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## Meaning In Life As A Moderator Of Resilience And Traumatic Stress: A Study Of Protective Factors And Sex Differences In A Sample Of Mississippi Coastal Residents Seeking Mental Health Services After The Deepwater Horizon Oil Spill

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MEANING IN LIFE AS A MODERATOR OF RESILIENCE AND TRAUMATIC STRESS: A  
STUDY OF PROTECTIVE FACTORS AND SEX DIFFERENCES IN A SAMPLE OF  
MISSISSIPPI COASTAL RESIDENTS SEEKING MENTAL HEALTH SERVICES AFTER  
THE DEEPWATER HORIZON OIL SPILL

A Dissertation  
presented in partial fulfillment of requirements  
for the degree of Doctor of Philosophy  
in the Department of Psychology  
The University of Mississippi

By

BETHANY J. AIENA

August 2017

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## ABSTRACT

In April of 2010, the Deepwater Horizon oil platform exploded, releasing millions of barrels of crude oil into the Gulf of Mexico, becoming the largest oil spill in U.S. history. Disasters often lead to a decrease in psychological well-being for those affected by the disaster. Positive psychological constructs such as resilience and perceived meaning in life have been shown to be significant protective factors against the negative psychological effects of a disaster. Utilizing a sample of 1119 adults seeking mental health services along the coast of Mississippi after the spill, the current study aimed to investigate the relationship between these protective factors and posttraumatic stress and to investigate if sex moderates the relationship between posttraumatic stress and protective factors. An independent samples t-test determined that there were no significant differences in perceived resilience or perceived meaning between the non-effects and effects groups. An independent samples t-test determined that those who reported an effect from the spill endorsed higher levels of posttraumatic stress. Multiple hierarchical regression analysis determined that after controlling for the impact of the spill in the perceived effects group, resilience and perceived meaning were significant predictors of posttraumatic stress symptoms. Moderation analyses were conducted using the ordinary least squares regression-based method. It was found that meaning in life did not serve as a moderator in the relationship between resilience and posttraumatic stress. An independent samples t-test determined that there were no significant differences in reported levels of posttraumatic stress symptoms between males and females in the effects group. Lastly, it was determined that sex did

not moderate the relationship between resilience and posttraumatic stress symptoms or between perceived meaning in life and posttraumatic stress symptoms. Overall, this study further demonstrates the importance of resilience and perceived meaning as protective factors to consider when examining individuals who have been impacted by a specific technological disaster. Additionally, this study adds discrepant data to the assumption that posttraumatic stress differs by sex. Finally, this study adds to the movement in disaster mental health literature to broaden the focus to protective factors, recovery, and growth post-disaster. Implications for these data are discussed.

## DEDICATION

This dissertation is dedicated to my parents, Jody and Mary Ellen Aiena, for their never-ending support through my academic journey and unwavering acceptance of the ups and downs of academia.

## LIST OF ABBREVIATIONS AND SYMBOLS

BP	British Petroleum
BRS	Brief Resilience Scale
CD-RISC	Connor-Davidson Resilience Scale
DASS-21	Depression, Anxiety and Stress Scales-21
MS DMH	Mississippi Department of Mental Health
OLS	Ordinary Least Squares
PCL	PTSD Checklist
PCL-C	PTSD Checklist – Civilian Version
PCL-M	PTSD Checklist – Military Version
PCL-S	PTSD Checklist – Stressor Specific Version
PTSD	Post-Traumatic Stress Disorder
PIL	Purpose in Life Test
PIL-SF	Purpose in Life Test – Short Form
RS	Resilience Scale
RS-14	14-Item Resilience Scale
VIF	Variance Inflation Factor

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## I. INTRODUCTION

A disaster is a collectively experienced, potentially traumatic event with an acute onset that is inherently associated with loss, be that loss of one's resources, sense of security, property, loved ones, and/or ability to cope (McFarlane & Norris, 2006; Norris & Wind, 2009). On April 20, 2010, the Deepwater Horizon oil platform exploded, killing 11 rig workers and becoming the largest oil spill in U.S. history (Robertson & Krauss, 2010). The event came to be known as the Deepwater Horizon oil spill, or the Gulf oil spill. Many negative ecological impacts were observed as a result of this technological disaster. The spill resulted in the death of land and marine wildlife and the widespread blight of plant-life in coastal marshlands (Boxall, 2011; National Wildlife Federation, 2015). Industries along the coast were also affected negatively by the spill. Significant decreases in commercial and recreational fishing and tourism were evident, with some industries, such as coastal fishing, still being negatively impacted five years later (Elliot, 2015; Gallucci, 2015; Gill, Picou, & Ritchie, 2012). Marine life continues to deteriorate at an abnormally high rate (National Wildlife Federation, 2015). Clearly, the full impact of the spill will not be known for years (National Wildlife Federation).

In terms of the effects of the Deepwater Horizon oil spill on human health and well-being, many people employed in industries dependent on the ecosystem of the Gulf coast experienced significant stress as a result of job loss. While it was expected that the spill would increase the risk of physical health conditions such as cancer, liver disease, birth defects, kidney

disease, and developmental disorders, it was also anticipated that the presence of mental and stress-related health disorders would rise as well in the affected areas (Diaz, 2011).

Following the spill, British Petroleum (BP) apportioned funds to state departments of mental health to aid in recovery efforts in the affected areas, the Gulf Coast of Mississippi among them. The funds received by the Mississippi Department of Mental Health (MS DMH) were used to provide mental health services to affected residents. A portion of the funds were devoted to assessing the nature and extent of the services provided, as well as efforts to evaluate the impact of the spill on the mental health of those receiving services. Dr. Stefan Schulenberg of The University of Mississippi was hired by MS DMH to meet these assessment and evaluation goals. In addition to quantifying the amount of services provided by the funds, Dr. Schulenberg and his team also collected data with regard to such variables as depression, anxiety, stress, and posttraumatic stress on the symptomatic side, and life satisfaction, self-efficacy, resilience, and meaning on the adaptive side. From the data collected, many empirical questions have been investigated thus far. Specifically, studies have investigated the negative psychological impact of the spill (Drescher, Schulenberg, & Smith, 2014); the impact of the Gulf oil spill and Hurricane Katrina (a disaster that affected the Mississippi Gulf Coast in 2005) on environmental attitudes and action (Walters et al., 2014); the role that perceived meaning in life, self-efficacy, and perceived spill impact had on life satisfaction (Drescher et al., 2012); the systematic study of the psychometric properties of the 14-item Resilience Scale (Aiena, Baczwaski, Schulenberg, & Buchanan, 2015) and the Purpose in Life test – Short Form (PIL-SF; Schulenberg, Smith, Drescher, & Buchanan, 2016) in adults and adolescents, respectively; and the convergent validity of perceived meaning in life and resilience as protective factors against posttraumatic stress symptoms following the Deepwater Horizon oil spill (Aiena, Buchanan, Smith, & Schulenberg,

2016). In this most recent study, Aiena et al. (2016) found that both meaning and resilience were statistically significant predictors of posttraumatic stress symptoms, and hierarchical regression was used to demonstrate that meaning may be an essential aspect of what makes an individual resilient. That is, while resilience alone was a significant predictor of posttraumatic stress symptoms, adding meaning to the model resulted in a stronger predictive model overall. Following these results, the current study sought to further examine the relationship between meaning, resilience, and posttraumatic stress. Prior to discussing the purpose of the current project in greater depth, the research behind these concepts is presented, as well as the rationale for studying them in conjunction with one another. Moreover, the known literature behind the impact of disasters on mental health is provided, with specific regard for the impact of technological disasters.

Technological and natural disasters share many similarities. They both can have long-term, negative psychological impacts on those that are affected, and the broad impact of such disasters leave entire communities struggling to return to normalcy. Technological disasters such as the Deepwater Horizon oil spill, however, are different from natural disasters in that they result in damage to people and/or the environment due to human intent or error, they are often much longer lasting than natural disasters, their effect can be latent or delayed, and their remediation may be economically, technically, or politically unfeasible (Baum, Fleming, & Davidson, 1983; Couch & Coles, 2011; Gallacher, Bronstering, Palmer, Fone, & Lyons, 2007). Regardless of whether the event is natural or technological/man-made, each type of disaster (hurricane, tornado, oil spill) occurs under unique circumstances. No two disasters are alike (Dursun, Steger, Bentele, & Schulenberg, 2016). Further, disasters within the same category (e.g., hurricane versus hurricane, oil spill versus oil spill) are going to have vast differences due

to differing precipitating circumstances, context, and level of impact. As such, it is important to study distress within the context of the Deepwater Horizon oil spill to add to the literature of this specific spill and also with respect to technological disasters in a more general sense.

Oil spills in particular are a type of technological disaster that affects coastal communities through ecological and economic disturbance to the surrounding areas (Shenesey & Langhinrichsen-Rohling, 2015). In the case of the Deepwater Horizon oil spill, specifically, Howard Osofsky further differentiates the event from other disasters due to the history of the area (e.g., multiple generations losing their jobs as fishermen due to the spill), the population diversity of the affected area (i.e., the stigma of mental illness is more prevalent in some populations in comparison to others), and the retraumatization of the people living along the Gulf Coast (IOM, 2010). According to Osofsky, when the Deepwater Horizon oil spill occurred, people on the Gulf Coast were still in the process of recovering from Hurricanes Katrina, Rita, and Gustav; therefore, individuals that experienced trauma from the hurricanes were at an increased risk of psychological distress due to the cumulative effects of multiple traumas (i.e., retraumatization). A Gallup Poll conducted with residents of the Gulf Coast after the spill revealed an overall decline in emotional health, with increased sadness, depression, stress, and worry being particularly common (Witters, 2010). Calls to mental health assistance hotlines increased significantly as many Gulf Coast residents experienced increased worries about their families' financial future (Yun, Lurie, & Hyde, 2010). Thus, there is a need to study and understand the impact of disasters on the mental health and emotional well-being of those affected.

### **The Impact of Disasters on Mental Health and Emotional Well-Being**

Technological disasters such as the Deepwater Horizon oil spill and natural disasters such as hurricanes often lead to the development of psychological issues with anxiety, depression, and posttraumatic stress disorder (PTSD) being among the most commonly experienced. Such events result in rises in people seeking mental health services, the reporting of somatic complaints, and the experiencing of relationship problems (for reviews, see Fothergill, Maestas, & Darlington, 1999; Green & Lindy, 1994; and Norris, Friedman, Watson, Byrne, Diaz, & Kaniasty, 2002). In addition, multiple studies have found that rates of depression and suicidal ideation increase in both technological and natural disasters (Devi, 2010; Maercker, Michael, Fehm, Becker, & Margraf, 2004; Ursano, Fullerton, & Benedek, 2009). With regard to the Deepwater Horizon oil spill, a study of Alabama coastal residents 18 months after the spill found that prevalence rates of generalized anxiety disorder in the area were significantly higher than that of the general public, and those that had direct contact with the oil reported significantly higher anxiety levels than those who did not have contact (Varner, Langhinrichsen-Rohling, & Bell, 2016). In a review of studies of PTSD following disasters, Neria, Nandi, and Galea (2008) found that the prevalence rate ranged from 30 to 40%. Furthermore, Weems and colleagues (2007) surveyed people living in regions affected by Hurricane Katrina in the months immediately following the storm and found that over half of the respondents reported at least one symptom of PTSD measured via an adapted version of the PTSD Checklist (Amaya-Jackson, McCarthy, Newman, & Cherney, 1995). Symptoms of PTSD include re-experiencing the event through flashbacks and nightmares, avoidance of associated stimuli, and hypervigilance (American Psychiatric Association, 2000, 2013).

Similar to natural disaster, studies have found increased prevalence rates of specific phobia, PTSD, depression, and anxiety after technological disasters (Kukihara, Yamawaki,



Uchiyama, Arai, & Horikawa, 2014; Lyons, Temple, Evans, Fone, & Palmer, 1999; Meewisse et al., 2011). Following the *Sea Empress* oil spill in 1996, exposed individuals reported higher levels of anxiety and depression as compared to those who were not exposed (Lyons et al.). While Green and Lindy (1994) reported that negative mental health effects after a disaster usually last around two years, some research suggests that a technological disaster can have mental health effects that last much longer than a natural disaster (Baum & Fleming, 1993). For example, Palinkas, Petterson, Russell, and Downs (1993) saw an increase in PTSD, generalized anxiety, and depression following the *Exxon Valdez* oil spill in 13 affected Alaskan communities. Additionally, Palinkas and colleagues found that the prevalence of PTSD one year after the spill was 9.4%, which is higher than the lifetime prevalence of PTSD reported in the National Comorbidity Survey (7.8%; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Freudenburg (1997) hypothesized that the longer lasting effects seen in technological disasters may be due to there being a clearer entity to blame against whom legal and financial reparations can be pursued.

One notable difference between technological and natural disasters is that with technological disasters the impact can be secondary instead of primary. Osofsky, Osofsky, and Hansel (2011) purported that the most influential psychological effects of the Deepwater Horizon oil spill would be associated with disturbances to victims' lives in terms of family, social, and work involvement. In other words, while individuals are not going to be directly impacted by the oil per se, they are affected by the damage done to their social and work communities. More specifically, damage to local industries (e.g., tourism, fishing, petroleum), subsequent job and income loss, worries about the environmental consequences of the disaster, and increased stress

as a result of the spill are major causes of negative psychological impacts (Arata, Picou, Johnson, & McNally, 2000; Mong, Noguchi, & Ladner, 2012).

While disasters generally have a negative impact on those affected, research has shown that the more severely a person is affected, the more likely they are to experience posttraumatic stress. For instance, via a meta-analytic study Brewin, Andrews, and Valentine (2000) found an association between the severity of trauma and the subsequent severity of PTSD response. Norris and colleagues (2002) reported that this relationship can be observed across cultures. Further, following the September 11<sup>th</sup> terrorist attacks, researchers found that proximity to the traumatic event generally predicted the prevalence rates of PTSD, with those closer to the location having higher prevalence rates (Galea et al., 2007; Schlenger et al., 2002).

**Sex differences in posttraumatic stress post-disaster.** Another important risk factor that affects distress following a disaster is whether a given person is male or female. Many studies have found that women tend to be more susceptible to experiencing symptoms of posttraumatic stress disorder (e.g., re-experiencing the trauma, avoidance of associated stimuli, and hypervigilance) following a disaster (Burnett & Helm, 2013; Carmassi et al., 2014; Dell’Osso et al., 2011; Kessler et al., 1995; van der Meer et al., 2017). Nation-wide epidemiological studies of PTSD have found that the lifetime prevalence rates range from 5-6% in men and 10-13% in women (Breslau, Chilcoat, Kessler, Peterson, & Lucia, 1999; Kessler et al., 1995). Kessler and colleagues (1995) have also reported that the duration of PTSD symptoms in women is significantly longer than in men. Women generally experience symptoms up to five years after the traumatic event, whereas men experience symptoms for approximately two.

Despite these statistics, research shows that, throughout the course of life, men are more likely to be exposed to a potentially traumatic event than are women (Breslau, 2001; Norris,

Foster, & Weisshaar, 2002). Many researchers theorize that this result is not due to some inherent vulnerability in women, but rather a multitude of factors such as the type of trauma that is more commonly experienced by either sex and the severity of the trauma experienced (Norris et al.,; Tang & Freyd, 2012). For instance, women are more likely to experience traumas such as sexual assault, whereas men are more likely to experience traumas such as accidents, combat, and physical assaults (Norris et al.). According to Christiansen and Hansen (2015), however, greater exposure to sexual assaults does not fully account for sex differences seen in rates of PTSD. They posit that females may report higher levels of PTSD due to having higher levels of associated risk factors such as anxiety sensitivity, negative posttraumatic cognitions about the world (e.g., the world is a dangerous place), depression, helplessness, and panic. Other researchers have hypothesized that differences in protective factors such as self-efficacy or differences in social roles of men and women may be a reason that women and men experience PTSD at significantly different rates (Costa, Terracciano, & McCrae, 2001; Hirschel & Schulenberg, 2009; Kling, Hyde, Showers, & Buswell, 1999; Pakalniškienė, Viliūnienė, & Hilbig, 2016).

**Coping with posttraumatic stress.** While most people will be confronted by a traumatic stressor, and more specifically a disaster, in their lifetime, those affected will experience different levels of distress. That is, some people experience long-term distress or clinical syndromes such as PTSD whereas others experience only short-term disturbances in functioning followed by a return to pre-disaster levels of functioning (Copeland, Keeler, Angold, & Costello, 2007; Shing, Jayawickreme, & Waugh, 2016; Williams, McDevitt-Murphy, Fields, Weathers, & Flood, 2011). Multiple epidemiological studies have found that most people (an estimated 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; Halpern & Tramontin, 2007; Kessler et al., 1995; Norris, 1992; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993).

Many researchers have sought to explain this finding citing the benefits of self-efficacy (Hirschel & Schulenberg, 2009), social support (Brewin et al., 2000; Ozer, Best, Lipsey, & Weiss, 2008), optimism (Rauch, Defever, Oetting, Graham-Bermann, & Seng, 2013), resilience (Arnetz, Rofa, Arnetz, Ventimiglia, & Jamil, 2013), and perceived meaning in life (Aiena et al., 2016; Dursun et al., 2016; Owens, Steger, Whitesell, & Herrera, 2009). The main difference in these protective factors is that some come from external sources such as social support whereas others come from within the individual. Internal coping strategies are of particular interest to researchers as they may help lessen the negative effects of disasters like the Deepwater Horizon oil spill by allowing affected individuals to use their own inherent coping strategies. They can also be areas targeted for intervention both pre- and post-disaster. Along the same lines, Doherty and Clayton (2011) proposed a model that purports 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 consequent psychological response. Following this line of thought, theoretical and empirical advances have been increasingly evident in recent years, specifically focusing on resilience and perceived meaning in life. Prior to discussing perceived meaning in life, a review focusing on the importance of resilience is offered.

