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Meaning In Life And Self-Efficacy's Relationship To Depression, Anxiety, And Stress: A Study Of Coastal Residents Affected By The Gulf Oil Spill

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MEANING IN LIFE AND SELF-EFFICACY’S RELATIONSHIP TO DEPRESSION, ANXIETY, AND STRESS: A STUDY OF MISSISSIPPI COASTAL RESIDENTS AFFECTED BY THE GULF 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

BRANDY J. BACZWASKI

March 2015
ABSTRACT

On April 20, 2010, the Deepwater Horizon Oil Platform exploded, killing 11 people and spilling approximately 210 million gallons of oil into the Gulf of Mexico over the following months. Disasters such as the Gulf Oil Spill affect individuals in many ways, including the possible onset of psychological issues such as depression, anxiety, and stress. Because mental health effects are common following a disaster, it is important to understand potential protective factors that may decrease the risk of negative consequences related to disaster events. The presence and severity of psychological distress, as well as the method of coping, varies between individuals and is likely influenced by protective factors such as perceived meaning in life and self-efficacy. The purpose of this study was to examine the psychological effects of the Gulf Oil Spill with a sample of 1119 Mississippi coastal residents seeking mental health services in response to the event. It was found that depression, anxiety, and stress were positively associated with each other. Self-efficacy and perceived meaning in life were positively associated with each other. Additionally, psychological distress was negatively related to protective factors. It was also found that, overall, sex and race/ethnicity did not serve to change the relationship between psychological distress and protective factors. Mean comparisons found that men reported significantly greater levels of self-efficacy than women and females reported significantly greater levels of depression, anxiety, and stress. However, no significant differences were found between males and females on report of perceived meaning in life. When comparing non-White and White individuals, it was found that non-White individuals reported significantly greater anxiety and White individuals reported significantly greater self-efficacy. There were no differences in
the report of depression, stress, or meaning in life. These results showed that the individuals who participated in this study experienced significant psychological distress and that protective factors may serve to buffer symptoms of depression, anxiety and stress. Future research on the impact of disaster on mental health should explore the types of treatment that are most effective in alleviating negative symptoms and enhancing protective factors.
DEDICATION

This dissertation is dedicated to my husband who provided invaluable love and support in my journey to fulfilling my goal to be a psychologist.
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<td>General Self-Efficacy Scale</td>
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ACKNOWLEDGMENTS

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I. INTRODUCTION

Disasters are “collectively experienced traumatic events with a severe impact, which affect large numbers of people” (Meewisse, Olff, Kleber, Kitchiner, & Gersons, 2011, p. 405). Disasters are associated with loss – loss of property, resources, safety/security, and possibly a loss in an individual’s ability to cope. On April 20, 2010, the Deepwater Horizon Oil Platform exploded, killing 11 oil rig workers (Robertson & Krauss, 2010). Following the explosion, the Macondo oil well spilled nearly 62,000 barrels of oil per day over a period of three months (Henry, 2010; Restore the Gulf, 2010). Though the oil well was capped on July 15, 2010, it continued to leak until mid-September, 2010 (Weber, 2010). It is estimated that approximately 4.9 million barrels (210 million gallons) of oil were spilled into the Gulf of Mexico (Robertson & Krauss, 2010).

The Deepwater Horizon Oil Spill (also known as the Gulf Oil Spill) was the largest oil spill in U.S. history, affecting 68,000 square miles of the Gulf of Mexico (Norse & Amos, 2010; Robertson & Krauss, 2010). Efforts to remove or limit the spread of the oil included skimmer ships, controlled burns, and floating booms (National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2010). Additionally, 1.84 million gallons of chemical dispersant were used in an attempt to minimize the impact of the Gulf Oil Spill; however, the dispersant itself may be harmful to marine life and the surrounding environment given it may contain carcinogens and other toxins (Blair, 2011; Coastal Response Research Center, 2010; Grissett, 2010). Additionally, instead of eliminating the oil from the water, the chemical dispersant caused
large amounts of oil to be collected underwater and this oil has not broken down as quickly as expected (Camilli et al., 2010). Up to one-third of the oil remains in ocean sediments, potentially damaging ecosystems, coastal businesses, and affecting future generations of coastal residents (Beech, 2010; Schrope, 2013).

The spill was vast, directly and indirectly affecting 1,074 miles of coast belonging to Louisiana, Mississippi, Alabama, and Florida (Boxall, 2011; Polson, 2011). While the intent of the dispersant was to remove the oil from the Gulf, as a side effect it increased the toxicity of the Gulf Oil Spill 52 fold to the waters and shoreline of the Gulf of Mexico (Rico-Martinez, Snell, & Shearer, 2013). Both the oil and chemical dispersants deprive the ocean water of oxygen, resulting in harm to a wide range of marine life (Kessler, Chiu et al., 2011). The Gulf Oil Spill resulted in the death or mutation (as well as other forms of serious harm) to numerous species, including various kinds of fish, whale sharks, blue crabs, pancake batfish, spiders, pelicans, dolphins, coral, and seagrass (Beaumont, 2012; Campagna et al., 2011; Gunderson, 2012; White et al., 2011; Whitehead et al., 2011).

In addition to harming marine life, the coastal economy was also damaged. The Gulf Coast saw a marked decrease in tourism (an approximate loss of $23 billion) due in part to dirty beaches littered with tar balls in the months and years following the spill (Dermansky, 2013; Oxford Economics, 2010). Additionally, jobs and businesses in the seafood industry were adversely affected, with estimated losses of up to $2.5 billion (Gill, Picou, & Ritchie, 2012; Walsh, 2010). Two years after the spill, the seafood industry continued to see an impact with only a fraction of crab, shrimp, and oysters being caught (Jamail, 2012). This concerns local fishermen as they cannot predict if or when the industry will recover.
Individuals living on the Gulf Coast have also experienced health problems as a result of the spill (Juhasz, 2012). Human health effects include respiratory problems, hypertension, short-term memory loss, lesions, liver damage, kidney damage, nervous system damage, skin rashes, and miscarriages (Blair, 2011; Juhasz, 2012). Diaz (2011) reported that these health problems are similar to those that occurred following the Exxon Valdez oil spill.\footnote{A similar disaster to the Gulf Oil Spill was the Exxon Valdez Oil Spill, which occurred on March 24, 1989. Approximately 11 million gallons of oil were spilled into Alaskan fishing waters, a fraction of the oil (about 1/20th) compared to the Gulf Oil Spill, and which continued to have an ecological impact for over a decade following the event (Exxon Valdez Oil Spill Trustee Council, 1999).} This is cause for concern because Wang (2010) noted that individuals who experienced health problems as a result of the Exxon Valdez oil spill continued to experience lingering health effects for at least 11 years post-disaster. He noted that there is the potential for chronic health problems to emerge such as birth defects, cancer, kidney disease, liver disease, and mental health problems.

**Mental Health Problems Associated with Disasters**

Disasters such as the Gulf Oil Spill can lead to an emergence of mental health issues among those affected (Drescher et al., 2012, 2014; McCauley, 2010; Schulenberg, Smith, Drescher, & Buchanan, 2014). Disasters are often conceptualized into three broad categories. Natural disasters include hurricanes, tornadoes, and floods (Rubin, Amlot, Wessely, & Greenberg, 2012; Sumer, Karanci, Berument, & Gunes, 2005); man-made disasters include mass shootings and terrorist attacks (Ahern & Galea, 2006; Meewisse et al., 2011); and technological disasters include oil spills, explosions, and plane crashes (Gallacher, Bronstering, Palmer, Fone, & Lyons, 2007; Palinkas, Downs, Petterson, & Russell, 1993). There are many mental health issues that are associated with disasters. Common disaster-related symptoms or occurrences include elevated stress, depression, anxiety, posttraumatic stress, relationship problems such as domestic violence, substance abuse, and somatic complaints (Arata et al., 2000; Beiser, Wiwa, &
Adebajo, 2010; Green & Lindy, 1994; Norris & Elrod, 2006; Norris, Friedman, Watson, Byrne et al., 2002; North, 2010; Palinkas, Downs, Petterson, & Russell, 1993; Picou, Formichella, Marshall, & Arata, 2009; Picou, Gill, Dyer, & Curry, 1992; Sabucedo, Arce, Ferraces, Merino, & Duran, 2009; Ursano, Fullerton, & Terhakopian, 2008; van der Velden et al., 2006). Such symptoms are common after disasters and can endure years post-disaster, and in some cases longer (Baum & Fleming, 1993; Palinkas, Petterson, Russell, & Downs, 1993; Weems et al., 2007). Specific to the Gulf Oil Spill, coastal residents have experienced increases in anxiety, worry, stress, somatic symptoms, and depression, which have contributed to an increase in the number of calls to mental health assistance hotlines (Osofsky, Osofsky, Wells, & Weems, 2014; Witters, 2010; Yun, Lurie, & Hyde, 2010). Moreover, many of the individuals involved in the Gulf Oil Spill cleanup efforts have experienced symptoms such as anxiety, worry, helplessness, and suicidality (Devi, 2010; Hedgpeth & Fahrenthold, 2010). Given a major focus of this study is on specific forms of psychological distress, namely depression, anxiety, and stress, they will be examined in greater detail prior to discussing protective factors such as self-efficacy and perceived meaning in life.

**Depression.** Depression is commonly experienced by survivors of both natural and technological disasters (Maercker, Michael, Fehm, Becker, & Margraf, 2004). The prevalence of post-disaster depression has been found to range between 16% and 35% (Krastal & Margraf, 2009; Kukihara, Yamawaki, Uchiyama, Arai, & Horikawa, 2014; Nandi, Galea, Ahern, & Vlahov, 2005; Palinkas, Petterson et al., 1993; Zhang, Shi, Wang, & Liu, 2012). Symptoms of depression include hopelessness, helplessness, guilt, decreased concentration, disrupted sleep and eating patterns, impaired psychosocial functioning, and thoughts of suicide (American Psychiatric Association, 2000, 2013; Murray & Lopez, 1996). Rates of suicidal ideation may
increase by as much as 13.8% at 4-year follow-up post-disaster (Devi, 2010; Ursano, Fullerton, & Benedek, 2009). For the purposes of this study, depression is defined by such symptoms as hopelessness, anhedonia, dysphoria, and decreased involvement in enjoyable activities.

With regard to technological disasters, some studies have reported prevalence rates of depression ranging from 12.4% to 16.1% of survivors (Ahern & Galea, 2006; Meewisse et al., 2011; Onder, Tural, Aker, Kilic, & Erdogan, 2006). In a study of a fireworks disaster, Meewisse and colleagues (2011) found that the symptoms of depression documented in their study did not subside shortly afterward, and at follow-up four years later they reported that many people continued to be depressed (although prevalence rates dropped from 16.1% post-disaster to 9.5% after four years). After 10 years, 6.2% of individuals affected by this disaster continued to experience clinically significant depressive symptoms (van der Velden, Wong, Boshuizen, & Grievink, 2013).

By way of other examples, individuals assessed after the Three Mile Island incident continued to experience depressive symptoms for six years following the event (Baum & Fleming, 1993). Specific to oil spill disasters, depression was commonly experienced as a result of the Exxon Valdez Oil Spill. Palinkas, Downs, and colleagues (1993) found that after this disaster, 28.8% of Alaskan natives and 17.3% of non-Alaskan natives directly affected by the spill experienced symptoms of depression related to the event’s impact. Symptoms of depression were also found following the 1996 Sea Empress Oil Spill, which released more than 22 million gallons of oil near Wales (Gallacher, Bronstering, Palmer, Fone, & Lyons, 2007). In a study of the Sea Empress Oil Spill (Gallacher et al., 2007), 23% of participants reported experiencing depression following the disaster, and those people who perceived greater health and financial risk experienced higher levels of depression. A study on the use of integrated care in providing
mental health services after the Gulf Oil Spill found that there was an increase in depressive symptoms among the 355 adults they treated (Osofsky et al., 2014).

