Meaning, social support, and resilience as predictors of posttraumatic growth:

A study of the Louisiana flooding of August 2016

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Abstract

Individuals who survive natural hazards often develop posttraumatic stress symptoms or other forms of psychological distress. However, some experience psychological growth. Given that the probability that such events will increase in the near future due to global warming, it would probably be helpful to examine predictors of growth across different kinds of natural hazards. The present study examined positive psychological factors that may serve as buffers against the negative effects of exposure to a natural hazard, specifically following the Louisiana flooding of August 2016. Volunteer participants ($N = 120$) self-reported perceived presence and search for meaning in life, social support, resilience, and posttraumatic growth (PTG). After controlling for amount of property damaged, posttraumatic stress symptoms, sex, religiosity, and ethnicity/race, presence and search for meaning, social support, and resilience explained significant additional variance in PTG scores. This research adds to our growing understanding of how individuals respond to natural hazards.

Keywords: natural disaster, posttraumatic growth, meaning, resilience, social support

Public Policy Relevance

Though individuals who survive natural hazards often develop posttraumatic stress symptoms, some report experiencing positive psychological growth. This study suggests that presence of meaning in life, search for meaning in life, social support, and resilience are all associated with increased posttraumatic growth. Thus, the incorporation of empirically supported prevention and interventions that encourage individuals to obtain a sense of meaning and build social support networks following natural hazards may alleviate the associated economic and health burden and foster a variety of positive outcomes.

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Natural Hazards

Natural hazards are increasing due to climate change (Clayton et al., 2015), causing physical damage to infrastructures and economies (Cunado & Ferreira, 2014). Further, natural hazards vary by type. For example, within the context of heat waves, health and economic factors place individuals at heightened risk for more adverse outcomes (Gamble et al., 2013) compared to other natural hazards. Tornadoes, in contrast to heat waves, occur suddenly and incur more severe structural impacts (Drescher, Schulenberg, & Smith, 2014). Floods, one type of sudden-onset natural hazard, represent a prominent public health concern. Since the year 2000, there have been over 2,100 natural hazards in the United States, 28% of which were classified as floods (Federal Emergency Management Agency, 2017). In August of 2016, powerful storms swept across the state of Louisiana over the course of weeks, delivering over 20 inches of rainfall. The resultant flooding caused 13 deaths, necessitated over 30,000 individuals requiring rescue, and damaged or destroyed an estimated 109,000 housing units (Terrell, 2016). While the structural and economical outcomes of floods are evident, it is also necessary to elucidate the physical and psychological outcomes of individuals affected by the Louisiana flooding.

Natural hazards cause injuries and deaths, as well as psychosocial concerns (Drescher et al., 2014). But, most survivors experience mild psychological symptoms following hazards. For other survivors, the intensity and frequency of symptoms meets diagnostic criteria for posttraumatic stress disorder (PTSD; American Psychiatric Association, 2013). Prevalence rates of PTSD following natural hazards vary widely, ranging from 3% to 59% (Dursun, Steger, Bentele, & Schulenberg, 2016; Ford, Grasso, Elhai, & Courtois, 2015).

Despite the risks natural hazards place individuals for posttraumatic stress reactions and PTSD, hazard-affected individuals frequently report improvements in psychological functioning following hazards, such as posttraumatic growth (Park, Currier, Harris, & Slattery, 2017). Consistent with recent conceptualizations, posttraumatic growth (PTG) refers to an individual's experience of positive psychological development after a major life crisis or traumatic event (Tedeschi & Calhoun, 1996, 2004; Tedeschi, Shakespeare-Finch, Taku, & Calhoun, 2018). Reports of PTG often fall within five domains: closer relationships with others, acknowledgment of new possibilities, a greater sense of personal strength, spiritual change and development, and a greater appreciation of life (Tedeschi et al., 2018; Weathers, Aiena, Blackwell, & Schulenberg, 2016). Posttraumatic growth has been studied in earthquake (McBride, Lovelock, Shepherd, Zubizaretta, & Burch, 2018) and flood survivors (Dursun et al., 2016), among other natural hazard survivors (see Cohen, Hettler, & Pane, 2008 for a review). Individuals can improve psychological functioning after a natural hazard above and beyond symptom reduction, but the degree to which this growth occurs is highly variable (Tedeschi et al., 2018). An understanding of the conditions under which PTG occurs is paramount to promoting well-being in the wake of natural hazards.

