


# Perceived and actual posttraumatic growth in religiousness and spirituality following disasters

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## Abstract

**Objective:** Religious/spiritual (R/S) growth is a core domain of posttraumatic growth (PTG). However, research on R/S growth following disasters has over-relied on retrospective self-reports of growth. We therefore examined longitudinal change in religiousness/spirituality following two disasters.

**Method:** Religious survivors of Hurricanes Harvey (Study 1) and Irma (Study 2) completed measures of perceived R/S PTG, general religiousness/spirituality (“current standing”-R/S PTG), and subfacets of religiousness/spirituality (spiritual fortitude, religious motivations, and benevolent theodicies). In Study 1, 451 participants responded at 1-month and 2-month postdisaster. In Study 2, participants responded within 5-days pre-disaster and at 1-month ( $N = 1,144$ ) and 6-months postdisaster ( $N = 684$ ).

**Results:** In both studies, perceived R/S PTG was weakly related to longitudinal increases in general religiousness/spirituality and in most of its subfacets, but reliable growth in any R/S outcome was rare. Additionally, Study 2 revealed evidence that actual change in psychological well-being is associated with actual (but not perceived) R/S PTG, but disaster survivors tend to exhibit declines in their religiousness/spirituality, spiritual fortitude, and religious motivations.

**Conclusions:** Results suggest disaster survivors are only modestly accurate in perceiving how much positive R/S change they experience following a disaster. We discuss implications for clinical practice, scientific research, and empirical and conceptual work on PTG more broadly.

## KEYWORDS

disasters, longitudinal, posttraumatic growth, religion, spirituality

## 1 | INTRODUCTION

Disasters are among the most commonly experienced traumatic events, with U.S. lifetime prevalence rates ranging from

22% (Briere & Elliott, 2000) to 51% (Kilpatrick et al., 2013). Following a disaster, survivors often draw on their religion/spirituality to help them cope and make meaning (Aten et al., 2019; Park, 2016). Survivors also often report experiencing religious/spiritual (R/S) growth (Davis, Kimball, Aten, Andrews, et al., 2019; Smith, Pargament, Brant, & Oliver, 2000). Although R/S growth is one of the core domains of

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posttraumatic growth (PTG; Tedeschi & Calhoun, 1996), only a few empirical studies have focused on R/S growth following disasters (Aten et al., 2019). In addition, most existing studies have used a cross-sectional methodology and collected only postdisaster data (Aten et al., 2019), thereby limiting their ability to test hypotheses about R/S growth over time (which requires longitudinal data) and R/S growth as a result of the disaster (which requires predisaster or baseline data; Aten et al., 2019). Moreover, despite considerable controversy over what the construct of PTG actually is and over how to measure it validly (Frazier et al., 2009; Jayawickreme & Blackie, 2014), to our knowledge, no studies have examined the relationships between perceived and actual R/S PTG following disasters. This paper addresses these gaps.

### 1.1 | Posttraumatic and religious/spiritual growth following disasters

PTG refers to “positive [personality] change experienced as a result of the struggle with highly challenging life circumstances” (Jayawickreme & Blackie, 2014, p. 312). Research on PTG has proliferated since Tedeschi and Calhoun (1996) proposed the construct. There has been extensive empirical research on perceived PTG following disasters, but very little has focused on the R/S domain of PTG following disasters. Extant longitudinal evidence suggests some key contributors to perceived R/S PTG following disasters are (a) positive religious coping, (b) *benevolent theodicies* (i.e., “beliefs about suffering that attempt to reconcile the manifestation of suffering in the world with a monotheistic view of an essentially benevolent deity,” Wilt, Exline, Lindberg, Park, & Pargament, 2017, p. 137), and (c) religious dispositions (Davis, Kimball, Aten, Andrews, et al., 2019). These findings are consistent with meta-analytic evidence suggesting three of the strongest correlates of overall perceived PTG following trauma are positive religious coping, positive reappraisal coping, and general religiousness/spirituality (Prati & Pietrantoni, 2009). Toward that end, the primary focus of this paper is to investigate the degree to which individuals exhibit R/S growth following a disaster.

### 1.2 | Methodological challenges to studying PTG

Several methodological challenges obfuscate efforts to study postdisaster PTG. Disaster research on PTG is usually limited by the same limitations that plague research on PTG more broadly (Mangelsdorf, Eid, & Luhmann, 2019). Most existing studies have used a cross-sectional methodology and post hoc self-reports of perceived PTG (Aten et al., 2019; Cook, Aten, Moore, Hook, & Davis, 2013). Even among the few longitudinal studies, PTG is typically assessed via retrospective

self-reports of growth. The extant longitudinal studies suggest it is common for disaster survivors to perceive PTG, yet this self-perception may be more reflective of active coping efforts than of actual positive personality change (Achterhof et al., 2018; Hafstad, Kilmer, & Gil-Rivas, 2011; Holgersen, Boe, & Holen, 2010). For instance, studies suggest perceived PTG from disasters is predicted by deliberate cognitive processing (e.g., post-disaster meaning making) and secondary control beliefs (e.g., changing one's thoughts to accommodate one's postdisaster reality), as well as by virtues (e.g., gratitude and spiritual fortitude; McElroy-Heltzel et al., 2018; Zhou & Wu, 2016).

Indeed, the construct of PTG itself has also been embroiled in controversy, namely over (a) whether PTG reflects genuine positive personality change and (b) whether PTG can be measured validly by post hoc self-reports of growth (Mangelsdorf et al., 2019). This debate has centered on whether PTG truly reflects positive personality change or instead reflects other phenomena, such as (a) active coping efforts (e.g., benefit finding, positive reinterpretation, or identity-related meaning making; Frazier et al., 2009; Pals & McAdams, 2004; Tennen & Affleck, 2002), (b) motivated cognitive distortions (e.g., “positive illusions;” Maercker & Zoellner, 2004; McFarland & Alvaro, 2000; Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000), or (c) increased well-being due to positive change (accommodation) of one's worldview and outlook (Joseph & Linley, 2005).

### 1.3 | Addressing methodological constraints

To address these concerns about reliance on post hoc reports, researchers have begun examining the relationship between prospectively measured PTG (which has been termed *actual PTG*) and retrospective self-reports of perceived PTG. For example, in a two-wave longitudinal study of trauma-exposed undergraduates, Frazier et al. (2009) compared participants' perceived PTG (PTGI scores) with their pre- to posttrauma change both in (a) “Current standing”-PTGI (C-PTGI) scores and (b) measures related to each PTG domain (change in religious commitment, meaning in life, positive relationships, life satisfaction, and trait gratitude). There was a weak correlation ( $r = .22$ ) between perceived PTG (PTGI scores at Time 2 [T2; posttrauma]) and actual change in C-PTGI scores from Time 1 (T1; pretrauma) to T2. Those results corroborated the modest link that has been found between actual and perceived change in people's personality traits (Oltmanns, Jackson, & Oltmanns, 2019; Robins, Nofhle, Trzesniewski, & Roberts, 2005) and attachment patterns (Kirkpatrick & Hazan, 1994). In their examination of convergence between perceived PTG and pre- to posttrauma changes in measures of each PTG domain (more likely reflecting *actual* PTG), Frazier et al. (2009) found perceived PTG was only related to change in religious commitment ( $r = .29$ ); it was unrelated to change in the other four PTG

domains. Frazier et al. (2009) also found that both perceived PTG and actual change in religious commitment were related to increased distress and to positive reinterpretation coping.