While depression is not an uncommon occurrence post-disaster, studies have differed in terms of the course of depressive symptomatology following an event. For example, North, Kawasaki, Spitznagel, and Hong (2004) found that depressive symptoms markedly decreased after one year, such that many survivors of the Great Midwestern Floods no longer met criteria for major depressive disorder. After the September 11, 2001 World Trade Center terrorist attack, disaster workers showed significantly higher levels of depression than control participants at 13-month follow-up (Fullerton, Ursano, & Wang, 2004). Beard, Tracy, Vlahov, and Galea (2008) suggested that there are three types of depressive trajectories. The first type includes those individuals who recover rapidly from the event, the second type includes those people who experience at least one major depressive episode as a result of the event, and the third type includes people who continue to be depressed. In Beard and colleagues’ (2008) study of New York City metropolitan residents 30 months post-World Trade Center terrorist attack, each of the three depressive trajectories was evident. Specifically, 68% of the participants did not meet criteria for depression, while 30% experienced at least one major depressive episode and 2% experienced continuous depressive symptoms.

Additional studies of the effects of the World Trade Center terrorist attack have also examined depression. One month post event, 9.7% of a community sample living in close proximity to the disaster’s location reported clinically significant symptoms of depression (Galea et al., 2002). Person and Galea (2006) reported similar rates (9.4% of the population) of depressive symptoms six months after the attack. Subsequently, Nandi and colleagues (2009) assessed New York City metropolitan residents six months after the event and at three additional
times over the next three years. Of their sample, 39.5% endorsed little to no symptoms of depression throughout the duration of the study. Forty-seven percent of their participants endorsed no symptoms six months after the event, but subsequently endorsed two to six symptoms of depression throughout the remainder of the study. Six percent of the sample endorsed a high level of depression (five symptoms at six months), which then diminished to a lower level (one symptom) throughout the remaining assessments. With regard to particularly high levels of depression (six to seven symptoms), 8.3% of respondents met these criteria and levels of depression persisted throughout the study. Clearly, the responses to disaster are diverse in terms of depressive symptoms. Symptom presentations, if evident, may vary from person to person and fluctuate over time, characterized by variable trajectories. In terms of individual variability in psychological reactions to disaster experiences, risk and protective factors play a major role.

There are many potential risk factors that can contribute to the development or exacerbation of depressive symptoms following a disaster. For instance, after the Exxon Valdez Oil Spill, individuals endorsing increased depressive symptoms also reported loss of resources, health problems, and changes in relationships with those around them (Arata et al., 2000). In a study by Jones and colleagues (2011), individuals from several Mexican cities affected by severe storms, floods, and landslides were examined to determine factors associated with higher rates of depression. The authors found that those with greater financial hardship, damage to their property, and lower levels of community support perceived greater depression. Participating in clean-up efforts may also lead to increased risk in developing depressive symptoms (Benedek, Fullerton, & Ursano, 2007; Ehring, Razik, & Emmelkamp, 2011). This is relevant to the current
study as many of the residents of the Mississippi Gulf Coast were involved in cleaning the spilled oil from beaches, boats, natural habitats, and animals.

**Sex differences in depression post-disaster.** Depression is a common disaster-related psychological consequence and many studies have found that women tend to be more susceptible to the development of mental health issues after disasters (Armenian et al., 2002; Chen et al., 2007; De Salvo et al., 2007; Frans, Rimmo, Aberg, & Fredrikson, 2005; Kessler et al., 1995; Kilic & Ulusoy, 2003; Norris, Friedman, Watson, Byrne et al., 2002). In terms of depression, research has shown that after natural disasters such as Japan’s Miyake Island volcano disaster, females have been shown to have significantly higher self-ratings of depression than males (Goto, Wilson, Kahana, & Slane, 2006). Additionally, after the 1999 earthquake in Turkey, women had higher rates of depression than men (Kilic & Ulusoy, 2003). Aksaray and colleagues (2006) suggested that the reason for the discrepancies in the reporting of depressive symptoms after an earthquake may be that men are less likely to report symptoms of distress than women, which is consistent with early self-disclosure research (Dindia & Allen, 1992). Additionally, culturally defined gender roles may play a part in the experience of distress after a disaster. For instance, women tend to be caregivers, and must assist in ensuring the family is safe and adaptively coping with the negative effects of the disaster (Aksaray et al., 2006). In the aftermath of Hurricane Katrina, women were found to be more likely to experience symptoms of depression than men (Adeola, 2009; Elliot & Pais, 2006; Galea et al., 2007; Kessler et al., 2006). This finding was true for women specifically living on the Mississippi Gulf Coast (Picou & Hudson, 2010).

While studies of natural disasters have shown that women tend to report more symptoms of depression than men, research on other types of disasters has found differing results. Male
residents in St. Louis, Missouri who experienced dioxin exposure and a flood reported a higher level of symptoms of depression than females (Soloman, 2002). Similarly, after the *Exxon Valdez* Oil Spill, Arata and colleagues (2000) found that 39% of men and 20% of women reported clinically significant symptoms of depression. These findings were consistent for both Alaskan natives and Euro-Americans.

In terms of the Gulf Oil Spill specifically, recent publication presented data gathered from the Gulf States Population Survey administered to individuals in the four states affected by the Gulf Oil Spill between December 2010 and December 2011 (Fan, Prescott, Zhao, Gotway, & Galea, 2014). This was a random-digit telephone survey of adults from Alabama, Florida, Mississippi, and Louisiana who were both directly and indirectly affected by the Gulf Oil Spill. In this sample of 36,669 individuals, females (17.7%) reported greater levels of depression than males (12.7%). At this time, no other research is available that examines sex differences in depressive symptoms relating to the Gulf Oil Spill. Thus, more research is needed in this area to enhance specificity for treatment seeking individuals directly affected by the Gulf Oil Spill in Mississippi. For the most part, depression is more common among women than men following disaster; however, there are some inconsistent findings. For this reason, it is important to conduct new research, specifically as relates to the effects of the Gulf Oil Spill. A better understanding of individual responding after a disaster will facilitate future disaster preparedness and intervention efforts.

**Racial/ethnic differences in depression post-disaster.** In addition to sex differences in depression following disaster, there may also be differences in depression based on race/ethnicity (Bolin, 2006; Fothergill & Peek, 2004). For instance, research has shown that non-White (e.g., African Americans, Hispanic Americans) individuals are at greater risk of being affected by a
disaster for a variety of reasons, such as lower socioeconomic status (Norris, Friedman, Watson et al., 2002) and a lack of disaster preparedness education (Eisenman et al., 2009; Elliot & Pais, 2006). For reasons such as these, non-White individuals are at an increased risk for psychological distress, including depression (Norris, Friedman, Watson et al., 2002; Perilla, Norris, & Lavizzo, 2002).

While much research has supported the finding that racial/ethnic minorities are at a greater risk of developing symptoms of depression in comparison to White individuals, there are some contradictory findings. For instance, on one hand, in a study of individuals from the Mississippi Gulf Coast affected by Hurricane Katrina, one study found that African Americans displayed high levels of depression as a result of the storm (Picou & Hudson, 2010). Moreover, in a study of a larger sample of individuals affected by the storm, Elliot and Pais (2006) found that racial/ethnic minorities reported more symptoms of depression than were reported by White individuals. On the other hand, in another study of Hurricane Katrina, Galea and colleagues (2007) found that White individuals experienced greater depressive symptomatology than racial/ethnic minorities.

In manmade and technological disasters, the findings have been clearer. Nandi and colleagues (2009) found that African Americans and Latinos were more likely to experience persistent depressive symptoms than White participants after the World Trade Center terrorist attack. After the Exxon Valdez Oil Spill, Alaskan Natives experienced significantly higher levels of depressive symptoms than Euro-Americans (Arata et al., 2000). While overall it appears that non-White individuals are at greater risk to experience symptoms of depression following a disaster, the findings are not uniform. Unanticipated findings showed that after the World Trade
Center terrorist attack, there were no significant differences based on race/ethnicity in symptoms of depression (Adams & Boscarino, 2005).

With respect to the Gulf Oil Spill, Fan and colleagues (2014) found racial/ethnic differences in reports of depression among their sample of adults residing in Mississippi, Alabama, Louisiana, and Florida. In their sample of 36,669 individuals 13.0% of those reporting depressive symptoms identified as White and 59.8% of those who were depressed identified as non-White (i.e., African American, Latino, or other). At this time, no other research has been presented on race/ethnicity differences in symptoms of depression after the Gulf Oil Spill. Because of this, it is important to conduct new research to better understand the direct psychological impact of this disaster, as well as to inform future prevention and intervention efforts for similar disasters. Therefore, an additional goal of this study is to add clarity to the literature in this area.

**Anxiety.** In addition to depression, anxiety is a common occurrence post-disaster (Green & Lindy, 1994; Mishra & Surar, 2012). Individuals with post-disaster anxiety often experience comorbid symptoms of depression, with rates of co-occurring symptoms as high as 88% (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Norris, Friedman, Watson, Byrne, et al., 2002). Researchers have suggested that comorbidity is logical considering anxiety and depression share common symptomatology (Brown, Chorpita, & Barlow, 1998; Mineka, Watson, & Clark, 1998). Symptoms of anxiety include excessive worry, fear, somatic complaints such as gastrointestinal discomfort and irregular heart rate, trembling, and shaking, as well as the possibility of panic attacks in some instances (American Psychiatric Association, 2000, 2013; van den Berg, Grievink, Yzermans, & Lebret, 2005). For the purposes of this study, anxiety is defined by such symptoms as autonomic arousal, situational anxiety, muscle tension, and
uncontrollable worry. Anxiety may manifest in different ways post-disaster, and is not necessarily considered to be a negative response. In some instances, anxiety can be adaptive, benefitting an individual such that he or she is motivated to respond to the demands of a disaster event, or engage in disaster preparedness efforts for future disasters (Mishra & Surar, 2012). Alternatively, anxiety can be so pervasive as to become clinically significant, adversely impacting an individual’s day-to-day functioning (Alonso et al., 2004; Kennedy, Lin, & Schwabb, 2002).

The anxiety disorder that is most commonly diagnosed after a disaster, and the one that is most widely studied, is posttraumatic stress disorder (PTSD) (Norris et al., 2002). Symptoms of PTSD include re-experiencing the event through flashbacks and nightmares, hypervigilance, and avoidance of event-related stimuli (American Psychiatric Association, 2000, 2013). The prevalence of PTSD varies depending on the type of disaster experienced. Natural disasters have reported prevalence rates of PTSD that range from 5% to 23%, man-made disasters tend to have prevalence rates between 4% and 17%, and technological disasters generally have rates between .4 and 46% (Fullerton et al., 2004; Kukihara et al., 2014; Meewisse et al., 2011; Neria, Nandi, & Galea, 2008; Zhang et al., 2012). Galea, Nandi, and Vlahov (2005) reported that 7% to 25% of individuals who experience a disaster will continue to experience notable symptoms of posttraumatic stress for at least 10 years.

While PTSD is the most widely studied anxiety disorder relating to disasters, individuals can develop other anxiety disorders, such as specific phobias, generalized anxiety disorder, social phobia, and panic disorder (Biggs et al., 2010; Maes, Mylle, Delmire, & Altamura, 2000; Palinkas, Petterson et al., 1993). Often, however, studies examine the presence of anxiety as a more general concept, as opposed to a specific disorder per se. For example, following the Exxon
Valdez Oil Spill, affected residents and clean-up workers experienced high levels of anxiety (33% to 36%), and many developed symptoms of posttraumatic stress disorder (9% to 15%) and generalized anxiety disorder (20%) (Devi, 2010; Palinkas, Petterson et al., 1993). Arata and colleagues (2000) found that factors associated with the development of anxiety symptoms after the Exxon Valdez Oil Spill included perceived health risk, changes in family and community relationships, as well as loss of personal income. Additional research on the Exxon Valdez Oil Spill showed that affected Alaskan natives and non-Alaskan natives experienced symptoms of generalized anxiety disorder and posttraumatic stress disorder (Palinkas, Downs et al., 1993; Palinkas, Russell, Downs, & Petterson, 1992). Of those who experienced generalized anxiety disorder, 41.7% identified as Alaskan natives and 24.6% identified as non-Alaskan natives. Additionally, 25% of the Alaskan natives and 10% of the non-Alaskan natives studied experienced symptoms of posttraumatic stress disorder. Similar rates of anxiety were found in studies of the Sea Empress Oil Spill. Gallacher and colleagues (2007) found that 13% of those affected experienced symptoms of anxiety attributed to the spill. Comparable to the findings of Arata and colleagues (2000), several factors were associated with the development of anxiety, including perceived risk to personal health, financial issues, and concern about the environment (Gallacher et al., 2007). With regard to the Gulf Oil Spill, Osofsky and colleagues (2014) found that several people endorsed symptoms of posttraumatic stress disorder in the aftermath of the spill.

