

Meaning, Resilience, and Traumatic Stress After the Deepwater Horizon Oil Spill: A Study of Mississippi Coastal Residents Seeking Mental Health Services

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The present study examines the relationship between resilience, perceived meaning in life, and traumatic stress symptoms among coastal residents of Mississippi directly affected by the Deepwater Horizon oil spill (also known as the Gulf oil spill). The study was conducted as part of a larger project that assessed the spill's effect on the mental health of individuals seeking therapeutic services. Multiple regression analyses were conducted to determine if resilience and perceived meaning are significant predictors of scores from a measure of posttraumatic stress. Descriptive data, reliability coefficients, and correlations were also calculated. Higher levels of resilience and meaning together were predictive of fewer posttraumatic stress symptoms after controlling for the effect of the spill. Resilience and meaning appeared to be similar predictors of lower posttraumatic stress scores, and meaning appears to be an important facet of what makes a person resilient. © 2015 Wiley Periodicals, Inc. *J. Clin. Psychol.* 72:1264–1278, 2016.

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Introduction

In April of 2010, the Deepwater Horizon oil platform exploded, killing 11 rig workers and eventually releasing nearly five million barrels of oil into the Gulf of Mexico over the course of 3 months (Robertson & Krauss, 2010). Since the spill (referred to as the Deepwater Horizon oil spill or the Gulf oil spill), the negative ecological effects have been demonstrated through an increase in the deaths of land and marine wildlife, with large peaks seen in dolphins washing up on the shores of Mississippi and Alabama, coupled with a decrease in indigenous plant life in coastal marshlands (Boxall, 2011). Many industries along the coast experienced negative effects of the spill, such as decreases in commercial and recreational fishing and tourism (Gill, Picou, & Ritchie, 2012). Consequently, many people in these industries lost their jobs. Technological disasters are different from natural disasters in that they involve damage to the environment caused by human error or intent (Baum, Fleming, & Davidson, 1983; Shenesey & Langhinrichsen-Rohling, 2015). Both technological and natural disasters can have long-term negative effects on those who are affected by them, and the broad effect of disasters leave whole communities struggling to return to normalcy.

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The Effect of Disasters

The most common psychological sequelae associated with disasters are generally anxiety, depression, and posttraumatic stress disorder (PTSD), along with increases in pursuing mental health services, reporting of somatic complaints, and experiencing of relationship problems (for reviews, see Green & Lindy, 1994, and Norris et al., 2002). After the Exxon Valdez oil spill, increases in posttraumatic stress, generalized anxiety, and depression were reported (Arata, Picou, Johnson, & McNall, 2000; Palinkas, Petterson, Russell, & Downs, 1993).

In another example, after the Sea Empress oil spill in 1996, victims reported higher levels of anxiety and depression than those who were not exposed (Lyons, Temple, Evans, Fone, & Palmer, 1999). A Gallup Poll conducted with residents of the Gulf Coast after the Deepwater Horizon oil spill revealed an overall decline in emotional health, with increased sadness, depression, stress, and worry being particularly common (Witters, 2010). Additionally, calls to mental health assistance hotlines increased significantly after the spill (Yun, Lurie, & Hyde, 2010). Green and Lindy (1994) reported that negative mental health effects usually last around 2 years after a disaster occurs, although some research suggests that the mental health effects of a technological disaster last longer than other disasters (Baum & Fleming, 1993; Palinkas et al., 1993).

Research has also shown that the more severely a person is affected by a disaster, the more likely they are to experience posttraumatic stress. For instance, in a meta-analytic review, Brewin and colleagues (2000) found an average weighted effect size of $r = 0.23$ for the association between the severity of the trauma and the subsequent severity of PTSD symptoms. Further, Norris and colleagues (2002) noted that the link between severity of the trauma and severity of PTSD symptoms exists across cultures. With technological disasters, the effect can be secondary instead of primary; that is, although some people are not going to be directly, individually affected by the event per se, they may be affected by the damage done to their community. In other words, in the case of the Gulf oil spill, job and income loss, damage to local industries (e.g., tourism, fishing, petroleum), worries about the environmental consequences of the disaster, and increased stress as a result of the spill are the causes of negative psychological effects (Arata et al., 2000; Mong, Noguchi, & Ladner, 2012).

Although disasters affect large numbers of individuals, the effects of the experience are not uniform among those affected. Effects can range from the long term to the short term, and involve a range of reactions, from clinical syndromes, such as PTSD, to short-term problems in daily functioning, followed by a return to predisaster levels of functioning (Williams, McDevitt-Murphy, Fields, Weathers, & Flood, 2011). Numerous epidemiological studies have found that the majority of people (reportedly 60%–80%) will experience at least one major traumatic event in their lifetime, and yet the lifetime prevalence of PTSD remains relatively low (approximately 8%) in comparison (Breslau, 2009; Kessler et al., 1995).