## **Resilience**

Resilience is defined as one's ability to adapt to, weather, or grow in the face of stressors and restore equilibrium to one's life after being confronted with a stressor (American Psychological Association, 2014; Bonanno, 2004; Wagnild & Young, 1993). Wong and Wong

(2012) further defined it as using available internal and environmental resources to aid recovery when confronted with negative or adverse events. Resilient individuals may experience intrusive thoughts or memories about a traumatic event, but continue to function at “normal” or routine levels (Bonanno & Mancini, 2012). Many researchers characterize resilience as a construct composed of numerous protective factors that work in sync (Herbert, Manjula, & Philip, 2013; Lyons, 1991; Rutter, 1985; Southwick, Bonanno, Masten, Panter-Brick, & Yehuda, 2014; Wagnild & Young, 1990). For instance, Wagnild (2009b) asserted that five characteristics (perseverance, equanimity, meaningfulness, self-reliance, and existential aloneness) make up the “Resilience Core”. Perseverance is the ability to keep going, even when faced with setbacks. People who possess equanimity are characterized as having a composed and calm view of life and their experiences, often using a sense of humor to help cope with problems. Meaningfulness is when people are aware that their life has meaning and purpose. People who are self-reliant are able to recognize and rely on their own personal strengths to guide their actions. Finally, existential aloneness is the recognition that while some situations and experiences can be shared with other people, one must be able to face and manage other experiences alone.

For decades, researchers have acknowledged that stressful or traumatic events increase a person’s vulnerability to mental disorders (Garmezy & Rutter, 1985). Researchers have long been interested in what makes people less likely to develop a trauma-related mental disorder and more resilient in the face of these distressing events. While work in resilience is becoming more and more widespread with an increasing number of researchers and practitioners considering it an essential aspect of understanding trauma-related responses, it is still in the early stages as a science (Shahar, 2012). Research on this topic became prominent in the 1960s, gaining

momentum in the late 80's to early 90's in studies of children (Garmezy, 1993; Rutter, 1987; Werner, 1984; Wong & Wong, 2012).

In 1964, Michael Rutter carried out epidemiological studies of educational, psychiatric, and physical disorders of children known as the Isle of Wight Studies (Rutter, 1976). He noticed that while stressors like parental marital conflict, parental mental illness, low socioeconomic status, parental delinquency, large family size/overcrowding, and placement into governmental care left children more vulnerable to mental illness, a significant number of these children were able to overcome these stressors and not experience long-term, negative mental health impacts (Rutter, 1979). He concluded that there were certain protective factors that guard some children from succumbing to stressors, and that this was an area that needed to be investigated further (Rutter, 1979).

Following Rutter's work, Garmezy, Masten, and Tellegen (1984) studied children from urban environments in the United States that had either experienced significant stressors (determined using the Life Events Questionnaire; Coddington, 1972), had early life stress due to life-threatening congenital heart defects, or were children with severe physical handicaps being transitioned into non-special education classrooms. Following the stressful or negative experience, Garmezy et al. used social competence as the measure of the child's outcome which was comprised of academic achievement, classroom behavioral competence, and interpersonal competence. Garmezy and colleagues argued that personal attributes modify the impact of stress by either inhibiting or amplifying it. In other words, the level of stress has a lesser impact on the quality of a person's adaptation when protective factors are present as compared to when they are not. This model is also known as the "immunity-versus-vulnerability" model. The individuals with more protective factors (or higher quality protective factors) were more immune to the

effects of stress, whereas those with fewer protective factors (or lower quality protective factors) were more vulnerable to stress. The work of Garmezy and colleagues was used to demonstrate that more research is merited with respect to understanding the relationships between protective factors, stress, and mental health.

Lastly, the Kauai Longitudinal Study followed children from birth to 32 years of age and examined their vulnerability to negative developmental outcomes after being exposed to stressors early in life such as perinatal stress, poverty, parental mental illness, excessive conflict, and problems within the family (Werner, 1992). A major focus for Werner and colleagues was investigating the roots of resiliency in children that had successfully coped with these stressors and investigating the various protective factors that helped children to overcome adversity. Werner categorized a third of the children that had experienced multiple stressors as “high-risk” and found that a third of the high-risk children went on to not only overcome the stressors, but were as or more successful than children in the low-risk group. Werner noted that certain protective factors seemed to predict successful adult adaptation in these high-risk children. These factors included the ability to easily elicit positive responses from caregivers due to temperament, the ability to efficiently capitalize on whatever skills and values they had, having parents with competent caregiving styles, and having supportive caregivers that fostered trust. This longitudinal study set the stage for many later intervention programs aimed at fostering resilience and promoting these protective factors in at-risk children, laying the foundation for the work that is being done on resilience today (Alvord & Grados, 2005; Sanders, Munford, Thimasarn-Anwar, Liebenberg, & Ungar, 2015; Zolkoski & Bullock, 2012).

In terms of more recent research, Christopher (2000) found that resilience was positively correlated with psychological well-being. In addition, research has demonstrated that resilience

is positively correlated with gratitude, optimism, and self-esteem and negatively correlated with general psychological distress, generalized anxiety, impulsivity, and posttraumatic stress (Arnetz et al., 2013; Baldwin, Jackson, Okoh, & Cannon, 2011; Choi et al., 2015; Fredrickson, Tugade, Waugh, & Larkin, 2003; Nishi, Uehara, Kondo, & Matsuoka, 2010; Scali et al., 2012; Tugade & Fredrickson, 2004). A recent meta-analysis of 60 studies found that resilience was positively correlated with positive indicators of mental health (e.g., life satisfaction, positive affect) and negatively correlated with negative indicators of mental health (e.g., depression, anxiety) with a medium effect size for both correlations (Hu, Zhang, & Wang, 2015).

Research has demonstrated that resilience promotes both psychological and physical well-being, which has increased its prevalence in such fields as positive psychology and disaster mental health (e.g., Aiena et al., 2015; Bonanno, 2004; Bonanno, Galea, Bucciarelli, & Vlahov, 2007; Doherty & Clayton, 2011; Herrman, 2012; Schulenberg, Drescher, & Baczwaski, 2014; Vieselmeier, Holguin, & Mezulis, 2017). Many researchers are working to develop ways to foster and promote resilience to help individuals overcome significant stressors (e.g., Consoli, Gonzalez, & Lopez, 2012; Diab, Peltonen, Qouta, Palosaari, & Punamäki, 2015; Smith, Park, Ireland, Elwyn, & Thornberry, 2013; Stallard & Buck, 2013; Sun & Buys, 2012).

**Sex differences in resilience.** Similar to PTSD, there are often sex differences reported in levels of resilience, but the research results are much more likely to be mixed. When studying university students who were affected by the 2010 earthquake in Haiti, Burnett and Helm (2013) found no significant differences between men and women in reported levels of resilience. Similarly, Morano (2010) found in a study of Holocaust survivors that there were no significant differences in resilience between men and women following this traumatic event. In a more recent study of the role of sex in the experience of pain, Ramírez-Maestre and Esteve (2014) also



found no significant difference in reported levels of resilience by sex. However, in a study of online respondents, Wagnild (2009b) found that women scored significantly higher on the 14-Item Resilience Scale than did men. Conversely, Bonanno and colleagues (2007) found in a sample of adults living in New York after the 9/11 terrorist attacks that women reported significantly less resilience than men. Further, Campbell-Sills, Forde, and Stein (2009) found that women had lower self-reports of resilience than men. They noted, however, that this could be due in part to the fact that the men in their survey were more concerned with presenting themselves as unfazed and strong when confronted with stress. In a study of adults seeking mental health services following the Deepwater Horizon oil spill (the same sample as the current study) and an additional sample of college students, Aiena and colleagues (2015) found no statistically significant differences between male and female self-reports of resilience in either the clinical sample or the college student sample. Given mixed findings regarding sex differences in resilience scores and how one's self-reported resilience affects levels of posttraumatic stress following a disaster, the current study seeks to add to the literature in this area.

**Current resilience research.** Today, interest in resilience continues to grow with both researchers and clinicians shifting their focus to what's "right" with an individual (as opposed to focusing exclusively on symptoms or diagnoses) and capitalizing on strengths to produce better long-term outcomes to stressors. For instance, with suicide rates in U.S. military reaching a record high in 2012 (Briggs, 2013), Youssef and colleagues (2013) found in a three-year, longitudinal study that higher levels of resilience at the initial point of assessment predicted lower levels of suicidality at follow-up. They proposed the need to increase resilience in current and future veterans as a means of promoting military members' psychological well-being. Further, when examining individuals affected by the Deepwater Horizon oil spill one year after

the disaster, it was found that those who reported less perceived resilience also reported higher levels of posttraumatic stress and depressive symptoms as compared to individuals who reported higher levels of resilience (Shenese & Langhinrichsen-Rohling, 2015). There is a clear need to study resilience, particularly with regard to clinical implications for prevention and therapeutic intervention efforts (Rutter, 2013).

While early resilience researchers primarily examined adjustment to chronic adversity in children, efforts have been expanded to better understand resilience as it pertains to adjustment to more acute and broad traumatic events, such as natural or technological disasters, and examining the construct across the lifespan (Bonanno & Diminich, 2013). There is a need for resilience studies across a range of disasters, considering adults as well as children (Arnetz et al., 2013; Bonanno, 2004; Bonanno & Diminich, 2013; Bonanno, Westphal, & Mancini, 2011; Karlin, Marrow, Weil, Baum, & Spencer, 2012; Southwick et al., 2014; Zakour, 2012).

Like resilience, researchers have shown a growing interest in perceived meaning in life, and how it relates to other protective factors and disaster-related events. For example, when examining a proposed model of resilience, Smith, Epstein, Ortiz, Christopher, and Tooley (2013) found that an individual's perceived meaning in life significantly predicted their overall resilience. Further, Wagnild (2009b) posited that life meaning provides a foundation for the other four resilience characteristics (i.e., perseverance, equanimity, self-reliance, and existential aloneness) making it one of the most important facets of resilience. According to Wong and Wong (2012), when working to build resilience, efforts should be meaning-centered for two important reasons. The first reason is that resilience is a multifaceted construct that includes one's perceived meaning in life, whereas the second reason is that the aims of a meaning-centered approach to building resilience (e.g., development of character strengths, moral

strength, compassion for others, and supportive social ecologies) easily lends itself to greater individual resilience. As research continues to demonstrate the merit of each concept individually, the need to understand the mutualistic relationship between the two concepts undoubtedly grows. Moreover, understanding both concepts individually and collectively will enhance our grasp of the potential impact of disaster-related events. Prior to describing the purpose of the current study, the concept of meaning in life is discussed in greater detail.

### **Perceived Meaning in Life**

Perceived meaning is a person's belief that he or she is living in accordance with his or her own hierarchy of values (Frankl, 1959/2006; Schulenberg & Melton, 2010). In other words, if an individual has a high level of meaning then he or she has a sense of what is most important in life. The study of perceived meaning in life (sometimes referred to as purpose in life or life purpose) rose to the forefront of psychology in the mid-20<sup>th</sup> century, with Viktor Frankl serving as a major leader in the field. Frankl developed the theory of logotherapy in the 1930's as a separation from the then current, popular theories in psychology (Frankl, 1959/2006, 1986). Logotherapy focuses on the importance of meaning and purpose in life to the human condition (Schulenberg, Hutzell, Nassif, & Rogina, 2008). While Frankl's academic and clinical work with logotherapy was put on hold in the 1940's due to the Holocaust, his experiences in the concentration camps allowed him to describe and validate first-hand how valuable a sense of meaning and purpose could be in traumatic situations (see Frankl, 1959/2006; Klingberg, 2001). For instance, Frankl was able to find the motivation and will to survive in several World War II concentration camps, over a period of years, because he had thoughts of one day being reunited with his wife.

Frankl emphasized that it was up to the individual to define and discover meaning in his or her life, devoting his work to describing principles that could guide individuals on the path to meaningful living (Wong, 2012). According to Frankl, the three primary tenets of logotherapy include freedom of the will, the will to meaning, and meaning in life (Frankl, 1959/2006; Melton & Schulenberg, 2008; Schulenberg et al., 2008). Freedom of the will refers to a person's ability to choose how to respond to external circumstances, regardless of whether there is an apparent lack of freedom or how bleak these circumstances may be. The will to meaning refers to one's drive to find meaning in life. This drive is a compelling force in a person's existence. When an individual has meaning, life has purpose under all circumstances, even those that involve unavoidable suffering. As such, logotherapy and the concept of meaning in life have clear implications for research into potentially traumatic events (Schulenberg, 2003; Schulenberg et al., 2008; Schulenberg et al., 2014). Today, the study of meaning has become an important aspect of both positive psychology and disaster mental health, and is most commonly referred to in the literature as meaning, perceived meaning, or meaning-making (Halpern & Tramontin, 2007; Park, 2016; Park, 2017; Park, Currier, Harris, & Slattery, 2017; Peterson & Park, 2012; Schulenberg et al., 2008; Updegraff, Silver, & Holman, 2008; Yalçın & Malkoç, 2015).

In terms of coping with trauma, many researches have attempted to understand and explain how people adapt to and overcome stressors and how these stressors can change people's views of themselves and the world around them (Janoff-Bulman, 1992; Kress, Newgent, Whitlock, & Mease, 2015; Neimeyer, 2001; Park, 2013; Silver & Updegraff, 2013; Steger & Park, 2012; Taylor, 1983; Thompson & Janigan, 1988). Park (2010) conceptualized meaning-making or "the restoration of meaning in the context of highly stressful situations" as one way that individuals recover from potentially traumatic events (p. 257). Meaning-making appears to

play a central role with respect to disaster-related events, with different meaning-making theories tending to share four essential tenets (Silver & Updegraff, 2013). Specifically, (1) people have global belief systems that motivate and drive behavior and help them interpret ongoing experiences, (2) life experiences can challenge these belief systems, and people give meaning to these experiences, (3) people's distress is a function of how discrepant the meaning they give to a life experience is from their global belief systems, and (4) when distress occurs, people seek to reduce this discrepancy between their assessed meaning of the life experience and their belief system. By adjusting one's global beliefs or assessed meaning of the experiences in order to reduce the discrepancy, distress should be lessened, with the person regaining a general sense of coherence and order. People often search for meaning in response to potentially traumatic experiences, and finding meaning in such circumstances can help them adjust in the long-term.

When confronted by potentially traumatic events, people may lose their sense of security, becoming increasingly aware of life's fragility and their own vulnerability (Silver & Updegraff, 2013; Weems, Russell, Neill, Berman, & Scott, 2016). Following a large California wildfire, Updegraff and colleagues (1996) found that of those affected, those who were able to find meaning within two weeks after the fire reported significantly less distress over the following years. They additionally found that those who found meaning following the disaster reported less distress in the six months following the fire as compared to those who did not. By way of another example, following the 9/11 terrorist attacks, Updegraff, Silver, and Holman (2008) longitudinally examined a large, representative sample of Americans pre- and post-terrorist attacks to understand the effects that searching for and finding meaning would have. The authors determined that those who sought social support from others (e.g., by seeking advice) were more likely to find meaning in the terrorist attacks than those who either engaged in positive reframing

(i.e., attempting to reconsider one's situation in a positive or optimistic way) or denial coping. The study demonstrated the importance of the social environment when searching for meaning (i.e., social support is essential to discovering meaning in such large-scale disasters). More importantly, the study provided some of the most important evidence that meaning-making in the context of the disaster is critically important in the long-term adjustment to a major disaster event. The authors found that meaning predicted posttraumatic stress symptoms after controlling for pre-attack mental health, attack exposure, and early acute stress response. That is, the more meaning one found following the attacks, the less posttraumatic stress they experienced over time. They explained that finding meaning led to adjustment by lessening fears about future terrorist attacks (Updegraff et al., 2008).

While research has demonstrated that meaning in life assists in dealing with symptoms of posttraumatic stress, this construct has also been shown to be useful in predicting strengths and positive psychological outcomes across a range of problems and contexts. Perceived meaning is related to positive psychological and physical health and a greater sense of well-being (Debats, Drost, & Hansen, 1995; Melton & Schulenberg, 2008; Steger, 2012; Yalçın & Malkoç, 2015; Zika & Chamberlain, 1992). Furthermore, a strong sense of meaning has been shown to be positively related to life satisfaction, general self-efficacy, hope, mindfulness, and happiness (Allan, Bott, & Suh, 2014; Bronk, Hill, Lapsley, Talib, & Finch, 2009; Byron & Miller-Perrin, 2009; Dogra, Basu, & Das, 2011; Drescher et al., 2012; Schulenberg et al., 2016; Wnuk, Marcinkowski, & Fobair, 2012). Perceived meaning in life is also negatively correlated with depression, alcohol use, general psychological distress, internalized stigma to one's own mental illness, suicidal ideation, and self-injury (Dogra et al.; Ehrlich-Ben Or et al., 2012; Kress et al., 2015; Schnetzer, Schulenberg, & Buchanan, 2013; Schulenberg, Schnetzer, & Buchanan, 2011).