Meaning and PTG

One domain of well-being relevant to natural hazard outcomes is meaning in life. Definitions of meaning in life involve people's beliefs that their lives have purpose, make sense, and are significant (Martela & Steger, 2016). Presence of meaning, or simply presence, is a trait-like variable and concerns the belief that one's life is meaningful or significant and is generally the target variable in meaning in life research (George & Park, 2016). Presence of meaning is positively related to psychological well-being (Steger, Kashdan, Sullivan, & Lorentz, 2008) and

PTG (Tedeschi et al., 2018). In contrast to presence, search for meaning indicates deficits in coping and a motivation to discover meaning, with the two-factor model showing factor-analytic support (Steger, Frazier, Oishi, & Kaler, 2006). Search is frequently associated with psychological distress (Park, Chmielewski, & Blank, 2010). However, some studies have found search for meaning to be positively associated with PTG (Dursun et al., 2016), illustrating inconsistencies in the literature.

Natural disasters can shatter assumptions about the self and the world. Individuals are often left searching for meaning afterwards. As new meanings are established, individuals reconstruct views of themselves and their world; meaning can once again be experienced (Van Tongeren, Aten, Davis, Davis, & Hook, 2017). This theory of meaning making is consistent with theories of psychological growth (Park, 2010). Despite theoretical and practical relevance, findings involving search for meaning are rare. Further, only one study has examined presence and search in a natural hazard sample simultaneously (Dursun et al., 2016). Aside from presence and search, other psychological resources relate to PTG.

Social Support and PTG

An individual's ability to draw upon support from others facilitates PTG and posttraumatic stress. For example, individuals report higher PTG when they are embedded in social networks compared to individuals who are not (Vranceanu, Hobfoll, & Johnson, 2007). With regard to posttraumatic stress, Caramanica, Brackbill, Stellman, and Farfel (2015) found that prevalence rates of PTSD were higher among individuals with decreased levels of social support following the terrorist attacks of 9/11, compared to individuals with higher social support. Social support has been consistently hypothesized as a protective factor in the wake of natural hazards (McGuire et al., 2018). Because natural hazards often affect entire communities,

sources of social support may be restricted, as the emotional and material resources of potential social support providers are often allocated to their own hazard response.

Resilience and PTG

Resilience refers to an individual's ability to adapt and regain balance after being confronted with adversity (Southwick & Charney, 2018). Posttraumatic growth, rather, represents positive changes above and beyond the maintenance of subclinical psychological functioning. Resilient individuals use both internal and external resources under difficult conditions (Southwick, Bonanno, Masten, Panter-Brick, & Yehuda, 2014), which leads to greater physical and emotional well-being compared to non-resilient individuals (Aiena, Baczwaski, Schulenberg, & Buchanan, 2015). Resilience research has relied on a large and diverse array of self-report measures (Weathers et al., 2016), which may account for both positive and negative associations between resilience and PTG (Albuquerque, Narciso, & Pereira, 2018; Levine, Laufer, Stein, Hamama-Raz, & Solomon, 2009). Within the context of natural hazards, resilience moderates the association between a given environmental event and the subsequent psychological response (Doherty & Clayton, 2011). Non-resilient individuals are less able to successfully adapt to an environmental stressor compared to resilient individuals. Tedeschi and Calhoun (1996, 2004) explained that for PTG to occur, the adverse event must be disruptive enough to cause the survivor to engage in making meaning or exhibit resilience related to that event (see also Tedeschi et al., 2018). As such, resilience should be examined separately to presence and search for meaning and social support, as both are theorized to uniquely relate to PTG.