A number of explanations have been offered to explain such findings, such as the benefits of social support (Brewin et al., 2000), self-efficacy (Hirschel & Schulenberg, 2009), optimism (Rauch, Defever, Oetting, Graham-Bermann, & Seng, 2013), resilience (Aiena, Baczwaski, Schulenberg, & Buchanan, 2015; Arnetz, Rofa, Arnetz, Ventimiglia, & Jamil, 2013), and perceived meaning (Dursun, Steger, Bentele, & Schulenberg, 2015; Owens, Steger, Whitesell, & Herrera, 2009). Some of these protective factors come from external sources such as social support, while others come from within the individual. Such internal coping strategies are of interest to researchers because they may help assuage the effects of disasters like the Gulf oil spill and can be possible targets for intervention both before and after a disaster.

By way of a recent example, Doherty and Clayton (2011) proposed a model that states that coping mechanisms such as resilience and perceived meaning in life may serve to moderate the relationship between environmental changes, such as a disaster, and the subsequent psychological response. Along these lines, a number of theoretical and empirical advances have been increasingly evident in recent years, specifically focusing on concepts such as resilience and perceived meaning in life.

Resilience

Resilience is the ability to adapt to or withstand stressors and restore equilibrium to one's life after being confronted with a stressor (Bonanno, 2004; Wagnild & Young, 1993). Wong and Wong (2012) further defined resilience as using available internal and environmental resources when confronted with negative or adverse events. Resilience, according to some researchers, comprises multiple protective factors that work together (Herbert, Manjula, & Philip, 2013; Wagnild & Young, 1990). For example, Wagnild (2009b) described five characteristics that comprise the "resilience core": perseverance, equanimity, meaningfulness, self-reliance, and existential aloneness. Perseverance is defined as the ability to continue on even in the face of setbacks. People who possess equanimity are characterized as having a stable view of life and their experiences and often have a sense of humor. Meaningfulness is when a person recognizes that their life has purpose and meaning. People who are self-reliant recognize their own personal strengths and can rely on those strengths to guide their actions. Finally, existential aloneness is the recognition that while some experiences can be shared with other people, one must be able to face and manage other experiences alone.

With respect to research support, Christopher (2000) found that resilience was positively correlated with psychological well-being. In addition, studies have found that resilience is positively correlated with optimism, self-esteem, gratitude, and positive affect and negatively correlated with posttraumatic stress, general psychological distress, and generalized anxiety (Arnetz et al., 2013; Baldwin, Jackson, Okoh, & Cannon, 2011; Fredrickson, Tugade, Waugh, & Larkin, 2003; Nishi, Uehara, Kondo, & Matsuoka, 2010; Scali et al., 2012; Tugade & Fredrickson, 2004). Because research has demonstrated that resilience is a valuable construct that promotes psychological and physical well-being, it is becoming increasingly prevalent in the fields of both positive and disaster psychology (e.g., Aiena et al., 2015; Bonanno, 2004; Doherty & Clayton, 2011; Schulenberg, Drescher, & Baczwski, 2014). Many researchers are interested in finding ways to foster and promote resilience to help individuals overcome significant stressors (Smith, Park, Ireland, Elwyn, & Thornberry, 2013; Stallard & Buck, 2013).

In addition to resilience, researchers have shown a growing interest in perceived meaning in life, and how perceived meaning relates to resilience and disaster-related events. For example, when examining a proposed model of resilience, Smith, Epstein, Ortiz, Christopher, and Tooley (2013) found that a person's perceived purpose in life was a strong predictor of overall resilience. In addition, Wagnild (2009b) theorized that life meaning (meaning in life or life purpose) is one of the most important characteristics of resilience because it provides a foundation for the other four resilience characteristics (i.e., perseverance, equanimity, self-reliance, and existential aloneness). Undoubtedly, there is need to understand both resilience and perceived meaning in life individually and how these concepts relate to one another. Understanding these concepts individually and collectively will enhance our understanding of the potential effect of disaster-related events.

Perceived Meaning in Life

Perceived meaning is defined as a person's belief that they are living their life in accordance with their own hierarchy of values (Frankl, 1959/2006; Schulenberg & Melton, 2010). Individuals with a high level of meaning have a sense of what is important in their lives. Having meaning in life allows people to believe that life has a purpose under all circumstances, even those that involve unavoidable suffering experiences. Such theoretical positions have clear implications for understanding the effects of a wide range of trauma-related events (Schulenberg, 2003; Schulenberg et al., 2008; Schulenberg et al., 2014).