Additionally, perceived meaning has been shown to predict life satisfaction post-trauma in both adolescents and adults (Halama & Dedova, 2007; Park & Gutierrez, 2013; Triplett, Tedeschi, Cann, Calhoun, & Reeve, 2012). In a study of Mississippi coastal residents seeking mental health services following the Deepwater Horizon 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).

**Sex differences in perceived meaning in life.** Perceived meaning in life is an important protective factor against posttraumatic stress and other mental health issues. Similar to resilience, studies pertaining to sex differences in perceived meaning in life have found mixed results. One of the first studies to examine sex differences in perceived meaning in life found no significant differences in reported levels of meaning in life between men and women (Meier & Edwards, 1974). More recently, in a study of internet respondents, Steger, Oishi, and Kashdan (2009) found no statistically significant differences between men and women in either perceived presence of meaning or search for meaning. Further, Kiang and Fulgini (2010) found no significant differences between males and females in self-reported perceived meaning. In an unpublished dissertation that accessed the same dataset as the current study (i.e., adults seeking mental health services after the Deepwater Horizon oil spill), albeit to answer different empirical questions, Baczwaski (2015) found no significant differences between men and women in reported levels of perceived meaning in life.

Conversely, in a similar study of adolescents receiving mental health services after the Deepwater Horizon oil spill, Schulenberg et al. (2016) found that adolescent females reported significantly more meaning in life than males, findings which differed from those of the adult sample. In another study of sex differences in perceived meaning, Morgan and Robinson (2013)

found that women reported higher levels of meaning in life in young adulthood and midlife, but noted that males generally reported more meaning in older adulthood. Additionally, in a study of meaning in men and women across their lifespans, Reker, Peacock, and Wong (1987) found that women reported higher search for meaning scores than did men. Thege, Stauder, and Kopp (2010) found in a study of smoking intensity that females tended to report higher levels of meaning in life and that meaning in life significantly differentiated heavy from light smokers. Finally, Harlow, Newcomb, and Bentler (1986) found that when undergoing psychological distress, women who lacked meaning or purpose in their lives were more likely to turn to substance abuse, whereas men who lacked meaning or purpose were more likely to consider suicide. Given mixed findings regarding sex differences in perceived meaning in life and resilience, and how these constructs affect levels of posttraumatic stress following a disaster, the current study seeks to add to the literature in this area.

### **Present Study**

While some researchers have described the relationship between perceived meaning and resilience (Park, 2013; Steger & Park, 2012; Wagnild, 2009b), few studies have systematically examined the contributions that meaning may offer in relation to resilience. As a result, many studies of resilience have failed to examine the potential contribution that meaning could make in relation to resilience (e.g., Lee, Sudom, & Zamorski, 2013). The research to date that has examined both constructs often inadequately measures either or both concepts. Measurement is often done by using one item about meaning from a larger scale to account for one's general perceived meaning in life or using an amalgamated or random battery of positive variable scales of the researcher's choosing (e.g., positive affect, psychological well-being, and social network) and labeling the outcome as the indicator of resilience (Heisel & Flett, 2008; Pan, 2011).



Consequently, researchers interested in resilience may be omitting an important aspect of what makes people resilient, thus, not fully examining the respondents' complete and actual level of resilience. Further, as interest in resilience-building efforts grows, researchers may be missing a key aspect to be included in these skill-building exercises. Research is needed to more clearly define each concept and to better understand the distinctiveness and likeness of the constructs, so that they can be more clearly studied in the future. There is still no consensus among researchers if the two concepts are separate, but related, or if meaning is part of a larger definition of resilience. Many studies have independently examined the relationship that resilience and meaning have on traumatic stressors, but few studies have examined these constructs in conjunction with one another.

The present study aimed to further investigate the relationship between resilience, perceived meaning in life, and posttraumatic stress symptoms among Mississippi coastal residents directly affected by the Deepwater Horizon oil spill. As stated above, previous studies that have accessed these data have addressed a number of different empirical questions. In the most recent study, it was found that both meaning and resilience were significant predictors of posttraumatic stress symptoms (Aiena et al., 2016). It was also demonstrated through a hierarchical regression that meaning may be an essential aspect of what makes an individual resilient to posttraumatic stress symptoms following a technological disaster. In addition, Baczwaski (2015) found that there were no statistically significant differences between men and women in reports of meaning in life. Following these findings, 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 Deepwater Horizon oil spill, but also the protective factors that help people recover from these types of widespread disasters. Specifically, this study

aimed to illuminate the contribution that perceived meaning in life makes in conjunction with resilience as a protective factor against symptoms of posttraumatic stress. Further, this study aimed to investigate how these protective factors differ between men and women, that is, does sex play a role in the relationship between these protective factors and symptoms of posttraumatic stress? This study adds to the body of existing literature by examining resilience, perceived meaning in life, and sex differences in relation to symptoms of posttraumatic stress.

The hypotheses examined are as follows:

1. There would be no statistically significant differences in perceived resilience or meaning in participants regardless of level of Deepwater Horizon oil spill perceived effects.
2. Those who reported perceived, negative effects by the spill would have significantly higher levels of posttraumatic stress.
3. Oil spill impact, resilience, and meaning would be significant predictors of posttraumatic stress symptoms for the perceived effects group.
4. After controlling for impact of the spill in the perceived effects group, meaning in life would significantly moderate the effects of the predictive power of resilience on symptoms of posttraumatic stress. Those who reported greater levels of perceived resilience and meaning in life would report lower levels of posttraumatic stress symptoms than those reporting lower levels of perceived meaning.
5. In the perceived effects group, females would report significantly greater levels of posttraumatic stress than males.
6. After controlling for the impact of the spill in the perceived effects group, sex would significantly moderate the effects of the predictive power of resilience on symptoms of

posttraumatic stress such that resilience and posttraumatic stress symptoms were predicted to share a greater percentage of variance for females as compared to males.

7. After controlling for the impact of the spill in the perceived effects group, sex would significantly moderate the effects of the predictive power of perceived meaning in life on symptoms of posttraumatic stress such that meaning and posttraumatic stress symptoms were predicted to share a greater percentage of variance for females as compared to males.

## II. METHOD

### **Procedures**

Data accessed for the current study were part of a larger project consisting of many different agencies and organizations (Drescher et al., 2012; Drescher et al., 2014). The money apportioned by BP to the Mississippi Department of Mental Health (MS DMH) was used to fund 19 mental health organizations along the coast. These organizations offered a range of services, such as therapeutic interventions, mental health training programs, and community outreach efforts. Of the 19 different mental health facilities that participated in this study, 10 provided direct therapeutic services (e.g., psychotherapy, medication management). The organizations consisted of 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 determined if they were affected by the Deepwater Horizon oil spill by ruling out any individual that could not have been affected (e.g., someone who recently moved to this area from an unaffected area). Those affected were then asked to complete a battery of questionnaires that included the Posttraumatic Stress Disorder Checklist – Stressor Specific version (PCL-S), the 14-Item Resilience Scale (RS-14), and the Purpose in Life test-Short Form (PIL-SF), among many other measures of psychological distress, as well as well-being. Informed consent was obtained, and

individuals had the opportunity to decline at any point in the study, for any reason. Oversight was provided by both MS DMH and The University of Mississippi Institutional Review Board.

With regard to survey administration, both paper-and-pencil and computerized surveys were available. Participants completed the paper batteries individually, and any participants expressing difficulty in understanding the battery were given the opportunity to have a facility staff member read the questionnaire to them. Once paper batteries were completed, mental health facility staff sealed the batteries and mailed them (informed consent sheets sent separately) to The University of Mississippi for data entry and analysis. Sites that had internet capabilities were given links to the computer-administered battery created through Qualtrics. Data entered through this link were automatically entered and sent to the data team at The University of Mississippi. If the site was able to employ both methods of administration, trained test administrators were instructed to let respondents choose which format they would prefer. On the basis of previously-conducted research with regard to equivalence across paper-and-pencil and computerized formats, statistically significant and clinically-meaningful differences between paper-and-pencil and computerized tests were not anticipated (Schulenberg & Yutrzenka, 1999, 2001).

## **Participants**

Participants in this study included 1119 adults ( $M_{\text{age}} = 38.76$ ,  $SD_{\text{age}} = 12.77$ ) that were seeking mental health services at treatment facilities along the Mississippi Gulf Coast after the Deepwater Horizon oil spill. Because this study is part of a larger series of studies, participants completed a battery of questionnaires. Over half the sample was female ( $n = 613$ , 54.8%). Males comprised 43.9% of the sample ( $n = 491$ ). The sample was predominantly White/non-Hispanic ( $n = 765$ , 68.4%). African Americans ( $n = 236$ ) comprised 21.1% of the sample, while the remainder of the sample was comprised of Hispanic/Latino ( $n = 19$ , 1.7%) individuals, Asian

American individuals ( $n = 18$ , 1.6%), or individuals who identified as “multiracial” ( $n = 27$ , 2.4%).

The majority of the sample reported an annual income below \$19,999 ( $n = 833$ , 74.4%). The second largest group of participants reported an annual income in the \$20,000 to \$39,000 range ( $n = 163$ , 14.6%), followed by 39 (3.5%) individuals reporting an income of \$40,000 to \$59,000. The rest of the sample ( $n = 41$ , 3.6%) reported an annual income of \$60,000 or higher. With regard to education, 511 participants (45.7%) reported achieving some college credit or higher (including associates, bachelors, masters, professional, and doctoral degrees). Three hundred and forty-three participants (30.7%) reported achieving a high school diploma or GED, 166 participants (14.8%) reported some high school, 79 participants (7.1%) reported achieving between a kindergarten and high school education, and 6 participants (.5%) reported receiving no formal schooling.

## Measures

**Perceived effects of the Deepwater Horizon oil spill.** To assess perceived effects of the spill, three questions were developed specifically for this project. The questions measured how the Deepwater Horizon oil spill had changed the participants’ social relationships, financial situation, and physical health. The general format of the questions was “How has the Gulf oil spill affected your social relationships (or financial situation or physical health)?” The questions utilized a 7-point, Likert-type scale with anchors ranging from 1 (greatly worsened) to 7 (greatly improved). The 7-point scale was reverse scored for analyses, and the three items were averaged to create a single effects score. For descriptive analyses, reverse-scored ratings were collapsed into two categories: perceived effects (scores greater than 4,  $n = 492$ , 51%) and no perceived effects (scores of 4 or less,  $n = 473$ , 49%; Aiena et al., 2016).

**PTSD Checklist-Specific Version.** The PTSD Checklist (PCL; Appendix A) is a measure of symptoms of posttraumatic stress disorder. There are three different, interchangeable versions that can be used in civilian settings (PCL-C), military settings (PCL-M), and settings in which there is a specific, identifiable stressful experience (PCL-S; Weathers, Huska, & Keane, 1991; Weathers, Litz, Herman, Huska, & Keane, 1993; Weathers, Litz, Huska, & Keane, 1994). The PCL-S, which was the version used in this study, prompts individuals to respond to a specific stressful experience (i.e., the oil spill). For this reason, the PCL-S is a useful measure to administer when the intent is to collect information about a specific event.

The PCL-S is a 17-item self-report scale designed to measure PTSD diagnostic criteria B, C, and D as outlined in the *DSM-IV* and subsequently the *DSM-IV-TR* (American Psychiatric Association, 1994, 2000). Criterion B refers to intrusive recollections, for instance, re-experiencing the traumatic event through recurrent thoughts, images, or dreams (APA, 2000). Criterion C refers to avoidance/numbing symptoms, as may be evident through a person's attempts to avoid places, people, and conversations associated with the traumatic event. Symptoms also refer to a numbing of general affect that was not present prior to the traumatic event (APA, 2000). Criterion D refers to symptoms of hyper-arousal, such as being easily startled, trouble sleeping, irritability, and anger. For symptoms to meet criteria for PTSD, they must persist for more than one month and cause functional impairment in important areas of life, such as one's occupation or one's social context (APA, 2000).

The PCL-S utilizes a 5-point Likert-type response format with options ranging from 1 (not at all) to 5 (extremely). Scores on the PCL range from 17 (no endorsed symptoms of posttraumatic stress) to 85 (endorsing all posttraumatic stress symptoms listed as extremely bothersome), with higher scores representing more endorsed PTSD symptoms. While many

cutoff scores have been suggested over the years, a cutoff of 44 was used as a measure of clinical significance in conjunction with Ruggiero, Del Ben, Scotti, and Rabalais' (2003) paper on the psychometric properties of the PCL, as well as Hirschel and Schulenberg's (2009) paper on PTSD and self-efficacy in Hurricane Katrina survivors. According to Blanchard and colleagues (1996), the cutoff of 44 was found to have the best diagnostic efficiency (.90).

As for psychometric properties, Cronbach's alpha coefficients in studies using versions of the PCL often range from the mid .80s to the high .90s, suggesting good to excellent internal consistency reliability of scores (Adkins, Weathers, McDevitt-Murphy, & Daniels, 2008; Bollinger, Cuevas, Vielhauer, Morgan, & Keane, 2008; Hirschel & Schulenberg, 2009; Ruggiero et al., 2003). In a study that accesses the present data, albeit to address different empirical questions, excellent reliability support was reported, specifically, a Cronbach's  $\alpha$  coefficient of .97 (Drescher et al., 2014). Drescher and colleagues (2014) also reported a mean score of 40.90 ( $SD = 19.21$ ; specific version) and 437 participants (39.1% of the sample) met or surpassed the clinical cutoff of 44 suggested by Blanchard and colleagues (1996). As for validity support, the PCL has garnered support for the validity of scores by correlating positively and significantly with other measures of PTSD (Ruggiero et al., 2003; Weathers et al., 1993). In a study of adults seeking mental health services following the Deepwater Horizon oil spill (the same data set as the present study; Drescher et al., 2014), the PCL-S correlated significantly and positively with depression ( $r = .47$ ), anxiety ( $r = .50$ ), and stress ( $r = .49$ ) scores as measured by the Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995).

**14-Item Resilience Scale.** The 14-item Resilience Scale (RS-14; Wagnild, 2009b) was developed by refining the original 25-item Resilience Scale (RS; Wagnild & Young, 1993). Wagnild and Young developed the RS as a direct measure of resilience and created the items



based on a qualitative study of older women who had effectively overcome a major, negative life event (Wagnild, 2009a). According to Wagnild, the RS-14 was created with the idea of reducing completion time and burden on the respondent. RS-14 items were chosen because they had the highest inter-item correlations with the original RS, and also to measure the five characteristics of resilience discussed above (i.e., perseverance, equanimity, meaningfulness, self-reliance, and existential aloneness; Wagnild, 2009b). The RS-14 utilizes a 7-point Likert-type response format, 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. The following scoring guidelines are provided by Wagnild (2009b): Very Low (14-56), Low (57-64), On the Low End (65-73), Moderate (74-81), Moderately High (82-90), and High (91-98). Individuals with scores that fall in the Very Low range are characterized as feeling isolated or alone, lacking energy and motivation, and possibly having difficulty finding meaning (Wagnild, 2009b). Those in the Low range are characterized as possibly feeling anxious, depressed or dissatisfied about their lives, feeling pessimistic in general, and may be feeling the need to make some changes (Wagnild, 2009b). Those who score in the range that is characterized as On the Low End often report some anxiety and depression. In addition, they may be experiencing some problems in their lives that they are trying to resolve, and may have trouble letting things go that they have no control over. Wagnild (2009b) characterizes those in the Moderate range as having neither high nor low resilience, but possessing many characteristics of resilience that can be built on and strengthened. Those in the Moderately High range are characterized as individuals who are doing well, possessing the characteristics of resilient individuals (with room to grow, however). These individuals are likely to perceive life as being meaningful, and have a balanced and realistic life perspective. Finally, those in the High range are characterized as doing very well resilience-wise.

They are rarely depressed or anxious. They tend to be optimistic and are able to return to routine levels of functioning, regaining their equilibrium when faced with life's difficulties. In a recent study of the psychometric properties of the RS-14, a study involving both clinical and college student samples, Aiena et al. (2015) reported that the mean score for the college student sample ( $N = 1765$ ) was 74.88 ( $SD = 17.05$ ), while the mean score of the clinical sample (the current study accesses these same data) was 63.11 ( $SD = 19.87$ ). Overall, these data place the student sample in the Moderate range and the clinical sample in the Low range.

With regard to the reliability of RS-14 scores, Wagnild (2009b) reported that the measure yields coefficient alphas of .90 and higher. In Aiena et al.'s (2015) analysis of the RS-14's psychometric properties, coefficient alphas ranged from .93 (clinical sample) to .96 (college student sample). As for validity of RS-14 scores, Wagnild's research demonstrated that the RS-14 is highly correlated with the original RS ( $r = .97, p < .001$ ). RS-14 scores are significantly and negatively correlated with measures of depression, disability, anxiety, stress, and PTSD (Aiena et al., 2015; Nishi et al., 2010). Alternatively, RS-14 scores are significantly and positively correlated with measures of self-esteem, social support, perceived meaning in life, and self-reported good health (Aiena et al., 2015; Nishi et al., 2010; Wagnild, 2009b). Such studies are supportive of the measure's construct validity. With regard to the measure's factor structure, principal components analyses with direct oblimin rotation supported a single-factor solution, with item factor loadings greater than .40 (Wagnild, 2009b). Additionally, Aiena and colleagues (2015) employed exploratory and confirmatory factor-analytic procedures in both clinical and college student samples, documenting support for the one-factor model with all items loading cleanly ( $>.30$ ) onto the single factor. The one-factor model explained 53.2% of the variance in the clinical sample and 67.6% of the variance in the college student sample.