Studies examining other types of technological disasters have also commonly reported the presence of anxiety post-disaster. Maes and colleagues (2000) collected data from individuals who had either been affected by a New Year’s Eve hotel fire or a 150 car pile-up (including fire and explosions) as a result of unanticipated heavy fog. In their study, 13.4% of participants met
criteria for generalized anxiety disorder, 10.2% met criteria for agoraphobia, and 45.9% met criteria for PTSD. By way of other examples, the Three Mile Island accident occurred on March 28, 1979 and involved a partial nuclear meltdown which caused radioactive gasses to be emitted into the environment. Many individuals assessed after this incident continued to experience symptoms of anxiety for at least six years following the event (Baum & Fleming, 1993). More recently, on March 11, 2011, the Fukushima Daiichi nuclear disaster occurred, which involved nuclear meltdowns and radioactive materials being released into the environment immediately after the Tohoku earthquake and subsequent tsunami. After this event, 29.7% of individuals assessed reported increased anxiety attributed to having experienced damage to their home or property, perceived risk of negative health effects, and fearing injury to self or others (Rubin, Amlot, Wessely, & Greenberg, 2012). In addition, survivors of this disaster reported experiencing worry and anxiety associated with clean-up efforts, and expressed concern over the future impact of the event.

Meewisse and colleagues (2011), in their study of an explosion at a fireworks factory, reported a specific phobia rate of 21.5%. In another study examining the effects of the explosion, the rate of individuals presenting with obsessive-compulsive symptoms was 30.1% (van den Berg et al., 2005). In addition to specific phobia and obsessive-compulsive symptoms, 21.9% of individuals in their sample also met criteria for PTSD. At 10-year follow-up, a study conducted by van der Velden and colleagues (2013) found that 6.7% of individuals affected by the event continued to experience clinically significant symptoms of PTSD, and 3.8% reported continuing to struggle with persistent symptoms of anxiety.

In a study of the September 11 World Trade Center terrorist attack, Adams and Boscarino (2011) found that 12% of survivors experienced perievent panic attacks. These types of panic
attacks occur shortly after a disaster and are noteworthy because they carry implications for future psychological issues (Goodwin, Brook, & Cohen, 2005; Lawyer et al., 2006). They found that perievent panic attacks were associated with an increase in post-disaster stress, and were predictive of the onset of major depression (Person & Galea, 2006).

Symptoms of anxiety also develop as a result of natural disasters. For example, following the 2008 Wenchuan earthquake, Zhang and colleagues (2012) found that 42.9% of their participants endorsed clinically significant symptoms of anxiety. In a study of Norwegian tourists following the 2004 tsunami affecting Sumatra, Indonesia, Hussain and colleagues (2011) noted that various anxiety disorders were evident, including panic disorder with agoraphobia (17.5%), generalized anxiety disorder (6.3%), social anxiety disorder (11.1%), PTSD (11.1%), and specific phobia (30.2%).

**Sex differences in anxiety post-disaster.** As noted above, women may be more likely to develop psychological distress after disaster. This appears to be the case for anxiety as well as symptoms of depression (Armenian et al., 2002; Chen et al., 2007; De Salvo et al., 2007; Frans, Rimmo, Aberg, & Fredrikson, 2005; Kessler et al., 1995; Kilic & Ulusoy, 2003; Norris, Friedman, Watson, Byrne et al., 2002). For example, several studies have reported sex differences in rates of anxiety after earthquakes. Specifically, females have consistently been found to be at higher risk than males for developing symptoms of PTSD and generalized anxiety post-disaster (Aksaray et al., 2006; Ali, Farooq, Bhatti, & Kuroiwa, 2012; Dell’Osso et al., 2012; Ehring et al., 2011; Feder et al., 2013; Irmansyah, Dharmono, Maramis, & Minas, 2010; Kilic & Ulusoy, 2003; Wan Chan et al., 2011; Wang et al., 2011). As noted regarding symptoms of depression, these differences in reporting may be attributed to the nature of self-report data as well as culturally defined gender roles (Aksaray et al., 2006; Dindia & Allen, 1992). Hussain and
colleagues (2011) found that after a tsunami, women had higher prevalence rates of specific phobia than men (45.5% as opposed to a rate of 13.3% for men). After Hurricane Katrina, women were more likely than men to experience symptoms of anxiety (Adeola, 2009; Elliot & Pais, 2006; Galea et al., 2007; Kessler et al., 2006) and this finding was shown specifically among women from the Mississippi Gulf Coast (Picou & Hudson, 2010). Rubin and colleagues (2012) found that women affected by the Fukushima nuclear accident were more likely than their male counterparts to experience an increase in symptoms of anxiety.

Not all findings are consistent, however. Studies on the development of posttraumatic stress symptoms after two different earthquakes have found no significant differences between men and women in symptom ratings (Aslam & Tariq, 2010; Kun et al., 2009). The authors of these studies suggested that these findings may reflect cultural norms. In cultures that are family oriented, the development of symptoms may be similar in all members of the family, with individual differences being less pronounced. In the aftermath of a combined technological and natural disaster in which individuals experienced dioxin exposure followed by a flood, males reported more symptoms of posttraumatic stress and generalized anxiety than females (Soloman, 2002). In terms of a technological disaster sharing some similarities with the Gulf Oil Spill (the Exxon Valdez Oil Spill), Arata and colleagues (2000) reported that 23% of men and 13% of women endorsed clinically significant levels of anxiety. At this time, no studies have examined the role of sex in the development of symptoms of anxiety relating to the Gulf Oil Spill. Because findings have been somewhat inconsistent with respect to sex differences, additional research is warranted in this area.

**Racial/ethnic differences in anxiety post-disaster.** As described above, there may be racial/ethnic differences in the experience of symptoms of anxiety following a disaster. For
instance, studies have found that African Americans and Latinos tend to be more likely to meet criteria for posttraumatic stress disorder than White individuals (Breslau, Peterson, Poisson, Schultz, & Lucia, 2004; Davidson, Price, McCauley, & Ruggiero, 2013; Davis et al., 2011; Perilla et al., 2002). In the aftermath of Hurricane Katrina, individuals of minority status were found to experience more symptoms of psychological distress (such as symptoms of anxiety) than White individuals (Adeola, 2009; Elliot & Pais, 2006; Galea et al., 2007; Kessler et al., 2006). Specifically, African Americans living on the Mississippi Gulf Coast during Hurricane Katrina experienced clinically significant levels of posttraumatic stress (Picou & Hudson, 2010). PTSD symptomatology was shown to increase over time between 12 months and 30 months among African Americans affected by the storm (Weems et al., 2010).

Contrary to these findings, after Hurricane Katrina, Galea and colleagues (2007) reported that White survivors were more likely to experience symptoms of anxiety than non-White respondents. Research in the aftermath of the World Trade Center terrorist attack has also found varying results in reports of symptoms of anxiety (Adams & Boscarino, 2005). In this study, there were no statistically significant racial/ethnic differences in posttraumatic stress symptomatology. However, they did find that African Americans and Puerto Ricans were more likely to meet criteria for panic attack than White individuals.

At this time, there are no studies on the differences in symptoms of anxiety on the basis of race/ethnicity among individuals impacted by the Gulf Oil Spill. While there are a number of studies that point to race/ethnicity as being a risk factor for the development of anxiety post-disaster, there are other studies that appear to be contradictory. As a result, research is needed to better inform this area of empirical inquiry.
**Stress.** Disasters, whether natural, manmade, or technological, cause stress to those affected. For the purposes of this study, stress is defined as mental tension as a result of adverse circumstances. This stress can be associated with the disaster event itself or associated with continued concerns experienced following the event. Individuals can develop stress in the aftermath of disasters for a variety of reasons, including being closer in proximity to the disaster, lacking social support, loss of employment, perceived inadequacy of disaster relief efforts, fear of economic collapse, media exposure, and physical health problems associated with the disaster such as increased blood pressure and decreased immune system functioning (Baum & Fleming, 1993; Baxter, 2002; Bonanno et al., 2010; Dunn, Taylor, Elliot, & Walter, 1994; Freedy, Resnick, & Kilpatrick, 1992; Gill & Picou, 1998; Lee & Blanchard, 2012; Mirkowsky & Ross, 1986; Rajan, 2002; Zakour, 2012). Zakour (2012) suggested that stress reactions to disasters can persist for months to years post-disaster. Baum, Fleming, and Davidson (1983) noted that 20% to 40% of those affected by disaster experience chronic symptoms of stress.

There are two outcomes often associated with a stressful event – a stress reaction and a stress response. Kabat-Zinn and Hanh (2013) noted that a stress reaction includes what occurs within an individual immediately after a stressful event and of which the individual is typically unaware. For example, a stress reaction may include a change in breathing, physiological tension, or gastrointestinal distress. On the other hand, a stress response occurs when the individual is able to pause for a moment and employ coping mechanisms to deal with the stressful event. Individuals without a strong background in coping with stress tend to predominately engage in stress reactions (Kabat-Zinn & Hanh, 2013). The longer a stress reaction persists in the aftermath of disaster, the more likely it can develop into a psychological disorder such as depression or anxiety (Niederhoffer & Pennebaker, 2009). The manifestation of
such forms of psychological distress can often be attributed to the disaster itself, or to the experience of “nontraumatic stressors,” such as concern about finances (Galea et al., 2007; Galea, Tracy, Norris, & Coffey, 2008; Tracy, Norris, & Galea, 2011). Additional examples of nontraumatic stressors include concern about the environment, employment, education, property destruction, social support, and clean-up efforts. Thus, stress may be perceived as a direct result of the disaster, or the indirect result of the disaster’s effects.

The development of severe psychological distress may be the result of sensitization to stress (Antelman, Eichler, Black, & Kocan, 1980; Post & Weiss, 1998). Sensitization occurs when an individual experiences a potentially threatening event, such as a disaster, and as a result, has a more negative response to later stressful experiences than he or she would have had prior to the disaster. Indeed, research has shown that exposure to a disaster can sensitize an individual to perceive later stressors more negatively (Bland, O’Leary, Farinaro, Jossa, & Trevisan, 1996; Breslau, Chilcoat, Kessler, & Davis, 1999; Dougall, Herberman, Delahanty, Inslicht, & Baum, 2000; Kessler et al., 1995; Smid et al., 2012). Smid and colleagues (2012) found that after a fireworks disaster, individuals who were closer in proximity to the disaster showed greater stress sensitization and were more reactive to stressful life events 20 months after the disaster in comparison to those who were less exposed. As a result of these findings, the authors suggested that stress sensitization may not only lead to increased likelihood of the development of a psychological disorder but it may also explain why post-disaster mental health issues may persist long term.

Tracy and colleagues (2011) found that current life stressors, as well as stressors following a hurricane, were predictive of symptoms of posttraumatic stress and depression. The authors suggested that these stressors acted as triggers for the development of increasingly severe
symptoms, which corresponds to other relevant literature (Tracy et al., 2011; Yehuda, 2001). Additionally, it was found that symptoms of depression were more likely to develop as a result of nontraumatic stressors following the disaster while symptoms of posttraumatic stress were more likely to develop as a result of the stress experienced from the disaster event itself (Kendler, Karkowski, & Prescott, 1998, 1999; Kessler, 1997; Tracy et al., 2011).

Technological disasters, such as the Gulf Oil Spill, leave those affected with feelings of uncertainty as a result of the extent of the damage not being fully apparent (Gill & Picou, 1998; Kroll-Smith & Couch, 1993; Schrope, 2013; Vyner, 1988). For example, the oil was spilled into the waters of the Gulf of Mexico, therefore, it is difficult to fully understand the magnitude of the contamination as well as how long the Gulf Oil Spill will continue to pose a problem. Additional uncertainty occurs when individuals who lost their jobs as a result of the disaster do not know when they will find another job or how their finances will be affected (Florian & Mikulincer, 2004; Niederhoffer & Pennebaker, 2009). This uncertainty can result in psychological and social/community stress (Baum & Fleming, 1993; Greenberg, Koole, & Pyszczynski, 2004; Rajan, 2002; Zakour, 2012).

