

# Positive Emotional Traits and Coping Related to Depression in the Aftermath of Category 5 Hurricanes

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Climate change has increased the likelihood that each tropical cyclone will intensify to a major hurricane, destroying communities and causing tremendous distress. The purpose of this study was to explore the role of negative coping behaviors, situational factors (emotional responses, stressors, coping strategies), and dispositional factors (trait gratitude and hope) that may contribute to depressive symptoms in the aftermath of Hurricanes Maria and Michael (H-MM). Cross-sectional data were collected through a questionnaire from communities in Florida that were directly impacted by Hurricanes Maria and Michael in 2017 and 2018 ( $N = 566$ ;  $M_{\text{age}} = 41.3$ , 28% minorities). Hierarchical regression procedures were utilized to explore factors predicting depressive symptoms, with blocks of variables added following predetermined steps. Respondents who reported more hurricane-related negative emotions and stressors and who relied more on negative coping behaviors were more likely to report depressive symptoms, but those who reported greater hope and gratitude were less likely to have symptoms. To improve the health and well-being of disaster victims, future research should further examine negative coping and positive affect so as to improve interventions as well as disaster relief efforts in affected communities.

*Keywords:* depression, negative coping, hope, gratitude, hurricanes

Hurricanes are inevitable and becoming more active. Since 1979, climate change-related warming has increased the likelihood that each tropical cyclone will intensify to the level of a major hurricane by about 8% per decade (Kossin et al., 2020). Stronger hurricanes result in greater damage to property and infrastructure but also to public health. Their effects are felt not only in their immediate aftermath but also for decades afterward. Therefore, it comes as little surprise that exposure to such traumatic natural disasters has been associated with numerous mental health impacts, not only for the otherwise healthy, but also for individuals with preexisting mental illnesses. For example, ongoing environmental and other external conditions exacerbated by hurricanes can lead to severe mental health issues, especially among those with limited

resources and minority groups (Norris et al., 2002; Substance Abuse and Mental Health Services Administration (SAMHSA), 2017; World Health Organization (WHO), Pan American Health Organization (PAHO), 2010). The poststorm environment is truly rife for long-term, detrimental effects. Many encounter long-lasting psychological issues such as posttraumatic stress disorder (PTSD; Kessler, 1995, 2000); whereas others appear to initially recover before developing chronic symptoms such as depression (Goldmann & Galea, 2014; Tracy et al., 2011).

The purpose of this study was to explore situational (e.g., emotional responses, stressors, coping strategies) and dispositional (e.g., trait gratitude, hope) factors that may contribute to or buffer against hurricane-related mental health struggles (e.g., depressive symptoms).

## Background of the Study

On September 20, 2017, Category 5 Hurricane Maria ravaged Puerto Rico, causing damage in excess of \$90 billion, making it one of the costliest natural disasters in U.S. history. Maria destroyed homes, left hospitals flooded, and knocked out power, water, and communication services to the island's 3.4 million citizens, leading to the longest utility outage in U.S. history (Federal Emergency Management Agency, 2017; Kishore et al., 2018; Pasch et al., 2018). The Federal Emergency Management Agency estimated that more than \$4.2 billion in federal Maria-related aid had been disbursed to Puerto Rico by 2020; with an additional \$3 billion approved to help rebuild vital infrastructure (FEMA, 2017;

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2020a). The storm also created a public health crisis, officially resulting in nearly 3,000 deaths, though some estimate the total to be closer to 4,650 (Kishore et al., 2018). In addition, a mental health crisis emerged, with large proportions of Puerto Rican youths experiencing depressive symptoms and high levels of PTSD following the disaster (Orengo-Aguayo et al., 2019). In search of relief, more than 200,000 Puerto Ricans fled to Florida and other states, making Hurricane Maria one of the largest evacuation events in U.S. history (Alexander et al., 2019; Hinojosa et al., 2018; Ruiter, 2017).

Just over 1 year later, on October 10, 2018, Category 5 Hurricane Michael made landfall as the strongest hurricane to ever hit the Florida Panhandle. The storm displaced 375,000 Floridians and caused \$25 billion in damages to property, businesses, and infrastructure (Bevan et al., 2019; FEMA, 2020a), though the estimated damage cost does not include losses related to health care, natural resources, injury, and loss of life (FEMA, 2020b). Michael caused nearly 70 deaths from drowning, falling trees, flooding, poststorm clean-up, traffic accidents, and medical issues (Bevan et al., 2019), with the majority of those coming in the United States. Similar to Maria, Hurricane Michael left a mental health crisis in its wake (Allen et al., 2019). The total cost of the monumental task of rebuilding lives, infrastructure, as well as the negative physical and mental health impacts on individuals and families, may not be fully known for some time (Orengo-Aguayo et al., 2019; Tang et al., 2014). Given the horrific damage of both hurricanes, more research is needed to examine risk and protective factors for post-disaster depression.

### Disaster-Related Risk Factors

According to the U.S. National Comorbidity Survey, 60.7% of men and 51.2% of women reported exposure to at least one traumatic event during their lives; natural disasters were one of the most commonly reported traumas experienced (Kessler, 2000). The connection between traumatic event exposure and mental health outcomes has been well-studied. For example, studies show a consistent link between the experience of natural disasters, post-traumatic stress and anxiety, and depressive symptoms (Goldmann & Galea, 2014; Kessler, 2000). Research further shows that traumatic stress is common and persistent after hurricanes specifically (Bell et al., 2020; McLeish & Del Ben, 2008; Weems et al., 2007). Rates of depression can range from 6% to 54%, depending on survivor and disaster characteristics (Tang et al., 2014). Generalized anxiety disorder symptoms are also commonly reported (McFarlane et al., 2009). Postdisaster challenges often linger, as victims report an ongoing inability to cope with natural disasters and greater psychological distress (Goldmann & Galea, 2014; Sattler et al., 2002; Toukmanian et al., 2000). In fact, Kessler et al. (1995) found that about one third of individuals experiencing PTSD symptoms as a result of a trauma (like a natural disaster) may continue to do so for a decade afterward.

Numerous factors have been associated with increased risk of trauma-related mental health problems, including various subjective psychological phenomena that occur during or immediately following the traumatic event (Ozer et al., 2003). Interrelated sets of factors such as cognitive representations of trauma, emotional states, and social support can all contribute to one's posttraumatic mental health. Two such risk factors were of particular interest in

the current study: emotional responses to the hurricane and hurricane-related stressors.

Bovin and Marx (2011) contend that extreme environmental events, such as a major hurricane, demand an initial appraisal in terms of their relevance to self and close others, implications for well-being and goals, coping potential, and normative significance (e.g., self-concept, norms, values). Those appraisals generate a multitude of emotional reactions, most of which are negative including fear, anger, and sadness. Researchers examining major disasters such as 9/11 and Hurricanes Katrina and Rita have developed checklists to assess such disaster-related peritraumatic emotions (Ai et al., 2005; 2011, 2013). Results indicate that the more individuals experience peritraumatic negative emotions, the more likely they are to report various negative mental health outcomes, such as posttraumatic stress disorders and depressive symptoms (Ai et al., 2005; 2011, 2013; Nicdao et al., 2013). However, the same research also suggests that peritraumatic positive emotions may play a beneficial role in trauma recovery. Thus, both peritraumatic negative and positive emotional responses were measured in the current study.