Purpose of This Study

Given the unique impact of presence of meaning, search for meaning, social support, and resilience on PTG, as well as the lack of an adequately powered study examining these variables following a natural hazard, we chose to examine these variables in the current study with respect to PTG. Posttraumatic stress was controlled for due to findings that those who report increased symptoms of PTSD are more likely to report PTG after a traumatic event (Shakespeare-Finch & Lurie-Beck, 2014). Amount of damage received was controlled for due to findings that individuals who suffer severe house damage after a natural hazard report increased PTSD symptoms (Pan et al., 2015). Gender was controlled for due to consistent findings that women report more PTG after a traumatic event than men (Vishnevsky, Cann, Calhoun, Tedeschi, & Demakis, 2010). Religious status was also controlled for due to evidence indicating that individuals who report religiosity report greater PTG following traumatic events (Van Tongeren et al., 2017). Income was controlled for due to findings that individuals reporting increased income report greater PTG (Cordova, Cunningham, Carlson, & Andrykowski, 2001). Lastly, ethnicity/race was controlled for due to findings that ethnic minorities report more PTG than their ethnic majority counterparts (Helgeson, Reynolds, & Tomich, 2006). It was hypothesized that presence of meaning, perceived social support, and resilience would be significantly and positively correlated with PTG, whereas search for meaning would be significantly and negatively correlated with PTG. It was further hypothesized that presence of meaning, search for meaning, perceived social support, and resilience would contribute a significant amount of variance, above and beyond demographic variables and symptoms of posttraumatic stress, in the prediction of PTG.

Method

Participants and Procedure

The study protocol and procedure were approved by the Institutional Review Board at the University of Mississippi. Participants were recruited from October 2016 through January 2017 (two to five months post-flood) through outreach recovery teams, including church organizations and schools, as well as social network websites for flood survivors. This time frame was utilized given recent PTG trajectory research indicating no differences in PTG at one-, three-, and twelve-month follow-up post natural disaster (Marshall, Frazier, Frankfurt, & Kujier, 2015). Participants were provided with a Qualtrics link by news bulletin, email, or direct link through social network websites. On the initial page of the Qualtrics link, participants were provided with a description of the study's purpose, risks, and benefits. Those who were above the age of 18 years old and chose to participate were provided the option to begin the survey (i.e., participants provided written consent by clicking to the next page of the survey), while those who chose not to participate were provided with information about flood relief resources. Participants who provided consent were then given with a battery of measures (described in greater detail below), each of which were well known for yielding reliable and valid scores: the PTSD Checklist for *DSM-5*, the Posttraumatic Growth Inventory, the Meaning in Life Questionnaire, the Multidimensional Scale of Perceived Social Support, and the Brief Resilience Scale. A demographic questionnaire assessed self-report data on gender, age, ethnicity/race, religiosity, annual household income, place of residence during the floods, and assessment of damage from the floods. The online survey took approximately 15 minutes to complete. Upon completion (or withdrawal) from the study, each participant was presented with the rationale for the study, a description of common reactions to hazards, adaptive coping strategies, and guidelines for when and how to seek help (i.e., phone numbers for hotlines dedicated to helping survivors of the floods). The study authors have no conflicts of interest to disclose.