Picou et al., (1992) found that individuals who had been affected by the *Exxon Valdez* Oil Spill reported higher levels of stress than control participants who had not been affected by the spill. Gill (1994) and Gill and Picou (1998) discussed how the *Exxon Valdez* Oil Spill caused stress to the community. Specifically, damage to the fishing industry resulted in job loss, which caused subsequent stress related to finances and unemployment. Additionally, there was an influx in population size of the Alaskan coast due to the cleanup efforts. This influx occurred because clean-up crews were paid a high wage, which drew many individuals to the area seeking work. This increase in population to a relatively rural area caused stress to residents such that their
sense of community was shifted from those they had known for years in their hometown to many new, unknown people who were perceived to be taking jobs away from those who needed the jobs most. Similarly, stress related to clean-up work was seen in the aftermath of the Gulf Oil Spill (Hedgpeth & Fahrenthold, 2010; Witters, 2010; Yun et al., 2010).

Couch and Coles (2011) noted that in the aftermath of technological disasters, similar to the Gulf Oil Spill, individuals experience stress as a result of changes in the community as well as the potential risk of environmental contamination. These stressors then impact an individual’s daily functioning as well as his or her family’s level of stress. Technological disasters are unique from other disasters in that their impact may be delayed or prolonged (Cline et al., 2010). For example, at this point it is unclear as to how long the Gulf Oil Spill will be impacting the fishing industry of the Mississippi Gulf Coast. Additionally, plans to alleviate the negative effects of the spill may not be possible or may be perceived as unsatisfactory or even harmful. For example, the dispersants discussed above were used to clean the oil from the waters of the Gulf of Mexico, however, not all of the oil has been removed and additional chemicals remain. In technological disasters, there is a known target of blame unlike natural disasters that are weather-related (Couch & Coles, 2011). In the case of the Gulf Oil Spill, the Deepwater Horizon oil platform was operated by BP. In terms of financial remediation, BP was financially responsible for clean-up costs and it provided funds to states affected by the oil spill in order to assist in recovery (Goldman, 2010). In Mississippi, some of those funds were used to provide mental health services for the residents of the Mississippi Gulf Coast, indirectly funding this research study (described in greater detail below). In addition to the money BP gave to the coastal states affected by the spill, many lawsuits have been filed in order to compensate for the revenue that was lost (Spear, 2013). For individuals owning small businesses such as restaurants or fishing
boats, closing their doors has been easier than competing with large businesses such as hotels and casinos (given money provided by lawsuits). Additionally, because of the Oil Pollution Act of 1990 that was developed following the Exxon Valdez Oil Spill, new claims cannot be filed after three years from the date of the event (Oil Pollution Act of 1990, 2000). Therefore, while the oil spill may continue to impact the Mississippi Gulf Coast, residents and business owners are no longer able to recoup future losses, which contributes to continued financial stress. Such prolonged or chronic stress can lead to or exacerbate symptoms of psychological distress (Couch & Coles, 2011).

Couch and Coles (2011) also suggested that a technological disaster can cause distress within the community. For example, they noted that there may be arguments between community members regarding what should be done about the event. Additionally, outside organizations or individuals may come in to help with clean-up efforts without taking the individuals affected into consideration. Community stress can lead to stress within the family (Hobfall, 1991; Southwick, Vythilingam, & Charney, 2005). Families differ in the way in which they cope with stressors, as well as how significant stressors are considered to be in relation to the family dynamic (Fisher & Ransom, 1990). In the aftermath of technological catastrophes (e.g., Chernobyl and Three Mile Island), research has found that family stress tends to be expressed through somatic complaints as well as concern about future event-related health problems in family members (Baum, Fleming, & Davidson, 1983; Litcher et al., 2000). Family stress may be exacerbated by perceived marital obligations for women or single-parent status for men and women, especially when children develop problematic behaviors as a compensatory means for coping with stress (Norris, Friedman, Watson et al., 2002; Soloman, 2002). Taken together, community, family, and other psychosocial stressors interact with environmental hazards and health risk. Simply stated,
stress is a significant concern for those affected by disasters, and there is a relationship between toxins that have impacted the environment and the development of health problems (Cheng, Schwartz, & Sparrow, 2001; Davidson, Jonas, Dixon, & Markovitz, 2000; Jonas & Lando, 2000).

Each disaster is unique, occurring in a different context, with different precipitating circumstances and differential impact. There is substantial variability from disaster to disaster, whether one considers the type of disaster (tornado in comparison to oil spill) or even disasters within the same class (comparing one oil spill to another). For these reasons it is important to study stress within the context of the Gulf Oil Spill as a means of enhancing the literature in this important area, especially since oil spills can result in the continued experience of negative consequences related to stress (Aguilera et al., 2010).

Sex differences in stress post-disaster. Men and women may have different stress reactions when they experience a disaster. For example, findings have shown that women tend to have a more severe stress reaction than men and that their reaction tends to be longer lasting (Halpern & Tramontin, 2007; Hawkins, Zinzow, Amstadter, Danielson, & Ruggiero, 2009; Kimerling, Mack, & Alvarez, 2009). In a review of the literature on psychological distress as a result of disaster, Norris, Watson, Friedman, and colleagues (2002) found that women are more vulnerable to the development of stress after experiencing a disaster than are men. They found that women are twice as likely to develop a stress reaction. In a more recent study of the effects of the World Trade Center terrorist attack, males and females both experienced stress; however, females were found to report higher levels of stress (Colarossi, Heyman, & Phillips, 2005). Alternatively, Soloman’s (2002) study of St. Louis, Missouri residents who had experienced dioxin exposure followed by a large-scale flood revealed that men were more likely than women
to experience symptoms of stress. This finding was attributed to the stress that resulted from financial difficulties.

Research in the area of stress after a disaster tends to show women as being more likely to experience symptoms of stress. However, the findings are not uniform. Therefore, it is important to gain a better understanding of potential differences between the sexes following disasters. At this time, research has not been conducted examining sex differences in stress reactions following the Gulf Oil Spill. Studying sex differences in stress related to the Gulf Oil Spill is an additional goal of this investigation.

**Racial/ethnic differences and stress post-disaster.** Generally speaking, research has found that stress responses vary based on race/ethnicity (Adler, Marmot, McEwen, & Stewart, 1999; Marmot, 2004; Marmot, Rose, Shipley, & Hamilton, 1978). In studies of disasters, it has been found that racial/ethnic minorities tend to have a greater stress reaction than White individuals (Bolin, 2006; Fothergille & Peek, 2004; Halpern & Tramontin, 2007; Hawkins et al., 2009). After Hurricane Katrina, African American individuals were more likely to experience severe stress symptoms as compared to White individuals (Elliot & Pais, 2006). In terms of environmental contamination, research has found that racial/ethnic minorities perceive environmental threats as more stressful than White individuals (Brown, 1995). Differences in stress may be the result of racial/ethnic minority individuals having the potential of being in closer proximity to the environmental threat, their cultural ties to the community, and their financial ties to the industry affected by the disaster (Fothergill & Maestas, 1999). For example, racial/ethnic minorities may be in closer proximity to disaster as a result of socioeconomic status. They may not want to relocate after a disaster because of an extended network of family and friends that they would have to leave behind. Additionally, racial/ethnic minority individuals may
be more likely to work in industries affected by a disaster. In the aftermath of the Exxon Valdez Oil Spill, Alaskan natives reported that they perceived the spill to be more stressful than non-natives (Palinkas, Russell, Downs, & Petterson, 1992). The authors attributed this stress to be the result of greater participation in clean-up efforts by Alaskan Natives, as well as subsequent changes in psychosocial interactions due to an influx of new residents in the area looking for work.

While the existing research points to the greater potential for disaster-related stress to be experienced by non-White individuals, there is additional need for new research because studies focusing on the potential for differences in stress reactions among racial/ethnic minority groups in the United States is lacking. Moreover, research on this topic has yet to be conducted relating to the Gulf Oil Spill. Therefore, adding to the literature in this area is another goal of the current study.

**Protective Factors**

Symptoms of depression, anxiety, and stress are common following disasters. As there have been many studies of disaster-related mental health consequences conducted over the years, there has also been increasing interest in protective factors post-disaster. Examples of such protective factors that have been shown to modify the relationship between disaster experience and depressive symptoms include optimism, emotional expressiveness, increased physical activity, self-efficacy, and perceived meaning in life, to name a few variables (Arata et al., 2000; Benight, Ironson et al., 1999; Feder et al., 2013; Lyubomirsky, 2007; van der Velden et al., 2007). Protective factors (e.g., perceived meaning in life, social support, self-efficacy, spirituality) have also been shown to be predictive of lower levels of anxiety post-disaster (Bosmans, Benight, van der Knaap, Winkel, & van der Velden, 2013; Feder et al., 2013; Kuhl & Koole, 2004). With
regard to the negative effects of stress, protective factors include greater social support, helping others affected by the disaster, finding meaning in the aftermath of the disaster, getting adequate sleep, religion, meditation and mindfulness, self-esteem, and self-efficacy (Greenberg et al., 2004; Kuhl & Koole, 2004; National Sleep Foundation, 2010; Mirkowsky & Ross, 1986; Shapiro, 2009; Zakour, 2012).

There are many protective factors that may serve to influence the relationship between disasters and depression, anxiety, and stress. It is important to continue to conduct research to enhance the understanding of the role of protective factors in the development of psychological distress. This study seeks to add to the literature in this area with specific regard for the Gulf Oil Spill. The protective factors of interest to the current study are self-efficacy and perceived meaning in life.

**Self-efficacy.** Self-efficacy is a coping mechanism in which an individual feels capable of dealing with new situations as a result of his or her past experiences (Bandura, 1986, 1991; Sherer et al., 1982). Bandura (1986) noted that when individuals experience stress, they sometimes perceive the stress to be more than they are able to control. Those people with a strong sense of self-efficacy are more likely to have self-confidence in their ability to be in control of their situation. Bandura (1977, 1997, 2000, 2001) suggested that an individual’s self-efficacy will determine whether a coping technique is utilized, whether the person is motivated to use this coping behavior, and whether the coping behavior will continue to be effective in stressful situations. When an individual has a strong sense of self-efficacy, he or she trusts his or her ability to actively control stressors in his or her environment, motivating the person to take action. Bandura (1977) noted that there are four sources of information that influence an individual’s perceived self-efficacy. These sources include personal accomplishment, vicarious
experience (e.g., viewing the accomplishments of others), symbolic experience (e.g., gaining reassurance of one’s capabilities from others), and emotional arousal (e.g., the experience of anxiety after a threat).

Self-efficacy has been described in a number of ways. Bandura (1997) referred to self-efficacy as situation specific, such that individuals feel greater levels of self-efficacy when performing certain tasks (Scholz, Dona, Dun, & Schwarzer, 2002). Bandura (1997) noted that when an individual lacks a sense of self-efficacy, he or she may experience pessimistic thoughts, helplessness, depression, anxiety, and low self-esteem. Others have suggested that self-efficacy is more generalizable (i.e., general self-efficacy), such that individuals feel that they are able to deal with a range of stressful experiences with competence (Schwarzer, 1992; Schwarzer, Mueller, & Greenglass, 1999; Sherer et al., 1982). General self-efficacy has been found to be positively associated with impulse control, self-esteem, and positive outlook on life and negatively associated with depression and anxiety (Luszczynska, Gutiérrez-Doña, & Schwarzer, 2005; Siu, Lu, & Spector, 2007). Following the Gulf Oil Spill, self-efficacy was found to be predictive of life satisfaction in a sample of Mississippi coastal residents that were affected by the disaster (Drescher et al., 2012).

Another type of self-efficacy is referred to as coping self-efficacy. Coping self-efficacy refers to an individual’s ability to cope with distress, and it has been found to predict lower levels of general psychological distress after disasters such as hurricanes and earthquakes (Benight, Ironson et al., 1999; Sumer, Karanci, Berument, & Gunes, 2005). Additionally, coping self-efficacy is a significant mediator between optimism, social support, resource loss, and general psychological distress post-hurricane (Benight, Swift, Sanger, Smith, & Zeppelin, 1999). It has also been shown to be negatively correlated with symptoms of PTSD via a study of wildfires.
Regardless of whether self-efficacy is defined or referred to as general self-efficacy or coping self-efficacy, research has shown that self-efficacy is beneficial in coping with stress and may be a protective factor relating to the effects of a given disaster. Benight and Bandura (2004, p. 1130) defined self-efficacy after a disaster as “the perceived capability to manage one’s personal functioning and the myriad environmental demands of the aftermath occasioned by a traumatic event.” For the purposes of this study, self-efficacy is defined as an individual’s perceived ability to cope with stressful events.