Further, traumatic events often bring with them additional life stressors. For instance, hurricanes routinely result in the loss of electricity, personal property, jobs, and loved ones, all of which, for differing reasons, increase financial, physical, emotional, psychological, and spiritual strains on victims. Acute and chronic stress associated with negative experiences can limit one's control of their emotional responses and impair functioning (Eisenbarth, 2012; Spence et al., 2007). Unsurprisingly then, across a variety of contexts (including hurricanes), peritraumatic stressors have been associated with increased mental health challenges (Belz et al., 2017; Cerdá et al., 2013; Nillni et al., 2013) and poor adjustment (Ai et al., 2011; 2013). For instance, people in poverty, with low incomes, and with less education are often less prepared for disasters, thereby increasing their stress following a disaster (Fothergill & Peek, 2004; Substance Abuse and Mental Health Services Administration (SAMHSA), 2017), which can then lead to an increased risk of depressive symptoms (Tracy et al., 2011). Therefore, accounting for the role of hurricane-related stressors was essential in the current study.

One additional disaster-related factor that has rarely been explored is the duration between the event and the time of post-disaster mental health assessment. Past hurricane studies (Ai et al., 2013) have often been implemented in the few months immediately following a disaster. However, data for the present study were collected between four and 18 months after the two storms. Although the effect of time since the event seems intuitive—the shorter the time, the more acute the symptoms—research evidence suggests that this may not be the case, with measurable effects lasting years after a traumatic event (e.g., Kessler et al., 1995). Furthermore, as recent as January 2021, many communities in Florida had yet to complete some of the most visible (and dire) recovery tasks: home and store repairs, school and church reopenings, downed tree removal, and well-water service restoration (Mixon, 2021). Thus, many victims still inhabit environments filled with continual reminders of their past trauma. Therefore, in the current study, we also explored the role that time might play in mental health recovery.

### Negative Coping Strategies as Risk Factors

Coping refers to the actions and cognitive adjustments that individuals use to deal with, manage, and control stressful situations. As such, coping can mediate the relationship between traumatic events and psychological well-being. One's ability to cope with trauma can be impacted by the peritraumatic emotional responses and stressors discussed earlier. That is, it may not necessarily be the emotional reactions and stressors themselves that most impact a person after a traumatic event, but rather how individuals choose to cope with those conditions that effects their well-being.

Coping is a natural reaction following a stressful situation or event (Bistricky et al., 2019; Cherry et al., 2015; Glass et al., 2009). However, coping strategies vary, often characterized as either approach- or avoidance-oriented (i.e., seeking to alleviate stress by actively engaging with vs. withdrawing from the stressor). Broadly speaking, approach-oriented coping is seen as a positive response to trauma, while avoidant coping is seen as negative, even though the relative benefits of coping strategies are dependent upon numerous factors. Both positive and negative coping behaviors are routinely used by individuals in the aftermath of stressful events (Coyne & Racioppo, 2000) with differing effects. Avoidant/negative coping strategies were the focus in the current study.

Avoidant coping strategies can lead to less beneficial or maladaptive outcomes. Negative coping behaviors include denial, self-distraction, self-blame, substance use, venting, and being disengaged in daily activities (Carver, 1997). That is, instead of engaging in bringing awareness to and attempting to reduce or eliminate the problem, some ignore or deny the existence of the problem completely, resulting in (further) detrimental outcomes (Bistricky et al., 2019; Glass et al., 2009; Herman-Stahl et al., 1995). Negative coping behaviors following trauma are associated with poor psychological effects (Cherry et al., 2015; Krause et al., 2008) and increased risk of poor adjustment (Lazarus & Folkman, 1984). For example, the use of negative coping strategies were significant predictors of depression among HIV positive individuals (Kinyanda et al., 2011) and were previously associated with increased PTSD symptomatology among children who experienced Hurricane Andrew (La Greca et al., 1996).

### Positive Emotional Traits as Protective Factors

As discussed earlier, posttraumatic appraisals may elicit negative emotional states, which can reduce one's ability to adapt to stressful situations in the present and in the future (Fredrickson & Joiner, 2002). Conversely, such appraisals may generate positive emotions: sympathy and compassion for other victims, admiration for first responders, gratitude for support received, appreciation for one's own safety. Studies have shown that the more individuals experience peritraumatic positive emotions, the less they are at risk for mental health outcomes (Ai et al., 2005; 2011; Nicdao, 2013). Positive experiences such as receiving social support and engaging in problem-focused strategies may counteract the damaging effects of negative coping (Glass et al., 2009). Moreover, we contend that the positive role of such state responses may be built upon certain positive emotional traits, which might moderate the association between peritraumatic emotional responses and postdisaster mental health challenges.

The literature has demonstrated that dispositional factors related to positivity may be protective for mental health (Ai & Park, 2005; Ai et al., 2011). For the past few decades, positive psychologists have been illuminating the relationships between various character strengths (Peterson & Seligman, 2004), personality traits, psychological well-being, and human flourishing. Those who experience positive emotions are more likely to engage in positive behaviors, think more creatively and flexibly, and are more likely to seek out personal resources compared to those experiencing negative emotions (Fredrickson, 2013; Fredrickson & Joiner, 2002). However, few studies have investigated positive emotions among natural disaster victims. Based on the positive psychology literature, we explored two positive emotional traits as potential consequential factors—hope and gratitude—in relation to depression following Hurricanes Maria and Michael (H-MM).

Snyder (1994; 2000) proposed that hope is the belief that one has the means or ways to do what is required to realize one's desired expectations and that one is able to sustain movement along those selected pathways. Ai et al. (2004) posited that hope may be more motivational and emotional than other positive, expectation-oriented factors, such as optimism. Further, research demonstrated that hope can be protective against hurricane-related posttraumatic stress disorders among some populations (African American victims more so than Caucasians; Ai et al., 2011). Hope also mediated the desirable effect of spiritual support, altruism, and peritraumatic positive emotions, as well as the negative impacts of peritraumatic negative emotions, on depression among victims of Hurricanes Katrina and Rita (Ai et al., 2013).

Gratitude involves an orientation toward the positive aspects of life (Wood et al., 2008), involving (a) an acknowledgment of the good things in our lives and (b) a recognition that something or someone other than ourselves is responsible for those good things (Emmons, 2007). Past research has shown that trait gratitude is generally associated with lower levels of depressive symptoms (Wood et al., 2010). However, a few studies of gratitude among victims of nonhurricane natural disaster (e.g., earthquake, volcanic eruption) have yielded equivocal results (Subandi et al., 2014; Zhou & Wu, 2016). To our knowledge, the role of gratitude has not been specifically examined in a posthurricane context.