More recent studies (e.g., Boals, Bedford, & Callahan, 2019; Kunz, Joseph, Geyh, & Peter, 2019; Owenz & Fowers, 2019) have found evidence that perceived PTG is at best weakly related either to actual PTG or to actual change in measures of the five PTG domains. Furthermore, in one of the few prospective studies of R/S PTG to date, Perera and Frazier (2013) found that, in their trauma-exposed undergraduate sample, perceived R/S PTG (PTGI R/S items) was weakly related to actual (pre- to posttrauma) increases in religious commitment ( $r = .20$ ). They also found that both perceived R/S PTG and actual R/S PTG (change in religious commitment) were related to increases in psychological distress ( $r_s = .20$  and  $.28$ , respectively). These findings were not replicated in a matched non-trauma-exposed control group, suggesting perceiving PTG may be a coping strategy that trauma survivors use to reduce adversity-related stress and thereby enhance their psychological well-being.

## 1.4 | The current research

The current research seeks to fill several gaps. First, to date only one study of perceived versus actual PTG has focused on the PTG domain of religion/spirituality (Perera & Frazier, 2013), but that study only examined a small undergraduate sample ( $N = 122$ ). We will focus on the R/S domain because it is a core dimension of personality (Piedmont, 1999; Saraglou, 2002), and R/S growth is a common type of perceived PTG people report following disasters (Davis, Kimball, Aten, Andrews, et al., 2019; Park, 2016). Second, most extant research on R/S PTG (e.g., Boals et al., 2019; Perera & Frazier, 2013) has assessed R/S using either a measure of religious commitment or the R/S items from the PTGI/PTGI-SF or C-PTGI/C-PTGI-SF. We will use the R/S items from the PTGI-SF and C-PTGI-SF but will also assess trait-based facets of religiousness/spirituality that might reasonably change after a disaster: (a) *spiritual fortitude* (i.e., “a character trait enabling people to endure and make redemptive meaning from adversity through their sacred connections with God, others, and themselves,” Van Tongeren et al., 2019, p. 588), (b) religious motivations/orientations, and (c) religious beliefs about suffering. In so doing, we will test the relationship between perceived R/S PTG (assessed by the R/S items on the PTGI-SF) and actual R/S PTG (assessed by R/S items of the C-PTGI-SF and by measures of spiritual fortitude, religious motivations, and religious beliefs).

Assessing actual R/S PTG via more than just the two R/S items on the C-PTGI-SF will expand scientific understanding of R/S PTG. It will offer an opportunity to explore whether disaster-related adversity might lead to increases in general religiousness/spirituality (the two C-PTGI-SF items) and/or

to increases in distinct trait-based facets of people's religion/spirituality: religious virtues, motivations, and beliefs. Doing so provides a more comprehensive assessment of trauma survivors' religiousness/spirituality than prior prospective studies of actual R/S PTG.

In addition, the current research will address several methodological limitations of previous studies of PTG following disasters. First, most existing studies have assessed only perceived PTG (e.g., Hafstad, Gil-Rivas, Kilmer, & Raeder, 2010) and not actual PTG; no studies have compared both, which we will. Second, almost all studies have used a cross-sectional, postdisaster-only design (e.g., Cook et al., 2013), and virtually no longitudinal studies of postdisaster PTG have included pre-disaster data. We report findings from two longitudinal studies—one using a two-wave, postdisaster-only design (Study 1) and one using a three-wave, predisaster-inclusive design (Study 2). In so doing, we are able to examine change over time (via the longitudinal design of both studies) and examine prospective change since the disaster (via the predisaster-inclusive design of Study 2). Lastly, most extant longitudinal studies focus on only one disaster and sample (e.g., Achterhof et al., 2018), but we have recruited samples from two major hurricanes that occurred in the same geographical region (U.S. South) and just 2 weeks apart, permitting examination of the extent to which findings replicate across similar samples. (Nonetheless, only Study 2 can address our central research question, given the lack of predisaster data in Study 1.)

Specifically, Study 1 focuses on survivors of Hurricane Harvey, a category 4 hurricane that struck the United States (Texas) between August 25 and 31, 2017, killing 89 people, displacing 30,000 people, destroying 200,000 homes, and resulting in \$128.8 billion in damage. Study 2 focuses on survivors of Hurricane Irma, a category 4 hurricane that struck the United States (Florida) between September 10 and 12, 2017, killing 97 people, and resulting in \$51.5 billion in damage.

### 1.4.1 | Hypotheses

In the context of these two disasters, we will test the following related hypotheses: *Hypothesis 1 (H1)*: Perceived R/S PTG (retrospective self-report on the PTGI-SF R/S items) will be weakly related to longitudinal increases in general religiousness/spirituality (scores on the C-PTGI-SF R/S items). *Hypothesis 2 (H2)*: Perceived R/S PTG will be weakly related to longitudinal increases in measures of three trait-based facets of religion/spirituality: (2a) religious virtue (spiritual fortitude), (2b) religious motivations (intrinsic, extrinsic-personal, and extrinsic-social motivations), and (2c) religious beliefs (providence, suffering-God, and soul-building theodicies). *Hypothesis 3 (H3)*: Building on the findings of Perera and Frazier (2013), we predict that both perceived R/S PTG (PTGI-SF R/S items at T3) and actual R/S PTG (pre- to

posttrauma change in scores on the C-PTGI-SF R/S items and on the measures of R/S facets) will be related to actual change in psychological well-being.

### 1.4.2 | Data analysis plan

H1 and H2 were tested through (a) hierarchical regression analyses for Study 1 (to assess the impact on T2 scores while controlling for baseline levels and for perceived event severity [how much survivors were personally affected]) and (b) growth curve modeling for Study 2 (to assess the extent of change over time). We will only test H3 in Study 2 (using correlational analyses), because only that study is prospective and thereby permits the measurement of actual R/S PTG.

## 2 | STUDY 1: HURRICANE HARVEY

### 2.1 | Method

#### 2.1.1 | Participants and procedures

One month after Hurricane Harvey (T1), 1,200 adults were recruited (via Qualtrics panels) from the hardest-hit Texan counties (e.g., Harris, Jefferson, Fort Bend; Keyser, 2017), and they completed an online survey. Two months postdisaster (T2), 555 of them (53.8% attrition) completed the survey again. (When completers vs. noncompleters were compared on all demographic and study variables, there were no significant differences, except there was a slightly higher proportion of attrition among women [57.0%] than men [46.1%.]) Because this paper centers on R/S constructs, we decided to exclude from the Study 1 sample the 104 T1 participants (18.7%) who identified as nonreligious (atheist, agnostic, or nothing in particular).

The final Study 1 sample consisted of 451 religious disaster survivors who completed the survey at both T1 and T2. Participants were 18 to 87 years old ( $M = 51.91$ ,  $SD = 15.85$ ). See Table 1 for a description of sample demographics. On a scale from 1 (*not at all important*) to 4 (*very important*), participants' average religious importance was 3.52 ( $SD = 0.73$ ). On a scale from 0 (*not at all*) to 100 (*completely*), participants rated how much they were personally affected by Hurricane Harvey ( $M = 36.97$ ,  $SD = 33.42$ ). Everyone gave informed consent before participating, and after completion they read a debriefing form and received \$5 compensation.

#### 2.1.2 | Measures

For each measure, we calculated a mean-item score by averaging ratings across all items on the respective scale or

subscale. Each score reflects higher levels of the measured construct.

#### *Perceived R/S PTG*

To assess perceived R/S PTG, we used the two-item Spiritual Change subscale from the 10-item Posttraumatic Growth Inventory–Short Form (PTGI-SF; Cann et al., 2010), which was only administered at T2. The two items on this subscale are “I have a better understanding of spiritual matters” and “I have a stronger religious faith.” Respondents rated each item using a 6-point Likert scale (ranging from 0 = *I did not experience this change as a result of Hurricane Harvey* to 5 = *I experienced this change to a very great degree as a result of Hurricane Harvey*). In the current study, the alpha of the PTGI-SF's Spiritual Change subscale scores at T2 was .96.