The majority of disaster-related research on self-efficacy has examined its role in predicting symptoms of posttraumatic stress. Several studies have found that coping self-efficacy was predictive of lower levels of posttraumatic stress following different disasters (Benight, Cieslak, Molton, & Johnson, 2008; Benight, Freyaldenhoven, Hughes, Ruiz, & Zoschke, 2000; Benight & Harper, 2002; Benight, Ironson et al., 1999; van der Velden, van Loon, Benight, & Eckhardt, 2012). For example, self-efficacy has been shown to be an effective means of coping with posttraumatic stress as a result of military traumatization, volcanic eruptions, and terrorist attacks (e.g., Oklahoma City Bombing) and it has been found to be negatively correlated with symptoms of posttraumatic stress after natural disasters (Benight & Bandura, 2004; Benight & Harper, 2002; Hirschel & Schulenberg, 2009; Murphy, 1987).

In a study of a hurricane’s effects and the utility of the My Disaster Recovery website (designed to increase coping self-efficacy), lower levels of worry and anxiety were reported as a result of web-site usage (Steinmetz, Benight, Bishop, & James, 2012). Other hurricane-related research has found that coping self-efficacy was a strong predictor of posttraumatic stress symptoms even after controlling for income, education level, damage, and perceived life threat (Benight et al., 1997). Benight and Harper (2002) found that coping self-efficacy was a predictor
of posttraumatic stress two to eight weeks after a hurricane as well as one year post-hurricane. Other studies have demonstrated that residents who experienced cyclones and who reported higher levels of posttraumatic stress also reported lower levels of self-efficacy, and vice versa (Pooley, Cohen, O'Connor, & Taylor, 2013). In addition to natural disasters, self-efficacy has been researched in relation to a technological disaster. For instance, at 10-year follow-up after a fireworks disaster, coping self-efficacy was predictive of lower levels of posttraumatic stress (Bosmans et al., 2013).

In addition to symptoms of anxiety, self-efficacy has been found to be negatively related to depression, as evidenced by the use of the My Disaster Recovery website mentioned above such that an increased sense of self-efficacy among participants was related to a decrease in symptoms of depression (Luszczynska, Gutiérrez-Doña et al., 2005). Murphy (1988) examined the roles self-efficacy and social support had on depression after a volcanic eruption. She found that self-efficacy was a significant predictor of lower levels of depression and that those surveyed with a strong sense of self-efficacy were more likely to rely on themselves than others after this disaster. Following a hurricane, Hardin, Weinrich, Weinrich, Hardin, and Garrison (1994) found self-efficacy to be a protective factor against psychological distress, including depression and anxiety.

As noted above, self-efficacy is an individual’s belief that he or she can cope with stress. Generally speaking, self-efficacy has been shown to be a buffer between stress and academic success, job success, health, and smoking cessation (Bandura, Cioffi, Taylor, & Brouillard, 1988; Schwarzer & Hallum, 2008; Solberg & Viliarreal, 1997; Zajacova, Lynch, & Espenshade, 2005). With regard to stress and disaster-related situations, self-efficacy has been shown to be a protective factor against post-disaster stress in several studies (Bolin, 1982; Gleser, Green, &
Winget, 1981; Murphy, 1987). Murphy (1984) found that after the Mount St. Helens volcanic eruption, self-efficacy was a mediating variable between stress and the development of symptoms of depression. In a study of the 1995 and 1996 Ruapehu volcanic eruptions, self-efficacy was found to be important in reducing stress. Additionally, reported levels of self-efficacy following the disasters discriminated groups of individuals with higher levels of stress from those with lower levels of stress (Miller, Paton, & Johnston, 1999). While there are a number of studies that support self-efficacy’s utility following disasters, not all studies have produced consistent findings. For example, Yang and colleagues (2010) reported that self-efficacy was not effective in protecting their sample against the negative effects of stress after an earthquake.

Overall, self-efficacy appears to be an effective protective factor against the negative psychological effects of disaster such as depression, anxiety, and stress (Luszczynska, Gutiérrez-Doña et al., 2005). However, not all studies are consistent in their findings, and to date there have been no published studies examining self-efficacy, depression, anxiety, and stress in the context of the Gulf Oil Spill. The only available study of self-efficacy in the aftermath of the Gulf Oil Spill was conducted by Drescher and colleagues (2012). Their investigation found self-efficacy to be a statistically significant predictor of life satisfaction. This Gulf Oil Spill study also found that perceived meaning in life was another statistically significant predictor of life satisfaction. Perceived meaning in life will also be examined in this study and will be discussed shortly.

**Sex differences in self-efficacy.** Similar to differences in psychological distress, there are often sex differences in reported self-efficacy scores. In their assessment of the General Self-Efficacy Scale across 25 different countries, Scholz and colleagues (2002) found some sex
differences in self-efficacy scores, but these differences were not systematic. In some countries men had higher levels of self-efficacy, but this finding was not consistently found. Additionally, Schwarzer, Babler, Kwiatek, Schröder, and Zhang (1997) found that males from Germany and China reported higher levels of general self-efficacy, but that men and women from Costa Rica scored similarly. The authors of both studies attributed findings to culturally defined gender roles (Scholz et al., 2002; Schwarzer & Born, 1997).

Because there may be some differences in the reporting of self-efficacy between males and females, it is important to further the literature in this area, and with specific regard for the disaster context. Studies assessing self-efficacy have suggested that it may be more important for men than women when dealing with the aftermath of a disaster (Luszczynska, Benight, & Cieslak, 2009; Schwarzer et al., 1997). For instance, following Hurricane Katrina, men reported significantly greater levels of self-efficacy than did females (Hirschel & Schulenberg, 2009). Furthermore, in a study of a fireworks disaster, coping self-efficacy was found to be a stronger predictor of lower levels of posttraumatic stress for men than for women (Bosmans et al., 2013). The authors suggested that for men especially, the perceived ability to cope with the stress of disaster is of high importance. Research on sex differences in self-efficacy has not been conducted with respect to the Gulf Oil Spill. Therefore, the current study aims to add to the literature in this area.

**Racial/ethnic differences in self-efficacy.** A number of studies have found racial/ethnic differences in self-efficacy. For example, self-efficacy has been found to be a mediator between acculturative stress and depression among international college students identifying as African, Asian, and Latin American (Constantine, Okazaki, & Utsey, 2010). In a study of physical activity, Anderson, Wojcik, Winett, and Williams (2006) found that African American women
had higher levels of self-efficacy than their White counterparts. Undergraduate ethnic minority students have been found to have lower self-efficacy in regard to deciding on a career than White students (Gloria & Hird, 1999). In similar research, self-efficacy related to work has been demonstrated to be more important for White individuals than African Americans (Buchanan & Selmon, 2008). While these studies show that there may be some racial/ethnic differences in reports of self-efficacy, research on potential differences in the disaster context is rare, and is nonexistent relating to the Gulf Oil Spill. The present study intends to add to the literature in this area.

Meaning in life. While meaning in life has been pondered by philosophers for thousands of years, modern psychological conceptualizations of life meaning were asserted by Viktor E. Frankl, who endured the traumatic experiences of confinement in various concentration camps during World War II. He was able to find meaning and purpose despite his suffering experiences (Frankl, 1959/2006). Frankl described perceived meaning as an individual’s motivation for living. In this sense, it is the individual’s responsibility to determine what is meaningful and to seek it out (Wong, 2012). For the purposes of this study, perceived meaning is defined as an individual’s perception that he or she lives his or her life according to values that are deemed important and meaningful despite adversity (e.g., disaster). Individuals can find meaning in many areas of life, such as in their jobs, family, friends, nature, and so on (Blair, 2004; Frankl, 1959/2006; Schulenberg, Hutzell, Nassif, & Rogina, 2008). However, Frankl noted that when an individual has a disruption in the motivation for living, or if the person feels as though a meaning or purpose for his or her life cannot be found, issues in well-being can develop, including symptoms of anxiety, depression, suicidal ideation, and substance abuse (Dogra, Basu, & Das, 2011; Frankl, 1959/2006; Schnetzer, Schulenberg, & Buchanan, 2013; Schulenberg, Schnetzer,
Generally speaking, perceived meaning is associated with high levels of self-efficacy, happiness, optimism, hope, self-esteem, satisfaction with life, physical health, resilience, and empowerment (Drescher et al., 2012; Kashdan & Breen, 2007; King, Hicks, Krull, & Del Gaiso, 2006; Park, 2013; Schulenberg et al., 2008; Steger, 2012; Steger & Park, 2012; Strack & Schulenberg, 2009; Triplett, Tedeschi, Cann, Calhoun, & Reeve, 2011; Wnuk, Marcinkowski, & Fobair, 2012). Perceived meaning has been found to be effective in coping with stressful life events (Debats, Drost, & Hansen, 1995), so much so that research on perceived meaning is becoming of major interest in fields such as positive psychology and disaster mental health as researchers emphasize the importance of positive factors involved in adaptive coping, meaning being a primary example (Halpern & Tramontin, 2007; Peterson, 2006; Peterson & Park, 2012; Updegraff, Silver, & Holman, 2008).

Following a disaster, many individuals struggle to understand why such an event could have happened to them (Steger, 2009; Steger & Park, 2012). This is especially true for those affected by the Gulf Oil Spill in that there is great uncertainty in how the oil spill will affect peoples’ lives moving forward. Kuhl and Koole (2004) suggested that when individuals ask the “why did this happen to me?” question, they can answer it in one of two ways. If they are able to create a meaningful view of the event, they are in a position to be optimistic about their future, others’ futures, and the future of the world. However, if they are unable to find meaning in the event, they may make negative assumptions about other people or the world, and this may lead to symptoms of psychological distress, such as those comprising PTSD (Kuhl & Koole, 2004; Park, 2010).

Niederhoffer and Pennebaker (2009) and Zakour (2012) have taken a somewhat different take on the “why did this happen to me?” question. They have suggested that this question
cannot be answered definitively because in some cases it may be difficult to find meaning in a disaster event. Instead, a new question must be asked: “How do I respond?” In this sense, individuals are able to answer this question and take action. Individuals are able to take meaningful action in order to cope with the disaster and make the event meaningful for them. After a disaster, individuals may find enhanced meaning in their lives as a result of the realization that many things in life will come to an end (Martin, Campbell, & Henry, 2004; Zakour, 2012). For example, the Gulf Oil Spill affected the beauty in nature, the ecosystem, and the economy for many people living on the Mississippi Gulf Coast. When such things happen, the tendency for disaster survivors is to place more value on other life experiences. Additionally, searching for meaning post-disaster is thought to be a facilitator of long-term recovery (Silver & Updegraff, 2013).

When an individual experiences a disaster event, he or she may have a disruption in their views about future expectations, as well as world views (Cherry, 2009). The stress caused by a disaster can lead to existential anxiety which refers to concern about the “ultimate meaning of life and death” (Muraven & Baumeister, 1997; Tillich, 1952, 1961; Weems, Costa, Dehon, & Berman, 2004). Such concerns may be related to fear of death, a sense of meaninglessness in life, and feelings of emptiness (Chung, Chung, & Easthope, 2000; Martz, 2004; Mascaro & Rosen, 2008; Tillich, 1952, 1961). Existential anxiety has been shown to be related to depression, suicidality, posttraumatic stress, identity stress, and low self-esteem (Baldwin & Wesley, 1996; Berman, Weems, & Stickle, 2006; Mascaro & Rosen, 2008; Scott & Weems, 2013; Weems et al., 2004). Tillich (1952, 1961) proposed that individuals who feel a sense of meaninglessness experience a loss of importance in life and their perception of the future. As has been shown in a post-disaster context, these feelings are in turn associated with symptoms of depression and
suicidality (Scott & Weems, 2013). Janoff-Bulman (1992) noted that although traumatic experiences can affect an individual’s worldview and expectations about life, when individuals are able to integrate these experiences into a meaningful and purposeful worldview, they tend to recover successfully.