### Present Study

The present study examined the associations between post-disaster situational and dispositional factors and depressive symptoms among victims of H-MM living in Florida. More specifically, the study sought to examine how certain factors might facilitate depression, while others might protect against it. Previous studies have identified numerous important influences on mental health outcomes in the aftermath of natural disasters. Exposure and responses to such events can shape psychosocial outcomes for individuals affected by these disasters. It is critical to continue to explore the mental health consequences of hurricanes since 17% to 22% of those living in the United States are predicted to experience at least one natural disaster in their lifetime (Briere & Elliott, 2000; Kessler et al., 1995) and since the severity of such storms continues to increase. To that end, our study examined the effects of having experienced and survived one of the strongest and most costly hurricanes in U.S. history.

Victims of H-MM were surveyed while the slow community recovery process was continuing in Florida. We hypothesized that hurricane-related negative emotional responses, stressors, and negative coping behaviors would be positively associated with depressive symptom levels (Hypothesis 1), negative coping behaviors would also be positively associated with symptom levels (Hypothesis 2), but positive emotional traits would be inversely associated with depressive symptoms and moderate the desirable role of peritraumatic positive emotional responses in depression (Hypothesis 3). Finally, drawing conclusions from past hurricane-specific research (Ai et al., 2013), we predicted that depressive symptoms would be associated with less time between the hurricane and the survey response (Hypothesis 4).

## Method

### Procedures

The cross-sectional survey data were collected from communities in Florida directly impacted by H-MM. The survey instrument was based on past research on the psychological and mental health effects of natural disasters and other traumas (Ai et al., 2011). An online version of the instrument was made available through Qualtrics between April and December 2019. Recruitment of participants ( $N = 566$ ) occurred through contact with local school systems, community services, university student groups, and grassroots relief organizations. Each completed survey was awarded with an incentive of \$10 to \$20 as a token of appreciation (hard-to-reach populations received greater incentive).

### Measures

#### Depression

The primary outcome variable was assessed with the well-established 20-item Center for Epidemiological Studies–Depression Scale (Radloff, 1977). Respondents stated how often they had felt or behaved a certain way (e.g., fearful, lonely, happy, depressed) during the previous week, using response options ranging from 0 (*rarely or none of the time, <1 day*) to 3 (*most or all of the time, 5–7 days*;  $\alpha = .93$ ).

#### Demographic Characteristics

The demographic characteristics measured included age (measured in years), gender, race, and student status.

#### Days Since the Hurricane

The number of days between the hurricane making landfall (September 20, 2017 for Hurricane Maria; October 10, 2018 for Hurricane Michael) and the date of data collected was calculated for each participant.

#### Previous Traumatic Experiences

We assessed with a single item whether H-MM brought to mind recollections of a similar experience from their past (i.e., “Has Hurricane [Maria/Michael] reminded you of a past personal experience in your life?”), with a dichotomous response set (0 = no, 1 = yes).

### Peritraumatic Emotional Responses

We assessed initial emotional reactions to H-MM with the 12-item Types of Peritraumatic Emotional Responses checklist, previously employed in Lemieux et al. (2010) Hurricanes Katrina and Rita study, with necessary contextual modifications. Using a 5-level scale (1 = *not at all*, 5 = *a great deal*), respondents indicated the extent to which they experienced five types of negative (e.g., horror/shock, anger/hatred, fear/anxiety/worry) and seven types of positive emotional reactions (e.g., sympathy for victims and their families, admiration for the first responders, gratitude for the international support) during the month following H-MM. Similar to Lemieux et al.’s (2010) study, the two types of responses were summed yielding two factors: negative (five items;  $\alpha = .83$ ) and positive (seven items;  $\alpha = .79$ ) emotional responses.

### Hurricane-Related Stressors

We assessed hurricane-related stressors using an 18-item checklist developed by investigators for use after disasters (Plummer et al., 2008). Respondents indicated (0 = no, 1 = yes) which stressors they experienced during the month immediately following H-MM. Example stressors included being an evacuee, sharing a home with evacuees, food and gasoline shortages, compassion fatigue or guilt, loss of personal property, health and financial problems, and job loss. Responses to each item were summed, with higher scores reflecting greater numbers of stressors.

### Negative Coping Strategies

We also assessed types of coping means used by respondents, with subscales and individual items from the 30-item Brief COPE (Carver, 1997). Respondents indicated the frequency with which they relied on specific coping strategies on a 4-level scale (0 = *I haven’t been doing this at all*, 3 = *I’ve been doing this a lot*) since the time of H-MM. The scale comprises 14 conceptually distinct coping reactions, of which five are considered avoidant or negative (Bistricky et al., 2019; Glass et al., 2009). The negative coping subscales utilized in the current study included (a) self-distraction (two items;  $r = .39$ ); (b) denial (two items;  $r = .66$ ); (c) substance use (two items;  $r = .84$ ); (d) behavioral disengagement (two items;  $r = .69$ ); and (e) self-blame (single item).

### Hope

We assessed hope with the 12-item Hope Scale (Snyder et al., 1991; 1996); the four filler items were omitted for this study, resulting in an eight-item scale. On a 5-point Likert scale (1 = *definitely false*, 5 = *definitely true*), respondents reported how they had felt about each statement during the past month. Responses to the items were summed ( $M = 31.53$ ,  $SD = 5.22$ ,  $\alpha = .88$ ).

### Gratitude

We assessed the extent to which respondents were prone to feel and experience gratitude in their daily lives using a seven-item Likert scale developed by McCullough et al. (2002). Responses to the items were summed, with higher scores reflecting greater gratitude proneness ( $M = 36.56$ ,  $SD = 6.15$ ;  $\alpha = .83$ ).

### Statistical Analyses

Using SPSS Version 25, we performed a three-step multiple regression model to examine the association of positive emotions

and coping strategies with depressive symptoms following preplanned steps and listwise deletion. Step 1 controlled demographics (i.e., age, gender, race, student status, and days since the hurricane). Step 2 entered hurricane-related background information (i.e., peritraumatic emotional response during, stressors resulting from, and previous traumatic experiences reminded by H-MM) as independent variables. Step 3 entered the avoidant coping strategies. Step 4 introduced the two positive emotional traits (e.g., gratitude and hope).

## Results

### Descriptive Analyses

As reported in Table 1, the sample for the current study ( $N = 566$ ) was predominantly female (76.7%), White (72.0%), and nonstudent (78.4%). The mean age was 41.3 (range 16 to 78). A majority of participants had not experienced a similar trauma to H-MM previously (73.5%). Table 2 further reports the descriptive statistics for the primary predictor variables in the study.

### Multivariate Analyses

A hierarchical regression procedure was used to explore factors predicting depressive symptoms. The Step 1 model was significant ( $F_{5,506} = 4.77, p < .001$ ), with the demographic characteristics explaining just over 5% of the variance in depressive symptoms (Table 3). Age was the only significant (negative) predictor of depressive symptoms ( $\beta = -.23, p < .001$ ), though being a student approached traditional levels of significance ( $\beta = .10, p = .053$ ).