#### *General religiousness/spirituality*

To assess general religiousness/spirituality, we used the two-item Spirituality subscale from the 11-item “Current Standing” PTGI-SF (C-PTGI-SF; Kaur et al., 2017), which was administered at T1 and T2. This subscale's items are “I have an understanding of spiritual matters” and “I have religious faith.” These items parallel the corresponding items on the PTGI-SF, assessing general religiousness/spirituality over the past 2 weeks; their readministration permits measuring change in general religiousness/spirituality over time. Respondents use a 7-point Likert scale (ranging from 0 = *not at all* to 6 = *to a very great degree*) to rate items. In the current study, alphas for the C-PTGI-SF's Spirituality subscale scores were .82 at T1 and .90 at T2. The temporal stability estimate was  $r = .66$  ( $p < .001$ ).

#### *Spiritual fortitude*

We used the 9-item Spiritual Fortitude Scale (SFS-9; Van Tongeren et al., 2019) to assess spiritual fortitude. The SFS-9 uses a 5-point Likert scale (ranging from 1 = *strongly disagree* to 5 = *strongly agree*). Two example items are “My faith helps me withstand difficulties” and “I find meaning in adversity through Sacred connections.” Prior studies have supported the SFS-9's relationships with grit, resilience, meaning in life, and spiritual well-being (Van Tongeren et al., 2019). In the current study, alphas for SFS-9 total scores were .89 at T1 and .90 at T2. The temporal stability estimate was  $r = .72$  ( $p < .001$ ).

#### *Intrinsic/extrinsic religious motivations*

We used the 14-item Intrinsic/Extrinsic-Revised scale (I/E-R; Gorsuch & McPherson, 1989) to assess intrinsic and extrinsic religious motivations. The I/E-R uses a 5-point Likert scale (ranging from 1 = *strongly disagree* to 5 = *strongly agree*) and has subscales that assess three types of religious motivations: intrinsic (8 items; e.g., “I try hard to live all my

**TABLE 1** Demographic characteristics of Study 1 (Hurricane Harvey) and Study 2 (Hurricane Irma) participants

Characteristic	Study 1 <i>n</i> (%)	Study 2 <i>n</i> (%)
Sex/gender		
Male	155 (34.4)	472 (41.3)
Female	296 (65.6)	672 (58.7)
Race/ethnicity		
White	321 (71.2)	921 (80.5)
Black	53 (11.8)	67 (5.9)
Asian	30 (6.7)	22 (1.9)
Latino/a	39 (8.6)	117 (10.2)
Multiracial	7 (1.6)	12 (1.0)
Other	1 (0.2)	5 (0.4)
Household income 2016, before tax		
Less than \$25,000	41 (9.1)	76 (6.6)
\$25,000–\$49,999	94 (20.8)	228 (19.9)
\$50,000–\$74,999	99 (22.0)	266 (23.3)
\$75,000–\$99,999	56 (12.4)	203 (17.7)
\$100,000–\$149,999	92 (20.4)	214 (18.7)
\$150,000 or more	66 (14.6)	150 (13.1)
Missing data	3 (0.7)	7 (0.6)
Marital status		
Never married	74 (16.4)	127 (11.1)
Now married	266 (59.0)	733 (64.1)
Living with partner (unmarried)	18 (4.0)	79 (6.9)
Separated	10 (2.2)	12 (1.0)
Divorced	56 (12.4)	133 (11.6)
Widowed	26 (5.8)	57 (5.0)
Missing data	1 (0.2)	3 (0.3)
Education level		
High school graduate or GED	120 (26.6)	267 (23.3)
Associate's degree (2-year)	74 (16.4)	190 (16.6)
Bachelor's degree (4-year)	152 (33.7)	391 (34.2)
Master's degree or higher	105 (23.3)	296 (25.9)
Religious affiliation		
Christian	393 (87.1)	955 (83.5)
Jewish	9 (2.0)	155 (13.5)
Muslim	5 (1.1)	6 (0.5)
Buddhist	7 (1.6)	4 (0.3)
Hindu	7 (1.6)	3 (0.3)
Other	30 (6.7)	21 (1.8)
Religious importance		
Not at all important	6 (1.3)	74 (6.5)
Not too important	44 (9.8)	186 (16.3)
Somewhat important	110 (24.4)	375 (32.8)

(Continues)

**TABLE 1** (Continued)

Characteristic	Study 1 <i>n</i> (%)	Study 2 <i>n</i> (%)
Very important	291 (64.5)	509 (44.5)
Previously experienced disasters		
0	27 (6.0)	112 (9.8)
1	45 (10.0)	149 (13.0)
2	105 (23.3)	180 (15.7)
3	95 (21.1)	187 (16.3)
4	60 (13.3)	139 (12.2)
5 or more	119 (26.4)	375 (32.8)
Missing data	0 (0.0)	2 (0.2)

Note: Study 1: *N* = 451; Study 2: *N* = 1,144.

life according to my religious beliefs”), extrinsic-personal (3 items; e.g., “I pray mainly to gain relief and protection”), and extrinsic-social (3 items; e.g., “I go to church because it helps me make friends”). In the current study, T1 and T2 subscale score alphas ranged from .71 to .83. Temporal stability estimates were  $r = .86$  for intrinsic,  $r = .68$  for extrinsic-personal, and  $r = .66$  for extrinsic-social (all  $ps < .001$ ).

### Religious beliefs about suffering

To assess religious beliefs about suffering, we used three, three-item subscales from the Views of Suffering Scale (VOSS; Hale-Smith, Park, & Edmondson, 2012). Respondents used a 6-point Likert scale (ranging from 1 = *strongly disagree* to 6 = *strongly agree*) to rate three types of benevolent theodicies (Wilt et al., 2017): (a) the belief God has providential control over suffering and uses it for a higher purpose (*providence theodicy*; e.g., “Everything we experience, including suffering, is planned in detail by God”), (b) the belief God is present in the midst of suffering and suffers compassionately alongside people (*suffering-God theodicy*; e.g., “When we suffer, God is suffering along with us”), and (c) the belief God uses suffering to build virtues into people's character (*soul-building theodicy*; e.g., “Suffering is intended by God to be a source of personal growth”). In the current study, subscale score alphas at T1 and T2 ranged from .84 to .90. Temporal stability estimates were  $r = .75$  for providence,  $r = .75$  for suffering-God, and  $r = .75$  for soul-building (all  $ps < .001$ ).

## 2.2 | Results

First, we examined data for outliers and normality. Outliers (<2% per variable) were adjusted to 3 *SDs* from the mean. Skewness and kurtosis values were all within an acceptable range (between  $-1$  and  $+1$ ). Table 2 presents descriptive statistics and intercorrelations of study variables at T1 and T2. At both time periods, general religiousness/spirituality (C-PTGI-SF R/S items) was (a) strongly related to spiritual fortitude and

**TABLE 2** Study 1 (Harvey) descriptive statistics and intercorrelations at T1 (1-month postdisaster) and T2 (2-month postdisaster)