Many theories have attempted to describe how people adapt to trauma and stressors, both emotionally and cognitively, and the toll that these stressors can have on people's views of themselves and the world around them (Park, 2013; Silver & Updegraff, 2013; Steger & Park, 2012). One way to conceptualize the adjustment of individuals during periods of trauma and stress is through meaning-making, which is defined as "the restoration of meaning in the context of highly stressful situations" (Park, 2010, p. 257). With meaning-making, it is theorized that

by adjusting global beliefs or assessed meaning of the experiences to reduce the discrepancy between the two, distress should be lessened, with the person regaining a sense of order and coherence. In other words, searching for meaning is not only a common response to trauma, but it can also help one adjust to trauma in the long term. For instance, in a study of individuals affected by a wildfire in California, Updegraff and colleagues (1996) found that those who had found meaning within 2 weeks after the fire reported significantly less distress over the following years. They also found that those who were able to discover meaning in the disaster had a more rapid decrease in distress in the 6 months after the disaster than those who did not.

Additionally, after the 9/11 terrorist attacks, Updegraff, Silver, and Holman (2008) longitudinally studied the effects that searching for and finding meaning would have in a large representative sample of Americans, both before and after the attacks. After controlling for preattack mental health, attack exposure, and early acute stress response, they found that meaning predicted posttraumatic stress symptoms. In other words, the more meaning people found in the months after the attack, the less posttraumatic stress symptoms they experienced over time.

Although perceived meaning helps people deal with symptoms of posttraumatic stress after a traumatic event, it has also been shown to be a significant factor in predicting strengths and positive psychological outcomes across a range of contexts and for a range of problems. Studies have shown that meaning is positively related to psychological health, life satisfaction, general self-efficacy, hope, and happiness (Bronk, Hill, Lapsley, Talib, & Finch, 2009; Byron & Miller-Perrin, 2009; Dogra, Basu, & Das, 2011; Drescher et al., 2012; Melton & Schulenberg, 2008; Wnuk, Marcinkowski, & Fobair, 2012). Perceived meaning in life is also negatively correlated with alcohol use, depression, general psychological distress, and suicidal ideation (Dogra et al., 2011; Schnetzer, Schulenberg, & Buchanan, 2013; Schulenberg, Schnetzer, & Buchanan, 2011). After the Gulf oil spill, perceived meaning in life was a stronger predictor of life satisfaction than both self-efficacy and the perceived effect of the spill (Drescher et al., 2012).

As noted previously, some have asserted or described the importance of perceived meaning in relation to resilience (Park, 2013; Steger & Park, 2012; Wagnild, 2009b). However, there are few studies that actually examine the potential contributions that meaning may offer in relation to resilience, in a rigorous or systematic way, with many studies overlooking perceived meaning's influence completely (e.g., Lee, Sudom, & Zamorski, 2013). Research that has looked at both concepts inadequately measured either construct by using one question about meaning from a larger scale to account for one's perceived meaning in life or a random battery of positive variable scales of the researcher's choosing (e.g., psychological well-being, social network, and positive affect), labeling the amalgamated outcome as the indicator of resilience (Heisel & Flett, 2008; Pan, 2011). Consequently, resilience researchers may be overlooking a key aspect of what makes an individual resilient, and thus not fully measuring respondents' current and actual level of resilience (and possibly missing a core area to be strengthened during resilience-building exercises).

Research is needed to clarify the nature of these constructs in relation to one another in terms of their distinctiveness or likeness, to more clearly inform our understanding of them. For instance, some researchers conceptualize the concepts as being separate but related, while others conceptualize meaning as part of a larger definition of resilience. Many studies have independently examined the effects that resilience and meaning have on traumatic stressors, but to our knowledge these concepts have yet to be thoroughly examined in one study or in a sample of adults seeking mental health services after a disaster.

Present Study

The present study investigated the relationship between perceived resilience, perceived meaning in life, and posttraumatic stress symptoms in a sample of Mississippi coastal residents directly affected by the Gulf oil spill. Previous studies have accessed these data to investigate the negative psychological effects of the spill (Drescher, Schulenberg, & Smith, 2014); the effect of the Gulf oil spill and Hurricane Katrina on environmental attitudes and action (Walters et al., 2014); the role that perceived meaning in life, self-efficacy, and perceived spill effect had on life satisfaction (Drescher et al., 2012); and the systematic study of the psychometric properties of the 14-item

Resilience Scale (RS-14; Aiena, Baczwaski, Schulenberg, & Buchanan, 2015). In the study of the psychometric properties of the RS-14, results showed that scores correlated significantly and positively with the short form of the Purpose in Life test (PIL-SF), a measure of meaning in life ($r = .67$; Schulenberg, Schnetzer, & Buchanan, 2011), and negatively and significantly with the Posttraumatic Stress Disorder Checklist- Specific version (PCL-S; $r = -.25$; Weathers, Huska, & Keane, 1991).