The Step 2 model was also significant ( $F_{9,502} = 20.87, p < .001$ ), explaining more than one quarter of the variance (Table 3). Peritraumatic negative emotions ( $\beta = .41, p < .001$ ), hurricane-related stressors ( $\beta = .10, p < .05$ ) and having had a similar trauma experience ( $\beta = .10, p < .05$ ) all positively predicted depressive symptoms. Peritraumatic positive emotions ( $\beta = -.20, p < .001$ )

**Table 1**  
*Demographic Information of Sample*

Characteristic	<i>n</i>	%
Gender		
Female	437	76.7
Male	126	22.3
Transgender	2	0.4
Nonconforming	2	0.4
Race		
White	406	72.0
Non-White	158	28.0
Hispanic	92	16.3
Non-Hispanic Black	32	5.7
Multiracial	11	2.0
Other	23	4.0
Student status		
Nonstudent	444	78.4
Student	122	21.6
Previous traumatic experience?		
No	413	73.5
Yes	149	26.5

Note.  $N = 566$ .

and age ( $\beta = -.15, p < .01$ ) negatively predicted depressive symptoms.

The Step 3 model was likewise significant ( $F_{14,497} = 37.24, p < .001$ ), explaining more than one half of the variance (Table 3). Two of the avoidant coping strategies—self-blame ( $\beta = .37, p < .001$ ) and behavioral disengagement ( $\beta = .18, p < .01$ )—were found to be significant positive predictors of depressive symptoms, whereas coping through self-distraction approached traditional levels of significance ( $\beta = .06, p = .099$ ). In addition, peritraumatic negative ( $\beta = .20, p < .001$ ) and positive ( $\beta = -.12, p < .001$ ) emotions remained significant predictors of depressive symptoms. Further, days since the hurricane ( $\beta = -.10, p < .05$ ) became significant for the first time in the model, whereas hurricane-related stressors ( $\beta = .06, p = .10$ ), previous trauma experience, and age were no longer significant predictors of depression.

The final model was also significant ( $F_{16,495} = 41.04, p < .001$ ), explaining 57% of the total variance (see Table 3). As expected (Hypothesis 3), depressive symptoms were negatively predicted by hope and gratitude. Also, as predicted, depressive symptoms were positively predicted by (Hypothesis 1) peritraumatic negative emotions and hurricane-related stressors, as well as (Hypothesis 2) coping through self-blame, self-distraction, behavioral disengagement, and substance abuse (marginally). Having experienced a previous trauma also approached traditional levels of statistical significance in the final model. Finally, as expected (Hypothesis 4), less time (measured in days) since the hurricane was associated with greater depressive symptoms.

## Discussion

The current study surveyed 566 survivors of the devastating Category 5 H-MM living in Florida. Traumatic and catastrophic natural disasters such as these result in widespread and long-lasting damage, with homes and lives destroyed, but they also hold the potential for ongoing negative effects on mental health. The specific goal of the study was to explore the relationships between coping strategies, emotion-related dispositional constructs, and depressive symptoms. The final regression model—which accounted for 56% of the variance in depression—revealed that respondents who reported more hurricane-related negative emotions and stressors and who relied more on negative coping behaviors were more likely to have depressive symptoms. However, our results showed those who reported greater dispositional hope and gratitude were more likely to report lower levels of symptoms.

The results highlight the significance of negative coping and positive emotional traits following a natural disaster. With regard to the former, coping is an ongoing process that changes in response to events; it helps in an individual's efforts to manage demands that are difficult or that exceed their resources (Lazarus & Folkman, 1984). In times of trauma, many individuals employ both positive (or approach-oriented) and negative (or avoidant) coping strategies (Coyle & Racioppo, 2000). Negative coping behaviors increase the risk of poor adjustment (Lazarus, & Folkman, 1984) and other psychological effects, especially in the aftermath of a challenging event (Bistricky et al., 2019; Cherry et al., 2015; Krause et al., 2008).

In the current study, five negative coping behaviors were explored: self-distraction, denial, substance abuse, behavioral disengagement, and self-blame. Past research suggests that trauma

**Table 2**  
*Descriptive Statistics for Predictor and Criterion Variables*

Characteristic	<i>n</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum
Days since hurricane	536	272.81	128.67	118.00	533.00
Peritraumatic positive emotional responses	562	23.12	4.05	7.00	28.00
Peritraumatic negative emotional responses	562	13.84	3.98	5.00	20.00
Hurricane-related stressors	561	8.25	2.61	0.00	17.00
Avoidant coping: Self-distraction	560	4.89	1.82	2.00	8.00
Avoidant coping: Denial	560	3.20	1.74	1.00	8.00
Avoidant coping: Substance use	561	2.92	1.65	1.00	8.00
Avoidant coping: Behavioral disengagement	561	3.17	1.68	1.00	8.00
Avoidant coping: Self-blame	559	1.99	1.06	1.00	4.00
Hope	564	41.90	9.33	9.00	62.00
Gratitude	563	36.56	6.15	6.00	42.00
Depressive Symptoms	562	18.34	12.70	0.00	57.00

victims often turn to such negative coping approaches due to feelings of anger, fear, and other negative emotions, as well as ongoing life stressors following a trauma (Chen & Koenig, 2006; Cherry et al., 2015; García et al., 2019; Gerber et al., 2011; Glass et al., 2009). Unsurprisingly, peritraumatic negative emotions and H-MM-related stressors were significantly correlated ( $p > .001$ ) with all five negative coping behaviors, with coefficients ranging from  $r = .18$  to  $.42$  for negative emotions and from  $r = .10$  to  $.25$  for stressors. Peritraumatic negative emotions and H-MM-related stressors were also significant predictors of depressive symptoms in the final model.

Two negative coping behaviors significantly predicted depressive symptoms in the final model: self-blame and self-distraction. In fact, self-blame was far and away the single factor explaining

the most variance in depression. This is in line with past studies that have shown self-blame and behavioral disengagement to be associated with increased depression (Glass et al., 2009; Herman-Stahl et al., 1995; Tang et al., 2014). Coping through behavioral disengagement (“giving up”) was a marginally significant predictor of depression in the current study. Denial and substance abuse were not predictors for depression. This is surprising since previous research found both strategies to be related to poor outcomes including depression (Krause et al., 2008; Spence et al., 2007; Vosvick et al., 2003). However, Penley et al. (2002) suggested that the coping strategies utilized may depend on the type and duration of the stressor, as well as the availability of social support. It is possible that, due to the magnitude of destruction and subsequent public health crises, H-MM may have triggered factors and

**Table 3**  
*Hierarchical Regression Final Model Results*

	<i>B</i>	$\beta$	<i>R</i> <sup>2</sup>	<i>F</i> -change <sup>c</sup>
Step 1				
Gender <sup>a</sup>	-.04	-.00	.045	4.77****
Age	.00	.00		
Race <sup>b</sup>	.25	.01		
Student status	-.47	-.02		
Days since hurricane	-.01	-.11***		
Step 2				
Previous trauma	1.49	.05*	.272	39.19****
Peritraumatic positive emotions	-.12	-.04		
Peritraumatic negative emotions	.64	.20****		
Hurricane-related stressors	.32	.07**		
Step 3				
Coping: Self-distraction	.57	.08**	.512	48.82****
Coping: Denial	.23	.03		
Coping: Substance use	.58	.05*		
Coping: Behavioral disengagement	.78	.10**		
Coping: Self-blame	3.81	.32****		
Step 4				
Hope	-.47	-.19****	.570	33.52****
Gratitude	-.27	-.13***		

<sup>a</sup> For the sake of parsimony in the model, Gender was treated as binary (female = 0, male = 1). <sup>b</sup> For the sake of parsimony, race was also treated as binary (White = 0, Non-White = 1). <sup>c</sup> Step 1 *F*-change  $df = 5, 506$ ; Step 2  $df = 4, 502$ ; Step 3  $df = 5, 497$ ; Step 4  $df = 2, 495$ .