Though it was not possible to determine exactly how many people were contacted through the outreach recovery teams or via social media postings, 225 individuals entered the Qualtrics website, and 120 participants completed the entire set of surveys or had less than 5% of their data missing. The participants were primarily female (85.8%, $n = 103$) between the ages of 45 to 54 years old (29.2%, $n = 35$) or 35 to 44 years old (27.5%, $n = 33$). The sample was predominantly White (89.1%, $n = 107$). Most participants identified as religious (89.2%, $n = 107$), primarily Christian (85.8%, $n = 103$). The most commonly reported annual household incomes ranged from \$50,000 to \$74,999 (23.3%, $n = 28$) and \$75,000 to \$99,999 (17.5%, $n = 21$). Most participants resided in the Louisiana cities of Lafayette (31.7%, $n = 38$), Youngsville (14.2%, $n = 17$), Denham Springs (12.5%, $n = 15$), and Baton Rouge (9.2%, $n = 11$). The majority (77.5%, $n = 93$) of participants experienced property damage during the floods. If a participant reported damage, they rated this damage on a scale of 1 *barely any damage*, 2 *some damage*, 3 *moderate damage*, 4 *significant damage*, and 5 *damage unable to be repaired*, with most reporting significant (60.2%, $n = 56$), moderate (19.4%, $n = 18$) or unrepairable (12.9%, $n = 12$) damage. Participants who did not report damage were coded as a zero on this scale. Some ($n = 28$; 23.33%) of the participants were at or above the 33-point cutoff for clinical symptoms of PTSD. The average time of participation since the end of the flood (August 22, 2016) was 94.40 days ($SD = 9.92$). Consistent with prior research on PTG (e.g., Tedeschi & Calhoun, 1996) participation time was not correlated with PTG, $r = .13$, $p = .17$.

Measures

Posttraumatic stress. The PTSD Checklist for *DSM-5* (PCL-5; Weathers et al., 2013) is a 20-item self-report screening tool that corresponds to diagnostic criteria for PTSD (American Psychiatric Association, 2013). Participants were provided with a list of problems, such as

“Repeated, disturbing, and unwanted memories of the stressful experiences,” and indicated the degree to which each has been bothersome over the past month. Items employ a five-point Likert-type response scale. Item scores are summed, yielding a total score ranging from 0 to 80. Higher scores reflect increased symptoms of posttraumatic stress, with scores at or above 33 indicating a provisional diagnosis of PTSD (pending further evaluation). PCL-5 scores demonstrated excellent internal consistency with the current sample (Cronbach’s $\alpha = .95$).

Posttraumatic growth. The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) is a 21-item self-report measure that assesses positive outcomes reported by individuals who have experienced a traumatic event. The PTGI is comprised of five factors corresponding to spiritual change, appreciation of life, personal strength, relating to others, and new possibilities. Participants were provided with statements such as, “I changed my priorities about what is important in life,” and indicated the degree to which each occurred as a result of the flooding. Each item employs a six-point Likert-type response format. Item scores are summed, yielding a total score ranging from 0 to 105. Higher scores reflect increased perceived growth. PTGI scores demonstrated excellent internal consistency reliability with the current sample (Cronbach’s $\alpha = .94$).

Meaning in life. The Meaning in Life Questionnaire (MLQ; Steger et al., 2006) is a 10-item self-report measure of presence of meaning (MLQ-P; 5 items) and search for meaning (MLQ-S; 5 items). Presence assesses the degree to which individuals perceive their lives as meaningful. Search assesses the degree to which individuals are actively searching for meaning in their lives. Participants were provided with statements such as, “I am looking for something that makes my life feel meaningful,” and indicated their degree of agreement with each statement. Each item employs a 7-point Likert-type response format. Scores are summed for the

respective subscales (there is no total score). Each subscale score ranges from 5 to 35. Higher presence scores indicate greater perceived presence of meaning, while higher search scores indicate a greater motivation to search for meaning. Both presence and search subscales demonstrated excellent internal consistency reliability with the current sample (Cronbach's α = .91 and .91, respectively).

Perceived social support. The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988) is a 12-item self-report measure of perceptions of support (family, friends, significant others). Participants were provided with statements such as, "I get the emotional help and support I need from my family," and indicated their degree of agreement with each statement. It employs a 7-point Likert-type scale. Scores on the MSPSS are averaged, and range from 1 to 7. Higher scores indicate greater perceived social support. MSPSS total scores demonstrated excellent internal consistency reliability with the current sample (Cronbach's α = .95).