Variable	1	2	3	4	5	6	7	8	9	<i>M</i>	<i>SD</i>
1. Perceived R/S PTG at T2	–	–	–	–	–	–	–	–	–	–	–
2. General religiousness/spirituality	<b>.33</b>	–	<b>.57</b>	<b>.65</b>	<b>.26</b>	.13	<b>.37</b>	<b>.39</b>	<b>.30</b>	5.07	1.13
3. Spiritual fortitude	<b>.34</b>	<b>.55</b>	–	<b>.58</b>	<b>.34</b>	<b>.20</b>	<b>.45</b>	<b>.46</b>	<b>.43</b>	4.09	0.63
4. Intrinsic motivation	<b>.26</b>	<b>.63</b>	<b>.55</b>	–	<b>.18</b>	.14	<b>.30</b>	<b>.37</b>	<b>.25</b>	3.59	0.80
5. Extrinsic-personal motivation	<b>.36</b>	<b>.38</b>	<b>.37</b>	<b>.29</b>	–	<b>.40</b>	<b>.43</b>	<b>.42</b>	<b>.43</b>	3.46	0.91
6. Extrinsic-social motivation	<b>.27</b>	.09	.15	.10	<b>.34</b>	–	<b>.24</b>	<b>.28</b>	<b>.26</b>	2.13	0.96
7. Providence theodicy	<b>.33</b>	<b>.35</b>	<b>.43</b>	<b>.23</b>	<b>.39</b>	<b>.22</b>	–	<b>.62</b>	<b>.80</b>	3.90	1.53
8. Suffering-God theodicy	<b>.28</b>	<b>.43</b>	<b>.49</b>	<b>.40</b>	<b>.37</b>	<b>.19</b>	<b>.65</b>	–	<b>.58</b>	4.24	1.36
9. Soul-building theodicy	<b>.30</b>	<b>.33</b>	<b>.51</b>	<b>.27</b>	<b>.38</b>	<b>.21</b>	<b>.76</b>	<b>.64</b>	–	4.10	1.41
<i>M</i>	1.68	4.74	4.01	3.54	3.37	2.03	3.79	4.26	4.05		
<i>SD</i>	1.70	1.40	0.66	0.82	0.94	0.96	1.57	1.40	1.48		
Possible range	0–5	0–6	1–5	1–5	1–5	1–5	1–6	1–6	1–6		

Note:  $N = 451$  at T1 and T2. R/S = religious/spiritual; PTG = posttraumatic growth. Descriptive statistics and intercorrelations at T1 are presented above the diagonal, and descriptive statistics and intercorrelations at T2 are presented below the diagonal. For values above the diagonal,  $|r| \geq .11, p < .05$ ;  $|r| \geq .13, p < .01$ ;  $|r| \geq .15, p < .001$ . For values below the diagonal,  $|r| \geq .09, p < .05$ ;  $|r| \geq .12, p < .01$ ;  $|r| \geq .16, p < .001$ . All correlations that are significant at  $p < .001$  are indicated in boldface type.

intrinsic religious motivation, (b) moderately related to extrinsic-personal religious motivation and to all three benevolent theodicies, and (c) unrelated to extrinsic-social religious motivation. Last, we calculated a reliable change index for each R/S outcome variable, to determine what percentage of our sample exhibited reliable growth (i.e., an increase not due to measurement error; Jacobson & Truax, 1991). Between 1.55% (intrinsic and extrinsic-personal motivations) and 7.10% (suffering God theodicy) showed reliable growth (see Table S1).

## 2.2.1 | H1: Relationship between perceived R/S PTG and increases in general religiousness/spirituality

We conducted a hierarchical linear regression to examine whether perceived R/S PTG at T2 (PTGI-SF R/S items) explained variance in general religiousness/spirituality at T2 (C-PTGI-SF R/S items), after controlling for (a) T1 general religiousness/spirituality and (b) how much participants were personally affected by the hurricane. In Step 1, T1 religiousness/spirituality was a significant predictor of T2 religiousness/spirituality ( $B = 0.65, p < .001$ ), but how much participants reported being affected by the hurricane was not ( $B = 0.03, p = .487$ ),  $R^2 = 0.43, p < .001$ . In Step 2, T2 perceived R/S PTG explained an additional 4.1% of the variance in T2 religiousness/spirituality ( $B = 0.22, p < .001$ ), thus supporting Hypothesis 1 in that there was a small, positive relationship between perceived R/S PTG and T2 general religiousness/spirituality. This result was the same when we examined the correlation between perceived R/S PTG at T2 and change of the C-PTGI-SF R/S-item mean scores,  $r = .22, p < .001$ .

## 2.2.2 | H2: Relationship between perceived R/S PTG and increases in facets of religion/spirituality

Next, we conducted a series of hierarchical linear regressions to examine whether perceived R/S PTG at T2 explained variance in facets of religion/spirituality (spiritual fortitude, religious motivations, and benevolent theodicies) at T2, after controlling for baseline (T1) levels and for how much participants reported being affected by the hurricane (see Table 3). Here, we used a Bonferroni correction because we were conducting seven regression analyses, yielding a family-wise error rate of .007. In Step 1, baseline levels of each R/S facet explained between 44.0% and 74.0% of variance in their respective T2 R/S facet score ( $Bs = 0.66$ – $0.88$ , all  $ps < .001$ ); how much participants were personally affected by the hurricane was only a significant predictor of T2 extrinsic-personal religious motivation ( $B = 0.00, p = .029$ ). In Step 2, perceived R/S PTG at T2 explained an additional 1.1%–1.8% of the variance in each R/S facet at T2 ( $Bs = 0.05$ – $0.13, ps < .002$ ), except for intrinsic religious motivation ( $p = .113$ ) and suffering-God theodicy ( $p = .021$ ). These results largely support H2 in that there was a small relationship between perceived R/S PTG and increases in most of the T2 R/S facet scores.

## 2.3 | Discussion

Study 1 revealed three key findings. First, results suggest disaster survivors' perceived R/S PTG is weakly related to postdisaster increases in their general religiousness/spirituality. Second, results indicate survivors' perceived R/S PTG is weakly related to postdisaster increases in trait-based facets

**TABLE 3** Study 1 (Hurricane Maria) results of hierarchical regression analyses to test Hypothesis 2

	Facet of religion/spirituality at T2			
	<i>B</i>	<i>SE</i>	$\Delta R^2$	<i>p</i>
Step 1			51.7%	<.001
Constant	0.89	0.15		<.001
T1 spiritual fortitude	0.75	0.04		<.001
Amount personally affected by hurricane	0.00	0.00		.061
Step 2			1.2%	.001
Constant	0.97	0.15		<.001
T1 spiritual fortitude	0.72	0.04		<.001
Amount personally affected by hurricane	0.00	0.00		.357
Perceived R/S PTG at T2	0.05	0.01		.001
Step 1			74.0%	<.001
Constant	0.37	0.09		<.001
T1 intrinsic religious motivation	0.88	0.03		<.001
Amount personally affected by hurricane	0.00	0.00		.390
Step 2			0.1%	.113
Constant	0.38	0.09		<.001
T1 intrinsic religious motivation	0.87	0.03		<.001
Amount personally affected by hurricane	0.00	0.00		.697
Perceived R/S PTG at T2	0.02	0.01		.113
Step 1			47.0%	<.001
Constant	0.90	0.13		<.001
T1 extrinsic-personal religious motivation	0.69	0.04		<.001
Amount personally affected by hurricane	0.00	0.00		.029
Step 2			1.1%	.002
Constant	0.96	0.13		<.001
T1 extrinsic-personal religious motivation	0.65	0.04		<.001
Amount personally affected by hurricane	0.00	0.00		.221
Perceived R/S PTG at T2	0.07	0.02		.002
Step 1			44.0%	<.001
Constant	0.64	0.09		<.001
T1 extrinsic-social religious motivation	0.66	0.04		<.001
Amount personally affected by hurricane	0.00	0.00		.743
Step 2			1.6%	<.001
Constant	0.60	0.09		<.001
T1 extrinsic-social religious motivation	0.63	0.04		<.001
Amount personally affected by hurricane	0.00	0.00		.183
Perceived R/S PTG at T2	0.08	0.02		<.001
Step 1			56.4%	<.001
Constant	0.80	0.14		<.001
T1 providence theodicy	0.77	0.03		<.001
Amount personally affected by hurricane	0.00	0.00		.952
Step 2			1.8%	<.001
Constant	0.78	0.14		<.001
T1 providence theodicy	0.74	0.03		<.001

(Continues)