\*  $p < .10$ . \*\*  $p < .05$ . \*\*\*  $p < .01$ . \*\*\*\*  $p < .001$ .

situations unmeasured in the study that impacted the use of denial and substances as means of coping.

Past research has found that positivity and positive traits outcomes may counteract the damaging effects of negative coping (Glass et al., 2009) and decrease negative mental health (Ai et al., 2005; 2011; 2013; Lambert et al., 2012; Nicdao, 2013; Smith et al., 2016). Following natural disasters such as hurricanes, positive emotions are particularly important as they may serve as protective factors against depression (Fredrickson, 2013; Fredrickson & Joiner, 2002). In the current study, it was found that respondents higher in trait gratitude reported fewer depressive symptoms. As a key element of the human virtue of transcendence (Peterson & Seligman, 2004), gratitude has been called the most quintessential positive trait. It involves an orientation toward the positive aspects of life (Wood et al., 2008); from an evolutionary perspective, it is beneficial for the sharing of resources by coordinating reciprocity to another person's altruism. As such, gratitude is an outwardly oriented disposition; it is a moral affect (McCullough et al., 2001). The positive benefits of trait gratitude have been demonstrated in various social contexts: fostering altruism toward strangers, feelings of greater connection to others, and prosocial behaviors (Bartlett & DeSteno, 2006). But this study clearly demonstrates the beneficial role of trait gratitude to the self, as it significantly moderated depressive symptoms among hurricane victims. Previous studies have examined the role of gratitude in trauma outcomes, but often within a specific population (e.g., police officers; McCanlies et al., 2018), as an emotional state (Zhou & Wu, 2016), or in response to relief efforts (Raggio & Folse, 2011). Given the current findings, future studies of disaster-related trauma should seriously consider examining the role of trait gratitude as a buffer against mental health problems.

In addition, persons higher in trait hope reported fewer depressive symptoms. Hope involves the feeling of yearning for an outcome, typically that is unlikely to happen. Hope provides emotional fuel for people to persevere, even in the presence of obstacles. It is a self-motivating emotional disposition, which entails the belief that somehow, with or without one's own doing, one's favorable and wished-for outcome will manifest (Alarcon, Bowling & Khazon, 2013). It involves having both the will to achieve a goal (agency thinking) and the ideas about how to accomplish that goal (pathways thinking; Snyder et al., 1991). Few studies have examined hope in relation to postnatural disaster mental health, though restoring hope has been identified as vitally important by trauma specialists for many years (e.g., Substance Abuse and Mental Health Services Administration's Trauma-Informed Care protocols; Substance Abuse and Mental Health Services Administration (SAMHSA), 2014). The robust findings herein suggest that researchers should consider examining the role of hope as a buffer against depressive symptoms in such future studies.

Despite the valuable insight gained from our results, the study has some limitations. First, we acknowledge the limitations in all of our measures, given that they rely on participant self-report. In particular, the primary outcome variable—depressive symptoms—was measured via self-report, rather than in a psychiatric or other clinical setting; as such, attempts to infer individual or collective diagnoses of depression within the sample should be avoided. Second, although successfully used in past research, the hurricane-related stressors measure necessarily equates the psychological

effect of each of the 18 stressors (i.e., “yes, I experienced this”; “no, I did not”), despite the fact that some may be inherently more stress-inducing than others. We contend that our measurement of other event-related factors (especially, peritraumatic emotions) captured at least some of this “lost” variance. Nevertheless, more psychometric work on the stressor measure is encouraged. Third, as with all survey data, the relationships identified herein are correlational in nature; attempts to infer causality should likewise be avoided. Fourth, as noted, the participants in the study experienced two different traumatic events (Hurricanes Maria and Michael), which occurred 13 months apart. Although time (i.e., days between the hurricane and survey completion) was included in the model, it is possible that the two groups differed on other influential hurricane-related factors, which went unobserved in the current study and unaccounted for in our model. Finally, despite extensive efforts to recruit a diverse participant pool, we acknowledge an imbalance in the sample with regard to gender and race, in particular in relation to the overall U.S. population. The generalizability of the findings must be considered in light of this fact.

The study serves to highlight two major issues. First, as has been seen in past research, negative coping strategies can result in mental health challenges. Second, traits associated with positive emotions can moderate those effects. Specifically, our results showed depressive symptoms were lower among those who high in trait gratitude and hope. Continued examination of such phenomena is essential since depression is a commonly reported symptoms following a traumatic event (Allen et al., 2019; Briere & Elliott, 2000; Orengo-Aguayo et al., 2019).

Hurricanes are seasonal and regular occurrence for those who live in the Caribbean and along the Gulf of Mexico coast of the United States, but the events following the aftermath are important and valuable to understand for the future of all community members in these affected areas and beyond. Disasters are mass traumatic events that involve multiple individuals and frequently are accompanied by loss of property and economic hardship on a massive scale. As a result, psychological distress and the corresponding coping mechanisms are critical. Our findings suggest that individuals who utilize a diverse range of coping strategies and who have well-developed positive traits (such as a gratitude and the hope) can better deal with that distress, moving more quickly toward posttraumatic well-being.

## References

- Ai, A. L., Cascio, T., Santangelo, L. K., & Evans-Campbell, T. (2005). Hope, meaning, and growth following the September 11, 2001, terrorist attacks. *Journal of Interpersonal Violence, 20*(5), 523–548. <https://doi.org/10.1177/0886260504272896>
- Ai, A. L., & Park, C. L. (2005). Possibilities of the positive following violence and trauma: Informing the coming decade of research. *Journal of Interpersonal Violence, 20*(2), 242–250. <https://doi.org/10.1177/0886260504267746>
- Ai, A. L., Peterson, C., Tice, T. N., Bolling, S. F., & Koenig, H. G. (2004). Faith-based and secular pathways to hope and optimism subconstructs in middle-aged and older cardiac patients. *Journal of Health Psychology, 9*(3), 435–450. <https://doi.org/10.1177/1359105304042352>
- Ai, A. L., Plummer, C., Kanno, H., Heo, G., Appel, H. B., Simon, C. E., & Spigner, C. (2011). Positive traits versus previous trauma: Racially different correlates with PTSD symptoms among Hurricane Katrina-Rita