As a result, to further investigate the role of these two constructs in a disaster event, a major goal of the current study was to use these data to better understand not only the negative psychological effects that can be caused by a technological disaster such as the Gulf oil spill, but also the protective factors that help people recover from these types of wide-spread disasters (individually and how these protective factors relate to one another).

Following the finding that perceived resilience and perceived meaning were correlated significantly and positively and that resilience correlated significantly and negatively with posttraumatic stress symptoms, we hypothesized that individuals with higher levels of perceived meaning in life will report significantly fewer symptoms of posttraumatic stress, regardless of oil spill effects (Hypothesis 1); those with a perceived general oil spill effect would exhibit higher posttraumatic stress symptoms (Hypothesis 2); and oil spill effect, resilience, and meaning will be significant predictors of posttraumatic stress symptoms for the effect group (Hypothesis 3).

Method

Participants and Procedures

This study comprised 1,119 (mean $[M]_{\text{age}} = 38.76$, standard deviation $[SD]_{\text{age}} = 12.77$) adult participants that were seeking mental health services at 10 mental health treatment facilities along the coast of Mississippi in the months after the Gulf oil spill. Participants included new clients as well as clients that had been receiving services for both brief and long periods of time. Because this study was part of a larger series of studies, participants completed a battery of questionnaires (procedures are described below). After the Deepwater Horizon oil spill (or Gulf oil spill), British Petroleum (BP) issued funds to state departments of mental health for the Gulf Coast states directly affected by the spill. The funds were to be used to provide mental health services to affected residents. The Mississippi Department of Mental Health (MS DMH) used the funds received to create the BP Behavioral Health Grant program, providing funds to 19 mental health organizations along the coast.

Of the 19 different mental health facilities that participated in this study, 10 provided direct therapeutic services (e.g., psychotherapy, medication management). The organizations comprised four private counseling centers, two mental health centers, one women's shelter, one Vietnamese community organization, one school-based counseling service, and one in-patient mental health hospital. Participants came into the facilities seeking services, and staff excluded any individuals who were clearly not affected by the spill (e.g., they were not living in the area at the time). The sample was predominantly female ($n_{\text{female}} = 613$, 54.8%; $n_{\text{male}} = 491$, 43.9%; $n_{\text{other}} = 0.3\%$) and White ($n = 765$, 68.4%) or Black ($n = 236$; 21.1%). Ages ranged from 18 to 79 years ($M_{\text{age}} = 38.76$, $SD_{\text{age}} = 12.77$). Incomplete data were present in surveys for meaning, resilience, and posttraumatic stress, and participants were excluded pairwise for analyses involving these variables.

Measures

Perceived effect of the Gulf oil spill. Perceived effect of the spill was assessed through three questions that were developed specifically for this program of research. The questions measured how the Gulf oil spill had changed the participants' financial situation, social relationships, and physical health, because we were interested in how these variables interacted with the mental health of those affected by the spill. The general format of the questions was "How has the Gulf oil spill affected your financial situation (or social relationships or physical health)?" The questions used a 7-point scale with anchors ranging from 1 (*greatly*

Table 1
Descriptive Statistics and Correlation Matrix for Variables Included in Regression Model

		Mean	SD	Min.	Max.	PCL-S	Resilience	Meaning
No effect	Effect	3.95	0.25	1.67	4.00	-.14**	.06	-.01
	PCL-S	34.58	18.38	17	85	-	-.27***	-.21***
	Resilience	64.73	19.76	14	98	-	-	.65***
	Meaning	19.02	5.37	4	28	-	-	-
Effect	Effect	5.18	0.80	3.00	7.00	.39***	-.18***	-.12*
	PCL-S	46.80	18.09	17	85	-	-.27***	-.33***
	Resilience	62.78	20.01	14	98	-	-	.67***
	Meaning	18.87	5.54	4	28	-	-	-

Note. SD = standard deviation; PCL-S = PTSD Checklist-Stressor Specific version; RS-14 = 14-Item Resilience Scale; PIL-SF = Purpose in Life test-Short Form. The standard cutoff for the PCL-S is 44 (Blanchard et al., 1996).