**TABLE 3** (Continued)

	Facet of religion/spirituality at T2			
	<i>B</i>	<i>SE</i>	$\Delta R^2$	<i>p</i>
Amount personally affected by hurricane	0.00	0.00		.199
Perceived R/S PTG at T2	0.13	0.03		<.001
Step 1			55.9%	<.001
Constant	0.94	0.15		<.001
T1 suffering-God theodicy	0.76	0.03		<.001
Amount personally affected by hurricane	0.00	0.00		.051
Step 2			0.5%	.021
Constant	0.95	0.15		<.001
T1 suffering-God theodicy	0.74	0.03		<.001
Amount personally affected by hurricane	0.00	0.00		.236
Perceived R/S PTG at T2	0.07	0.03		.021
Step 1			55.6%	<.001
Constant	0.86	0.15		<.001
T1 soul-building theodicy	0.78	0.03		<.001
Amount personally affected by hurricane	0.00	0.00		.796
Step 2			1.1%	.001
Constant	0.86	0.15		<.001
T1 soul-building theodicy	0.75	0.03		<.001
Amount personally affected by hurricane	0.00	0.00		.233
Perceived R/S PTG at T2	0.10	0.03		.001

Note: *N* = 451. R/S = religious/spiritual; PTG = posttraumatic growth.

of their religion/spirituality—namely their spiritual fortitude, extrinsic-personal religious motivation, extrinsic-social religious motivation, belief in God's providential control over suffering, and belief that God uses suffering to build people's character. Third, results suggest that, following a disaster, it is quite rare for survivors to exhibit reliable growth in their R/S, whether at the general level or the facet level.

One noteworthy limitation of Study 1 is the R/S items of the PTGI-SF purportedly measured perceived R/S growth from pre-disaster to 2-month postdisaster (T2). However, the R/S items of the C-PTGI-SF and the other R/S measures were not administered until T1 (1-month postdisaster), and thus their measured change from T1 to T2 does not reflect the same time period that is purportedly reflected on the PTGI-SF. We address this limitation in Study 2.

### 3 | STUDY 2: HURRICANE IRMA

The results of Study 1 provided preliminary empirical support for our hypotheses. However, given that Study 1 data were gathered postdisaster, a more stringent test of our hypotheses required we assess change from *before* a disaster to *after* the disaster. Toward that end, we sought to collect data

from participants in the path of a hurricane before it made landfall.

## 3.1 | Method

### 3.1.1 | Participants and procedures

On September 5, 2017, 5 days before the projected landfall of Hurricane Irma in South Florida, we tracked the hurricane in consultation with a meteorologist, using National Hurricane Center forecasts. During that 5-day prelandfall window (T1), 2,333 participants were recruited (via Qualtrics panels) from central and southern Florida counties that were likely to be affected by the hurricane (e.g., Orange to Hillsborough to Miami-Dade). At T1 they completed the same online survey as described in Study 1, and then they did so again at 1-month postdisaster (T2, *N* = 1,426 participants [38.9% attrition]) and 6-month postdisaster (T3, *N* = 848 [40.5% attrition]). (When completers vs. noncompleters were compared on all demographic and study variables, there again was a higher proportion of attrition among women [66.4%] than men [59.4%]; also, noncompleters were slightly lower in age [Cohen's *d* = -0.22] and higher in spiritual fortitude [Cohen's



$d = 0.10$ ].) The final Study 2 sample consisted only of those who completed the survey at both T1 and T2. Again, we excluded the 282 people (19.8%) who identified as nonreligious.

The final Study 2 sample consisted of 1,144 religious disaster survivors of Hurricane Irma. Participants were 19 to 86 years old ( $M = 55.28$ ,  $SD = 13.90$ ). See Table 1 for a description of sample demographics. Of note, on a scale from 1 (*not at all important*) to 4 (*very important*), participants' average religious importance was 3.15 ( $SD = 0.92$ ). Lastly, at T2, on a scale from 0 (*not at all*) to 100 (*completely*), participants indicated how much they were personally affected by Hurricane Irma ( $M = 42.23$ ,  $SD = 33.06$ ). All participants provided informed

consent before participating, and after completion they read a debriefing form and received \$5 compensation.

### 3.1.2 | Measures

We used mostly the same measures as in Study 1 and again calculated mean-item scores for each scale and subscale. Alphas for each measure are presented along the diagonals of Table 4. In addition, to test Hypothesis 3, we administered the Flourishing Scale (Diener et al., 2010), which is an eight-item measure of psychological well-being. Two

**TABLE 4** Study 2 (Irma) descriptives, alphas, and correlations at T1 (predisaster), T2 (1-month postdisaster), and T3 (6-month postdisaster)

Variable	1	2	3	4	5	6	7	8	9	<i>M</i>	<i>SD</i>
<i>Time 1</i>											
1. Perceived R/S PTG	–									–	–
2. General religiousness/spirituality	–	(.86)								4.72	1.37
3. Spiritual fortitude	–	<b>.62</b>	(.90)							3.84	0.74
4. Intrinsic motivation	–	<b>.66</b>	<b>.60</b>	(.81)						3.28	0.86
5. Extrinsic-personal motivation	–	<b>.48</b>	<b>.47</b>	<b>.38</b>	(.75)					3.26	0.98
6. Extrinsic-social motivation	–	<b>.26</b>	<b>.25</b>	<b>.30</b>	<b>.39</b>	(.81)				1.93	0.92
7. Providence theodicy	–	<b>.34</b>	<b>.48</b>	<b>.33</b>	<b>.42</b>	<b>.27</b>	(.89)			3.43	1.55
8. Suffering-God theodicy	–	<b>.51</b>	<b>.60</b>	<b>.48</b>	<b>.44</b>	<b>.27</b>	<b>.66</b>	(.88)		3.88	1.49
9. Soul-building theodicy	–	<b>.32</b>	<b>.50</b>	<b>.32</b>	<b>.38</b>	<b>.28</b>	<b>.76</b>	<b>.63</b>	(.90)	3.57	1.48
<i>Time 2</i>											
1. Perceived R/S PTG	(.89)									1.22	1.53
2. General religiousness/spirituality	<b>.33</b>	(.91)								4.29	1.70
3. Spiritual fortitude	<b>.32</b>	<b>.65</b>	(.89)							3.80	0.73
4. Intrinsic motivation	<b>.29</b>	<b>.68</b>	<b>.62</b>	(.82)						3.24	0.89
5. Extrinsic-personal motivation	<b>.37</b>	<b>.52</b>	<b>.52</b>	<b>.40</b>	(.78)					3.15	1.02
6. Extrinsic-social motivation	<b>.29</b>	<b>.27</b>	<b>.23</b>	<b>.28</b>	<b>.36</b>	(.83)				1.83	0.91
7. Providence theodicy	<b>.36</b>	<b>.43</b>	<b>.47</b>	<b>.36</b>	<b>.44</b>	<b>.26</b>	(.91)			3.37	1.61
8. Suffering-God theodicy	<b>.36</b>	<b>.59</b>	<b>.61</b>	<b>.53</b>	<b>.51</b>	<b>.29</b>	<b>.69</b>	(.89)		3.90	1.56
9. Soul-building theodicy	<b>.32</b>	<b>.41</b>	<b>.52</b>	<b>.34</b>	<b>.41</b>	<b>.24</b>	<b>.80</b>	<b>.67</b>	(.92)	3.60	1.56
<i>Time 3</i>											
1. Perceived R/S PTG	(.91)									1.11	1.48
2. General religiousness/spirituality	<b>.34</b>	(.92)								4.08	1.67
3. Spiritual fortitude	<b>.36</b>	<b>.64</b>	(.90)							3.74	0.74
4. Intrinsic motivation	<b>.32</b>	<b>.68</b>	<b>.62</b>	(.83)						3.18	0.88
5. Extrinsic-personal motivation	<b>.41</b>	<b>.51</b>	<b>.53</b>	<b>.38</b>	(.79)					3.08	1.00
6. Extrinsic-social motivation	<b>.23</b>	<b>.24</b>	<b>.22</b>	<b>.30</b>	<b>.34</b>	(.86)				1.86	0.93
7. Providence theodicy	<b>.32</b>	<b>.38</b>	<b>.48</b>	<b>.33</b>	<b>.44</b>	<b>.23</b>	(.91)			3.37	1.57
8. Suffering-God theodicy	<b>.34</b>	<b>.56</b>	<b>.60</b>	<b>.49</b>	<b>.49</b>	<b>.26</b>	<b>.68</b>	(.89)		3.83	1.52
9. Soul-building theodicy	<b>.30</b>	<b>.38</b>	<b>.53</b>	<b>.32</b>	<b>.46</b>	<b>.23</b>	<b>.81</b>	<b>.65</b>	(.92)	3.62	1.52