- volunteers. *Journal of Community Psychology*, 39(4), 402–420. <https://doi.org/10.1002/jcop.20442>
- Ai, A. L., Richardson, R., Plummer, C., Ellison, C. G., Lemieux, C., Tice, T. N., & Huang, B. (2013). Character strengths and deep connections following Hurricanes Katrina and Rita: Spiritual and secular pathways to resistance among volunteers. *Journal for the Scientific Study of Religion*, 52(3), 537–556. <https://doi.org/10.1111/jssr.12043>
- Alarcon, G. M., Bowling, N. A., & Khazon, S. (2013). Great expectations: A meta-analytic examination of optimism and hope. *Personality and Individual Differences*, 54(7), 821–827. <https://doi.org/10.1016/j.paid.2012.12.004>
- Alexander, M., Polimis, K., & Zagheni, E. (2019). The impact of Hurricane Maria on out-migration from Puerto Rico: Evidence from Facebook data. *Population and Development Review*, 45(3), 617–630. <https://doi.org/10.1111/padr.12289>
- Allen, L., Daniels, D., Lee, A., Tasker, T., & Woffard, C. G. (2019). Surviving Hurricane Michael: Helping individuals with serious and persistent mental illness, foster families and child welfare involved families prepare and recover. *Journal of Family Strengths*, 19(1), Article 13.
- Bartlett, M. Y., & DeSteno, D. (2006). Gratitude and prosocial behavior: Helping when it costs you. *Psychological Science*, 17(4), 319–325. <https://doi.org/10.1111/j.1467-9280.2006.01705.x>
- Bell, S. A., Banerjee, M., Griggs, J. J., Iwashyna, T. J., & Davis, M. A. (2020). The effect of exposure to disaster on cancer survival. *Journal of General Internal Medicine*, 35(1), 380–382. <https://doi.org/10.1007/s11606-019-05465-x>
- Belz, M., Belz, M., Özkan, I., & Graef-Calliess, I. T. (2017). Posttraumatic stress disorder and comorbid depression among refugees: Assessment of a sample from a German refugee reception center. *Transcultural Psychiatry*, 54(5-6), 595–610. <https://doi.org/10.1177/1363461517745473>
- Bevan, J. L., Berg, R., & Hagen, A. (2019). *National Hurricane Center Tropical cyclone report: Hurricane Michael*. [https://www.nhc.noaa.gov/data/tcr/AL142018\\_Michael.pdf](https://www.nhc.noaa.gov/data/tcr/AL142018_Michael.pdf)
- Bistricky, S. L., Long, L. J., Lai, B. S., Gallagher, M. W., Kanenberg, H., Elkins, S. R., Harper, K. L., & Short, M. B. (2019). Surviving the storm: Avoidant coping, helping behavior, resilience and affective symptoms around a major hurricane-flood. *Journal of Affective Disorders*, 257, 297–306. <https://doi.org/10.1016/j.jad.2019.07.044>
- Bovin, M. J., & Marx, B. P. (2011). The importance of the peritraumatic experience in defining traumatic stress. *Psychological Bulletin*, 137(1), 47–67. <https://doi.org/10.1037/a0021353>
- Briere, J., & Elliott, D. (2000). Prevalence, characteristics, and long-term sequelae of natural disaster exposure in the general population. *Journal of Traumatic Stress*, 13(4), 661–679. <https://doi.org/10.1023/A:1007814301369>
- Carver, C. S. (1997). You want to measure coping but your protocol's too long: Consider the brief COPE. *International Journal of Behavioral Medicine*, 4(1), 92–100. [https://doi.org/10.1207/s15327558ijbm0401\\_6](https://doi.org/10.1207/s15327558ijbm0401_6)
- Cerdá, M., Bordelais, P. M., Galea, S., Norris, F., Tracy, M., & Koenen, K. C. (2013). The course of posttraumatic stress symptoms and functional impairment following a disaster: What is the lasting influence of acute versus ongoing traumatic events and stressors? *Social Psychiatry and Psychiatric Epidemiology*, 48(3), 385–395. <https://doi.org/10.1007/s00127-012-0560-3>
- Chen, Y. Y., & Koenig, H. G. (2006). Traumatic stress and religion: Is there a relationship? A review of empirical findings. *Journal of Religion and Health*, 45(3), 371–381. <https://doi.org/10.1007/s10943-006-9040-y>
- Cherry, K. E., Sampson, L., Nezat, P. F., Cacamo, A., Marks, L. D., & Galea, S. (2015). Long-term psychological outcomes in older adults after disaster: Relationships to religiosity and social support. *Aging and Mental Health*, 19(5), 430–443. <https://doi.org/10.1080/13607863.2014.941325>
- Coyne, J. C., & Racioppo, M. W. (2000). Never the Twain shall meet? Closing the gap between coping research and clinical intervention research. *The American Psychologist*, 55(6), 655–664. <https://doi.org/10.1037/0003-066X.55.6.655>
- Eisenbarth, C. (2012). Coping profiles and psychological distress: A cluster analysis. *North American Journal of Psychology*, 14(3), 485–496.
- Emmons, R. A. (2007). *Thanks!: How the new science of gratitude can make you happier*. Houghton Mifflin Harcourt.
- Federal Emergency Management Agency [FEMA]. (2017). *Historic disasters*. <https://www.fema.gov/disasters/historic>
- Federal Emergency Management Agency [FEMA]. (2020a). *Three years after Hurricane María, FEMA obligations reach \$7.3 billion*. <https://www.fema.gov/press-release/20200916/three-years-after-hurricane-maria-fema-obligations-reach-73-billion>
- Federal Emergency Management Agency [FEMA]. (2020b). *Mitigation assessment team report: Hurricane Michael in Florida: Building performance observations, recommendations, and technical guidance*. [https://www.fema.gov/sites/default/files/2020-07/mat-report\\_hurricane-michael\\_florida.pdf](https://www.fema.gov/sites/default/files/2020-07/mat-report_hurricane-michael_florida.pdf)
- Fothergill, A., & Peek, L. A. (2004). Poverty and disasters in the United States: A review of recent sociological findings. *Natural Hazards*, 32(1), 89–110. <https://doi.org/10.1023/B:NHAZ.0000026792.76181.d9>
- Fredrickson, B. L. (2013). Positive emotions broaden and build. *Advances in Experimental Social Psychology*, 47, 1–53. <https://doi.org/10.1016/B978-0-12-407236-7.00001-2>
- Fredrickson, B. L., & Joiner, T. (2002). Positive emotions trigger upward spirals toward emotional well-being. *Psychological Science*, 13(2), 172–175. <https://doi.org/10.1111/1467-9280.00431>
- García, F. E., Vázquez, C., & Inostroza, C. (2019). Predictors of post-traumatic stress symptoms following occupational accidents: A longitudinal study. *Anxiety, Stress, and Coping*, 32(2), 168–178. <https://doi.org/10.1080/10615806.2019.1566533>
- Gerber, M. M., Boals, A., & Schuettler, D. (2011). The unique contributions of positive and negative religious coping to posttraumatic growth and PTSD. *Psychology of Religion and Spirituality*, 3(4), 298–307. <https://doi.org/10.1037/a0023016>
- Glass, K., Flory, K., Hankin, B. L., Kloos, B., & Turecki, G. (2009). Are coping strategies, social support, and hope associated with psychological distress among Hurricane Katrina survivors? *Journal of Social and Clinical Psychology*, 28(6), 779–795. <https://doi.org/10.1521/jscp.2009.28.6.779>
- Goldmann, E., & Galea, S. (2014). Mental health consequences of disasters. *Annual Review of Public Health*, 35, 169–183. <https://doi.org/10.1146/annurev-publhealth-032013-182435>
- Herman-Stabl, M. A., Stemmler, M., & Petersen, A. C. (1995). Approach and avoidant coping: Implications for adolescent mental health. *Journal of Youth and Adolescence*, 24(6), 649–665. <https://doi.org/10.1007/BF01536949>
- Hinojosa, J., Román, N., & Meléndez, E. (2018). Puerto Rican post-Maria relocation by States. *Center for Puerto Rican Studies*. <https://centropr.hunter.cuny.edu/sites/default/files/PDF/Schoolenroll-v2-3-3-2018.pdf>
- Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry*, 52(12), 1048–1060. <https://doi.org/10.1001/archpsyc.1995.03950240066012>
- Kessler, R. C. (2000). Posttraumatic stress disorder: The burden to the individual and to society. *The Journal of Clinical Psychiatry*, 61(5), 4–12.
- Kinyanda, E., Hoskins, S., Nakku, J., Nawaz, S., & Patel, V. (2011). Prevalence and risk factors of major depressive disorder in HIV/AIDS as seen in semi-urban Entebbe district, Uganda. *BMC Psychiatry*, 11(1), 205, Article. <https://doi.org/10.1186/1471-244X-11-205>
- Kishore, N., Marqués, D., Mahmud, A., Kiang, M. V., Rodriguez, I., Fuller, A., Ebner, P., Sorensen, C., Racy, F., Lemery, J., Maas, L., Leaning, J., Irizarry, R. A., Balsari, S., & Buckee, C. O. (2018).