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

worsened) to 7 (greatly improved). These questions were reverse scored and averaged for an overall general effect score to make interpretation simpler for analyses¹. Reliability for the scale was $\alpha = .73$.

From these data, we created two groupings: no perceived effect sample ($n = 467, 48.4\%$) and a perceived effect sample ($n = 498, 51.6\%$). To create these groups, ratings were collapsed into two categories: worsening (scores of 4 or more on the reversed scale) or no change/improvement (scores of 3 or less). In terms of the Gulf oil spill’s effect on finances, relationships, and physical health, 410 respondents (36.6%) reported a worsened financial situation, 264 (23.6%) reported worsened social relationships, and 272 (24.3%) reported worsened physical health (data as reported in Drescher, Schulenberg, & Smith, 2014). Participants who were classified as worsening in at least one facet (finances, relationships, or physical health) were included in the perceived effect sample, and those with no worsening scores in any area were included in the no effect group. Table 1 includes descriptive statistics.

PCL-S version. The PCL is a 17-item self-report scale designed to measure PTSD diagnostic criteria as outlined in the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition Text Revision (American Psychiatric Association, 2000). There are three different versions that can be used in the following settings: military (PCL-M), civilian (PCL-C), and a specific, identifiable stressful experience–PCL-S (Weathers, Huska, & Keane, 1991; Weathers, Litz, Herman, Huska, & Keane, 1993; Weathers, Litz, Huska, & Keane, 1994). We used the PCL-S in this study and instructed the respondents to refer to the Gulf oil spill. The PCL-S uses a 5-point Likert-type response format, with rating options ranging from 1 (*not at all*) to 5 (*extremely*). Scores on the PCL-S range from 17 to 85, with higher scores indicating more endorsed symptoms of PTSD. Mean scores are presented in Table 1. Overall, 387 participants (no effect 27.8%, effect 51.6%) met or surpassed the clinical cutoff of 44 suggested by Blanchard and colleagues (1996). The internal consistency reliability was $\alpha = .97$ for the sample.²

RS-14. The RS-14 (Wagnild, 2009b) was developed as a short form of the original 25-item Resilience Scale (Wagnild & Young, 1993). This measure was developed as a direct measure of perceived resilience. The items were based on a qualitative study of older women who had

¹Data regarding each individual affected area were reported in a separate investigation of the effect of the Gulf oil spill on Mississippi coastal residents regarding socioeconomic status (see Drescher, Schulenberg, & Smith, 2014). After this study, we sought to investigate if one’s overall general perceived effect would affect posttraumatic stress in a similar fashion.

effectively overcome a major, negative life event (Wagnild, 2009a). The RS-14 uses a 7-point response format, with anchors ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Respondents rate the degree to which each statement describes them, and item scores are summed to determine overall level of resilience. Scores range from 14 to 98, and higher scores are suggestive of greater perceived resilience. In comparison to a study of community-dwelling adults who were classified, according to the RS-14 manual, as being in the moderate range ($M = 76.16$; $SD = 13.90$), the current sample would be placed in the low range of reported resilience (Wagnild, 2009b; see Table 1). The internal consistency reliability was $\alpha = .93$ for the sample.²

PIL-SF. The PIL-SF (Schulenberg, Schnetzer, & Buchanan, 2011) is a four-item version of the original 20-item Purpose in Life test (Crumbaugh & Maholick, 1964, 1969). Each of the four items employs a 7-point Likert-type scale, with different anchors for each item. Scores on the PIL-SF range from 4 to 28, and a higher score is indicative of greater perceived meaning and purpose in life. See Table 1 for mean scores of this sample. Studies using the PIL-SF in samples of college students found mean scores of 22.67 ($SD = 3.73$; Schulenberg et al., 2011) and 22.66 ($SD = 2.64$; Schnetzer et al., 2013). The internal consistency reliability was $\alpha = .88$ for this sample.

Results

Data were screened for assumptions of multivariate statistics. Although the sample contained multivariate outliers (found via Mahalanobis distance), results were similar when tested without outliers; therefore, they were included in all analyses. Using the guidelines of Tabachnick and Fidell (2012) we found other assumptions (normality, linearity, homogeneity, etc.) to be satisfactory. For the regression equations, sample sizes differed due to participants' with incomplete measures being dropped from the equation. Descriptive statistics for each scale can be found in Table 1.