Resilience. The Brief Resilience Scale (BRS; Smith et al., 2008) is a 6-item self-report measure of resilience defined as "the ability to bounce back or recover from stress" (Smith et al., 2008, p. 194). Participants were provided with statements such as, "I tend to bounce back quickly after hard times," and indicated their degree of agreement with each statement. The BRS employs a 5-point Likert-type response scale. Scores are summed, ranging from 6 to 30. Higher scores indicate greater perceived resilience. BRS scores demonstrated excellent internal consistency reliability with the current sample (Cronbach's α = .91).

Results

Power

An *a priori* power analysis was conducted to determine sample size necessary to conduct a hierarchical multiple regression analysis using G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007). Results indicated that assuming a medium effect size $f^2 = .15$ requires at least 107 participants.

Data Screening

Data were screened for accuracy errors, missing data, outliers, and assumptions of normality, linearity, additivity, homogeneity, and homoscedasticity. We excluded 105 of the original participants with more than 5% of their data missing using columns representative of variables of interest. Of the remaining 120 included in our analyses, the *mice* package in *R* (Van Buuren & Groothuis-Oudshoorn, 2011) was used to impute continuous data (i.e., not demographics) for two participants who were missing 5% or less of those data. No outliers were detected using Mahalanobis distance. Data met assumptions of normality, linearity, additivity, homogeneity, and homoscedasticity.

As common method variance (i.e., variance attributable to the method of measurement rather than the purported constructs of the measures) has been identified as a potential threat due to the sole use of self-report measures in this study, statistical assessment was conducted to assess the extent of this potential threat. Harman's single factor test, the most widely used method of assessing common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) was conducted to examine the degree to which a single measurement factor emerged to account for majority of the covariance among the measures. As the single factor accounted for only 33.55%, which is less than 50%, we concluded that there is no evidence of common method bias within this data. As Podsakoff et al. (2003) note, this test may not reveal all forms of method bias, as data often do not fit a one-factor model.

Correlational Analyses

Pearson product-moment correlations were computed to explore relationships among variables in relation to PTG, which are shown in Table 1. Consistent with our hypotheses, perceived social support ($r = .19$), search for meaning ($r = .21$), and presence of meaning ($r = .19$) were all positively correlated with overall PTG scores. Posttraumatic stress ($r = .24$) was also positively correlated with overall PTG scores. Resilience, however, was not significantly correlated with overall PTG scores ($r = .11$).

Regression Analyses

We used hierarchical multiple regression to test the degree to which whether meaning in life, perceived social support, and resilience accounted for additional PTG variance above and beyond demographic variables (i.e., income, gender, ethnicity/race, damage impact, and religiosity). Demographic variables were entered in the first block. Overall, this step was significant, indicating that these variables predicted PTG, $F(6, 108) = 4.34, p < .001, R^2 = .19$. In examining specific predictors, posttraumatic stress was a weak predictor of PTG ($\beta = 0.19$), indicating that as posttraumatic stress increased, PTG increased. Damage impact was a stronger predictor of PTG than posttraumatic stress ($\beta = 0.23$), portraying that increases in damage impact predicted increased PTG. Ethnicity/race was a significant predictor of PTG ($\beta = -0.22$), indicating that the non-White group had higher levels of PTG compared to the White group. Gender was not a predictor of PTG ($\beta = -0.11$), and this result should be interpreted with the caveat that our sample was predominantly female. Additionally, neither income ($\beta = -0.03$), nor religiosity ($\beta = 0.11$), was a predictor of PTG.