- Mortality in Puerto Rico after Hurricane Maria. *The New England Journal of Medicine*, 379(2), 162–170. <https://doi.org/10.1056/NEJMsal803972>
- Kossin, J. P., Knapp, K. R., Olander, T. L., & Velden, C. S. (2020). Global increase in major tropical cyclone exceedance probability over the past four decades. *Proceedings of the National Academy of Sciences, USA, USA of the United States of America*, 117(22), 11975–11980. <https://doi.org/10.1073/pnas.1920849117>
- Krause, E. D., Kaltman, S., Goodman, L. A., & Dutton, M. A. (2008). Avoidant coping and PTSD symptoms related to domestic violence exposure: A longitudinal study. *Journal of Traumatic Stress*, 21(1), 83–90. <https://doi.org/10.1002/jts.20288>
- La Greca, A., Silverman, W. K., Vernberg, E. M., & Prinstein, M. J. (1996). Symptoms of posttraumatic stress in children after Hurricane Andrew: A prospective study. *Journal of Consulting and Clinical Psychology*, 64(4), 712–723. <https://doi.org/10.1037/0022-006X.64.4.712>
- Lambert, N. M., Fincham, F. D., & Stillman, T. F. (2012). Gratitude and depressive symptoms: The role of positive reframing and positive emotion. *Cognition and Emotion*, 26(4), 615–633. <https://doi.org/10.1080/02699931.2011.595393>
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer Publishing.
- Lemieux, C. M., Plummer, C. A., Richardson, R., Simon, C. E., & Ai, A. L. (2010). Mental health, substance use, and adaptive coping among social work students in the aftermath of Hurricanes Katrina and Rita. *Journal of Social Work Education*, 46(3), 391–410. <https://doi.org/10.5175/JSWE.2010.200900004>
- Marsac, M. L., Ciesla, J., Barakat, L. P., Hildenbrand, A. K., Delahanty, D. L., Widaman, K., Winston, F. W., & Kassam-Adams, N. (2016). The role of appraisals and coping in predicting posttraumatic stress following pediatric injury. *Psychological Trauma: Theory, Research, Practice, and Policy*, 8(4), 495–503. <https://doi.org/10.1037/tra0000116>
- McCanlies, E. C., Gu, J. K., Andrew, M. E., & Violanti, J. M. (2018). The effect of social support, gratitude, resilience and satisfaction with life on depressive symptoms among police officers following Hurricane Katrina. *International Journal of Social Psychiatry*, 64(1), 63–72. <https://doi.org/10.1177/0020764017746197>
- McCullough, M. E., Emmons, R. A., & Tsang, J. A. (2002). The grateful disposition: A conceptual and empirical topography. *Journal of Personality and Social Psychology*, 82(1), 112–127. <https://doi.org/10.1037/0022-3514.82.1.112>
- McCullough, M. E., Kilpatrick, S. D., Emmons, R. A., & Larson, D. B. (2001). Is gratitude a moral affect? *Psychological Bulletin*, 127(2), 249–266. <https://doi.org/10.1037/0033-2909.127.2.249>
- McFarlane, A. C., Van Hooff, M., & Goodhew, F. (2009). Anxiety disorders and PTSD. In Y. Neria, S. Galea, & F. H. Norris (Eds.), *Mental health and disasters* (pp. 47–66). Cambridge University. <https://doi.org/10.1017/CBO9780511730030.004>
- McLeish, A. C., & Del Ben, K. S. (2008). Symptoms of depression and posttraumatic stress disorder in an outpatient population before and after Hurricane Katrina. *Depression and Anxiety*, 25(5), 416–421. <https://doi.org/10.1002/da.20426>
- Mixon, T. (2021, January 19). *Bay County school officials frustrated with slow federal aid since Hurricane Michael*. Panama City News Herald. <https://www.news Herald.com/story/news/local/2021/01/19/hurricane-michael-federal-reimbursement-bay-county-florida-fema-slow-response/6637404002/>
- Nicdao, E. G., Noel, T., Ai, A. L., Plummer, C., & Groff, S. (2013). Post disaster resilience: Racially different correlates of depression symptoms among hurricane Katrina-Rita volunteers. *Disaster Health*, 1(1), 45–53. <https://doi.org/10.4161/dish.23077>
- Nillni, Y. I., Nosen, E., Williams, P. A., Tracy, M., Coffey, S. F., & Galea, S. (2013). Unique and related predictors of major depressive disorder, posttraumatic stress disorder, and their comorbidity after Hurricane Katrina. *Journal of Nervous and Mental Disease*, 201(10), 841–847. <https://doi.org/10.1097/NMD.0b013e3182a430a0>
- Norris, F. H., Friedman, M. J., Watson, P. J., Byrne, C. M., Diaz, E., & Kaniasty, K. (2002). 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981–2001. *Psychiatry: Interpersonal and Biological Processes*, 65(3), 207–239. <https://doi.org/10.1521/psyc.65.3.207.20173>
- Orengo-Aguayo, R., Stewart, R. W., de Arellano, M. A., Suárez-Kindy, J. L., & Young, J. (2019). Disaster exposure and mental health among Puerto Rican youths after Hurricane Maria. *JAMA Network Open*, 2(4) Article, e192619. <https://doi.org/10.1001/jamanetworkopen.2019.2619>
- Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin*, 129(1), 52–73. <https://doi.org/10.1037/0033-2909.129.1.52>
- Pasch, R. J., Penny, A. B., & Berg, R. (2018). *National Hurricane Center tropical cyclone report: Hurricane Maria*. [https://www.nhc.noaa.gov/data/tcr/AL152017\\_Maria.pdf](https://www.nhc.noaa.gov/data/tcr/AL152017_Maria.pdf)
- Penley, J. A., Tomaka, J., & Wiebe, J. S. (2002). The association of coping to physical and psychological health outcomes: A meta-analytic review. *Journal of Behavioral Medicine*, 25, 551–603. <https://doi.org/10.1023/A:1020641400589>
- Peterson, C., & Seligman, M. E. P. (2004). *Character strengths and virtues: A classification and handbook*. American Psychological Association.
- Plummer, C. A., Ai, A. L., Lemieux, C. M., Richardson, R., Dey, S., Taylor, P., Spence, S., & Kim, H. J. (2008). Volunteerism among social work students during hurricanes Katrina and Rita: A report from the disaster area. *Journal of Social Service Research*, 34(3), 55–71. <https://doi.org/10.1080/01488370802086328>
- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1(3), 385–401. <https://doi.org/10.1177/014662167700100306>
- Raggio, R. D., & Folse, J. A. G. (2011). Expressions of gratitude in disaster management: An economic, social marketing, and public policy perspective on post-Katrina campaigns. *Journal of Public Policy and Marketing*, 30(2), 168–174. <https://doi.org/10.1509/jppm.30.2.168>
- Ruiter, J. (2017). Thousands enroll in Florida schools in wake of Hurricane Maria: Housing a major issue. *Orlando Sentinel*. <https://www.orlandosentinel.com/news/lake/os-puerto-rico-hurricane-irma-student-enrollment-central-florida-20171128-story.html>
- Substance Abuse and Mental Health Services Administration (SAMHSA). (2014). *Trauma-informed care in behavioral health services*. <https://store.samhsa.gov/sites/default/files/d7/priv/sma14-4816.pdf>
- Substance Abuse and Mental Health Services Administration (SAMHSA). (2017). *Disaster technical assistance center supplemental research bulletin greater impact: How disasters affect people of low socioeconomic status*. [https://www.samhsa.gov/sites/default/files/programs\\_campaigns/dtac/srb-low-ses.pdf](https://www.samhsa.gov/sites/default/files/programs_campaigns/dtac/srb-low-ses.pdf)
- Sattler, D. N., Preston, A. J., Kaiser, C. F., Olivera, V. E., Valdez, J., & Schlueter, S. (2002). Hurricane Georges: A cross-national study examining preparedness, resource loss, and psychological distress in the U.S. Virgin Islands, Puerto Rico, Dominican Republic, and the United States. *Journal of Traumatic Stress*, 15(5), 339–350. <https://doi.org/10.1023/A:1020138022300>
- Smith, M. M., Saklofske, D. H., Keefer, K. V., & Tremblay, P. F. (2016). Coping strategies and psychological outcomes: The moderating effects of personal resiliency. *The Journal of Psychology*, 150(3), 318–332. <https://doi.org/10.1080/00223980.2015.1036828>
- Snyder, C. R. (1994). *The psychology of hope: You can get there from here*. Simon & Schuster.
- Snyder, C. R. (Ed.). (2000). *Handbook of hope: Theory, measures, and applications*. Academic press.