Hypothesis 1

Correlational analyses were conducted to determine the relationship between Gulf oil spill effect, resilience, perceived meaning, and posttraumatic stress symptoms (see Table 1 for correlations). Individuals with higher levels of perceived meaning in life reported significantly fewer symptoms of posttraumatic stress, a finding that supports hypothesis 1 and can be seen in both groups. For the noneffect group, there is a small negative correlation between oil spill effect and posttraumatic stress, which can be attributed to the limited range of the oil spill variable. As expected for the effect group, those who reported being more negatively affected by the spill had higher levels of posttraumatic stress and lower levels of resilience and perceived meaning. That is, the worse individuals were affected by the spill, the more posttraumatic stress and less resilience and meaning they reported.

Hypothesis 2

We analyzed independent *t* tests to examine the differences in posttraumatic stress, meaning, and resilience for both groups. Mean values are reported in Table 1. The no effect group reported significantly less posttraumatic stress than the effect group, $t(888) = -9.99$, $p < .001$, $d = 0.67$. However, both groups were not significantly different on meaning, $t(892) = 0.41$, $p = .68$, $d = 0.03$, or resilience, $t(913) = 1.48$, $p = .14$, $d = 0.10$.

²Descriptive data for the PCL-S, RS-14, and PIL-SF used in this study were reported in separate investigations of the effect of the Gulf oil spill on Mississippi coastal residents regarding socioeconomic status (see Drescher, Schulenberg, & Smith, 2014) and a psychometric study of the RS-14 (see Aiena, Baczowski, Schulenberg, & Buchanan, 2015). They are reported here for context.

Table 2
 Gulf Oil Spill Impact, Resilience, and Meaning Predicting Posttraumatic Stress Symptoms (*N* = 498)

Variable	Model 1			Model 2			Model 3		
	<i>B</i>	<i>SE</i> of <i>B</i>	β	<i>B</i>	<i>SE</i> of <i>B</i>	β	<i>B</i>	<i>SE</i> of <i>B</i>	β
Effect	9.05	1.05	0.39***	8.43	1.04	0.36***	8.31	1.01	0.36***
RS-14				-0.19	0.04	-0.21***	-0.03	0.05	-0.03
PIL-SF							-0.90	0.19	-0.27***
<i>R</i> ²		0.15			0.19			0.23	

Note. SE = standard error; PCL-S = PTSD Checklist-Stressor Specific version; RS-14 = 14-Item Resilience Scale; PIL-SF = Purpose in Life test-Short Form.

p* < .05. *p* < .01. ****p* < .001.

Hypothesis 3

Hierarchical multiple regression was used to examine the relationship between posttraumatic stress, oil spill effect, resilience, and meaning for the effect group. First, oil spill effect was a significant predictor of posttraumatic stress symptoms, $F(1, 414) = 73.95, p < .001, R^2 = .15$, indicating that as the effect increased, posttraumatic stress symptoms also increased. In the second step, resiliency added another 4.2% of variance to the model, $F_{change}(1, 413) = 21.60, p < .001, R^2 = .19$. In the third step, meaning scores significantly added (4%) to the prediction of posttraumatic stress, $F_{change}(1, 412) = 21.62, p < .001, R^2 = .23^3$.

Both resilience and meaning were negatively correlated with posttraumatic stress, wherein higher meaning and resilience resulted in fewer posttraumatic stress symptoms. Both beta values were similar in the step in which they were entered $\beta_{RS-14} = -0.21$ and $\beta_{PIL-SF} = -0.27$, indicating a similar predictive value when examining posttraumatic stress individually. However, the strong correlation between predictors and decrease in RS-14 prediction in model 2 indicates that the two variables may not show divergent validity in this sample. Table 2 includes the coefficients for this model.

Discussion

The purpose of this study was to examine the predictive power of meaning and resilience for posttraumatic stress symptoms in a clinical sample of 1,119 adults receiving services from 10 mental health agencies along the Gulf Coast of Mississippi after the Gulf oil spill. Correlational analyses demonstrated that individuals in both groups in the sample who had higher levels of resilience and/or perceived meaning in life reported significantly fewer symptoms of posttraumatic stress (Hypothesis 1). Further, when dividing the sample into those who reported effect and those who reported no effect, we found that the effect group reported significantly more posttraumatic stress symptoms than the noneffect group (Hypothesis 2). The two groups did not significantly differ on reports of perceived resilience or meaning in life.

Finally, in a regression model that included Gulf oil spill effect (step 1), resilience (step 2), and meaning (step 3), it was apparent that resilience and meaning were both significant predictors of posttraumatic stress, and incorporating meaning resulted in a stronger predictive model overall (Hypothesis 3). Based on the analyses, it is evident that perceived resilience and perceived meaning in life are similarly strong and significant predictors of fewer posttraumatic stress symptoms. This finding is discussed in detail below.