**The Purpose in Life Test-Short Form.** The Purpose in Life test – Short Form (PIL-SF; Schulenberg et al., 2011; Appendix B) was created as a four-item short form of the original, 20-item Purpose in Life test (PIL; Crumbaugh & Maholick, 1964, 1969). Like the PIL, it is used to assess perceived meaning and purpose in life, but it requires less time and respondent effort. While the PIL (and subsequently the PIL-SF) was originally derived from Frankl’s logotherapy paradigm, it has been shown to have increased utility in the measurement of general meaning across a range of studies, regardless of theoretical perspective (Crumbaugh & Maholick; Schulenberg & Melton, 2010; Schulenberg et al., 2011; Schnetzer et al., 2013). The PIL-SF was developed based on factor-analytic studies of the PIL that demonstrated the presence of two distinct factors, exciting life and purposeful life (Schulenberg & Melton, 2010; Schulenberg et al., 2011). The PIL-SF was derived on the basis of the purposeful life factor with the inclusion of an additional PIL item that inquired directly about the presence of perceived meaning and purpose in life. The PIL-SF was developed to be a parsimonious, “purer” measure of meaning than the original PIL, which had received criticism in recent years questioning the dimensionality of the scale (Schulenberg et al., 2011). Each of the four items employs a 7-point Likert-type scale with different anchors for each item. An example of an item is: “I have discovered... 1 (no mission or purpose in life) to 7 (clear-cut goals and a satisfying life purpose).” Scores on the PIL-SF range from 4 to 28, with higher scores signifying greater perceived meaning and purpose in life.

The PIL-SF possesses encouraging psychometric support across a growing number of empirical studies, and is a promising alternative to the original form (Bronk, 2014). Cronbach’s  $\alpha$  coefficients of PIL-SF scores typically range from .79 to .86 (Schnetzer et al., 2013; Schulenberg et al., 2011). Further, in the published study, the investigation involving a subset of the current

data, it was found that PIL-SF scores were reliable with a Cronbach's  $\alpha$  of .86 (Drescher et al., 2012). In addition, PIL-SF scores demonstrate good convergent and discriminant validity, positively correlating with other measures of life satisfaction, self-efficacy, and perceived meaning and negatively correlating with measures of depression, anxiety, stress, alcohol use, and boredom proneness (Baczwaski et al., 2012; Schulenberg et al., 2011; Schulenberg, Baczwaski, & Buchanan, 2014; Schulenberg et al., 2016).

### **Statistical Analyses**

Data were entered and checked by trained graduate research assistants. If any participant data for the scales examined were missing or incomplete, they were dropped from the analyses on a listwise basis for all analyses except descriptive statistics. Standardized scores were calculated to check for univariate outliers, and Mahalanobis distance was calculated to evaluate multivariate outliers. Descriptive data are reported for the measures used, and include means, standard deviations, minimum and maximum values, and coefficient alphas. After the sample was separated into a perceived effects group and a perceived non-effects group, independent *t*-tests were used to examine group differences in resilience, meaning in life, and posttraumatic stress. Hierarchical multiple regression was used to examine the relationship between perceived meaning in life, resilience, and posttraumatic stress symptoms in the effects group after controlling for the effects of the spill. Finally, moderation analyses were conducted using the ordinary least squares (OLS) regression-based method proposed by Hayes (2013), which allows for the examination of continuous variables. The PROCESS plug-in (Hayes, 2013) was used to center variables and analyze the interaction between perceived meaning and resilience predicting symptoms of posttraumatic stress. It was also used to analyze both the relationship between resilience, sex, and posttraumatic stress symptoms and the relationship between meaning in life,

sex, and posttraumatic stress symptoms. It was predicted that meaning in life would significantly moderate the effects of the predictive power of resilience on posttraumatic stress symptoms such that those who reported greater levels of perceived resilience and meaning in life would report fewer posttraumatic stress symptoms than those reporting lower levels of perceived meaning. It was also predicted that after controlling for the impact of the spill, sex would significantly moderate the effects of the predictive power of resilience on symptoms of posttraumatic stress such that resilience and posttraumatic stress symptoms would share a greater percentage of variance for females as compared to males. Finally, it was predicted that after controlling for the impact of the spill, sex would significantly moderate the effects of the predictive power of perceived meaning in life on symptoms of posttraumatic stress such that meaning and posttraumatic stress symptoms would share a greater percentage of variance for females as compared to males.

### III. RESULTS

Prior to data analysis, data were screened for assumptions of multivariate statistics. Although the sample contained four multivariate outliers (found via Mahalanobis distance), the results were similar when tested without outliers. As a result, they were retained in the analysis. All other assumptions (normality, linearity, homogeneity, and homoscedasticity) were found to be satisfactory per the guidelines established by Tabachnick and Fidell (2012).

**Descriptive statistics.** Descriptive statistics were calculated for each measure to determine mean scores, standard deviations, minimum and maximum values, and coefficient alphas. These data are presented in Table 1 and reported by overall sample as well as by sex and by perceived effects and non-effects. As for PCL-S scores, while a diagnosis based on these data alone cannot be made, 39.1% of the total sample met or surpassed the clinical cutoff of 44 (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Hirschel & Schulenberg, 2009; Ruggiero et al., 2003). When examining the data by sex, 39.2% of men met or surpassed the clinical cutoff, whereas 38.8% of females met or surpassed the clinical cutoff. For the total sample, the average score on the PCL-S was 40.90 ( $SD = 19.21$ ). For males, the average score on the PCL-S was 40.62 ( $SD = 18.49$ ), and for females, the average score on the PCL-S was 41.11 ( $SD = 19.81$ ). For the effects group, 51.6% of respondents met or surpassed the clinical cutoff, whereas 28.1% of individuals in the non-effects group met or surpassed the clinical cutoff. For the effects group, the average PCL-S score was 46.85 ( $SD = 18.08$ ). For the non-effects group,

the average PCL-S score was 34.00 ( $SD = 18.40$ ). Internal consistency reliability coefficients for the PCL-S ranged from .95 to .97, whether evaluated by overall sample, by sex, or by perceived effects. These reliability data are considered to be excellent (see DeVellis, 2012).

Descriptive statistics were also calculated for resilience based on RS-14 scores (see Table 1). For the total sample, the average score was 63.11 ( $SD = 19.87$ ). For males, the average RS-14 score was 64.06 ( $SD = 20.42$ ), and for females, the average score was 62.27 ( $SD = 19.42$ ). The average score in the perceived effects group was 62.58 ( $SD = 19.96$ ) whereas the average score in the perceived non-effects group was 64.92 ( $SD = 19.80$ ). According to the interpretive guidelines offered by the scale's manual (Wagnild, 2009b), these scores, whether examined by overall sample, by sex, or by perceived effects, fall in the Low range (57-64). Internal consistency reliability coefficients ranged from .93 to .94 considering the total sample, sex, or perceived effects. These reliability data are considered to be excellent based on interpretive standards (see DeVellis, 2012).

Further, descriptive statistics were calculated for meaning as assessed by the PIL-SF (see Table 1). While there are no published cutoff scores for the PIL-SF, as described previously, higher scores are indicative of greater perceived meaning in life. With respect to the total sample, mean scores were 18.83 ( $SD = 5.45$ ). For males, the mean score was 18.96 ( $SD = 5.07$ ). For females, the mean score was 18.71 ( $SD = 5.76$ ). In the perceived effects group, the average PIL-SF score was 18.86 ( $SD = 5.56$ ), whereas in the perceived non-effects group the average score was 19.03 ( $SD = 5.35$ ). Comparatively, studies using the PIL-SF in samples of college students found mean scores of 22.67 ( $SD = 2.64$ ; Schulenberg et al., 2011) and 22.66 ( $SD = 2.64$ ; Schnetzer et al., 2013). Coefficient alphas for the PIL-SF ranged from .85 to .90 whether

examining the data by the overall sample, by sex, or by perceived effects. These reliability data are considered to be very good (see DeVellis, 2012).

For the questions used to measure perceived effects of the Deepwater Horizon oil spill (see Table 1), the total sample yielded an average score of 4.58 ( $SD = .86$ ). For males, the average perceived effects score was 4.60 ( $SD = .90$ ), whereas for females, the average perceived effects score was 4.57 ( $SD = .82$ ). These scores suggest that the individuals sampled tended to perceive the Deepwater Horizon oil spill as having worsened their functioning in at least one of the three life areas of financial situation, social relationships, and physical health. More specifically, 410 respondents (36.6%) reported a worsened financial situation, 264 (23.6%) reported worsened social relationships, and 272 (24.3%) reported worsened physical health. Overall, 534 individuals (47.8%) reported that the spill had caused at least one of the three areas to become worse, and 134 (12.0%) reported that the spill worsened each of these three life areas (Drescher et al., 2014). As stated previously, using the averaged oil spill effects score, 473 (49%) individuals reported no perceived negative effects by the spill and 492 (51%) reported perceived, negative effects. Reliability coefficients for the overall sample and sub-samples ranged from .72 to .76 whether examining the data by overall sample or by sex. These reliability data are considered respectable by interpretive standards (see DeVellis, 2012). When examining reliability coefficients by perceived effects, coefficient alphas ranged from .46 to .57. By the same interpretive standard, these data are considered to be in the unacceptable range.

## **Hypothesis Testing**

**Hypotheses 1 and 2.** Hypothesis 1, which stated that there would be no statistically significant differences in perceived resilience or meaning in participants regardless of level of Deepwater Horizon oil spill impact, was supported. As predicted, there were no statistically



significant differences in reported resilience between the perceived non-effects ( $M = 64.92$ ,  $SD = 19.80$ ) and the perceived effects ( $M = 62.58$ ,  $SD = 19.96$ ) groups,  $t(913) = 1.78$ ,  $p = .08$ . Also as predicted, there were no statistically significant differences in reported meaning between the perceived non-effects ( $M = 19.03$ ,  $SD = 5.35$ ) and the perceived effects ( $M = 18.86$ ,  $SD = 5.56$ ) groups,  $t(892) = .465$ ,  $p = .64$ . An independent samples  $t$ -test determined that those who reported perceived effects from the spill endorsed significantly higher levels of posttraumatic stress symptoms ( $M = 46.85$ ,  $SD = 18.07$ ) than those who did not report perceived effects ( $M = 34.70$ ,  $SD = 18.40$ ),  $t(888) = -9.94$ ,  $p < .001$ ,  $d = 0.67$ . This finding is supportive of Hypothesis 2.

**Hypothesis 3.** Examining the perceived effects group, in step one of the hierarchical multiple regression model, oil spill impact was entered first to control for its effects. The model was a statistically significant predictor of posttraumatic stress symptoms,  $F(1,410) = 78.64$ ,  $p < .001$ . Impact accounted for approximately 16% of the variance in posttraumatic stress symptoms ( $R^2 = .16$ ). RS-14 scores were added in step two of the model and were a statistically significant predictor,  $\Delta F(1, 409) = 24.76$ ,  $p < .001$ , adding 5% of predictive capacity ( $\Delta R^2 = .05$ ). PIL-SF scores were added in step three of the model. This model also significantly predicted posttraumatic stress symptoms,  $\Delta F(1, 408) = 19.97$ ,  $p < .001$ . Incorporating perceived meaning into the model added an additional 4% of predictive capacity ( $\Delta R^2 = .04$ ). When examining the variables at the individual predictor level in the final model, impact and PIL-SF scores were statistically significant, but RS-14 scores became non-significant (see Table 2). These findings are supportive of Hypothesis 3.

**Hypothesis 4.** Hypothesis 4 stated that after controlling for impact of the spill in the perceived effects group, reported meaning in life would significantly moderate the effects of the predictive power of resilience on symptoms of posttraumatic stress. To test this hypothesis, a

moderation analysis using the PROCESS plug-in was conducted. Specifically, it was predicted that those who reported greater levels of perceived resilience and meaning in life would report fewer posttraumatic stress symptoms than those reporting lower levels of perceived meaning. In the first step, two variables were included: resilience and perceived meaning in life. These variables accounted for a statistically significant amount of variance in posttraumatic stress symptoms,  $F(4, 407) = 30.09, p < .001, R^2 = .25$ . To avoid issues with multicollinearity, the variables were centered, and an interaction term between resilience and perceived meaning in life was created (Aiken & West, 1991). Next, the interaction term between resilience and perceived meaning in life was added to the regression model and was found to be non-significant,  $F(1,407) = .96, p = .33 \Delta R^2 = .002$  (Table 3; Figure 1). However, it was found that perceived meaning does significantly predict symptoms of posttraumatic stress,  $b = -.82, t(407) = -4.37, p < .001$ . These findings are not supportive of Hypothesis 4.

**Hypothesis 5.** Hypothesis 5, which stated that females would report significantly higher posttraumatic stress symptom scores than males, was not supported. An independent samples *t*-test determined that there were no statistically significant differences in PCL-S scores between men ( $M = 46.76, SD = 16.73$ ) and women ( $M = 46.91, SD = 19.27$ ) in the perceived effects group,  $t(442) = -.08, p = .93$ .

**Hypothesis 6.** Hypothesis 6 stated that after controlling for the impact of the spill, sex would significantly moderate the effects of the predictive power of resilience on symptoms of posttraumatic stress. More specifically, resilience and posttraumatic stress were predicted to share a greater percentage of variance for females as compared to males. A moderation analysis was conducted to address this hypothesis. In the first step, sex and resilience were included. These variables accounted for a statistically significant amount of variance in posttraumatic

stress symptom scores,  $F(4, 427) = 26.22, p < .001, R^2 = .21$ . The variables were then centered and an interaction term between resilience and sex was created. The interaction term between resilience and sex was added to the regression model and found to be non-significant,  $F(1,427) = 3.10, p = .08, \Delta R^2 = .01$  (Table 4; Figure 2). As expected, it was found that resilience did significantly predict posttraumatic stress symptom scores,  $b = -.20, t(427) = -4.80, p < .001$ . These findings were not supportive of Hypothesis 6.

**Hypothesis 7.** Hypothesis 7 stated that after controlling for the impact of the spill, sex would significantly moderate the effects of the predictive power of perceived meaning in life on posttraumatic stress symptom scores such that meaning and posttraumatic stress would share a greater percentage of variance for females as compared to males. A moderation analysis was conducted to address this hypothesis. Sex and perceived meaning in life were included in the first step, and these variables accounted for a statistically significant amount of variance in posttraumatic stress symptom scores,  $F(4, 414) = 30.61, p < .001, R^2 = .25$ . After the variables were centered, an interaction term between perceived meaning and sex was created and added to the regression model. The interaction was found to be non-significant,  $F(1,414) = .64, p = .42, \Delta R^2 = .001$  (Table 5; Figure 3). As with the findings above, perceived meaning in life was found to significantly predict posttraumatic stress symptom scores,  $b = -.96, t(414) = -6.83, p < .001$ . These findings were not supportive of Hypothesis 7.

#### IV. DISCUSSION

The purpose of this study was to examine the relationship between resilience, perceived meaning in life, and posttraumatic stress symptoms among a sample of Mississippi coastal residents affected by the Deepwater Horizon oil spill, concomitantly seeking mental health services. More specifically, the aim was to investigate if meaning in life served to moderate the relationship between resilience and symptoms of posttraumatic stress. Additionally, this project aimed to study whether sex influences the relationship between these individual protective factors and posttraumatic stress symptoms following a technological disaster. Measures used to assess these constructs included a three-question measure of the perceived effects of the oil spill, the PCL-S, the RS-14, and the PIL-SF. The findings are discussed in detail below.

##### **Hypotheses**

Independent samples *t*-tests demonstrated that there were no statistically significant differences reported in perceived resilience or meaning in respondents regardless of level of perceived effects (Hypothesis 1). That is, regardless of how much an individual reported being impacted by the spill, reports of resilience and meaning were similar across groups. This finding was expected due to a number of reasons. For example, longitudinal studies have demonstrated the stability of resilience when faced with a stressor, in this case the Deepwater Horizon oil spill (Bonanno et al., 2012; Küenzlen, Bekkhus, Thorpe, & Borge, 2016; Lee, Sudom, & Zamorski, 2013; Pakalniškienė et al., 2016; Sudom, Lee, & Zamorski, 2014). While fewer studies have

examined the stability of meaning following a stressor, and instead focused on the restoration of (or variation in) perceived meaning when confronted with a stressor, multiple studies have demonstrated that perceived meaning is a generally stable construct in adults (King, Hicks, Krull, & Del Gaiso, 2006; Steger, 2012; Steger & Kashdan, 2007). As such, while the stress related to the spill may impact specific aspects of people's lives that they find meaningful (e.g., their job), it was still expected that broadly the perceived effects and non-effects groups would not differ significantly.