In the second step, presence of meaning, search for meaning, perceived social support, and resilience were entered as predictors along with the step 1 variables. The addition of these

variables was significant, $\Delta F(4, 104) = 11.86, p < .001, \Delta R^2 = .26$, overall $R^2 = .45$. Presence of meaning was a predictor of PTG ($\beta = 0.32$). Search for meaning ($\beta = 0.30$) and social support ($\beta = 0.27$) were also positive predictors of PTG. Finally, resilience was a positive predictor of PTG ($\beta = 0.23$). See Table 2 for relevant statistics. Beta values (i.e., standardized coefficients) indicated that these variables were relatively equal in their prediction of PTG. Also, pr^2 values are provided as a measure of effect size for the regression, and they further indicate that each variable provides approximately the same amount of predictive variance in PTG when controlling for all other variables. In sum, the positive coefficients were quite similar across the four variables studied, and indicated that as presence of meaning, search for meaning, perceived social support, and resilience increased, PTG increased.

Discussion

Natural hazards, such as floods, are pivotal events for survivors. Hazards affect the infrastructure and social resources of communities and assail the psychological resources of survivors. Despite the obvious threat posed by natural hazards, people nonetheless appear able to find the seeds of psychological growth in their aftermath. Given that natural hazards are projected to increase in frequency in the future, it is increasingly necessary to examine predictors of recovery and growth in samples considering various demographics and geographic locations. The present study sought to further the scientific understanding of the facilitators of PTG with a sample of adequate power, particularly given the context of the devastating flooding that occurred in Louisiana in August of 2016. As in a similar, previous study of PTG following the 2013 flooding of Colorado (Dursun et al., 2016), search for meaning and receipt of social support predicted greater reports of PTG. In addition, PTG was significantly related to symptoms of posttraumatic stress, the impact of flood damage, and the demographic variables of religiosity

and ethnicity/race. After controlling for these variables, PTG was related to the psychological variables of presence of meaning and resilience.

Although there was convergence with this earlier study of PTG following flooding with respect to search for meaning, the present study also found that the perception of presence of meaning was positively related to reports of PTG. This finding was expected, as presence of meaning consistently is related to desirable well-being outcomes across a broad spectrum of constructs and populations (see Steger, Oishi, & Kashdan, 2009). However, in contrast search for meaning is often related to various forms of psychological distress, as opposed to favored outcomes such as growth (Schulenberg, Strack, & Buchanan, 2011; Schulenberg et al., 2013). One possible resolution of this apparent paradox comes from theories of PTG that emphasize the necessity for people to discover new meaning in their lives following events that upset the meaning systems that had been constructed during times of safety and predictability (e.g., Park, 2010). In these models, PTG comes about as a result of the search for new meanings that can accommodate natural hazards such as flooding. The results of the present study might be seen as support for meaning-making models of PTG.

Social support and resilience were replicated as important correlates of PTG. Perceiving that others are available to provide support continues to be buttressed by research as an important partner associated with PTG (Vranceanu et al., 2007). A more nuanced contribution from the present research is in adding to the literature in differentiating between PTG and another closely-related construct. Resilience was distinguished from PTG in our sample by a negative rather than positive relationship with posttraumatic stress symptoms, and by larger positive relationships with well-being variables such as presence of meaning and social support. Interestingly, resilience also had a medium-sized positive correlation with search for meaning. This pattern of

results suggests that those who perceive growth and those who perceive themselves as resilient (i.e., possessive of the capacity to bounce back) may search for new meanings in their respective lives following such events compared to those who do not perceive growth and resilience. However, resilient individuals may be distinguished by less distress and greater well-being compared to non-resilient individuals, as a trademark characteristic of resilient individuals is the ability to adapt to environmental stressors (Southwick et al., 2014). Additionally, the positive association between resilience and PTG highlights the ability of individuals to both bounce back quickly, without much distress or disruptions in well-being, and experience a positive trajectory of growth following such an event.

This pattern could have important clinical and practical implications, suggesting divergent strategies for those who are distressed and seeking meaning and those who are not. For the former, finding new meanings and perspectives might be a fruitful part of growing in the aftermath (a PTG arc), whereas for the latter, consolidating one's capacity for survival and reinforcing a survivor's investments in the meaning drawn from life (a resilience arc). It is interesting that an engagement with meaning in life is involved in both cases, which further suggests that clinicians serving those affected by natural hazards may wish to become conversant in existential matters.