³To this point, resilience has had a much larger presence in the field of disaster mental health. For this reason it was entered first into the equation as a means to better understand the statistical role meaning played in the prediction of posttraumatic stress symptoms above and beyond individual resilience.

To better understand the relationship between meaning and resilience, one can examine more deeply the potential reasons for such a significant relationship. First, the reason for a strong and significant correlation between resilience and meaning, coupled with the similar contributions to the regression equation, may be because meaning is a similarly important protective factor in relation to resilience. Although these constructs are clearly closely associated and share some similarities, they are distinctly different in that they, by definition, have different functions. Resilience is often regarded as one's ability to effectively use available personal and ecological resources to experience positive outcomes (e.g., recovery, posttraumatic growth) in a type of situation that may lead to negative outcomes (e.g., psychopathology; Ungar, Brown, Liebenberg, Cheung, & Levine, 2008; Wong & Wong, 2012).

Meaning, alternatively, is a driving force. If a person is aware of his or her values and making decisions and living consistently with those values, then life is likely going to be perceived as meaningful. As a driving or motivational force, meaning is what compels us to make sense of our world and imbues us with a sense of purpose. Comparatively speaking, resilience is a characteristic and meaning is a prime motivator. Both concepts have large, independent bodies of research dedicated to their understanding and utilization as protective factors. With respect to disaster-related mental health, historically resilience has received greater attention. In light of the present findings, meaning is an equally strong predictor that demands comparable consideration, particularly with regard to disaster-related mental health.

Another possible explanation of the magnitude of the correlation between the scores of the RS-14 and the PIL-SF lies in the fact that the RS-14 was based on meaning in its conception (Wagnild, 2009b). Both measures draw heavily on the work of Viktor Frankl, and the RS-14 itself specifically addresses meaningful living in one of its items and logotherapy-related principles in two other items (goal completion and exciting life; Schulenberg & Melton, 2010). Because of the correlation between the two scales and similar theoretical backgrounds, it is likely that the RS-14 is assessing a concept similar to meaning as measured by the PIL-SF, which was specifically designed to parsimoniously assess meaning and purpose in life. This would explain why meaning contributed such a small amount to the overall regression model (and its subsequent small effect size, $R^2 = .01$; Cohen, 1988) and the high correlation between the constructs and their similar importance in predictive capacity. Further, although both resilience and meaning have been defined in the literature, they are often conceptualized in various ways. As a result of various conceptualizations, there are multiple measures available to assess each concept. In the present case, because the RS-14 specifically addresses meaning in several items and was meaning-based in its construction, it is unclear whether this scale measures resilience in a "pure" fashion (Wagnild, 2009b). While a factor analytic study of the psychometric properties of the RS-14 did support a one-factor model for the scale (Aiena, Baczwaski, Schulenberg, & Buchanan, 2015), it is possible that the RS-14 may represent a blending of the two concepts and would be more aptly defined as a scale that measures both meaning and resilience rather than merely resilience per se. Put another way, the RS-14 may be measuring a common aspect of meaning and resilience. Research comparing the RS-14 with other resilience scales such as the Brief Resilience Scale (Smith et al., 2008) or the Connor-Davidson Resilience Scale (Connor & Davidson, 2003) would clarify this issue.

It may also be helpful to assess the RS-14 in relation to other scales of meaning, such as the Meaning in Life Questionnaire (Steger, Frazier, Oishi, & Kaler, 2006). More broadly, and as mentioned earlier, many researchers are using their own combinations of questions or measures to assess respondent level of resilience, but these inadequate measurement habits may be leading to inaccurate conclusions. Therefore, it is important to determine which measure is the most precise measure of resilience (i.e., the gold standard), if one exists, or whether it is necessary to develop a new measure of resilience that is psychometrically superior to current, available measures.

A third explanation of the magnitude of association between resilience and meaning is the idea that meaning may be an essential facet of what makes a person resilient. As discussed earlier, the resilience core comprises many pillars, and the RS-14 was meaning-based in its conception. Wagnild (2009b) stated that having a purposeful life is "probably the most important characteristic of resilience" because one's purpose is the foundation for the other four characteristics in

the core (p. 15). Wagnild further described purpose as what drives people forward even in the face of adversity.