The concept of meaning in life is a blossoming area for empirical research following disasters (Alim et al., 2008; Feder, Nestler, & Charney, 2009; Pietrzak et al., 2010; Pietrzak, Russo, Ling, & Southwick, 2011; Schulenberg, Drescher, & Baczwaski, 2014). Updegraff, Silver, and Holman (2008) have drawn ties between perceived meaning in life and disaster mental health, such that meaning may be more effective in helping survivors cope by reorienting their focus to their strengths and other positives as opposed to retaining a focus on psychological distress or other negatives. Research has shown that individuals who perceive that they have a strong sense of meaning tend to cope more effectively with stressful and/or traumatic events (Debats et al., 1995; Halama & Dedova, 2007; Updegraff, Silver, & Holman, 2008). Silver and Updegraff (2013) also noted that finding meaning post-disaster may lead to more long-term positive mental health effects. Indeed, as referred to previously, in terms of the Gulf Oil Spill perceived meaning was a significant predictor of life satisfaction after controlling for self-efficacy and the event’s perceived impact (Drescher et al., 2012).

Several other studies have examined perceived meaning in life in the context of disaster. However, many of them focus on general symptoms of distress or symptoms of PTSD. For example, research has shown that earthquake survivors report lower levels of perceived meaning in comparison to others (Zhang & Xu, 2011). Additionally, individuals who reported to have symptoms of PTSD as a result of experiencing an earthquake also reported feelings of purposelessness (Suhail et al., 2009). In another study, earthquake survivors reported that higher
levels of perceived meaning were associated with fewer symptoms of both PTSD and depression (Feder et al., 2013). Moreover, individuals experiencing symptoms of posttraumatic stress who reported higher levels of perceived meaning tended to have higher levels of positive emotion post-disaster. Ishida (2011) described ikigai, which is the term used for purpose in life in Japan. The author noted that ikigai was an effective method of coping with stress among individuals affected by an earthquake. In other research, a study of individuals affected by a tsunami, the authors reported that levels of PTSD symptoms were related to the ability to discover meaning in life, as well as with goal setting (Kalayjian, Moore, Kuiansky, & Aberson, 2010). Not only has perceived meaning in life been found to be an important buffer against the negative effects of natural disaster, but it has also been studied related to man-made disasters. For instance, after the World Trade Center terrorist attack, Updegraff and colleagues (2008) found that when controlling for exposure to the event, mental health prior to the event, and stress responses, meaning was significantly associated with fewer symptoms of posttraumatic stress. While a number of empirical studies have shown the importance of the perceived meaning in life construct, it is important to conduct new research, especially relating to disaster contexts such as the Gulf Oil Spill. Examining the role that perceived meaning in life may play as a protective factor against the development of psychological distress post-disaster is another goal of this study.

**Sex differences in meaning in life.** Perceived meaning in life is an important protective factor against the development of mental health issues. Studies reporting on the differences between men and women have yielded mixed results. In a study of meaning in life and adjustment in ethnic minority adolescents, Kiang and Fuligni (2009) found that there were no statistically significant sex differences in self-reports of perceived meaning in life. Ryff (1995)
also found that men and women reported comparable perceived purpose scores. Similarly, Steger, Oishi, and Kashdan (2009) found no statistically significant sex differences in self-reports of perceived presence of meaning and search for meaning.

While some studies have found no statistically significant sex differences in meaning scores, other studies have found statistically significant differences. Reker, Peacock, and Wong (1987) found that women reported greater search for meaning scores than did men. Additionally, Morgan and Robinson (2013) found that women reported greater meaning in life than men. Along similar lines, in a study of smoking intensity, male participants were also found to report lower levels of meaning in their lives (Thege, Stauder, & Kopp, 2010). This study also found that meaning in life was predictive of smoking intensity for women and not men, such that meaning in life differentiated light from heavy smoking in women. Further research on substance abuse and mental illness has found that men and women may deal with meaninglessness in diverse ways (Harlow, Newcomb, & Bentler, 2006). This research has found that females who lack meaning in life and experience psychological distress (depression being one example) are more likely to use substances than men. Additionally, men who reported a lack of perceived meaning in life and who also experience psychological distress are more likely to consider suicide than are women. With respect to the Gulf Oil Spill, Schulenberg, Smith, Drescher, and Buchanan (2014) found that female adolescents reported significant greater symptoms of perceived meaning in life than males. Given mixed findings regarding sex differences in perceived meaning in life scores, and that there are no published studies of such differences among adults in the disaster context in general or the Gulf Oil Spill specifically, the current study sought to add to the literature in this area.
**Racial/ethnic differences in meaning in life.** In addition to potential sex differences in perceived meaning in life, there may also be racial/ethnic differences. In Kiang and Fuligni’s (2009) study of meaning and adjustment, adolescents identifying as Asian American reported greater levels of meaning in life than those identifying as Latin American or European American. The authors found that meaning in life mediated the relationship between ethnic identity and adjustment, concluding that an individual’s perceived ethnic identity was a source of meaning. In a study of religiosity and meaning in life among college students, Holmes and Hardin (2009) found that meaning in life was an important predictor of fewer mental health issues for White participants. However, this was not the case for African American students. Research on non-student adults being treated for cancer reported that White patients had fewer existential needs (higher levels of meaning) than ethnic minorities who reported a high level of existential needs (Moadel et al., 1999).

In a disaster context, research has found that in African Americans with high levels of trauma exposure, higher perceived meaning in life was predictive of resilience (Alim et al., 2008). Additionally, reported levels of perceived meaning in life differentiated those who had recovered from those who were mentally ill (e.g., high levels of perceived meaning in life predicted recovery from mental illness). In a study of coping and PTSD, Feder et al., (2013) found that higher levels of perceived meaning in life after an earthquake were predictive of lower levels of psychological distress. Because this study was conducted in Pakistan, a culture much different from the culture of the United States, the authors suggested that meaning in life may be an effective protective factor across races and ethnicities. Support for this assertion comes from separate studies of perceived meaning and purpose in life among individuals who have been affected by earthquakes in Pakistan and Japan, as well as a tsunami in Sri Lanka (Feder et al.,
2013; Ishida, 2011; Kalayjian et al., 2010; Suhail et al., 2009; Zhang & Xu, 2011). These studies provide compelling evidence that meaning is an effective coping mechanism in non-Western cultures. With respect to the Gulf Oil Spill, no differences in perceived meaning in life were found between White and non-White adolescents. However, differences in race/ethnicity have not yet been studied in this context among adults, and are therefore an additional focus of the current study.

**Disaster Impact**

Research has shown that the greater exposure one has to a disaster, the more likely he or she is to experience psychological distress (Chouet al., 2005; Nolen-Hoeksema & Morrow, 1991; Seplaki, Goldman, Weinstein, & Lin, 2006). Exposure may refer to physical proximity or other direct impacts such as loss of job, loss of home, development of health risks, and so on. For example, the loss of a job as a result of a disaster has been shown to negatively impact an individual’s sense of worth and self-esteem (Florian & Mikulincer, 2004; Niederhoffer & Pennebaker, 2009). After the *Sea Empress* Oil Spill, greater levels of anxiety and depression were associated with financial problems, health problems, and concern about environmental risk (Gallacher et al., 2007). Similarly, after the *Exxon Valdez* Oil Spill, increased symptoms of anxiety were associated with difficulties in relationships, health problems, and loss of income while depressive symptoms were related to health problems, difficulties in relationships, and loss of occupation (Arata et al., 2000). Therefore, it is important to consider the level of impact the individual experiences as a result of a disaster.

**Purpose of this Study**

The Gulf Oil Spill negatively affected the economy, livelihood, and mental well-being of Mississippi Gulf Coast residents. Individuals who were affected by disaster are more likely to
experience symptoms of depression, anxiety, and stress. There are many possible protective factors that aid in buffering individuals from experiencing negative psychological consequences post-disaster. Self-efficacy and perceived meaning in life are two prime examples that appear to play a significant role in adaptive coping after the event. However, not all people are equally affected by disasters. Moreover, there may be differences in symptom presentation, rates, and coping when examining demographic variables such as sex and race/ethnicity. The purpose of this study was to examine and report on the severity of mental health effects (depression, anxiety, stress) as well as protective factors (self-efficacy, perceived meaning in life), among Mississippi coastal residents affected by the Gulf Oil Spill. The study involved additional analyses of these variables by sex and by race/ethnicity. Based on the literature review and related studies (e.g., Drescher et al., 2012; Drescher et al., 2014), it was expected that those who report a greater impact from the Gulf Oil Spill (financial, health, social relationships) would report greater depression, anxiety, and stress. In addition, it was expected that self-efficacy and perceived meaning in life would be significantly and positively related to one another, and significantly and negatively related to depression, anxiety, and stress. On this basis, the study’s hypotheses were as follows:

1a. After controlling for the impact of the Gulf Oil Spill, self-efficacy would significantly predict depression for males and females. However, sex would influence the strength of the relationship between these variables. For instance, for females, self-efficacy and depression were predicted to share a greater percentage of variance than for males.

1b. After controlling for the impact of the Gulf Oil Spill, self-efficacy would significantly predict anxiety for males and females. However, sex would influence the strength of the
relationship between these variables. For instance, for females, self-efficacy and anxiety were predicted to share a greater percentage of variance than for males.

1c. After controlling for the impact of the Gulf Oil Spill, self-efficacy would significantly predict stress for males and females. However, sex would influence the strength of the relationship between these variables. For instance, for females, self-efficacy and stress were predicted to share a greater percentage of variance than for males.

1d. After controlling for the impact of the Gulf Oil Spill, perceived meaning in life would significantly predict depression for males and females. However, sex would influence the strength of the relationship between these variables. For instance, for females, meaning and depression were predicted to share a greater percentage of variance than for males.

1e. After controlling for the impact of the Gulf Oil Spill, perceived meaning in life would significantly predict anxiety for males and females. However, sex would influence the strength of the relationship between these variables. For instance, for females, meaning and anxiety were predicted to share a greater percentage of variance than for males.

1f. After controlling for the impact of the Gulf Oil Spill, perceived meaning in life would significantly predict stress for males and females. However, sex would influence the strength of the relationship between these variables. For instance, for females, meaning and stress were predicted to share a greater percentage of variance than for males.

2a. After controlling for the impact of the Gulf Oil Spill, self-efficacy would significantly predict depression for non-White individuals and White individuals. However, race/ethnicity would influence the strength of the relationship between these variables. For instance, for non-White individuals, self-efficacy and depression were predicted to share a greater percentage of variance than for White individuals.
2b. After controlling for the impact of the Gulf Oil Spill, self-efficacy would significantly predict anxiety for non-White individuals and White individuals. However, race/ethnicity would influence the strength of the relationship between these variables. For instance, for non-White individuals, self-efficacy and anxiety were predicted to share a greater percentage of variance than for White individuals.

2c. After controlling for the impact of the Gulf Oil Spill, self-efficacy would significantly predict stress for non-White individuals and White individuals. However, race/ethnicity would influence the strength of the relationship between these variables. For instance, for non-White individuals, self-efficacy and stress were predicted to share a greater percentage of variance than for White individuals.

2d. After controlling for the impact of the Gulf Oil Spill, perceived meaning in life would significantly predict depression for non-White individuals and White individuals. However, race/ethnicity would influence the strength of the relationship between these variables. For instance, for non-White individuals, perceived meaning in life and depression were predicted to share a greater percentage of variance than for White individuals.

2e. After controlling for the impact of the Gulf Oil Spill, perceived meaning in life would significantly predict anxiety for non-White individuals and White individuals. However, race/ethnicity would influence the strength of the relationship between these variables. For instance, for non-White individuals, perceived meaning in life and anxiety were predicted to share a greater percentage of variance than for White individuals.

2f. After controlling for the impact of the Gulf Oil Spill, perceived meaning in life would significantly predict stress for non-White individuals and White individuals. However, race/ethnicity would influence the strength of the relationship between these variables. For
instance, for non-White individuals, perceived meaning in life and stress were predicted to share a greater percentage of variance than for White individuals.

3a. Females would report significantly higher levels of depression than males.

3b. Females would report significantly higher levels of anxiety than males.

3c. Females would report significantly higher levels of stress than males.

3d. Men would report significantly higher levels of self-efficacy than women.