Another possible explanation for the lack of differences between groups could be that the individuals in the perceived non-effects group were more negatively impacted by the spill than they perceived. As stated previously, when examining the average reports of resilience in both the perceived effects and non-effects groups, the average score was in the Low range (Wagnild, 2009b). In addition, when comparing average reports of perceived meaning in both the perceived effects and perceived non-effects groups to other published reports of perceived meaning in college student samples, the reports of respondents in this study were found to be lower than non-clinical samples of college students (Schnitzer et al., 2013; Schulenberg et al., 2011). The mean scores on the PIL-SF were also found to be lower than the published mean ( $M = 21.30$ ,  $SD = 4.60$ ) in a study of individuals with spinal cord injury (Peter et al., 2015). Furthermore, and as stated above, 28.1% ( $n = 133$ ) of individuals in the non-effects group met or surpassed the clinical cutoff for posttraumatic stress symptoms on the PCL-S, which is higher than the lifetime prevalence rate in the U.S. (7.8%), meaning that these individuals were experiencing significant distress (Kessler et al., 1995). It is possible that the individuals in the perceived non-effects group might have been more impacted by the Deepwater Horizon oil spill than what was reported due to the nature in which impact was measured. That is, this study used impact

questions examining three broad life areas impacted (i.e., physical, social, and financial functioning). These individuals could have either been impacted in other, more specific areas of life or had not been affected themselves but had close friends or relatives that were negatively impacted. The impact questions used, while broad, could have overlooked person-specific spill-related stressors due to the nature in which the items were worded or interpreted by some respondents. For example, if the spill did not affect the respondent's physical health directly, but it strongly impacted that of a close friend or relative, the respondent might have been inclined to report no physical impact even though they could still be experiencing distress. Furthermore, a respondent might have experienced increased marital or familial stress due to the spill (e.g., decrease in wages), but the individual did not attribute this increase in stress directly to the Deepwater Horizon oil spill. Moreover, staff administering these batteries were trained on separating and administering batteries to individuals who were impacted by the spill. While it cannot be claimed that this was a perfect system, as human error is a variable that can occur when doing research projects of this size, it does give further evidence to the possibility that some of the respondents indicated to the test administrators that they had been impacted in some way by the spill that might not have been captured by the impact questions.

Another possible explanation of this finding is that the individuals in the non-effects group were experiencing other, non-spill-related stressors. As this was a clinical sample, that is, a group of individuals seeking mental health services, it is conceivable that the people in the perceived non-effects group were experiencing other, non-oil-spill related stressors that led them to seek services and report levels of perceived resilience and meaning similarly as the perceived effects group. This could explain the lower than average reports of perceived resilience and meaning in the perceived non-effects group as compared to the data documented in other

samples. As such, future studies should examine both of these constructs both before and after the potentially traumatic stressor in order to better clarify whether the lack of differences seen between the effects and non-effects groups is due to the stabilities of the constructs or whether the similarities seen between groups are attributable to other variables (such as the non-effects group being more impacted than what was reported or these individuals experiencing other, non-related but similarly impactful stressors). In addition, as no two disasters are alike, it is possible that the relationship between these constructs is not the same in other disasters. As such, future studies should also examine these constructs in samples of individuals in other disasters to see if variance between disasters affects perceived resilience and meaning differently or if they behave similarly across disasters. If we consider the non-effects group as a quasi-control group in this particular analysis, this cross-sectional finding expands the current understanding of these constructs in the literature by adding further evidence that internal positive coping characteristics such as resilience and meaning generally appear stable in adults even when considering traumatic stressors such as the Deepwater Horizon oil spill. Thus, as they are strong positive traits, they are targets for both inherent coping and possible intervention that can lead to better long-term recovery and growth.

Further, independent samples *t*-tests also demonstrated that those who reported being negatively affected by the spill, as compared to those who reported no perceived effects, endorsed significantly higher levels of posttraumatic stress symptoms (Hypothesis 2). As mentioned previously, the effects of the oil spill aspect of this disaster were largely secondary. Even though individuals were not directly impacted by the oil per se (e.g., the spill did not destroy their house as might have been the case with a hurricane), 47.8% individuals in the current study sample reported that the spill had negatively affected their social relationships

(23.6%), financial situation (36.6%), physical health (24.3%), or a combination of these three areas (Drescher et al., 2014). More specifically, many people experienced damage to their economy/local industries, social communities, and financial well-being, as well as increased familial stress and interpersonal conflict. These factors help to explain the higher levels of posttraumatic stress observed in the perceived effects group (Arata et al., 2000; Mong et al., 2012; Osofsky et al., 2011; Osofsky, Osofsky, Weems, Hansel, & King, 2016). This particular finding is consistent with the literature base that suggests that the greater the impact, the greater the likelihood of adverse mental health outcomes (e.g., Brewin, Andrews, & Valentine, 2000; Norris et al., 2002). This finding also further demonstrates the impact that technological disasters can have on the affected community's mental health, highlighting the importance of being mindful of psychological well-being, as well as physical health and environmental well-being, following man-made disasters.

Another finding of this study was that after controlling for the perceived effects of the oil spill, hierarchical multiple regression demonstrated that resilience and meaning together were statistically significant predictors of posttraumatic stress symptoms in the perceived effects group (Hypothesis 3)<sup>1</sup>. To date, resilience has received far more attention in the fields of positive psychology and disaster mental health. This current finding demonstrates the importance of meaning in life as a protective factor in disaster-related situations. In recent years, a growing number of researchers have demonstrated the importance of utilizing meaning in life when examining and/or promoting resilience (Damon, 2008; Weathers, Aiena, Blackwell, & Schulenberg, 2016; Wong & Wong, 2012). Additionally, Wagnild (2009b) constructed the RS-

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<sup>1</sup> Data as to the predictive capacity of resilience and meaning with regard to posttraumatic stress were also reported in a separate investigation of the interrelationships between resilience, perceived meaning in life, and traumatic stress symptoms (Aiena et al., 2016). This paper was published while the current project was in progress, so this hypothesis was retained for context and to ensure that each of the proposed empirical questions was addressed.



14 by drawing from the work of Viktor Frankl. She considered meaning one of the five pillars of resilience. That is, in Wagnild's (2009b) conceptualization, meaning is considered to be an essential part of what makes a person resilient. It is worth considering the implications of constructing the RS-14 with meaning being one of the five essential components of what makes a person resilient. Considering the collinearity between the two scales and given that the RS-14 contains three meaning-themed questions, had the meaning items been removed from the RS-14, meaning in life would have been an even stronger contributor to the predictive model<sup>2, 3</sup>. This finding demonstrates that the RS-14 may measure a blend of both resilience and meaning rather than merely resilience. In other words, the RS-14 may be measuring a common facet of resilience and meaning which could lead to the collinearity seen between the two measures and the change in predictive capacity when the meaning items are removed. Future studies should compare the RS-14 to other measures of resilience such as the Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003) or the Brief Resilience Scale (BRS; Smith et al., 2008) to determine the most precise way to measure resilience.

One issue in the field of resilience research is that there is no agreed upon definition as to what constitutes this construct (Southwick et al., 2014). As there is no gold standard definition of this protective factor, many researchers use an amalgamated list of positive psychological variables (e.g., problem solving skills, social network, positive affect) as an indicator of

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<sup>2</sup> After removing the meaning items from the RS-14 in the perceived effects group, oil spill impact was entered first to control for its effects. The model again was a statistically significant predictor of posttraumatic stress symptoms,  $F(1,412) = 78.64, p < .001$ . Impact accounted for approximately 16% of the variance in posttraumatic stress symptoms ( $R^2 = .16$ ). RS-14 scores (minus the three meaning questions) were added in step two of the model and were a statistically significant predictor,  $\Delta F(1, 411) = 21.28, p < .001$ , adding 4% of predictive capacity ( $\Delta R^2 = .04$ ; 1% lower than in the previous analysis). PIL-SF scores were added in step three of the model. This model also significantly predicted posttraumatic stress symptoms,  $\Delta F(1, 410) = 25.22, p < .001$ . Incorporating perceived meaning into the model added an additional 5% of predictive capacity ( $\Delta R^2 = .05$ ; 1% higher than the previous analysis). The predictive capacity of resilience and meaning is flipped when removing the three meaning items from the RS-14, with meaning contributing 1% more.

resilience (e.g., Fayyad et al., 2017; Heisel & Flett, 2008; Pan, 2011). As such, resilience as defined and measured in one study may not be comparable to the definition and method of measurement in other studies. With the findings of this project in mind, researchers who study resilience without examining meaning or purpose in life as one of its facets are likely overlooking an important attribute of what makes a person resilient. Similarly, when aiming to bolster resilience in populations that are likely to experience traumatic events (such as residents of the Mississippi Gulf Coast), mental health professionals who neglect to include or address meaning in their interventions are likely omitting an important aspect of what makes a person resilient, leading to poorer outcomes of intervention efforts (Sudom et al., 2014).

In addition, after controlling for the impact of the spill in the perceived effects group, it was determined that meaning in life did not significantly moderate the relationship between resilience and posttraumatic stress symptoms (Hypothesis 4). However, meaning in life was still a statistically significant predictor of lower reported levels of posttraumatic stress. While research concerning meaning in life being an essential component of what makes a person resilient continues to gain support in the literature (Aiena et al., 2016; Damon, 2008; Schuhmann & Geugten, 2017; Weathers et al., 2016; Wong & Wong, 2012), our study did not find that meaning was a moderator of the relationship between resilience and posttraumatic stress. This could be due to a number of possible factors such as the high collinearity between the PIL-SF and RS-14 scales, the characteristics of the sample, and the lower than average levels of reported perceived meaning in this sample. Firstly, it is possible that the collinearity between resilience and meaning in life led to the non-significant moderation between the two variables<sup>3</sup>. Because

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<sup>3</sup> Note: PIL-SF scores and RS-14 scores were found to be significantly and positively correlated ( $r = .67, p < .001$ ). According to Tabachnick and Fidell (2012), independent variables correlated at .70 and above should not be used in multiple regression analyses as they are too collinear. When examining tolerance and the variance inflation factor (VIF), which are indicators of multicollinearity, all variables were found to be well below the recommended cutoff

these two scales were highly correlated, it is possible that their shared variance could be leading to suppression of the moderating effect. If less of the variance had been shared between these two scales, it is possible that this model would have garnered more support. Further, the sample examined for this portion of the analyses was a clinical-services-seeking population who reported perceived, negative effects from the oil spill. As mentioned previously, over half of the respondents in the perceived effects group (51.6%) met or surpassed the clinical cutoff for reporting posttraumatic stress symptoms on the PCL-S (Blanchard et al., 1996). It is possible that due to the sample's level of distress and due to the prolonged nature of this disaster many of these individuals had not yet reconciled what had happened to their community with their worldview (Park, 2010). That is, it is possible that if these individuals had been assessed longitudinally and had more time to discover meaning in the situation, the role of meaning as a moderator might have trended toward significance in this analysis. If one examines the average level of reported meaning in life in the current study ( $M = 18.83$ ,  $SD = 5.45$ ) as compared to non-disaster affected samples of college students (in which average scores ranged from 22.66 to 22.67), individuals in this sample endorsed lower levels of perceived meaning in life than in these studies. Other studies utilizing the PIL-SF also had higher reported perceived meaning in life on average. For example, in a study of individuals with spinal cord injury, the mean score on the PIL-SF was found to be 21.30 ( $SD = 4.60$ ; Peter et al., 2015). In a nationally representative sample of United States military veterans, cluster analysis divided the individuals in the sample into three groups: a control group, a resilient group, and a distressed group (Isaacs et al., 2017). In the control group, a group which was made up of individuals who reported low lifetime trauma exposure and low current psychological distress, the average score on the PIL-SF was

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for usage in statistical analyses (Hair, Anderson, Tatham, & Black, 1995; Kennedy, 1992). Therefore, while these two scales are significantly related, they are distinct to the extent that both may be included in regression models (i.e., although 45% of the variance is shared, 55% of the variance is not).

22.00 ( $SD = 0.11$ ). In the resilient group, which consisted of individuals who reported high lifetime trauma and low current distress, the mean score on the PIL-SF was 21.90 ( $SD = 0.18$ ). In the distressed group that was comprised of individuals who reported high trauma and current distress, the mean PIL-SF score was 17.90 ( $SD = 0.36$ ). These studies suggest that the Deepwater Horizon oil spill may have had an impact on perceived meaning in life scores (Schnitzer et al., 2013; Schulenberg et al., 2011). Little is known about the longitudinal course one's perceived meaning in life takes when faced with a traumatic stressor and having one's worldview threatened. This finding demonstrates the need to study these constructs longitudinally in disaster-affected samples. More specifically, if a traumatic stressor does affect one's perceived meaning in life, future studies should aim to understand what a typical return to baseline looks like. Some studies examining resilience when confronted with a traumatic stressor have suggested that major life events or responses to stressors can lead to temporary variance in resilience (or the different factors that compose resilience) over one's lifetime due to an individual's given situation (Chi et al., 2016; Seligman & Csikszentmihalyi, 2000; Vaidya, Gray, Haig, Mroczek, & Watson, 2008). In a longitudinal twin study, Amstadter, Myers, and Kendler (2014) found that environmental stressors can have an enduring effect on an individual's level of resilience. That is, exposure to major stressors was found to be inoculating in some individuals and sensitizing in others. The authors suggested that more research should be conducted in order to better understand what type of stressor led to what effects (i.e., inoculating or sensitizing). Future studies should examine meaning in a similar fashion to understand how this construct varies following a disaster. More specifically, does meaning vary temporarily in response to a traumatic stressor or is the effect more long-term? Additionally, given the uniqueness of the course of this disaster (i.e., how long the spill lasted, the concerns of the effects for the coastal

ecology for years to come, the long-term effects on mental and physical health of those affected, and there being a clear entity where blame may be placed), future studies should compare these variables with respect to different types of disasters (e.g., natural, technological). No two disasters are exactly alike due to occurring under unique circumstances and contexts, so it is imperative that each incident be investigated to best understand disasters both individually and collectively (Dursun et al., 2016). Regardless, this project demonstrates the importance of meaning in life as a protective factor to be considered and enhanced in the post-disaster context. Moreover, research and educational efforts should be undertaken in the pre-disaster context (i.e., disaster preparedness) to evaluate the utility of meaning enhancement prior to the occurrence of a future disaster.

An independent samples *t*-test determined that males and females did not significantly differ in their reports of posttraumatic stress symptoms (Hypothesis 5). This finding was contrary to the literature demonstrating that females tend to report higher levels of posttraumatic stress symptoms as compared to males (e.g., Jin, Xu, & Liu, 2014; Kessler et al., 1995; Koo, Hebenstreit, Madden, & Maguen, 2016; van der Meer et al., 2017). In the present investigation, males and females reported comparable levels of posttraumatic stress symptoms following the Deepwater Horizon oil spill. In a meta-analytic study of sex differences in vulnerability to PTSD that examined a variety of different study types (e.g., epidemiological, convenience samples), it was found that while women consistently report higher levels of posttraumatic stress symptoms than men, sex differences are not evident in some instances (Tolin & Foa, 2006). For example, sex differences often disappear in studies where symptoms are assessed over a distinct period of time as opposed to symptoms over a respondent's lifetime. The instructions in this study encouraged participants to think about the Deepwater Horizon oil spill and symptoms

experienced over the last month (as prompted by the PCL-S). That is, had we asked respondents to consider symptom occurrence over a longer period of time, it is possible that we would have seen the expected sex differences. When examining posttraumatic stress symptoms over a distinct period of time, it is possible that individuals would have experienced a limited number of traumatic events (besides the oil spill) during that time period as compared to over their lifetime, which could be influencing the ways in which men and women responded in this study. Additionally, Tolin and Foa found that sex differences were reduced in studies that employed self-report questionnaires (which were used in this study) as opposed to studies which employed structured interviews. They postulated that men might be more willing to report traumatic events as well as emotional distress in an anonymous, written questionnaire where social demand characteristics are not as present as opposed to an interview. As a result, it is possible that our results could be influenced by the nature in which posttraumatic stress symptoms were assessed. Nevertheless, this finding sheds light on how devastating the effects of the spill were regardless of one's sex.

Relatedly, sex did not significantly moderate the relationship between resilience and posttraumatic stress symptoms or the relationship between perceived meaning and posttraumatic stress symptoms (Hypotheses 6 and 7). These results became expected following the non-significance of Hypothesis 5. Because males and females were not reporting statistically significant differences in posttraumatic stress symptoms, it was unlikely that sex would serve as a moderator between these protective factors and posttraumatic stress symptom reports. Stated differently, the ability of sex to serve as a moderator is likely reduced in this particular sample due to the lack of significant posttraumatic stress differences in mean PCL-S scores between sexes. While it is possible that sex does not serve to moderate the relationship between resilience

and posttraumatic stress symptoms or the relationship between meaning and posttraumatic stress symptoms, researchers have reported differences in how men and women utilize positive coping mechanisms and exhibit posttraumatic growth post-disaster (Dekel, Hankin, Pratt, Hackler, & Lanman, 2016; Jin et al., 2014; Vishnevsky, Cann, Calhoun, Tedeschi, & Demakis, 2010). For example, studies have found differences in the sources from which men and women draw meaning (Grouden & Jose, 2014). Interpersonal relationships, religiosity/spirituality, children, and well-being are more valued by women in terms of sources of meaning in life; whereas, men tend to value self-actualization, independent pursuits, and leisure (Baum & Stewart, 1990; Debats, 1999; Grouden & Jose; Schnell, 2009; Wong, 1998). Further, Dekel and colleagues (2016) found that men utilize interpersonal relationships for shorter periods of time to help with coping following a stressor (eventually moving on to using strategies like appreciation for life and spirituality coping), whereas women use interpersonal relationships predominantly to assist with coping. Some examples of commonly shared sources of meaning between men and women are love/marriage and work (Grouden & Jose). While reported posttraumatic stress symptoms were not significantly different between men and women, sources of meaning and the way in which the spill affected those specific sources could still differ by sex. That is, there could be distinct differences in the ways in which men and women recover following a disaster, and this could be affecting differences normally seen in reports of posttraumatic stress symptoms. Future studies should examine these constructs related to different types of disasters as well as related to non-disaster affected samples. Research endeavors should also investigate whether different disasters affect sources of meaning in life and resilience differently and if these differences impact the ways in which people draw from these protective factors to influence their initial distress and rate of returning to baseline post-disaster. These constructs should also be studied in

samples in which posttraumatic stress symptoms are assessed in a variety of ways (e.g., structured interviews and self-reports) to better elucidate the differences and similarities between men and women.

