in the sample as well.

PTG is seen to be both a cognitive and an emotional effort to process and make meaning from difficult life events. Such efforts may include an effortful reconstruction of a new set of beliefs and assumptions about the world, life, and themselves (Tedeschi & Calhoun, 2004). Survivors who are faced with these serious life events begin to feel stronger and more confident and generally think that they are capable of coping with any kind of traumatic event hereafter (Tedeschi & Calhoun, 1996). Many people report feeling more ready to make a fresh start and to commit to being open to new possibilities, options, and various routes in life.

Our results reflect the theoretical assertion that PTG incorporates an active search for meaning rather than having an already meaningful life. Engaging with the world, trying to have a purpose or mission or finding meaning in suffering can be a path to an increased appreciation of existence because major life crises help us realize how human life is vulnerable. The positive relationship between search for meaning and PTG has not been consistent with previous studies (e.g., Linley & Joseph, 2011), in which search for meaning was correlated with negative experiences in life. It is possible that natural disasters differ in important ways from other traumas that have been studied. It is also possible that the time that elapsed between the floods and our study allowed respondents to progress in a positive direction in their search for meaning. Finally, it is possible that people who felt they had experienced growth after the floods were more likely to respond to our recruitment efforts.

It may be that serious events such as floods can change the priorities of one's life to "living life to the fullest," especially in respect to supporting the people closest to us with sincere help (Tedeschi & Calhoun, 1996, p. 457). Most people report that they experience or garner meaning through satisfactory relationships (Steger, Beeby, Garrett, & Kashdan, 2013) and after traumatic events survivors often look to their social networks for support. This experience broadens and deepens these relationships to create more important and closer relationships. Particularly, by obtaining greater perceived social support from these meaningful relationships, survivors may reconstruct their meaning systems and engage more effectively with the emotional and cognitive process of PTG by changing the philosophy of their lives.

Accordingly, a positive relationship between perceived social support and PTG is consistent with previous studies (e.g., Cadell, 2007; Park et al., 2005; Prati & Pietrantonio, 2009; Sattler et al., 2006; Swickert & Hittner, 2009). For instance, in a study conducted by Park et al. (2005) with an older adult sample, emotional support (as a part of adaptive coping strategies) was correlated with PTG or growth from the most stressful event ever experienced. Congruently, in a qualitative study from Cadell (2007), social support, especially from family, was found to be one of the primary coping strategies among HIV caregivers. According to Tedeschi and Calhoun (2004), receiving social support is one of the environmental sources that survivors use for rendering self-disclosure to make sense of the events and to get concrete help for better adjustment. Similarly, Lakey and Cohen (2000) suggested that seeking and receiving social support enables people to evaluate the threatening event as less distressful.

In other words, obtaining support may lead people to solve problems more easily, and as they cope with the adversities, they begin to feel more confident and stronger after overcoming the problems triggered by the traumatic event. The more their self-perceptions change, the more their philosophy toward life changes, such as a tendency to establish more meaningful interpersonal relations and become more empathetic and compassionate to others.

Our last finding was the insignificant role of subjective vitality in PTG. Subjective vitality is a positive energy that includes enthusiasm, spontaneity, feeling alive, and fully engaging with life (Ryan & Frederick, 1997). Even though it has received little empirical attention to date, it has been one of the indicators of well-being (Niemi et al., 2006; Salama-Younes, 2011; Tremblay et al., 2006). Yet various research studies conducted on the relationship between well-being and PTG have suggested that positive effects of PTG can take time (Carver & Antoni, 2004; Park & Helgeson, 2006; Park & Lechner, 2006; Tomich & Helgeson, 2012). Perhaps our insignificant

result of vitality with PTG may be related to the time of the assessment. Apparently, achieving vitality—feeling energetic and alive for living to the fullest, as opposed to perceiving some degree of psychological growth—can require more time and greater consolidation of psychological and social resources. This thought raises the idea that vitality may be more an outcome of PTG rather than a predictor of it. It is also possible that sample-specific or event-specific characteristics could account for the lack of statistically significant results.

Limitations

Several limitations of the current study should be considered. First, participants involved in the study were mostly employed and had achieved a 4-year university degree. Having personal/social and professional resources helps to inoculate against stressors and aid in the recovery process. Also, they were recruited mostly through social networks 6 months after the actual flooding occurred. Although there has not been an exact time frame mentioned in PTG assessments (see Cohen et al., 2008), 6 months may not be sufficient to adequately measure the PTG process. In other words, of those individuals who will go on to experience PTG, for some the developmental trajectory for PTG may be shorter, while for others it may take longer.

Additionally, although the geographical distribution of the sample closely reflects where flood damage occurred and several recruitment methods were pursued, including partnership with flood relief agencies and nonprofit organizations, we were unable to compare the sociodemographic characteristics data obtained from the larger community. Such broader data are not available to our knowledge. Thus, it is not known how closely the present sample represents the full population of those affected by the floods.

Second, theoretically PTG is both an outcome and a process and includes many components, such as positive reinterpretation coping (Butler et al., 2005), preexisting personality (Tedeschi & Calhoun, 1996), the intensity of posttrauma cognitions (Calhoun & Tedeschi, 2006), the life narrative (Neimeyer, 2006), and sociocultural factors (Park & Lechner, 2006). For these reasons, we can assume that both meaning in life dimensions and social support are also consequences and predictors. In this study, we examined them as predictors, whereas in other studies, they have been examined as consequences. Surely, the most ideal design would be to obtain pre-event and postevent assessments of PTG correlates employing a repeated measures research method. Future studies emphasizing increasingly systematic research designs may yield much insight into this area above and beyond what may be learned from cross-sectional methods.

Finally, the sample relied on voluntary participation and is admittedly small ($N = 57$). A larger sample that is more varied across demographic characteristics might provide greater insight into the predictors of PTG after this disaster.

Conclusion

In conclusion, this study contributes to the broader research on PTG, meaning in life, and recovery after natural disasters. In particular, the search for meaning dimension and perceived social support were shown to explain PTG above and beyond the influence of PTS symptoms, sex, and religion. Even after property loss, occupational upheaval, financial strains, and the psychological effect of the destructive power of the flooding, people perceived that they had grown and their lives had meaning. Further, this sample appeared to manage their search for meaning in healthy, growth-oriented ways, suggesting that there may be opportunities to highlight existential matters in the aftermath of disasters.

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