3e. There would not be statistically significant differences between men and women in scores of meaning in life.

4a. Non-White individuals would report significantly higher levels of depression than White participants.

4b. Non-White individuals would report significantly higher levels of anxiety than White participants.

4c. Non-White individuals would report significantly higher levels of stress than White participants.

4d. White participants would report significantly higher levels of self-efficacy than non-White individuals.

4e. There would not be statistically significant differences between White participants and non-White participants with regard to meaning in life scores.
II. METHOD

Procedure

This study was part of a larger investigation of the impact of the Gulf Oil Spill on the mental health of affected Mississippi Gulf Coast residents (see Aiena, Baczwaski, Schulenberg, & Buchanan, in press; Drescher et al., 2012; Drescher, Schulenberg, & Smith, 2014; Schulenberg, Johnson, Drescher, Herzog, Willoughby, & Allen, in press; Schulenberg, Drescher et al., 2014). The project was funded through monies provided to the Mississippi Department of Mental Health (MS DMH) by BP p.l.c.² MS DMH used these monies to fund 19 mental health facilities on the Mississippi Gulf Coast to serve the mental health needs of those affected by the spill. Dr. Stefan Schulenberg, Associate Professor of Clinical Psychology at The University of Mississippi, was hired by MS DMH to evaluate the amount of services provided by the facilities awarded funds from MS DMH, as well as to examine the mental health effects of the Gulf Oil Spill on those seeking services.

Data collection procedures were approved by the Institutional Review Boards of MS DMH and The University of Mississippi. Of the 19 mental health facilities funded by MS DMH, 9 provided training and outreach services. Trainings included a variety of American Red Cross offerings such as first aid, CPR, and wilderness training; stress management for both children and adults; and resilience training. Outreach programs included support groups for individuals with mental illness, educational classes on mental illness and coping with stress, as well as

² Though MS DMH provided funds to support the collection of these data, the conclusions and findings herein do not necessarily reflect the views of the State of Mississippi.
mental health information provided at wellness conferences and pamphlets given to offices throughout the coastal area. The remaining 10 mental health facilities provided a variety of clinical services. These sites included one mental health inpatient hospital, two community mental health centers, one school-based counseling service, one women’s shelter, one Vietnamese community organization, and four private counseling centers.

Each of these 10 agencies were responsible for data collection from clients who were affected by the Gulf Oil Spill and who were receiving mental health services through the funds provided by BP. Data collection was managed by trained graduate students from the Clinical Training Program in the Department of Psychology at The University of Mississippi. These graduate students communicated with the sites via telephone and email on a weekly basis. In addition, the graduate students met with each site on a quarterly basis and provided updates, feedback, and continued training on the data collection procedures. Data were collected through a battery of measures developed to assess the demographic makeup of the sample, the perceived impact of the Gulf Oil Spill, and positive and negative psychological variables. The batteries were completed via paper-and-pencil format or through the use of Qualtrics, an online survey manager. For some facilities, computer access was not available for participants so the paper-and-pencil format was used. For those facilities that had access to computers, participants were encouraged to use the online survey but were allowed to use paper-and-pencil measures if desired. Research has shown that individual scores on paper-and-pencil and computerized measures tend to be equivalent across formats (McDonald, 2002; Schulenberg & Yutrzenka, 1999, 2001), and if differences are noted, they may be statistically significant but not clinically meaningful. Data obtained from paper-and-pencil questionnaires were entered and checked by
trained research assistants. Data obtained via the online survey were automatically entered into the database.

**Participants**

Participants in this study included 1119 adults who were seeking services at mental health facilities on the Mississippi Gulf Coast following the Gulf Oil Spill. Adult participants’ ages ranged from 18 to 79 ($M$ age = 38.76, $SD$ age = 12.73). Of these participants, 54.8% ($n = 613$) were female and 43.9% ($n = 491$) were male. In terms of race/ethnicity, 68.4% ($n = 765$) of participants identified as White and 21.1% ($n = 236$) identified as African American, with 9.2% ($n = 90$) identifying as multiracial (2.4%, $n = 27$), Latino (1.7%, $n = 19$), Asian (1.6%, $n = 18$), Native American (1.2%, $n = 13$), Pacific Islander (.2%, $n = 2$), Alaskan Native (.1%, $n = 1$) or other (.9%, $n = 10$).

**Measures**

**Demographic variables.** Participants completed a demographic form that included questions regarding their sex and race/ethnicity as well as their age, socioeconomic status, living arrangements, and employment status.

**Depression, anxiety, and stress.** The 21-item Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995; Appendix A) contain three, 7-item scales that assess depression, anxiety, and stress. The DASS-21 employs cutoff scores to determine levels of severity. These cut-off scores are presented in Appendix B. Item responses are ranked on a 4-point Likert-type scale ranging from 0 (did not apply to me at all) to 3 (applied to me much, or most of the time). Scores for each scale are determined by summing the items and multiplying by two per the recommendations of the developers of the measure. Scores for each scale range from 0 to 42 with higher scores indicating greater perceived levels of depression, anxiety, and stress.
Data from the current study have been used in previous research. DASS-21 data from the Gulf Oil Spill have reported mean scores and standard deviations of depression ($M = 13.88, SD = 12.79$), anxiety ($M = 11.68, SD = 11.29$), and stress ($M = 16.22, SD = 12.29$) (Drescher et al., 2014).

As for psychometric properties, DASS-21 scores have strong internal consistency reliability, with coefficient alphas ranging from .82 to .94 for the depression scale, .78 to .90 for the anxiety scale, and .87 to .93 for the stress scale (Antony, Bieling, Cox, Enns, & Swinson, 1998; Drescher et al., 2014; Henry & Crawford, 2005; Norton, 2007). Accessing the current data, Drescher and colleagues (2014) reported coefficient alphas of .94 for the depression scale, .89 for the anxiety scale, and .92 for the stress scale. As for validity support, these scales have been shown to be distinct constructs using factor-analytic procedures (Antony et al., 1998; Clara, Cox, & Enns, 2001; Henry & Crawford, 2005; Norton, 2007). The DASS-21 also has garnered support for the validity of scores, correlating significantly and positively with other measures of depression and anxiety, as would be expected (Henry & Crawford, 2005; Page, Hooke, & Morrison, 2007; Tran, Tran, & Fisher, 2013).

**Self-Efficacy.** The General Self-Efficacy Scale (GSES; Schwarzer & Jerusalem, 1995; Appendix C) is a 10-item measure of an individual’s confidence in his or her ability to cope with stressful situations (Schwarzer, 2002). Items are scored on a 4-point Likert-type scale that ranges from 1 (not at all true) to 4 (exactly true). Item responses are summed to yield a total score ranging from 10 to 40. Higher scores indicate greater levels of self-efficacy. An example of an item is “I can always manage to solve difficult problems if I try hard enough.”

The GSES has good psychometric properties, with internal consistency reliability coefficients ranging from .75 to .96 from data collected from participants in 25 different
countries (Cheung & Sun, 1999; Drescher et al., 2012; Hirschel & Schulenberg, 2009; Leganger, Kraft, & Roysamb, 2000; Rimm & Jerusalem, 1999; Scholz et al., 2002; Schwarzer & Born, 1997; Schwarzer, Born et al., 1997; Schwarzer, Meuller, & Greenglass, 1999). Drescher and colleagues (2012) found the coefficient alpha in a subsample of data from this study to be .92.

With respect to validity, Scholz and colleagues (2002) used factor-analytic procedures to support the measure being comprised of one factor, with this unidimensionality evident across data from 25 different countries. The one-factor model has also been supported in several other studies (Cheung & Sun, 1999; Leganger et al., 2000; Rimm & Jerusalem, 1999; Schwarzer, Babler et al., 1997; Schwarzer & Born, 1997; Sherbaum, Cohen-Charash, & Kern, 2006). Additionally, the measure has demonstrated convergent and discriminant validity, such that scores correlate significantly and positively with measures of self-esteem, positive outlook on life, and optimism, as well as significantly and negatively with measures of anxiety and depression (Cheung & Sun, 1999; Leganger et al., 2000; Luszczynska, Scholz, & Schwarzer, 2005; Luszczynska, Gutierrez-Dona et al., 2005; Schwarzer, Babler et al., 1997; Schwarzer et al., 1999). Within a sample of coastal Mississippians who were affected by Hurricane Katrina, the GSES yielded a mean score of 29.09 (SD = 6.87) and significantly predicted severity of symptoms as assessed by a measure of PTSD (Hirschel & Schulenberg, 2009). Data associated with this scale were presented in previous work related to the Gulf Oil Spill (Drescher et al., 2012). This study consisted of a subsample (N = 361) of the overall data set. Drescher et al., reported a mean of 27.52 and a standard deviation of 6.77. They also found that self-efficacy was a statistically-significant predictor of life satisfaction following the event.

**Perceived meaning in life.** The Purpose in Life test – Short Form (PIL-SF; Schulenberg, Schnetzer, & Buchanan, 2011; Appendix D) is a 4-item short form developed from the original
20-item PIL, which was initially designed to assess perceived meaning and purpose in life (Crumbaugh & Maholick, 1964, 1969). Items are rated on a 7-point Likert-type scale with varying response anchors based on the content of the item [e.g., In life I have…1 (no goals or aims at all) to 7 (very clear goals and aims)]. Responses from each item are summed. Total scores range from 4 to 28 with higher scores indicating greater perceived meaning in life.

PIL-SF scores are reliable, with internal consistency reliability coefficients ranging from .79 to .86 among adults (Schnetzer, Schulenberg, & Buchanan, 2013; Schulenberg et al., 2011). Within an adolescent sample affected by the Gulf Oil Spill, an internal consistency reliability of .89 was found (Schulenberg, Smith et al., 2014). Support for the validity of the measure is evident through significant and positive correlations with other measures of perceived meaning and purpose in life, as well as life satisfaction (Schulenberg et al., 2011; Schulenberg, Smith et al., 2014). Alternatively, PIL-SF scores correlate significantly and negatively with measures of perceived search for meaning, depression, boredom proneness, posttraumatic stress, and alcohol use (Schulenberg et al., 2011; Schulenberg, Smith et al., 2014). Data from this study were used in a previous investigation that examined perceived meaning in life in relation to self-efficacy and life satisfaction. Data related to this scale were presented in a subsample (N = 361) in which Drescher and colleagues (2012) reported a range of scores between 4 and 28 (M = 19.32, SD = 5.47) and a coefficient alpha of .86. They also found that perceived meaning in life significantly predicted life satisfaction following the Gulf Oil Spill. In sample of adolescents affected by the Gulf Oil Spill, Schulenberg, Smith, and colleagues (2014) reported a range of scores between 4 and 28 (M = 21.34, SD = 5.41) and a coefficient alpha of .89.

Impact factor. To assess the perceived impact of the Gulf Oil Spill, an impact factor was created similarly to other studies accessing the same data set (e.g., Drescher et al., 2014).
Specifically, three questions were used to assess respondent perceptions as to how the Gulf Oil Spill affected physical health, social relationships, and financial situation. Each of these questions was rated on a 7-point Likert-type scale ranging from 1 (greatly worsened) to 7 (greatly improved). For this study, scores were reversed such that higher scores suggested greater perceived negative impact of the Gulf Oil Spill. The questions were:

“How has the Gulf Oil Spill affected your financial situation?”

“How has the Gulf Oil Spill affected your social relationships (family, friends)?” and

“How has the Gulf Oil Spill affected your physical health?”

Data related to this scale have been presented in previous work on the Gulf Oil Spill (Drescher et al., 2012; Drescher et al., 2014; Walters et al., 2014). For example, Drescher and colleagues (2014) reported the rates of individuals experiencing an impact in these three life domains as a result of the Gulf Oil Spill using this scale. They reported that 36.6% of participants reported worsened finances, 23.6% of participants reported worsened social relationships, and 24.3% of participants reported worsened physical health. Drescher and colleagues (2014) noted that of these three areas, 47.8% of participants experienced an impact in at least one area and 12% reported an impact in all three areas. They also reported that worsened life domains predicted posttraumatic stress symptoms. In the earlier Drescher and colleagues (2012) study, these three impact items, along with an additional item relating to emotional well-being, were found to significantly predict life satisfaction scores following the Gulf Oil Spill (e.g., greater perceived impact of the Oil Spill was associated with less life satisfaction). These studies did not report means or standard deviations for these items.
Data Analyses

Prior to data analysis, the data collected from individuals on the Mississippi Gulf Coast were examined for inconsistency and outliers. Outliers were those scores that fell three or more standard deviations from the mean. Outliers found were removed from the data.