Aside from the evident implications related to fostering a sense of meaning and resilience in hazard survivors, the results of the current study also suggest that building social support in the wake of a natural hazard may increase PTG. Response efforts to those affected by natural hazards may seek to address social support, as it appears paramount in promoting a positive adjustment experience. Indeed, a commonly utilized evidence-based intervention method used when responding to natural hazards is Psychological First Aid (PFA; Hambrick, Rubens,

Vernberg, Jacobs, & Kanine, 2014). The PFA model suggests that connections with social support is a prominent facet of responding to individuals affected by natural hazards. Taken together, the results of the current study introduce clinical and practical implications in a sample with sufficient statistical power with regard to positive psychology constructs and a positive adjustment experience above and beyond symptom reduction.

Limitations and Future Directions

Conclusions drawn from this study are limited by several factors. First, the cross-sectional and retrospective nature of our study design prevent causal interpretation. While presence of and search for meaning, resilience, and social support are related to PTG scores, it remains unknown whether or not these variables cause fluctuations in PTG scores. Prospective or case-controlled studies would help assess whether meaning, resilience, and social support precede and possibly help galvanize PTG. Due to the reactionary nature of hazard research, it is difficult to conduct studies with tight internal validity controls. However, studies like the present one are critical for documenting that even after events such as natural hazards people are able to perceive that their lives and capacities have expanded, and for signaling some of the potential mechanisms by which people come to perceive this growth.

A second limitation was that our sample was primarily female. As such, a more diverse sample is needed to warrant generalization of results to other flood victim groups. This predominantly female sample may also shed light as to why some results differed from Dursun and colleagues (2016), which included a more even sample of females ($n = 32$) and males ($n = 25$). Additionally, the majority of the sample was within the age range of 35 to 54 ($n = 68$) and predominantly White ($n = 107$). In conjunction with the limitations regarding sample size and demographic characteristics, participants were recruited through various forms of social media

and by contacting relief organizations and churches in the Louisiana area. It is therefore unwise to conclude that our sample is representative of all individuals affected by the 2016 Louisiana flooding. For example, aside from the gender of participants, individuals who completed our questionnaire via Qualtrics were assumed to have internet access. While online survey data collection methods are mainstream for psychological research (Reips, 2012), individuals who experienced extensive flood damage may not have had access to such resources at the time data were collected, especially if the hazard-related damage they experienced was extensive. Future studies comprising a more geographically diverse sample may help to corroborate these findings.

Another limitation relates to the lack of longitudinal methodology. Within the context of natural hazards, the lack of longitudinal studies can be attributed to recruitment and attrition concerns (i.e., longitudinal studies of natural hazard survivors require extensive resources and multisector partnerships; Hudson, Thieken, & Bubeck, 2019). Further, cross-sectional studies can be misleading in that they do not capture the full trajectory of symptoms, especially with natural hazard survivors (Siegrist, 2013). A final limitation was that the sample identified predominantly as Christian (85.8%). While comparable to the 84% of individuals who identify as Christian among religious adults in Louisiana (Pew Research Center, 2014), the results may not generalize to individuals affected by natural hazards who identify with other religions other than Christianity.

Longitudinal studies would provide insight regarding how individuals respond to hazards and how these responses change as time progresses. For example, future researchers may collect baseline data related to presence, search, social support, and resilience immediately following a natural hazard. Then, at a subsequent time point, outcome data on PTG or posttraumatic stress could be collected to determine whether baseline variables predict PTG or posttraumatic stress at

future time points. Examining predictors of PTG and posttraumatic stress longitudinally would be a feasible first step in facilitating longitudinal research with hazard survivors. Further, examining PTG over time will help researchers to better understand its trajectory, that is, onset, fluctuations, duration, and outcome, as individuals will differ in the time it takes for them to experience growth after an event such as a natural hazard (Cohen et al., 2008), and not everyone will perceive or experience such growth. Regarding potential clinical implications, results from this study should motivate clinicians to incorporate meaning-centered practices (see Vos, 2018) when working with natural hazard survivors.