As research regarding differences in protective factors between men and women in disaster situations becomes more prevalent, it is important to investigate if these protective factors function differently following a disaster and between sexes (i.e., do different sources impact post-disaster functioning differently in males and females, and if so, which sources are most/least protective). While sex did not serve as a moderator in this cross-sectional sample, the research literature would benefit from examining these data longitudinally to determine whether sex affects the ways or rates in which males and females recover following a disaster. More specifically, studies should address questions such as if males and females recover differently from disasters due to the sources from which they draw meaning and resilience and/or the number of sources they have to draw from. If so, preventive and reactive efforts might be more effective if aimed at sex differences and the sources from which individuals draw from for coping. Certain interventions may be more effective or better received in some contexts as opposed to others. As disaster mental health research continues to widen its focus from psychopathology to resilience and growth in the aftermath of trauma, more research needs to be done with regard to how demographic factors such as sex influence recovery and growth post-disaster (Cerdá, 2014).

Additionally, multiple studies have found that gender roles impact posttraumatic stress symptoms following a traumatic event. Increased masculinity in males has been found to be correlated with greater posttraumatic stress symptom severity and greater self-reported posttraumatic stress symptoms (McDermott, Tull, Soenke, Jakupcak, & Gratz, 2010; Morrison,



2012). As individuals in the southern United States tend to hold more traditional gender roles, it is possible that this cultural difference could also have played a role in the results of the present study (Marquart, Nannini, Edwards, Stanley, & Wayman, 2007; Powers et al., 2003; Rice & Coates, 1995). While gender role data are not available for the current sample, it is possible that the gender culture of this sample could be influencing the results. Future studies should examine this relationship in cultures that do not abide by traditional gender roles to better understand what role sex and gender have with respect to the relationship between sex, meaning, resilience, and posttraumatic stress. Future studies should also aim to examine this relationship in other cultures that hold traditional gender roles to see if the findings are comparable. These studies would also assist in better understanding if traditional beliefs about gender impact the relationship between sex, meaning, resilience, and posttraumatic stress. Based on the data from this study, it is clear that a disaster of this nature has the potential to affect males and females negatively and significantly. However, it is also clear that there are protective factors that help assuage the impact of the disaster.

Overall, the results from this study indicate that meaning and resilience are both important protective factors to consider when examining individuals who have been impacted by a specific technological disaster, in this case the Deepwater Horizon oil spill. It also further sheds light on the importance of meaning in life as an essential facet of resilience, one that some resilience researchers overlook. This study also further discusses possible measurement overlap with the RS-14 and the PIL-SF. In addition, while sex differences in posttraumatic stress symptoms are widely found to be the norm in the research literature (Kimerling, Weitlauf, Iverson, Karpenko, & Jain, 2014), it is important to be mindful that this is not the case in all samples. Factors such as measurement method or gender role variability may influence how

individuals experience and report symptoms of posttraumatic stress (McDermott et al., 2010; Morrison, 2012; Tolin & Foa, 2006). Moreover, differences in the sources from which men and women draw perceived meaning in life and resilience can possibly lead to differences in distress and recovery post-disaster which could greatly impact ways in which mental health providers intervene on these protective factors both pre- and post-disaster. As the literature continues to shift from the exclusive examination of psychopathology to include protective factors, this study adds further evidence to the importance of examining constructs such as resilience and perceived meaning that can increase coping and growth following a traumatic stressor. These findings are important contributions to the existing literature. Implications for intervention efforts are discussed below.

### **Strengths, Limitations, and Further Research Directions**

This project has a number of strengths. For instance, this study further examined two constructs with growing research bases in the fields of positive psychology and disaster mental health (one of which has been more extensively studied to date, particularly in the area of disaster mental health), supporting their importance as protective factors against posttraumatic stress symptoms in light of a technological disaster. This project was unique in that it focused on a large sample of Mississippi coastal residents affected by the Deepwater Horizon oil spill, concomitantly seeking mental health services. This study, along with previous studies using this existing data set to address various empirical questions (e.g., Aiena et al., 2016; Drescher et al., 2014) aimed to further establish the negative impact that technological disasters, and more specifically oil spills, can have on the communities affected. Because no two disasters are alike (Dursun et al., 2016), research concerning the Deepwater Horizon oil spill (which was the largest spill of its kind to date and a spill that occurred over a three-month period) is important in

guiding studies for future spills and other technological disasters. Furthermore, the field of disaster mental health continues to broaden its focus on psychopathology and the negative sequelae of a disaster to document displays of resilience and growth, conceptualizing individuals more comprehensively as opposed to solely the negative or the positive aspects (Cerdá, 2014). As this study focused on multiple protective factors, it further demonstrates the need to examine and intervene upon positive constructs that help individuals cope when encountering a traumatic stressor. The more research that is conducted with individuals affected by disasters and the variables that help them adaptively cope, the more informed researchers and clinicians will be, a process that will no doubt enhance preventive and reactive education and intervention approaches.

Additionally, this study adds discrepant data to the widely accepted idea that women usually report higher levels of posttraumatic stress symptoms than do males. A strength of this study was that the sample included almost as many males as females. Cohen (1977, 2016) noted that having similar sub-sample sizes equates to greater power when using mean comparison analyses. As such, the similar sample sizes of this project when divided by sex might be contributing to the finding that women did not report higher levels of posttraumatic stress as compared to men. Furthermore, and as discussed above, the way in which posttraumatic stress was assessed and cultural gender role differences might be contributing to the lack of statistically significant differences seen in reports of posttraumatic stress symptoms between men and women. As such, future studies should examine the function of gender role in relation to perceived meaning, resilience, and posttraumatic stress following a technological disaster. In addition, to further investigate sex differences researchers should examine these constructs using a structured interview for posttraumatic stress disorder such as the Clinician-Administered PTSD

Scale for DSM-5 (CAPS-5) in addition to a self-report measure for a multimethod approach to data collection (Weathers et al., 2013).

Another strength of this study was the use of a clinical sample (i.e., individuals receiving mental health services following the Deepwater Horizon oil spill). Data for clinical samples of this size are difficult to collect in the disaster context, and as a result, they are often neglected in the literature. This study provides important information not only about the posttraumatic stress response of individuals along the Mississippi Gulf Coast, but also protective factors that assuage negative effects of the spill in affected individuals. These data add further evidence supporting the need to consider mental health-related issues in conjunction with physical health and environmental concerns following technological disasters. As discussed earlier, the effects of technological disasters are more likely to persist for longer periods of time than natural disasters (Baum & Fleming, 1993; Freudenburg, 1997; Palinkas et al., 1993). The grant (funded by BP via the Mississippi Department of Mental Health) that financed the mental health organizations that provided the data for the project provided services for two years following the oil spill. The data for the current study were collected during that two-year period. While data were not analyzed based on the date they were collected, given the large number of individuals reporting negative effects over this period of time, it is unlikely that all the individuals perceiving effects came from the early months of collection. This study demonstrates the importance of continued, long-term services and support for individuals affected by a technological disaster, especially one as impactful as the Deepwater Horizon oil spill.

While this study has many strengths, there are also a number of limitations. One limitation of this study is the homogeneity of the sample (which was predominantly White). While this sample was demographically similar to the racial/ethnic composition of the

Mississippi Gulf Coast (U.S. Census Bureau, 2015), the effects of technological disasters on non-White individuals seeking mental health services is in need of further study. The underrepresentation of racial and ethnic minorities in much of the research to date could be due in part to differences in mental health stigma and the decreased likelihood of minority individuals to seek mental health services (Aggarwal, Pieh, Dixon, Guarnaccia, Alegría, & Lewis-Fernández, 2016; Dinwiddie, Gaskin, Chan, Norrington, & McCleary, 2013; Miranda, Soffer, Polanco-Roman, Wheeler, & Moore, 2015). Epidemiological studies have found that risk for the development of posttraumatic stress disorder differs based on race/ethnicity (lifetime prevalence of African Americans 8.7%, White Americans 7.4%, Hispanic/Latino Americans 7.0%, Asian Americans 4.0%; Roberts, Gilman, Breslau, Breslau, & Koenen, 2011). In an unpublished dissertation that utilized the same dataset to examine different empirical questions, Baczwski (2015) found that non-White individuals endorsed greater symptoms of psychological distress (i.e., symptoms of depression, anxiety, and stress) as compared to White individuals. In addition, it was found that race/ethnicity served as a significant moderator in the relationship between perceived meaning in life and scores on a scale of depression. As non-White individuals appear to be at greater risk for negative psychological sequelae following the Deepwater Horizon oil spill, and considering that race/ethnicity influences the strength of the relationship between perceived meaning in life and depression, it is important that future research examine these constructs in a more racially diverse sample. This would serve to not only determine whether the relationships between these constructs differ on the basis of cultural and socioeconomic differences, but also to better understand how technological disasters may affect non-White individuals disproportionately.

An additional limitation to this study is its correlational, post-test only design along with the lack of baseline data for purposes of comparison. Given these characteristics, causal inferences may not be made. Further, due to the data being collected after the oil spill occurred, another limitation is the lack of treatment and diagnostic history data on these individuals pre-oil spill (Drescher et al., 2014). Given the nature of disasters and their unpredictability, this is a common design flaw (Drescher et al.; Galea, Maxwell, & Norris, 2008; Masten & Narayan, 2012). Galea and colleagues suggest matched control groups as a way to circumvent this issue, and future studies of this nature would help to further clarify how these constructs relate to one another in disaster-affected individuals. While causal inferences should not be made on the basis of the present data and methodology, similar future studies can access these current data for comparative purposes. Future studies should examine these constructs using a longitudinal design, which would better elucidate the complex interrelationships between and among resilience, meaning in life, sex, and posttraumatic stress symptoms, pre- and post-disaster. More specifically, studies should seek to explicate the trajectory of these protective factors over time, as well as how they influence symptoms of traumatic stress in both the short- and long-term. The research in this area is limited, but growing, and more research needs to be conducted to determine whether stressors change positive psychological constructs (positively or negatively) or whether they are stable over time (Küenzlen et al., 2016; Lee, Sudom, & Zamorski, 2013; Pakalniškienė et al., 2016). Moreover, longitudinal studies should examine the cumulative effects of multiple traumas in individuals who are likely to have experienced multiple disasters. Research suggests that the experience of a prior trauma increases the amount of distress experienced as the result of a subsequent trauma (Dougall, Herberman, Delahanty, Inslicht, & Baum, 2000; Picou & Hudson, 2010; Shultz, Walsh, Garfin, Wilson, & Neria, 2015). Many

respondents of the present study were still recovering from natural disasters that hit the area previously (e.g., Hurricane Katrina; Abramson et al., 2010; Shultz et al., 2015). With respect to this particular dataset, as a result of Hurricane Katrina 45.6% ( $n = 510$ ) of individuals reported job loss, 16.1% ( $n = 180$ ) reported that their industry was negatively affected, 53.6% ( $n = 600$ ) reported that their finances were negatively affected, 53.3% ( $n = 596$ ) reported that their housing was negatively affected, 54.6% ( $n = 611$ ) reported that their emotional well-being was negatively affected, 31.1% ( $n = 348$ ) reported that their social relationships were negatively affected, and 25.3% ( $n = 283$ ) reported that their physical health was negatively affected. It is possible that the distress from previous disasters such as Hurricane Katrina could have increased the posttraumatic stress response of the current sample or that these individuals could have been resilient or meaning-oriented in response to the disasters. Research endeavors should investigate the cumulative effects of disasters and establish baseline data for comparative purposes in areas such as the U.S. Gulf Coast (areas that are more likely going to be affected by future disasters). Studying individuals affected by disasters longitudinally would better illuminate the progression of distress and recovery, identifying individuals who may benefit from mental health interventions, as well as uncovering areas that would be the best targets for intervention strategies.

Another limitation of the current study is its sole reliance on self-report data. While the measures utilized in this study were chosen based on strong psychometric support, having only one method of data collection can reduce reliability (Morgan, 2014; Teddlie & Tashakkori, 2009). Self-report data are common in studies of similar size and studies of disaster-affected areas due to logistical and financial constraints (Galea et al., 2008). Employing a multi-method, multi-modal approach to data collection in future studies (e.g., structured or semi-structured

interviews, government damage reports) would serve to increase reliability and account for potential self-report biases (e.g., social desirability) that can influence individuals' responses on self-report measures (Lee & Sargeant, 2011; Nederhof, 1985).

A final limitation of this study is the internal consistency reliability of the three impact questions in the perceived effects and perceived non-effects groups. The Cronbach's alphas or internal consistency reliabilities for these groups was found to be in the unacceptable range (DeVellis, 2012). This finding could be due to a number of reasons. For example, it can be interpreted as there being wide variation in responses within items in the three-item measure. That is, individuals may have experienced an impact in one life area, but not others. While these three items together aimed to broadly measure impact, individually they are measuring different life areas (i.e., physical health, financial situation, social relationships). Further, as this is not an established measure, but rather a measure created solely for the purposes of this project, it was not surprising that the alpha reliabilities overall were not as respectable as the other, more established measures. This is a measure in which the psychometric properties have not been studied and improved upon over time. Future studies can further examine and refine the psychometric properties of this measure. While there is no gold standard measure of perceived disaster (or more specifically oil spill) effects, future studies should compare this measure to other measures of perceived disaster effects to better understand how best to measure disaster impact in a given context.

As treatment for both physical and, more recently, mental health shifts from a disease-management approach to a preventive approach, it is important to study protective factors such as resilience and meaning in life as they relate to traumatic stress (Mechanic & Olfson, 2016; Shim et al., 2012). A growing number of studies are examining interventions aimed to enhance



or strengthen these positive coping characteristics in order to inoculate individuals and increase the likelihood of resilience, meaning-making, and posttraumatic growth in response to future stressors (e.g., Biswas-Diener, Kashdan, & Minhas, 2011; Burton, Pakenham, & Brown, 2010; Shaheen & Oppenheim, 2016; Sudom et al., 2014; Wolmer, Hamiel, & Laor, 2011). While sex was not a moderator between the positive constructs studied in this sample, it remains a common conclusion in the literature that men and women tend to report disparate levels of distress following a disaster. It is possible that the assessment method employed or differences in gender roles might explain the findings of similar reports of posttraumatic stress symptoms in men and women in this study. Empirical inquiries should further elucidate the role of sex/gender and aim to investigate if differences in how men and women utilize positive coping skills or the sources from which men and women draw positive coping skills could be leading in part to the differences researchers normally see in the rates in which men and women report posttraumatic stress symptoms. Additionally, an increasing number of studies have examined ways in which communities can increase disaster preparedness (Mishra & Mazumdar, 2015; Noda, 2016). The majority of these efforts are physical in nature (e.g., storing stockpiles of supplies, planning emergency responder actions, contingency planning; Cox & Hamlen, 2015; Gil-Rivas & Kilmer, 2016; Wells, Springgate, Lizaola, Jones, & Plough, 2013). Research studies should also examine how communities can increase preparedness for psychological well-being, such as resilience-building and meaning-based preventive interventions, as well as how these interventions can prepare individuals to withstand and/or more efficiently recover from disaster experiences and stressors in general. If community members, researchers, and responders can take a more comprehensive approach to preparedness (i.e., both physical and psychological measures), communities might be able to recover more quickly and efficiently following a disaster.

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## APPENDIX



## APPENDIX 1: DESCRIPTIVE STATISTICS

Table 1

*Descriptive Statistics for Impact Questions, PCL-S, RS-14, and PIL-SF (N = 1119), By Total Sample, Sex, and Perceived Effects*

Measure	Sample	(N or n)	Min	Max	M	SD	$\alpha$
PCL-S	Total	1003	17	85	40.90	19.21	.97
	Male	463	17	85	40.62	18.49	.97
	Female	537	17	85	41.11	19.81	.97
	Effects	448	17	85	46.85	18.08	.95
	Non-effects	442	17	85	34.00	18.40	.97
RS-14	Total	1032	14	98	63.11	19.87	.93
	Male	474	14	98	64.06	20.42	.94
	Female	555	14	98	62.27	19.42	.93
	Effects	468	14	98	62.58	19.96	.93
	Non-effects	447	14	98	64.92	19.80	.93
PIL-SF	Total	1010	4	28	18.83	5.45	.88
	Male	465	4	28	18.96	5.07	.85
	Female	542	4	28	18.71	5.76	.90
	Effects	457	4	28	18.86	5.56	.89
	Non-effects	437	4	28	19.03	5.35	.85
Impact	Total	965	1.67	7.00	4.58	.86	.74
	Male	447	2.00	7.00	4.60	.90	.76
	Female	515	1.67	7.00	4.57	.82	.72
	Effects	492	4.33	7.00	5.20	.79	.46
	Non-effects	473	1.67	4.00	3.94	.25	.57

*Note.* N = total sample size; n = sub-sample size; Min = minimum score; Max = Maximum score; M = mean score; SD = standard deviation of scores;  $\alpha$  = Cronbach's alpha; PCL-S = PTSD Checklist – Stressor Specific version; RS-14 = 14-Item Resilience Scale; PIL-SF = Purpose in Life test – Short Form.