Note:  $N = 1,144$  at T1 and T2;  $N = 684$  at T3. R/S = religious/spiritual; PTG = posttraumatic growth. Cronbach's alphas are presented in parentheses along the diagonals. All correlations that are significant at  $p < .001$  are indicated in boldface type. Perceived R/S PTG refers to post hoc self-report of R/S growth (R/S items on PTGI-SF). General R/S refers to scores on the R/S items of the C-PTGI-SF.

example items are: “I lead a purposeful and meaningful life” and “My social relationships are supportive and rewarding.” Respondents use a 7-point Likert scale (ranging from 1 = *strongly disagree* to 7 = *strongly agree*) to rate items. In Study 2, alphas for Flourishing Scale scores were .92 at T1 through T3.

### 3.2 | Results

First, we examined the data for outliers and normality. Outliers (<2% per variable) were adjusted to three *SDs* from the mean. For all variables, skewness and kurtosis values were within an acceptable range (between  $-1$  and  $+1$ ). Table 4 presents the descriptive statistics, alphas, and intercorrelations of study variables at T1, T2, and T3. At each time period, general religiousness/spirituality (R/S items of the C-PTGI-SF) was (a) strongly related to spiritual fortitude, intrinsic religious motivation, extrinsic-personal religious motivation, and suffering-God theodicy; (b) moderately related to providence and soul-building theodicies; and (c) weakly related to extrinsic-social religious motivation. We calculated a reliable change index for each outcome variable (see Table S1) to see what percentage of our sample exhibited reliable growth, and between 0.44% (for intrinsic religious orientation) and 11.40% (soul-building theodicy) did.

#### 3.2.1 | Data analytic strategy

To test our hypotheses, we used multilevel modeling (MLM) to create growth curve models in R (Bliese & Polyhart, 2002). This approach involves building a series of models of increasing complexity, contrasting the model fit, and retaining the most parsimonious model at each step (see Table 5). Time points (level 1) are nested within participants (level 2).

In Step 1, we built an empty model to estimate the intraclass correlation coefficient (ICC). ICCs ranged from .53 to .88, indicating between 53% and 88% of the variance in outcome scores was between participants. This finding means that most outcome variance can be attributed to differences between participants rather than to within-participant change over time.

In Step 2, we tested whether participants were generally increasing, decreasing, or staying the same on each R/S outcome variable over time. Each variable (except for providence, suffering-God, and soul-building theodicies) had a significant, weak, negative relationship with time (estimates =  $-0.05$  to  $-0.16$ ), suggesting a decline in most trait-based R/S outcomes over time.

In Step 3, we tested whether there was significant slope variation between participants. This step tests if participants are experiencing different trajectories (i.e., some increasing, some staying the same, and some decreasing) on

**TABLE 5** Results of growth curve models for each outcome variable in Study 2 (Irma)

Outcome variable	Model variable	Estimate	SE	df	t	p
General religiousness/spirituality (R/S items on C-PTGI-SF) ICC = .70	Intercept	4.53	0.05	1,366	87.67	<.001
	Time	-0.49	0.04	1,366	-11.01	<.001
	Perceived R/S PTG at T3	0.29	0.03	682	8.32	<.001
	Time × perceived R/S PTG	0.10	0.03	1,366	3.37	<.001
Spiritual fortitude ICC = .76	Intercept	3.79	0.02	1,367	151.95	<.001
	Time	-0.05	0.01	1,367	-3.15	.001
Intrinsic motivation ICC = .88	Intercept	3.23	0.03	1,367	101.82	<.001
	Time	-0.05	0.01	1,367	-3.47	<.001
Extrinsic-personal motivation ICC = .66	Intercept	3.24	0.03	1,367	98.53	<.001
	Time	-0.16	0.02	1,367	-5.75	<.001
Extrinsic-social motivation ICC = .67	Intercept	1.92	0.03	1,367	59.26	<.001
	Time	-0.07	0.02	1,367	-2.66	.007
Providence theodicy ICC = .77	Intercept	3.37	0.05	1,367	60.86	<.001
	Time	-0.01	0.03	1,367	-0.31	.755
Suffering-God theodicy ICC = .79	Intercept	3.85	0.05	1,367	72.85	<.001
	Time	-0.02	0.03	1,367	-0.59	.549
Soul-building theodicy ICC = .75	Intercept	3.56	0.05	1,367	66.36	<.001
	Time	0.05	0.03	1,367	1.39	.162

Note: *N* = 1,144 at T1 (pre-disaster) and T2 (1-month post-disaster); *N* = 684 at T3 (6-month post-disaster). R/S = religious/spiritual; C-PTGI-SF = “Current standing”-Posttraumatic Growth Inventory-Short Form; PTG = posttraumatic growth; ICC = intraclass correlation coefficient.

the R/S outcome variables across time. Only the change in general religiousness/spirituality (R/S items on the C-PTGI-SF) model was improved by allowing slopes to vary between participants (log likelihood ratio = 31.65,  $p < .001$ ). No other R/S outcome demonstrated significant slope variation, so for those variables, we did not include a term for slope variation in our models or test predictors of slope variation. In sum, participants largely showed similar trajectories (i.e., small to moderate decreases) in R/S outcomes over time.

In Step 4, we tested for the presence of autocorrelation and heteroscedasticity, and no outcome variables demonstrated evidence of autocorrelation or heteroscedasticity.

Last, we tested predictors of slope variation (Step 5). These analyses examine variables that might predict why participants show different trajectories of change across time (i.e., slope variation). To aid in interpreting coefficients, predictors were grand mean centered. We only tested predictors of slope variation for change in general religiousness/spirituality (C-PTGI-SF R/S items) because only that variable showed significant slope variation in Step 3. Specifically, to test Hypothesis 1 (the association between perceived R/S PTG and increases in religiousness/spirituality), slopes based on change over time were regressed on perceived R/S PTG at T3. We also tested whether the degree participants were personally affected by the storm was a predictor.

### 3.2.2 | H1: Relationship between perceived R/S PTG and increases in general religiousness/spirituality

Table 5 presents results of the growth curve models for each R/S outcome variable. First, change in general religiousness/spirituality (estimate =  $-0.49$ ,  $p < .001$ ) had a moderate, negative, linear relationship with time, suggesting general religiousness/spirituality may actually tend to decline following a disaster. Perceived R/S PTG (T3 retrospective self-reports of R/S growth since the disaster) showed a small, positive association with between-participant differences in slopes of change in general religiousness/spirituality (R/S items of the C-PTGI-SF; estimate =  $0.10$ ,  $p < .001$ ). See Figure S1 for a graph of this interaction. (How much participants were affected by the storm was not a significant predictor of between-participant differences in these slopes,  $p = .840$ .) In sum, participants with higher perceived R/S PTG demonstrated a more gradual decline in general religiousness/spirituality over time. Yet again, the magnitude of this coefficient ( $.10$ ) suggests perceived R/S PTG and change in general religiousness/spirituality are only weakly related. This finding supports Hypothesis 1 in that there was a weak, positive relationship between perceived R/S PTG and actual growth in general religiousness/spirituality.