- Snyder, C. R., Harris, C., Anderson, J. R., Holleran, S. A., Irving, L. M., Sigmon, S. T., Yoshinobu, L., Gibb, J., Langelle, C., & Harney, P. (1991). The will and the ways: Development and validation of an individual-differences measure of hope. *Journal of Personality and Social Psychology, 60*(4), 570–585. <https://doi.org/10.1037/0022-3514.60.4.570>
- Snyder, C. R., Sympson, S. C., Ybasco, F. C., Borders, T. F., Babyak, M. A., & Higgins, R. L. (1996). Development and validation of the State Hope Scale. *Journal of Personality and Social Psychology, 70*(2), 321–335. <https://doi.org/10.1037/0022-3514.70.2.321>
- Spence, P. R., Lachlan, K. A., & Burke, J. M. (2007). Adjusting to uncertainty: Coping strategies among the displaced after hurricane Katrina. *Sociological Spectrum, 27*(6), 653–678. <https://doi.org/10.1080/02732170701533939>
- Subandi, M. A., Achmad, T., Kurniati, H., & Febri, R. (2014). Spirituality, gratitude, hope and post-traumatic growth among the survivors of the 2010 eruption of Mount Merapi in Java, Indonesia. *Australasian Journal of Disaster and Trauma Studies, 18*(1), 19–26.
- Tang, B., Liu, X., Liu, Y., Xue, C., & Zhang, L. (2014). A meta-analysis of risk factors for depression in adults and children after natural disasters. *BMC Public Health, 14*, 623–634. <https://doi.org/10.1186/1471-2458-14-623>
- Tracy, M., Norris, F. H., & Galea, S. (2011). Differences in the determinants of posttraumatic stress disorder and depression after a mass traumatic event. *Depression and Anxiety, 28*(8), 666–675. <https://doi.org/10.1002/da.20838>
- Toukmanian, S. G., Jadaa, D., & Lawless, D. (2000). A cross-cultural study of depression in the aftermath of a natural disaster. *Anxiety, Stress, and Coping, 13*(3), 289–307. <https://doi.org/10.1080/10615800008549267>
- Vosvick, M., Koopman, C., Gore-Felton, C., Thoresen, C., Krumboltz, J., & Spiegel, D. (2003). Relationship of functional quality of life to strategies for coping with the stress of living with HIV/AIDS. *Psychosomatics, 44*(1), 51–58. <https://doi.org/10.1176/appi.psy.44.1.51>
- Weems, C. F., Watts, S. E., Marsee, M. A., Taylor, L. K., Costa, N. M., Cannon, M. F., . . . Pina, A. A. (2007). The psychosocial impact of Hurricane Katrina: Contextual differences in psychological symptoms, social support, and discrimination. *Behaviour Research and Therapy, 45*(10), 2295–2306. <https://doi.org/10.1016/j.brat.2007.04.013>
- Wood, A. M., Froh, J. J., & Geraghty, A. W. (2010). Gratitude and well-being: A review and theoretical integration. *Clinical Psychology Review, 30*(7), 890–905. <https://doi.org/10.1016/j.cpr.2010.03.005>
- Wood, A. M., Maltby, J., Gillett, R., Linley, P. A., & Joseph, S. (2008). The role of gratitude in the development of social support, stress, and depression: Two longitudinal studies. *Journal of Research in Personality, 42*(4), 854–871. <https://doi.org/10.1016/j.jrp.2007.11.003>
- World Health Organization (WHO), Pan American Health Organization (PAHO). (2010). *Culture and Mental Health in Haiti: A literature review*. World Health Organization.
- Zhou, X., & Wu, X. (2016). Understanding the roles of gratitude and social support in posttraumatic growth among adolescents after Ya'an earthquake: A longitudinal study. *Personality and Individual Differences, 101*, 4–8. <https://doi.org/10.1016/j.paid.2016.05.033>

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