APPENDIX 2: IMPACT, RESILIENCE, AND MEANING PREDICTING POSTTRAUMATIC  
STRESS

Table 2

*Deepwater Horizon Oil Spill Impact, Resilience, and Meaning Scores Predicting Posttraumatic Stress Symptoms in the Perceived Effects Sample (N = 492)*

Variable	Model 1			Model 2			Model 3		
	<i>B</i>	<i>SE of B</i>	$\beta$	<i>B</i>	<i>SE of B</i>	$\beta$	<i>B</i>	<i>SE of B</i>	$\beta$
Impact	9.47	1.07	.40***	8.84	1.05	.38***	8.71	1.02	.37***
RS-14				-.20	.04	-.22***	-.05	.05	-.05 <sup>ns</sup>
PIL-SF							-.86	.19	-.26***
<i>R</i> <sup>2</sup>		.16			.21			.25	

*Note.* For all tables \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ ; ns = not significant; PCL-S = PTSD Checklist – Stressor Specific version; RS-14 = 14-Item Resilience Scale; PIL-SF = Purpose in Life test – Short Form.

APPENDIX 3: MEANING AS A MODERATOR OF RESILIENCE AND POSTTRAUMATIC  
STRESS

Table 3

*Moderation Analysis Hypothesis 4: Perceived Meaning in Life as a Moderator of the Relationship Between Resilience and Posttraumatic Stress Symptom Scores (N = 412)*

Model Summary: Outcome PCL-S					
<i>R</i>	<i>R</i> <sup>2</sup>	<i>F</i>	<i>df1</i>	<i>df2</i>	<i>p</i>
.50	.25	30.09	4	407	.0001

	<i>b</i>	<i>SE</i>	<i>T</i>	<i>p</i>
Constant	.978	5.385	.182	.856
PIL-SF	-.818	.187	-4.372	.000
RS-14	-.048	.051	-.926	.356
Interaction	.007	.007	.982	.327
Impact	8.636	8.461	8.461	.000

*Note.* Impact of the Deepwater Horizon oil spill was entered as a covariate; PCL-S = PTSD Checklist – Stressor Specific version; RS-14 = 14-Item Resilience Scale; PIL-SF = Purpose in Life test – Short Form.

APPENDIX 4: SEX AS A MODERATOR OF RESILIENCE AND POSTTRAUMATIC  
STRESS

Table 4

*Moderation Analysis Hypothesis 6: Sex as a Moderator of the Relationship Between Resilience and Posttraumatic Stress Symptom Scores (N = 433)*

Model Summary: Outcome PCL-S					
<i>R</i>	<i>R</i> <sup>2</sup>	<i>F</i>	<i>df1</i>	<i>df2</i>	<i>p</i>
.46	.21	26.22	4	427	.0001

	<i>b</i>	<i>SE</i>	<i>T</i>	<i>p</i>
Constant	2.330	5.412	.430	.667
Sex	.246	1.558	.158	.875
RS-14	-.197	.041	-4.802	.000
Interaction	-.143	.081	-1.760	.080
Impact	8.485	1.024	8.284	.000

*Note.* Impact of the Deepwater Horizon oil spill was entered as a covariate; PCL-S = PTSD Checklist – Stressor Specific version; RS-14 = 14-Item Resilience Scale.



APPENDIX 5: SEX AS A MODERATOR OF MEANING AND POSTTRAUMATIC STRESS

Table 5

*Moderation Analysis Hypothesis 7: Sex as a Moderator of the Relationship Between Perceived Meaning in Life and Posttraumatic Stress Symptom Scores (N = 420)*

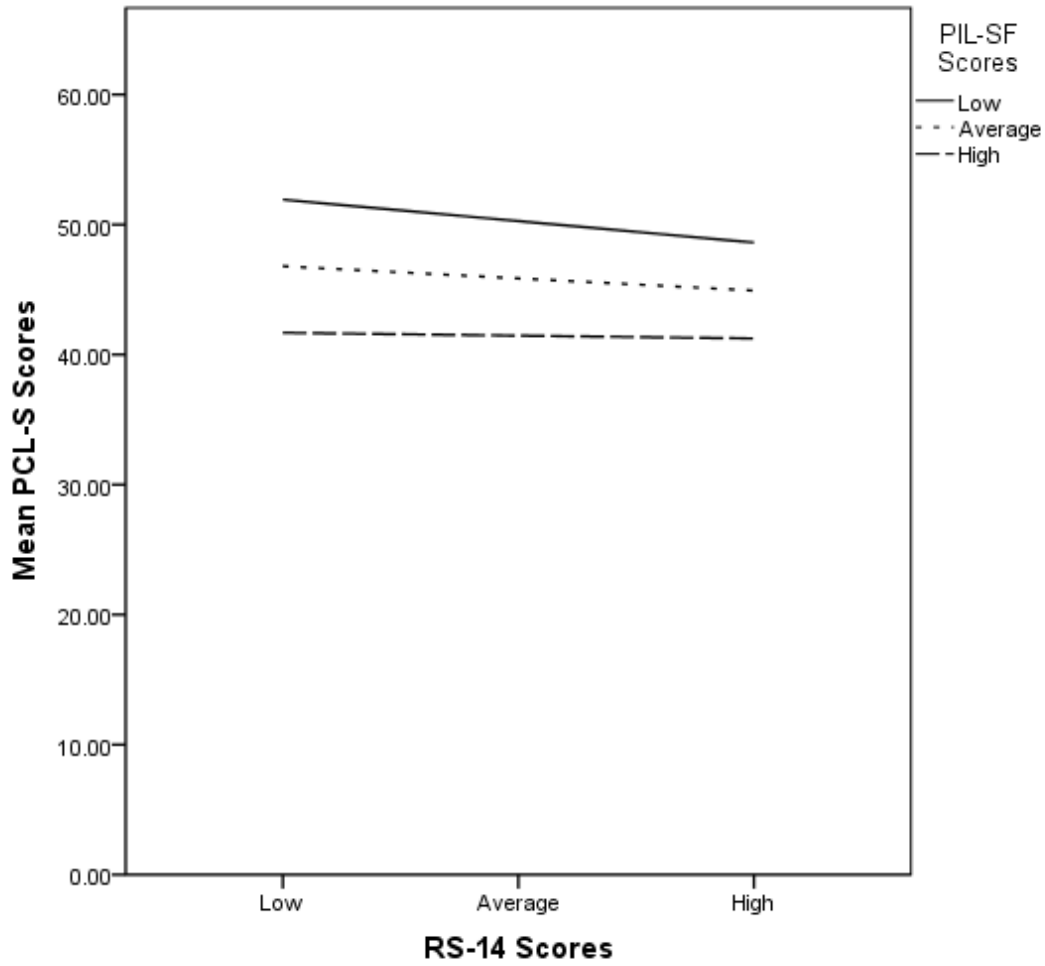
Model Summary: Outcome PCL-S					
<i>R</i>	<i>R</i> <sup>2</sup>	<i>F</i>	<i>df1</i>	<i>df2</i>	<i>p</i>
.50	.25	30.61	4	414	.0001

	<i>b</i>	<i>SE</i>	<i>T</i>	<i>p</i>
Constant	.644	5.272	.122	.903
Sex	.743	1.535	.484	.629
Meaning	-.962	.141	-6.829	.000
Interaction	-.225	.281	-.803	.423
Impact	8.837	1.001	8.820	.000

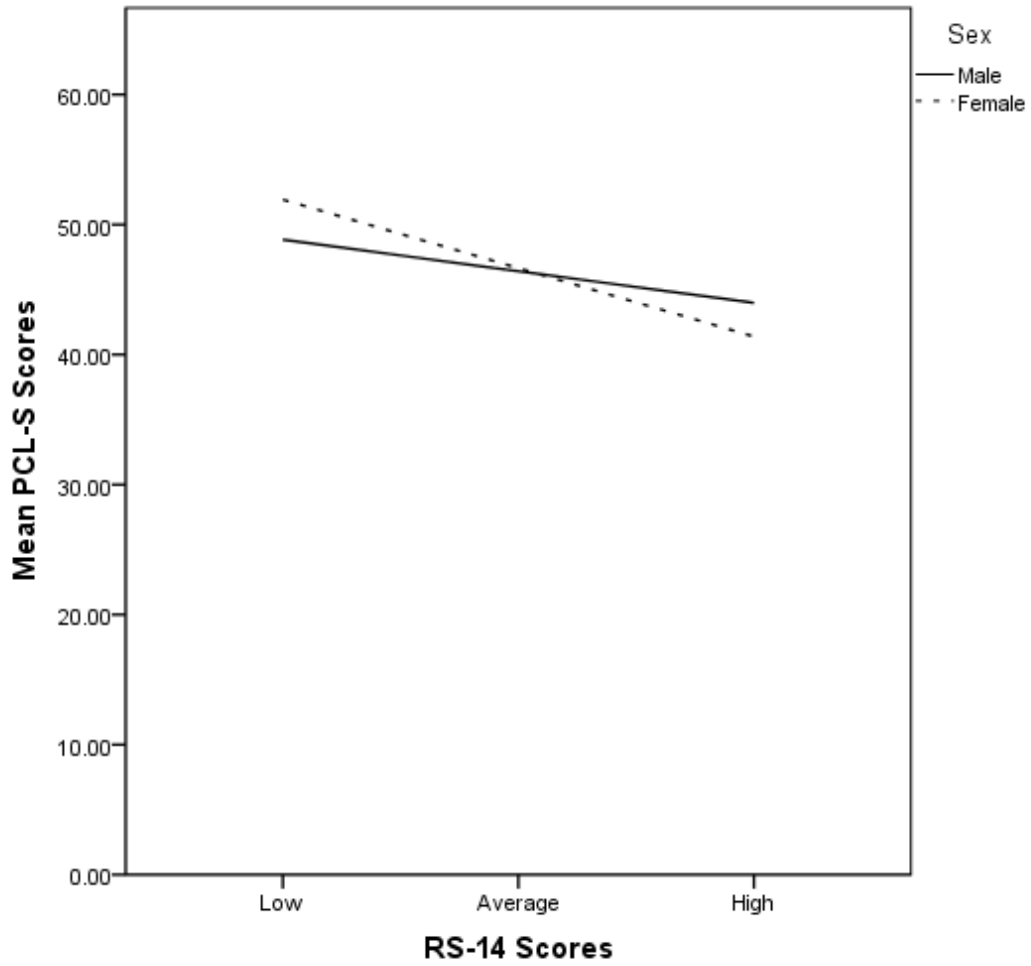
*Note.* Impact of the Deepwater Horizon oil spill was entered as a covariate; PCL-S = PTSD Checklist – Stressor Specific version; PIL-SF = Purpose in Life test – Short Form.

APPENDIX 6: MODERATING EFFECT OF MEANING ON RESILIENCE AND  
POSTTRAUMATIC STRESS



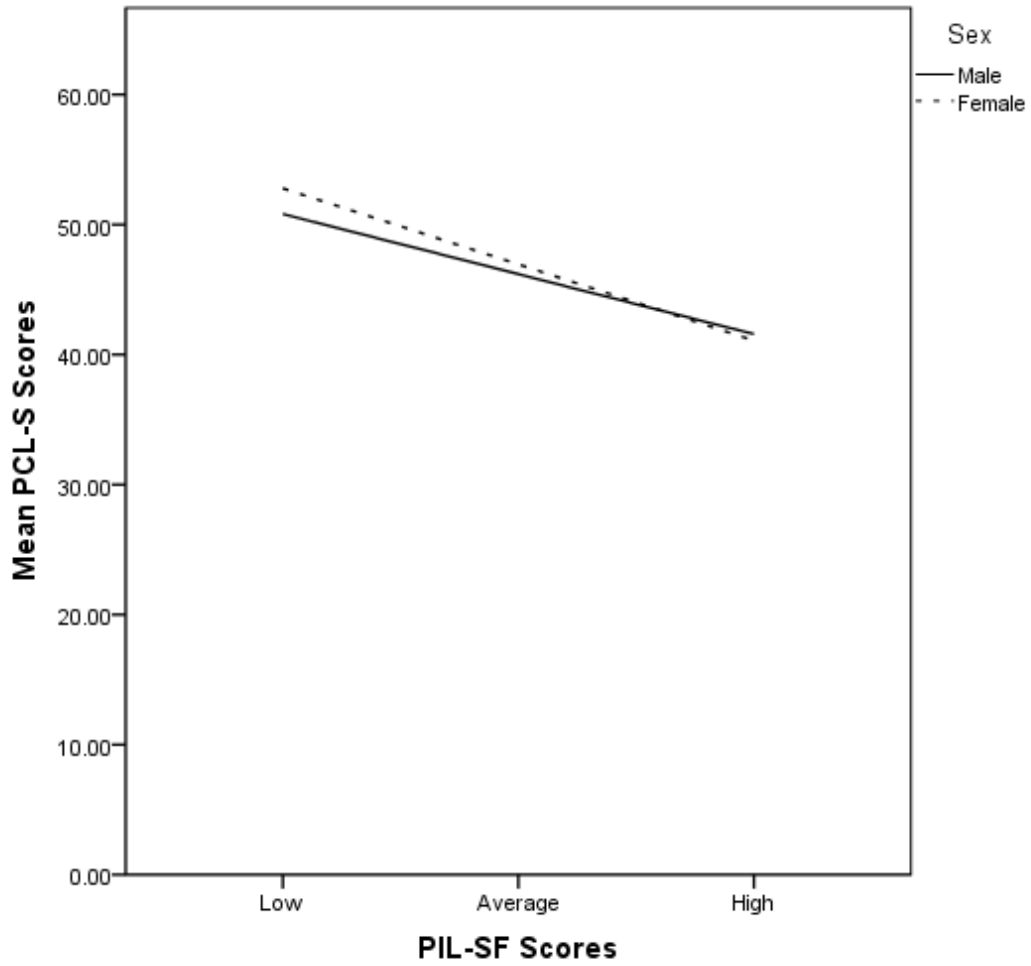
*Figure 1.* Moderating effect of perceived meaning in life on the relationship between resilience and symptoms of posttraumatic stress. PCL-S = PTSD Checklist – Stressor Specific version; RS-14 = 14-Item Resilience Scale; PIL-SF = Purpose in Life test – Short Form.

APPENDIX 7: MODERATING EFFECT OF SEX ON RESILIENCE AND  
POSTTRAUMATIC STRESS



*Figure 2.* Moderating effect of sex on the relationship between resilience and symptoms of posttraumatic stress. PCL-S = PTSD Checklist – Stressor Specific version; RS-14 = 14-Item Resilience Scale.

APPENDIX 7: MODERATING EFFECT OF SEX ON MEANING AND POSTTRAUMATIC  
STRESS



*Figure 3.* Moderating effect of sex on the relationship between perceived meaning in life and symptoms of posttraumatic stress. PCL-S = PTSD Checklist – Stressor Specific version; PIL-SF = Purpose in Life test – Short Form.



VITA

**Bethany J. Aiena, M.A.**

***Education***

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Doctor of Philosophy (anticipated August 2017)

University of Mississippi, Oxford, MS

Clinical Psychology

Dissertation: Meaning in Life as a Moderator of Resilience and Traumatic Stress: A Study of Protective Factors and Sex Differences in a Sample of Mississippi Coastal Residents Seeking Mental Health Services After the Deepwater Horizon Oil Spill

Advisor: Stefan E. Schulenberg, Ph.D.

Committee: Laura Dixon, Ph.D., Elicia Lair, Ph.D., & Steven Skultety, Ph.D.

GPA 4.0

Master of Arts (received August 2014)

University of Mississippi, Oxford, MS

Clinical Psychology

Thesis: Meaning, Resilience, and Traumatic Stress Following the Gulf Oil Spill: A Study of Mississippi Coastal Residents Seeking Mental Health Services

Advisor: Stefan E. Schulenberg, Ph.D.

Committee: Scott Gustafson, Ph.D. & C. Veronica Smith, Ph.D.

GPA 4.0

Bachelor of Science, Honors Graduate (received May 2011)

Lamar University, Beaumont, TX

Major: Psychology

Minor: Biology

Advisor: Jeremy Shelton, Ph.D.

GPA 3.9

***Clinical Experience***

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University of Kansas Medical Center, Kansas City, KS (2016-Present)

- Pre-doctoral Psychology Intern
- Underserved Populations Track
- **Rotation 1: Child Inpatient Psychiatric Unit** (July –September). Intern mental health therapist for children and adolescents with acute mental health issues. Attended multidisciplinary treatment team rounds; conducted psychodiagnostic, intelligence, and

achievement assessments; educated medical students on psychodiagnostic interviews; provided feedback and recommendations to patients, family, and staff; provided individual and group therapy. Supervised by Teri Smith, Ph.D.