### 3.2.3 | H2: Relationship between perceived R/S PTG and increases in facets of religion/spirituality

Because slopes must vary to a sufficient degree in order to use growth curve modeling to test how participants change over time, we had to rely on a series of hierarchical linear regressions (as in Study 1) to test Hypothesis 2. Specifically, we examined if perceived R/S PTG at T3 predicted T3 scores on the measured facets of religion/spirituality, after controlling for baseline (predisaster/T1) R/S scores and for how much participants were affected by the hurricane (see Table S2). In Step 1, T1 R/S facet scores explained between 44.0% and 76.8% of the variance in each facet's respective T3 score ( $B_s = 0.68$ – $0.91$ ,  $p_s < .001$ ), but how much participants were personally affected by the hurricane was not a significant predictor of any T3 R/S facet score. In Step 2, perceived R/S PTG at T3 explained an additional 0.6%–4.5% of the variance in each T3 R/S facet score ( $B_s = 0.06$ – $0.15$ ,  $p_s \leq .001$ ), thereby supporting Hypothesis 2. However, once more, each of these effects was small.

### 3.2.4 | H3: Relationships among actual R/S PTG, perceived R/S PTG, and psychological well-being

To test H3, we conducted a series of correlational analyses among perceived R/S PTG (PTGI-SF R/S items), actual (pre- to posttrauma) change in general religiousness/spirituality (C-PTGI-SF R/S items) and its facets (measures of spiritual fortitude, religious motivations, and benevolent theodicies), and actual change in psychological well-being (Flourishing Scale scores). We used a Bonferroni correction because we were conducting nine correlational analyses, yielding a family-wise error rate of  $.006$ . H3 was partly supported. Change in psychological well-being was unassociated with perceived R/S PTG at T3 ( $r = .08$ ,  $p = .034$ ), but it was associated with pre- to posttrauma increases in general religiousness/spirituality ( $r = .27$ ), spiritual fortitude ( $r = .32$ ), intrinsic religious motivation ( $r = .16$ ), extrinsic-personal religious motivation ( $r = .18$ ), providence theodicy ( $r = .11$ ), and suffering-God theodicy ( $r = .16$ ; all  $p_s < .003$ ). Change in psychological well-being was unrelated to change in extrinsic-social religious motivation ( $r = .03$ ,  $p = .515$ ) or soul-building theodicy ( $r = .03$ ,  $p = .415$ ). In sum, actual R/S PTG was generally related to increased psychological well-being (pre- to post-disaster), but perceived PTG was not.

## 3.3 | Discussion

Study 2 replicated Study 1 findings using a more rigorous design and larger sample. Study 2 results again suggest

disaster survivors' perceived R/S PTG is weakly related to actual pre- to posttrauma growth in (a) their general religiousness/spirituality and (b) trait-based facets of their religion/spirituality. These findings are consistent with prior evidence of a small positive correlation between (a) perceived PTG (post hoc PTGI total scores) and actual PTG (change in C-PTGI total scores from pre- to posttrauma; Frazier et al., 2009), (b) perceived PTG and actual growth in general religiousness/spirituality (Yanez et al., 2009) and religious commitment (Frazier et al., 2009), and (c) perceived R/S PTG (PTGI R/S items) and actual growth in general religiousness/spirituality (C-PTGI R/S items) and religious commitment (Perera & Frazier, 2013). In sum, it seems disaster survivors—like survivors of other types of adversity—are at best modestly accurate at perceiving postdisaster growth in their religion/spirituality and its subfacets.

Replicating Study 1 results, it again was rare for survivors to exhibit reliable growth (increase) in their general religiousness/spirituality and its subfacets (ranging from 0.44% [intrinsic religious motivation] to 11.40% [soul-building theodicy]). It appears genuine R/S growth following a disaster is rare, despite survivors' common perception to the contrary (Aten et al., 2019; Davis, Kimball, Aten, Andrews, et al., 2019). This possibility is consistent with growing prospective evidence adversity does *not* tend to lead to R/S PTG (Mangelsdorf et al., 2019; Perera & Frazier, 2013).

Indeed, Study 2 results revealed moderate-to-high ICCs for all R/S variables, suggesting that over time, religious disaster survivors do not change much on R/S outcomes. Even so, all variables except the three benevolent theodicies demonstrated a significant small-to-moderate decline over time following the disaster. The lack of significant between-participant slope variability suggests most people had a negative trajectory. That is, following a natural disaster, religious survivors may normatively tend to experience declines in their religion/spirituality (and its subfacets) over time. However, this lack of slope variation might be due to the assessment time points being too close together, or it might reflect relative stability in the R/S constructs we measured. Because religious identities and values can and do change over time (e.g., Fadjukoff, Pulkkinen, & Kokko, 2016; Hardy, Pratt, Pancer, Olsen, & Lawford, 2011), the former possibility is more likely; perhaps R/S change is just slow. However, if the latter possibility is true, then it would have significant implications for the study of PTG. For example, if people's religion/spirituality does not tend to change much over time—even in the wake of trauma such as a disaster—then researchers should examine (a) what makes religion/spirituality so robust against change following adversity, (b) what dimensions or aspects of religion/spirituality are more versus less stable following adversity,

(c) what are the boundary conditions of this stability versus malleability, and (d) should religion/spirituality even be included in current conceptualizations of PTG (if it indeed tends to be so stable and resistant to change following adversity). Future research can address these questions by assessing more R/S variables, examining plausible boundary conditions, increasing the number of time points, and extending the longitudinal duration of the study.

Nevertheless, results of Study 2 suggest if survivors in fact experience actual R/S PTG following a disaster, then it may enhance their postdisaster well-being. This finding is discrepant from previous research demonstrating that actual R/S PTG (e.g., change in religious commitment) is related to enhanced psychological distress (Perera & Frazier, 2013). However, it is consistent with prior research indicating that actual PTG in other PTG domains (e.g., relationships, personal strengths, appreciation of life) is related to better psychological adjustment (e.g., decreased distress; Frazier et al., 2009; Kunz et al., 2019; Yanez et al., 2009). It may be that in a disaster context, actual R/S PTG may at times lead to increased positive religious coping and thereby enhance survivors' postdisaster well-being (cf. Davis, Kimball, Aten, Andrews, et al., 2019).

One notable limitation of Study 2 is that, although it was prospective, like with most PTG research, true baseline data are hard to define and collect. We collected pre-disaster data within 5 days prelandfall—a time when weather forecasters were predicting Irma might devastate Florida worse than Hurricane Katrina devastated the U.S. Gulf Coast in 2005. Thus, our Study 2 baseline data were collected during a period people may have been in states of anticipatory threat or harm, perhaps limiting how accurate the baseline assessment of their R/S was. During such times, R/S people often experience heightened activation of their religious attachment, so survivors' baseline report of their R/S may already have been higher than usual (Davis, Kimball, Aten, Andrews, et al., 2019; Davis, Kimball, Aten, Hamilton, et al., 2019).