Conclusion

Despite these limitations, our study adds to the research examining how individuals respond to natural hazards. These findings build upon and add to the small but emerging area of research examining both presence and search for meaning in relation to PTG among survivors of natural hazards utilizing an adequately powered sample. Promoting a sense of meaning in life and encouraging individuals to search for meaning in life is associated with a wide variety of positive outcomes. Social support and resilience, too, are important in promoting positive growth after a traumatic event, such as a natural hazard.

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Table 1

Correlation Matrix and Descriptive Statistics of Posttraumatic Stress, Presence of Meaning, Search for Meaning, Resilience, Perceived Social Support, and Posttraumatic Growth (N = 120)

Measures	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10
1 PTS	20.52	16.94	-									
2 Presence	25.52	6.70	-.41**	-								
3 Search	21.02	7.82	.23*	-.44**	-							
4 Resilience	20.53	4.86	-.54**	.46**	.30**	-						
5 Perceived Social Support	65.00	16.12	-.42**	.50**	.20*	.33**	-					
6 PTG	52.42	24.06	.24**	.19*	.21*	.11	.19*	-				
7 Income	4.18	2.10	-.16	.13	-.15	.16	.25**	-.10	-			
8 Sex (Male)	-	-	.12	-.04	-.01	-.22*	-.02	-.04	-.13	-		
9 Damage Impact	2.90	1.75	.42**	-.23*	.07	-.10	-.15	.28**	-.08	.17	-	
10 Religion (None)	-	-	-.08	.07	.10	-.05	.05	.11	.11	<.01	-.07	-
11 Race (Minority)	-	-	-.06	-.01	-.13	-.12	.05	-.19	.15	-.07	-.11	.12

Note: * indicates $p \leq .05$; ** indicates $p \leq .01$. *Note.* Income was rated from 1 to 9 using binned ranges for the purpose of this study. The average score of 4 represents \$100,000 to \$124,999. The reference group is included in parenthesis for binary variables.

Table 2

Hierarchical Regression Analyses of Posttraumatic Stress, Presence of Meaning, Search for Meaning, Resilience, and Perceived Social Support in Predicting Overall PTG Scores (N = 120)

Predictor	β	B	SE_b	T	p	pr^2
Step 1						
PTS	0.19	0.28	0.14	2.03	.05*	.04
Gender	-0.11	-7.62	6.01	-1.27	.21	.01
Damage	0.23	3.23	1.33	2.43	.02*	.05
Income	-0.03	-0.39	1.04	-0.38	.70	<.01
Religion	0.11	8.065	6.64	1.30	.20	.02
Ethnicity/Race	-0.22	-17.25	6.96	-2.48	.01**	.05
Step 2						
PTS	0.48	0.69	0.15	4.72	<.001**	.18
Gender	-0.07	-5.05	5.23	-0.97	.34	.01
Damage	0.23	3.12	1.16	2.70	.01**	.07
Income	-0.10	-1.16	0.90	-1.29	.20	.02
Religion	0.09	7.13	5.69	1.25	.21	.01
Ethnicity/Race	-0.12	-9.32	6.16	-1.51	.13	.02
Presence	0.32	1.17	0.36	3.21	<.01**	.09
Search	0.30	0.92	0.26	3.46	<.001**	.10
Social Support	0.27	0.41	0.14	3.01	<.01**	.08
Resilience	0.23	1.16	0.50	2.34	.02*	.05

Note: β = Standardized beta; B = Unstandardized beta; SE_b = Standard error of unstandardized beta, pr^2 = partial correlation. Religion and ethnicity/race were dummy coded with no religion and non-White as the comparison groups. * indicates $p \leq .05$; ** indicates $p \leq .01$