Theoretically, and coupled with the data from the present study, meaning may serve as an essential building block of resilience. In the way that Wagnild defines resilience, it appears that resilience is the broader umbrella term that encompasses these five characteristics (i.e., life purpose, perseverance, equanimity, self-reliance, and existential aloneness), and by this definition, to measure resilience one needs to assess whether the individual perceives meaning. For example, Damon (2008) demonstrated that a key component of helping young people respond resiliently to adversity is when they develop a sense of purpose and meaning that helps them to transcend self-interest. In addition, Frankl and meaning researchers describe how living a life that has meaning gives people a reason to bounce back from setbacks and adversities (Frankl, 1959/2006; Schulenberg et al., 2008; Wong, 2010). If this is the case, researchers studying resilience without taking meaning into account may be excluding a significant contributing factor of what makes a person resilient. Furthermore, researchers examining resilience-building programs could be neglecting an important factor that, when bolstered, helps participants to recover more quickly from disasters.

Given that there are multiple potential reasons for the magnitude of correlation between meaning and resilience, what may be concluded from the present findings? Through an analysis of the results of this study and an examination of the available research, it is apparent that meaning and resilience are related, albeit distinct, and significant protective factors against symptoms of posttraumatic stress after a technological disaster. Nonetheless, there is probable measurement overlap within the RS-14 in that it may be either measuring a blend of resilience and meaning rather than “pure” resilience or assessing an aspect that is common to both. For these reasons, future research should aim to clarify the definitions of these concepts, aiming to understand if meaning is in fact an essential component of resilience, as well as refining how they are measured. Subsequent studies of both resilience and meaning should be conducted using clearly defined, agreed-upon definitions as well as precise and pure measures.

Additionally, the results make a strong case for perceived meaning being an important factor in what makes a person resilient in the face of a disaster such as the Gulf oil spill. Consequently, future studies examining resilience or resilience-based interventions would be incomplete without the inclusion of a measurement of meaning or considering meaning-enhancement techniques in resilience-building treatment studies.

Strengths

The results of this investigation are useful in a number of ways. The study examines two constructs, one more established in the field of disaster mental health than the other, and demonstrated their importance as protective factors against symptoms of posttraumatic stress in a unique sample of individuals seeking mental health services after the Gulf oil spill. This study and previous ones using the existing data set (e.g., Drescher et al., 2014) demonstrate the strong, negative effects that events like the Gulf oil spill can have on those affected. Therefore, future studies should examine which interventions are most effective and under what circumstances. Moreover, to our knowledge the relationship between symptoms of posttraumatic stress, resilience, and meaning has yet to be thoroughly examined in a single study or in a sample of adults seeking mental health services after a disaster. Finally, this study illuminates potential measurement issues with the RS-14 and the construct of resilience in general.

Limitations

Although there are a number of strengths to the investigation, there are also a number of limitations, such as the homogeneity of the sample. The sample was predominantly White. Demographically this sample was similar to the racial/ethnic breakdown of the Mississippi Gulf Coast (U.S. Census Bureau, 2015), but future studies should examine the relationship between resilience, meaning, and symptoms of posttraumatic stress in a more diverse sample to see if findings vary on the basis of culture and socioeconomic status.

Other significant limitations involve the correlational nature of the study and posttest-only design as well as the lack of baseline data for purposes of comparison. Because the study is correlational, causal inferences may not be made. Measuring resilience and meaning in a cross-sectional manner means that we are examining an individual's perception at one point in time. We do not know how these variables would change over time, or whether perceptions of meaning and resilience assessed at one point in time would predict an individual's behavior at some future point.

Moreover, we do not know whether the correlations documented in this study were the result of participants' coping with, or successfully adapting to, the disaster. Relatedly, because the data were collected after the disaster (as opposed to before and after the event), the lack of information regarding pre-Gulf oil spill treatment and diagnostic histories is another limitation (Drescher, Schulenberg, & Smith, 2014). Such limitations are common design flaws in disaster research because it is hard to predict a disaster's occurrence and difficult to track people longitudinally (Drescher et al., 2014; Galea, Maxwell, & Norris, 2008).

Conclusion

While causal inferences may not be drawn from the current findings, these data can be used for comparison purposes for future studies of a similar nature. Future researchers are encouraged to examine these constructs using a longitudinal design to better clarify the relationship and relative importance of resilience and perceived meaning as protective factors against symptoms of posttraumatic stress. Studying individuals affected by disasters longitudinally will better illuminate the progression of their distress and eventual recovery, uncovering areas that would be the best targets for interventions. In addition to studying clinical samples, the relationship between resilience, meaning, and symptoms of posttraumatic stress should also be examined in nondisaster-affected community samples to assess whether similar relationships can be found.

The findings from the current study further support the examination of resilience and meaning in conjunction with one another. With resilience-based interventions becoming increasingly prevalent in the literature, the results of this study demonstrate the need to incorporate meaning into such intervention efforts. With the incorporation of meaning into resilience-based interventions, the systematic benefits of this combination can be better studied and understood.

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