## 4 | GENERAL DISCUSSION

“That which does not kill us makes us stronger”—*Friedrich Nietzsche* (Twilight of the Idols)

Nietzsche's maxim on the positive role of adversity is a notion of PTG that is pervasively embedded into American culture. But does it hold up to empirical scrutiny? Meta-analytic evidence suggests it does not, especially when it comes to R/S PTG (Mangelsdorf et al., 2019), and our two longitudinal studies of disaster survivors seem to support the same conclusion. Positive personality change in R/S and its subfacets was very rare in both studies. In both samples, only around

4% of survivors evidenced positive change in their general religiousness/spirituality, and positive change in intrinsic and extrinsic-personal religious motivations was exceedingly rare (between 0.5% and 2%). It was slightly more common for survivors to evidence positive change in extrinsic-social religious orientation (between 4% and 5%), spiritual fortitude (between 5% and 7%), and benevolent theodicies (between 5% and 11%). Taken together, these findings suggest religious disaster survivors may tend to draw on their religion/spirituality to cope with disaster-related adversity (Aten et al., 2019; Davis, Kimball, Aten, Andrews, et al., 2019), but they do not necessarily tend to experience positive R/S growth as a result of that adversity.

In addition, findings from both studies suggest survivors are only modestly accurate in perceiving how much they have grown religiously/spiritually after a disaster. In each sample, there was a significant positive relationship between perceived R/S PTG (PTGI-SF R/S item scores) and longitudinal increases in scores on (a) the C-PTGI-SF R/S items (general religiousness/spirituality) and (b) several measures of trait-based R/S facets. Nevertheless, consistent with prior studies (Frazier et al., 2009; Kunz et al., 2019; Perera & Frazier, 2013), this relationship was weak. This modest link suggests perceived R/S PTG and actual R/S PTG may reflect different phenomena. For example, for religious survivors of disasters, one common and potentially adaptive coping strategy might be perceiving one has experienced R/S growth. That is, in a disaster context, perceiving growth may have some adaptive aspects (e.g., helpful self-empowerment) and some maladaptive ones (e.g., illusory self-deception; Maercker & Zoellner, 2004). Indeed, our results suggest R/S PTG following disasters likely has real and positive dimensions, as well as somewhat inaccurate and unhelpful facets (e.g., perceived PTG was associated with weaker declines in R/S but was unrelated to psychological flourishing).

A particularly interesting finding from both Studies 1 and 2 was that event severity had no effect on longitudinal change in R/S outcomes. This finding contradicts Tedeschi and Calhoun's (1996) original model of PTG, which asserted that greater trauma event severity is associated with greater PTG. Thus, there may be no relationship between the degree of actual R/S PTG disaster survivors experience and the severity of the disaster-related trauma they endure. Other internal and situational factors may influence how much actual R/S growth occurs.

Lastly, Study 2 revealed evidence that perceived and actual R/S growth are only modestly positively related. This finding is consistent with similar existing research on personality change more broadly (Oltmanns et al., 2019; Robins et al., 2005) and on attachment patterns (Kirkpatrick & Hazan, 1994). Taken together, retrospective measurement of personality change may tend to have limited value, because people are generally not very accurate in tracking their own change. However, there may be individual differences in perceptual

accuracy. For instance, Gunty et al. (2011) found evidence that trauma survivors who reported the highest levels of post-trauma psychosocial well-being (e.g., high life satisfaction and low distress) were very accurate in their self-report of perceived PTG. In contrast, trauma survivors who reported the lowest psychosocial well-being tended to overestimate how much they thought they had grown, and their perceived PTG and actual PTG were uncorrelated. Similarly, Kirkpatrick and Hazan (1994) found evidence that people with a secure attachment style are more accurate in perceiving personal change than are people with an insecure attachment style (anxious-ambivalent or avoidant). Hence, if personality researchers are conducting prospective studies of personality change and want to compare actual and perceived change, we suggest they include measures of potential moderators of this relationship (e.g., psychological adjustment, attachment style), to examine variation in people's accuracy of retrospectively reporting on their personality change.

## 4.1 | Implications

Our findings have several implications. First, researchers and clinical practitioners should be aware that disaster survivors are generally not very accurate in their perceptions of how much positive personality change (e.g., change in religion/spirituality) they have experienced as a result of disaster-related adversity. Their retrospective reports of R/S growth (and other forms of PTG) likely reflect some adaptive psychological processes (e.g., self-empowerment) and some maladaptive ones (e.g., self-deception). What would perhaps be most advisable for clinicians to do is use brief outcome measures to help disaster survivors prospectively track changes in their personality, well-being, and R/S over time. Second (and relatedly), some disaster survivors may indeed experience genuine R/S PTG—that is, positive change in their religion/spirituality and its trait-based subfacets (e.g., religious virtue, motivations, and benevolent theodicies; Davis, Kimball, Aten, Andrews, et al., 2019). Third, disaster research on PTG permits the exploration of whether collectively experienced traumatic events (e.g., disasters) might lead to similar versus different types and degrees of positive personality change, relative to individually experienced traumatic events (e.g., abuse). Although it is impossible to predict perfectly where and when disasters will strike, researchers can optimize their chances of collecting the predisaster, prospective data needed to answer research questions adequately. We particularly suggest that researchers recruit samples regularly from high disaster-risk areas (e.g., counties in “tornado alley”) and (b) initiate large ongoing longitudinal studies that sample broadly, so that when disasters inevitably occur, predisaster data will be available (e.g., the New Zealand Attitudes and Values Study).

Finally, PTG researchers should explore whether and how current conceptualizations of PTG might need to be revised (Jayawickreme & Blackie, 2014; Mangelsdorf et al., 2019). For instance, R/S growth following adversity seems to be rare, which is consistent with meta-analytic evidence (Mangelsdorf et al., 2019). Instead, the extant empirical evidence from prospective studies suggests the three most common types of actual growth following traumatic events are better social relationships, environmental mastery, and self-esteem (Mangelsdorf et al., 2019).

## 4.2 | Limitations and suggestions for future research

In addition to the aforementioned limitations of Studies 1 and 2, we recognize our data has other limitations. The most notable limitation of this research is the omission of a control group for either Study 1 or 2. Therefore, we do not know whether observed longitudinal changes were due to the disaster or to other factors (e.g., normative maturation, other life events). In fact, the vast majority of studies of PTG are plagued by the absence of a control group that would permit comparison of personality change within a trauma-exposed group to that of a group that was not exposed to that traumatic event (Mangelsdorf et al., 2019). A control group design is all the more difficult in the context of disaster research, given the aforementioned difficulty of collecting predisaster data in the first place. One way researchers of PTG in disaster contexts might address some of these concerns is to measure what daily stressors survivors encounter from pre- to postdisaster. Doing so will allow researchers to account empirically for the impact of other life events besides the disaster. Another option might be to recruit a sample from an area in a disaster's path while at the same time recruiting from a comparable area elsewhere. Yet another possibility could be to use interrupted time-series approaches with a comparison group.

Another limitation of both studies was that we did not assess psychological distress or positive reinterpretation coping, and therefore we could not examine whether and how distress and coping were related to perceived R/S PTG or to longitudinal change in religion/spirituality (and its subfactors). Moreover, we did not compare PTG in the R/S domain to PTG in the other core PTG domains (social relationships, personal strengths, appreciation of life, and new possibilities).

Future research should address these limitations and concerns. In addition, researchers conducting prospective studies of disaster-related PTG could compare state and trait measures of PTG (Blackie et al., 2017), and they could compare self-report measures of PTG with non-self-report measures such as informant ratings (Blackie, Jayawickreme, Helzer, Forgeard, & Roepke, 2015) or behavioral measures. Finally, they can expand the number of time points of data collection,

the variables assessed, and the duration of the study, which will provide stronger modeling options for evaluating patterns of change and clusters of trajectories, beyond just linear growth models.

## 4.3 | Conclusion

Is it true that what does not kill us makes us stronger? Initial findings from these studies of religious disaster survivors suggest disasters unfortunately do *not* tend to lead to R/S growth. Even so, much more research is needed to answer this question more thoroughly and definitively. We hope future research can elucidate when and how disaster survivors might experience genuine positive personality change in their religion/spirituality and in other areas of their lives.

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## CONFLICT OF INTEREST

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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