- **Rotation 2: Family Medicine Clinic** (October – December). Intern mental health therapist in the Inter-professional Teaching Clinic who provided warm hand-offs and consultation to integrated team of medical residents, attending physicians, medical students, pharmacy students, nurses, social workers, and physical/occupational therapy students in outpatient medical clinics; followed up with patients using brief and intermediate length treatment modalities; provided consultation to and collaborated with medical residents and attending physicians in both an inpatient and outpatient setting; educated medical students and residents on presenting problems appropriate for behavioral assessment and intervention; provided feedback to medical students and residents on behavioral interventions and communication skills via observation and consultation; and conducted individual therapy and crisis interventions. Additionally, provided weekly supervision to two graduate practicum students that included modeling a clinical psychologist's role on an inter-professional team and shadowing and then discussing their clinical encounters. Supervised by Wendi Born, Ph.D.
- **Rotation 3: Neurorehabilitation** (January – March). Will attend multidisciplinary treatment rounds with psychiatry, social work, nursing, and expressive therapists; administer cognitive and emotional screens; facilitate traumatic brain injury and burn support group meetings; and provide feedback and education to patients, family, and staff. Patients on this unit include individuals with traumatic brain injury, stroke, brain tumor, or spinal cord injury, as well as those admitted to the rehabilitation unit due to motor vehicle accident, amputation, or burn injuries. Supervised by Monica Kurylo, Ph.D.
- **Rotation 4: Adult Inpatient Psychiatric Unit** (April – June). Will attend multidisciplinary treatment team rounds, conduct psychodiagnostic and neurocognitive assessments, and provide individual and group therapy to adults with acute mental health issues. Supervised by Albert Poje, Ph.D.
- **Ongoing: Outpatient Psychotherapy.** Duties include conducting intake assessments; developing treatment plans; providing individual and family therapy; administering psychodiagnostic, intelligence, achievement, and neurocognitive assessments; and providing feedback and recommendations to patients and guardians. Supervised by Edward Hunter, Ph.D. and Elizabeth Penick, Ph.D.
- **Ongoing: KU Center for Telemedicine and Telehealth.** Duties include participating in the provision of telemental health services including psychological evaluations and treatment of adults and children in rural and other underserved areas throughout the state of Kansas. Additionally, shadowed psychiatrists and psychologists in an autism diagnostic clinic and pediatric psychiatry appointments. Supervised by Eve-Lynn Nelson, Ph.D. and Elizabeth Penick, Ph.D.
- **Underserved Track Minor Rotation: Bull Docs Clinic** (October – June). Duties include working as a therapist in a primary care clinic in a high school in an underserved area of Kansas City, KS; providing individual therapy and assessment for adolescent individuals; providing bi-weekly group therapy on topics such as anger management, problem solving, emotion regulation, and coping with anxiety and depression; and

assisting with a program evaluation project for the mental health services provided. Supervised by Edward Hunter, Ph.D.

- **Minor Rotation: Organ Transplant Evaluations** (July – September). Duties include evaluating individuals for eligibility for kidney and liver implantation, living donor status, spinal cord stimulator implantation, and providing the information gathered to the individual being evaluated and their treatment team. Supervised by Jessica Hamilton, Ph.D.
- **Minor Rotation: Consultation and Liaison** (April – June). Duties will include providing consultation services to patients in the University of Kansas Hospital for behavioral medicine issues and providing brief assessment and supportive therapy to hospital patients with coexisting medical and psychological issues. Supervised by Albert Poje, Ph.D.
- **Program Evaluation Project** (January – June). Duties include working with fellow interns to do program evaluation of the implementation of the Needs Assessment in Oncology which encapsulates the Commission on Cancer's Accreditation mandate to assess distress. Aim of project is to assess the implementation of the Needs Assessment for patients, care teams, and support services.

Communicare, Oxford, MS (Fall 2014-Summer 2016)

- Provisionally certified mental health therapist (PCMHT; Intern) at a community mental health center. Duties included conducting intake assessments; providing crisis assessment and intervention; developing treatment plans; reviewing and updating annual paperwork; working with psychosocial rehabilitation clients; and providing individual, family, and couples therapy. Supervised by Dixie Church, LMFT and Alan Gross, Ph.D.

Psychological Services Center, University of Mississippi (Summer 2012-Summer 2016)

- Graduate therapist at a university training clinic. Duties include conducting intake assessments, developing treatment plans, providing therapy, and preparing client process notes and reports. Supervised by Scott Gustafson, Ph.D., Stefan Schulenberg, Ph.D., John Young, Ph.D., and Danielle Maack, Ph.D.

Psychological Assessment Clinic, University of Mississippi (2014-2016)

- Graduate assessor at a university assessment clinic. Duties include providing comprehensive psychological evaluations to assess for learning disabilities, Attention-Deficit/Hyperactivity Disorder, mood/anxiety disorders, and personality disorders; writing integrated assessment reports; and providing feedback to individual clients and families. Supervised by Scott Gustafson, Ph.D.

Delta Autumn Consulting, LLC (2014, 2015)

- Clinic assistant and psychodiagnostician at a private mental health practice serving children and adults. Responsibilities included day-to-day office management tasks, interfacing with clients and insurance/billing agencies/Medicaid, and conducting diagnostic assessments both in local schools. Supervised by John Young, Ph.D., and Danielle Maack, Ph.D.

North Mississippi Regional Center, Oxford, Mississippi (2013-2014)

- Graduate therapist at residential facility for adults with intellectual and developmental disabilities. Duties included providing individual therapy, functional assessments, social

skills training, comprehensive intellectual assessments for determination of ICF/IID and HCBS services, writing integrated reports on both residential and outpatient clients, composing behavior plans, and updating and composing yearly treatment plans. Supervised by Scott Bethay, Ph.D.

International Programs, University of Mississippi (2012-2014)

- Co-leader of Cultural Connections Club (C3) for two academic years. Conducted a weekly social support group for international students to meet and connect with other international students, discuss issues transitioning to the United States, and learn about cultures and diversity. The focus of the group depended on the needs of the members from week to week and it was a hybrid of support group and group therapy. Supervised by Laura Johnson, Ph.D.

### ***Research Experience***

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Meaning in Life Research Lab, University of Mississippi (2011-Present)

- Graduate Research Assistant under the supervision of Stefan Schulenberg, Ph.D. Duties include entering, analyzing, and interpreting data collected from projects pertaining to meaning/purpose in life, resilience, posttraumatic growth, self-efficacy, depression, anxiety, PTSD, suicidality, and disaster mental health; supervising undergraduates in presentations/honor's theses; and providing ad hoc reviews of literature including book chapters and journal articles in the fields of conduct disorder, assessment, telehealth, disaster mental health, positive psychology, and computer-based therapy

Ole Miss Disaster Preparedness, University of Mississippi (2012-2014)

- Graduate research assistant under the supervision of Stefan Schulenberg, Ph.D. and C. Veronica Smith, Ph.D. Duties included grant writing; collecting and analyzing data pertaining to preparedness levels of university faculty, staff, and students; and conducting focus groups related to disaster preparedness. Projects included researching levels of disaster preparedness at the University of Mississippi and assisting the UM Incident Response Team in developing research-informed preparedness procedures.

UM Clinical-Disaster Research Center, University of Mississippi (2011-2014)

- Graduate Research Assistant and data manager for the Gulf Oil Spill Behavioral Health Grant under the supervision of Stefan Schulenberg, Ph.D. and the Mississippi Department of Mental Health. Following the Gulf Oil spill, BP apportioned funds to state departments of mental health to aid in recovery efforts in the affected areas. The funds received by the Mississippi Department of Mental Health were used to provide mental health services to affected residents. The UM Clinical-Disaster Research Center was consulted to evaluate the impact of the spill on the mental health of those receiving services. In addition to quantifying the amount of services provided by the funds, we collected data with regard to such variables as depression, anxiety, stress, and posttraumatic stress on the symptomatic side, and life satisfaction, self-efficacy, resilience, and meaning on the adaptive side. My duties included entering, analyzing, and interpreting data; managing all outreach data submitted in by state mental health agencies funded by the grant; preparing data for quarterly reports; visiting with sites on a quarterly basis for quality assurance purposes; and assisting in development of research articles concerning the clinical

population served by the mental health agencies.

Lamar University Psychology Department Research Assistant (2008-2011)

- Duties included researching experiment topics, data entry for statistical analyses, coding results, running experiments for my research advisor, graduate students, and personal projects. Supervised by Dr. Jeremy Shelton, Ph.D.

### ***Teaching Experience***

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University of Kansas School of Medicine (April 2017)

- Guest lecturer leading a talk for medical students in the Family Medicine Interest Group on working with patients with behavioral health concerns in a primary care setting.

University of Mississippi, Oxford, Mississippi (2014-2015)

- Graduate instructor teaching introductory psychology to university undergraduates. Duties included preparing and giving lectures, preparing and giving tests, and meeting with and providing feedback to two sections of over 100 students. Supervised by Stefan Schulenberg, Ph.D.
- Graduate teaching assistant for two graduate-level assessment courses. Duties included holding multiple workshops for major assessment tools (e.g., WAIS-IV, WIAT-III, WISC-IV), supervising graduate student practice sessions of full-battery assessments, reviewing reports for full-battery assessments, reviewing interpretation of various self-report measures, and providing feedback for administration and report writing.
- Guest lecturer at University of Mississippi with topics including:
  - Personality assessment – undergraduate personality theories class
  - Suicidality and suicide assessment – undergraduate abnormal psychology class
  - Issues of religion within the field of psychology – honors undergraduate introductory psychology class.
  - Therapy Psychoeducation – freshman year experience class

### ***Professional Publications***

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Weathers, L. N., **Aiena, B. J.**, Blackwell, M. A., & Schulenberg, S. E., (in press). Meaning as a facilitator of resilience and posttraumatic growth: Recommendations for research and practice. In A. Batthyany, P. Russo-Netzer, & S. E. Schulenberg (Eds.), *Meaning in positive and existential psychotherapy contents*.

**Aiena, B. J.**, & Gross, A. M. (in press). Comprehensive Trail-Making Test (CTMT). *In The SAGE Encyclopedia of Abnormal and Clinical Psychology*.

**Aiena, B. J.**, & Gross, A. M. (in press). Behavior Assessment System for Children – Second Edition (BASC-2). *In The SAGE Encyclopedia of Abnormal and Clinical Psychology*.

**Aiena, B. J.**, Buchanan, E., Smith, and Schulenberg, S. E. (2016). Meaning, resilience, and traumatic stress following the Gulf Oil Spill: A study of Mississippi coastal residents seeking mental health services. *Journal of Clinical Psychology*, 72, 1264-1278. doi:

10.1002/jclp.22232

- Aiena, B. J.,** Baczwaski, B. J., Schulenberg, S. E., & Buchanan, E. M. (2015). Psychometric properties of the 14-Item Resilience Scale: A tale of two samples. *Journal of Personality Assessment, 97*, 297-300. doi:10.1080/00223891.2014.951445
- Walters, B. A., Drescher, C. F., Baczwaski, B. J., **Aiena, B. J.,** Darden, M. C., Johnson, L. R., Buchanan, E. M., & Schulenberg, S. E. (2014). Getting active in the Gulf: Environmental attitudes and action following two Mississippi coastal disasters. *Social Indicators Research, 118*, 919-936. doi:10.1007/s11205-013-0428-2
- Aiena, B. J.,** & Baczwaski, B. J. (2012). A measure of interest to logotherapy researchers: The 14-Item Resilience Scale. *The International Forum for Logotherapy, 35*, 109-110.
- Schulenberg, S. E., Baczwaski, B. J., & **Aiena, B. J.** (2012). Advancing logotherapy as a science: A research imperative – Part one. *The International Forum for Logotherapy, 35*, 65-72.
- Drescher, C. F., Baczwaski, B. J., Walters, A. B., **Aiena, B. J.,** Schulenberg, S. E., & Johnson, L. R. (2012). Coping with an ecological disaster: The role of perceived meaning in life and self-efficacy following the Gulf Oil Spill. *Ecopsychology, 4*, 56-63.

### ***Presentations***

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- Weathers, L. N., Blackwell, M. A., **Aiena, B. J.,** & Schulenberg, S. E. (2015, November). *The Importance of Meaning in Conceptualizations of Resilience and Posttraumatic Growth: Building a Foundation for Research and Practice*. Poster to be presented at the 49th annual meeting of the Association for Behavioral and Cognitive Therapies, Chicago, IL.
- Aiena, B. J.** (2014, October 24). *Disaster Mental Health and Psychological First Aid: Picking up the Pieces*. Presentation given to visiting FEMA Corps volunteers at the University of Mississippi, Oxford, MS.
- Aiena, B. J.,** Schulenberg, S. E., & Smith, C. V. (2013, November). *Perceived Meaning, Resilience, and Traumatic Stress Following the Gulf Oil Spill: A Study of Mississippi Coastal Residents Seeking Mental Health Services*. Poster presented at the 47th annual meeting of the Association for Behavioral and Cognitive Therapies, Nashville, TN.
- Baczwaski, B. J., **Aiena, B. J.,** Florez, I. A., Tkachuck, M., Smith, C. V., Schulenberg, S. E. (2013, November). *Informing disaster preparedness efforts on a college campus*. Poster presented at the 47th annual meeting of the Association for Behavioral and Cognitive Therapies, Nashville, TN.
- Aiena, B. J.,** Baczwaski, B. J., Buchanan, E. M., & Schulenberg, S. E. (2012, August). *The psychometric properties of the 14-item Resilience Scale (RS-14)*. Poster presented at the 120<sup>th</sup> annual meeting of the American Psychological Association, Orlando, FL.
- Aiena, B. J.,** & Schulenberg, S. E. (2012, September). *The PTSD Checklist: Psychometric properties and considerations with Vietnamese populations*. Poster presented at the annual convention of the Mississippi Psychological Association, Biloxi, MS.

Baczwaski, B. J., Schultz, K. V., **Aiena, B. J.**, Smith, C. V., & Schulenberg, S. E. (2012, August). *Depression, anxiety, stress, and meaning in life among those impacted by the Gulf Oil Spill*. Poster presented at the 120<sup>th</sup> annual meeting of the American Psychological Association, Orlando, FL.

**Aiena, B. J.** (2012, August). Discussant, *Film program and discussion: The Descendants* — *APA ad hoc Committee on Films and Other Media*. Presented at the annual meeting of the American Psychological Association, Orlando, FL.

**Aiena, B. J.** & Schulenberg, S. E. (2012, February). *Perceived meaning in life as a moderator between posttraumatic stress and suicidality*. Paper presented at the annual meeting of the Mississippi Academy of Science, Hattiesburg, MS.

**Aiena, B. J.**, Jordan, L., & LaFleur, A. (2010, October) *Effects of Socioeconomic Status Mindset on Attractiveness of Potential Mates*. Paper presented at the annual meeting of the Lamar University Student Research Symposium.

### ***Grants Applied for***

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**Aiena, B. J.**, Schulenberg, S. E., & Weathers, L. N. (2014). High school (Oxford/Lafayette) disaster preparedness and mitigation. The Lawrence Foundation. (Foundation Grant, \$5,089). Not funded.

### ***Professional Activities***

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- Health Career Pathways Mentorship, University of Kansas Medical Center, 2016 – Mentored two high school students from disadvantaged backgrounds who are interested in health careers.

Ad hoc reviewer:

- *Assessment* – 2015
  - *Journal of Personality Assessment* – 2015
  - *Social Indicators Research* – 2013
  - *Computers in Human Behavior* - 2011, 2012
  - *Professional Psychology: Research and Practice* – 2012, 2013
  - *Journal of Clinical Psychology* – 2012
- Student Faculty Representative – Psychology Department, University of Mississippi - 2014-2015
  - Abstract reviewer for APA Division 17: Positive Psychology April – 2014
  - Edited three assessment textbook chapters for Jerome Sattler, Ph.D. – 2012, 2013

### ***Special Training***

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**Integrating Mental Health Services with Primary Care** – Completion Certification  
Supervisor: Cherokee Health Systems, Suzanne Bailey, Psy.D., Joel Hornberger, MHS  
Trained in clinical aspects of integrating mental health into primary care and operation

and financing aspects of integrated care models.  
October, 2016: 10 hours

**Vietnamese Cross Cultural Training** – Completion Certification

Supervisor: Genia Crane, Mississippi Coast Interfaith Disaster Task Force  
Trained in counseling Vietnamese refugees and Vietnamese Americans.  
May, 2012: 3 hours

**American Red Cross Disaster Training in Psychological First Aid** – Completion Certification

Supervisor: Northwest Mississippi Chapter, Stefan E. Schulenberg, Ph.D.  
Trained in counseling individuals in the immediate aftermath of a disaster.  
September, 2011: 6 hours

***Honors and Awards***

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- Clinical Graduate Research Achievement Award, 2015
- Graduate Student Travel Award, 2012 & 2015 – travel grant awarded for APA and ABCT conference presentations
- Ann Shaw Outstanding Student Leader Award, 2010 – competitive award given to one student each year
- Lamar University Mirabeau Scholarship, 2007-2011 – full-tuition, merit-based academic scholarship

***Service Work***

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- **American Foundation for Suicide Prevention Out of the Darkness Walk Co-Chair, Fundraising Chair** (Fall 2011, 2012, 2013) – Chaired fundraising efforts and assisted in walk planning, preparation, and running the event on the day of the walk

***References***

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\*Available upon request