Moderation analyses were conducted using SPSS to determine if sex and race/ethnicity differences would serve to modify the predictive power of protective factors (e.g., self-efficacy, perceived meaning in life) on psychological distress (e.g., depression, anxiety, stress). In each regression analysis, depression, anxiety, or stress was entered as the dependent variable. The impact of the Gulf Oil Spill was entered into block one in order to control for its effects. Either self-efficacy or meaning in life as well as either sex or race/ethnicity were added to block one. In block two, an interaction variable was entered to assess for moderation (e.g., sex*self-efficacy). If moderation was determined, the variable was then entered into the PROCESS program within SPSS to test the moderation effect and assess for interaction.

Means, standard deviations, and coefficient alphas were calculated for each of the measures (e.g., DASS-21, GSES, PIL-SF, and the Gulf Oil Spill impact scale), by entire sample as well as broken down by sex and race/ethnicity. To assess for mean differences between sex and race/ethnicity (White participants versus non-White participants) in each of the measures used, t-tests were conducted and effect sizes were calculated. Correlational analyses were conducted to determine the strength and direction of the interrelationships between depression, anxiety, stress, self-efficacy, perceived meaning, and oil spill impact. These analyses were conducted using the total sample, by sex, and by race/ethnicity.
III. RESULTS

Descriptive Statistics

Descriptive statistics were calculated for each measure to determine mean scores, standard deviations, minimum and maximum values, and internal consistency reliability coefficients (Cronbach’s alphas). These data are reported in Table 1. For the DASS-21 (Lovibond & Lovibond, 1995), descriptive statistics were computed for each of the three scales. For the depression scale, total scores yielded an average of 13.88 (SD = 12.79). For females, the average depression score was 15.13 (SD = 13.09), whereas for males, the average depression score was 12.40 (SD = 12.24). For non-White individuals, the average depression score was 14.55 (SD = 13.32). For White individuals, the average depression score was 13.35 (SD = 12.46). The means of these data fall within the “mild” to “moderate” level of depressive symptoms (Lovibond & Lovibond, 1995; Appendix B; described in more detail below). Internal consistency reliability coefficients ranged from .93 to .94. The internal consistency reliabilities are considered to be “excellent” (e.g., DeVellis, 2012).

In addition to descriptive statistics for the DASS-21 depression scale, depression data are also presented in terms of Lovibond and Lovibond’s (1995) symptom severity guidelines (Appendix B; see Table 2). For the total sample, 41.6% (n = 466) scored within the “normal” range, 9.2% (n = 103) scored within the “mild” range, 15.5% (n = 174) scored within the “moderate” range, 8.8% (n = 98) scored within the “severe” range, and 18.1% (n = 202) scored within the “extremely severe” range. For females, 37.7% (n = 231) scored within the “normal” range, 8.6% (n = 53) scored within the “mild” range, 16.2% (n = 99) scored within the
“moderate” range, 9.5% ($n = 58$) scored within the “severe” range, and 20.7% ($n = 127$) scored within the “extremely severe” range. For males, 46.2% ($n = 227$) scored within the “normal” range, 10.0% ($n = 49$) scored within the “mild” range, 15.1% ($n = 74$) scored within the “moderate” range, 7.9% ($n = 39$) scored within the “severe” range, and 14.9% ($n = 73$) scored within the “extremely severe” range. For non-White individuals, 39.9% ($n = 130$) scored within the “normal” range, 5.5% ($n = 18$) scored within the “mild” range, 19.0% ($n = 62$) scored within the “moderate” range, 6.7% ($n = 22$) scored within the “severe” range, and 20.6% ($n = 67$) scored within the “extremely severe” range. For White individuals, 43.5% ($n = 333$) scored within the “normal” range, 11.0% ($n = 84$) scored within the “mild” range, 14.2% ($n = 109$) scored within the “moderate” range, 9.3% ($n = 71$) scored within the “severe” range, and 16.7% ($n = 128$) scored within the “extremely severe” range.

For the DASS-21 anxiety scale (see Table 1), total scores yielded an average of 11.68 ($SD = 11.29$). For females, the average anxiety score was 13.07 ($SD = 11.70$). For males, the average anxiety score was 9.95 ($SD = 10.52$). For non-White individuals, the average anxiety score was 13.42 ($SD = 11.95$). For White individuals, the average anxiety score was 10.81 ($SD = 10.87$). Based on guidelines for interpretation (Lovibond & Lovibond, 1995; Appendix B), the means for these data fall within the “mild” to “moderate” level of anxiety symptoms. Internal consistency reliability coefficients ranged from .89 to .90, and are considered to be “very good” to “excellent” by interpretive standards (e.g., DeVellis, 2012).

In addition to the descriptive statistics for the DASS-21 anxiety scale, data are also presented based on Lovibond and Lovibond’s (1995) symptom severity guidelines (Appendix B; see Table 2). For the total sample, 41.0% ($n = 459$) scored within the “normal” range, 7.2% ($n = 81$) scored within the “mild” range, 13.6% ($n = 152$) scored within the “moderate” range, 7.5%
(n = 84) scored within the “severe” range, and 24.1% (n = 270) scored within the “extremely severe” range. For females, 36.4% (n = 223) scored within the “normal” range, 7.5% (n = 46) scored within the “mild” range, 13.2% (n = 81) scored within the “moderate” range, 8.5% (n = 52) scored within the “severe” range, and 28.1% (n = 172) scored within the “extremely severe” range. For males, 46.8% (n = 230) scored within the “normal” range, 7.1% (n = 35) scored within the “mild” range, 14.1% (n = 69) scored within the “moderate” range, 6.3% (n = 31) scored within the “severe” range, and 19.3% (n = 95) scored within the “extremely severe” range. For non-White individuals, 34.3% (n = 112) scored within the “normal” range, 7.7% (n = 25) scored within the “mild” range, 13.8% (n = 45) scored within the “moderate” range, 6.4% (n = 21) scored within the “severe” range, and 30.7% (n = 100) scored within the “extremely severe” range. For White individuals, 44.8% (n = 343) scored within the “normal” range, 7.3% (n = 56) scored within the “mild” range, 13.3% (n = 102) scored within the “moderate” range, 7.8% (n = 60) scored within the “severe” range, and 21.3% (n = 163) scored within the “extremely severe” range.

For the DASS-21 stress scale (see Table 1), total scores yielded an average of 16.22 (SD = 12.29). For females, the average stress score was 17.58 (SD = 12.89). For males, the average stress score was 14.49 (SD = 12.01). For non-White individuals, the average stress score was 17.17 (SD = 13.02). For White individuals, the average stress score was 15.58 (SD = 11.82). Based on guidelines for interpretation (Lovibond & Lovibond, 1995; Appendix B), the means for these data fall within the “mild” level of stress symptoms. Internal consistency reliability coefficients ranged from .91 to .93, and are considered to be “excellent” by interpretive standards (e.g., DeVellis, 2012).
In addition to these descriptive statistics for the DASS-21 stress scale, data are also presented based on symptom severity within this sample (Lovibond & Lovibond, 1995; see Table 2). For the total sample, 46.7% \((n = 523)\) scored within the “normal” range, 8.5% \((n = 95)\) scored within the “mild” range, 13.0% \((n = 146)\) scored within the “moderate” range, 14.7% \((n = 165)\) scored within the “severe” range, and 10.2% \((n = 114)\) scored within the “extremely severe” range. For females, 41.9% \((n = 257)\) scored within the “normal” range, 8.0% \((n = 49)\) scored within the “mild” range, 14.8% \((n = 91)\) scored within the “moderate” range, 15.8% \((n = 97)\) scored within the “severe” range, and 11.9% \((n = 73)\) scored within the “extremely severe” range. For males, 53.2% \((n = 261)\) scored within the “normal” range, 9.0% \((n = 44)\) scored within the “mild” range, 10.4% \((n = 51)\) scored within the “moderate” range, 13.6% \((n = 67)\) scored within the “severe” range, and 8.1% \((n = 40)\) scored within the “extremely severe” range. For non-White individuals, 42.9% \((n = 140)\) scored within the “normal” range, 6.7% \((n = 22)\) scored within the “mild” range, 12.3% \((n = 40)\) scored within the “moderate” range, 17.8% \((n = 58)\) scored within the “severe” range, and 12.0% \((n = 39)\) scored within the “extremely severe” range. For White individuals, 49.5% \((n = 379)\) scored within the “normal” range, 9.2% \((n = 70)\) scored within the “mild” range, 13.7% \((n = 105)\) scored within the “moderate” range, 13.3% \((n = 102)\) scored within the “severe” range, and 8.9% \((n = 68)\) scored within the “extremely severe” range.

Descriptive statistics were also calculated for self-efficacy (see Table 1) as assessed by the GSES (Schwarzer & Jerusalem, 1995). Total scores yielded an average of 26.82 \((SD = 7.00)\). For females, the average self-efficacy score was 26.15 \((SD = 6.96)\), whereas for males the average self-efficacy score was 27.66 \((SD = 6.93)\). For non-White individuals, the average self-efficacy score was 26.12 \((SD = 8.11)\), whereas for White individuals, the average self-efficacy
score was 27.16 ($SD = 6.42$). As mentioned above, higher scores on this measure indicate better functioning in this area. However, there are no published cut-off scores. These means are considered to be above average based on their range and, therefore, suggest that this sample had moderate to good levels of self-efficacy. Internal consistency reliability coefficients ranged from .92 to .94 when considering the total sample, sex, and race/ethnicity. These internal consistency reliabilities are “excellent” based on interpretive standards (e.g., DeVellis, 2012).

With respect to perceived meaning in life (see Table 1), PIL-SF (Schulenberg et al., 2011) total scores yielded an average of 18.83 ($SD = 5.45$). For females, the average perceived meaning in life score was 18.71 ($SD = 5.76$), whereas for males, the average perceived meaning in life score was 18.96 ($SD = 5.07$). For non-White individuals, the average perceived meaning in life score was 19.06 ($SD = 6.27$), whereas for White individuals, the average perceived meaning in life score was 18.76 ($SD = 5.11$). As mentioned above, higher scores on this measure are indicative of higher perceived meaning in life. Previous studies using samples of individuals who were affected by the Gulf Oil Spill found scores to range between 19.32 ($SD = 5.47$) and 21.34 ($SD = 5.41$). The mean scores found in this study are consistent with the previous literature and represent a disaster-affected population. Internal consistency reliability coefficients ranged from .85 to .91 when considering the total sample, sex, and race/ethnicity. These data are considered “very good” to “excellent” by interpretive standards (e.g., DeVellis, 2012).

For the measure of perceived impact of the Gulf Oil Spill (see Table 1), total scores yielded an average of 4.63 ($SD = .83$). For females, the average perceived Gulf Oil Spill impact score was 4.61 ($SD = .80$) whereas for males, the average perceived impact score was 4.68 ($SD = .88$). For non-White individuals, the average perceived impact of the Gulf Oil Spill score was 4.80 ($SD = .95$), whereas for White individuals, the average perceived Gulf Oil Spill impact
score was 4.58 ($SD = .78$). These scores suggest that individuals perceived the Gulf Oil Spill to have worsened their functioning in terms of finances, social relationships, and physical health. Reliability coefficients were “respectable” by interpretive standards (e.g., DeVellis, 2012), ranging from .71 to .77.

**Correlational Analyses**

Correlational analyses were conducted to assess the interrelationships of the variables under study (see Table 3). As expected, total DASS-21 depression scores were positively associated with anxiety ($r = .79$, $p < .001$), stress ($r = .86$, $p < .001$), and impact of the Gulf Oil Spill ($r = .22$, $p < .001$) and negatively associated with perceived meaning in life ($r = -.44$, $p < .001$) and self-efficacy ($r = -.37$, $p < .001$). Higher depression scores were associated with greater reports of anxiety, stress, and perceived impact, as well as lower meaning in life and self-efficacy scores. As seen in Table 3, these findings overall were consistent in their direction and magnitude whether considered by total sample, sex, or race/ethnicity.

Total DASS-21 anxiety scores were positively associated with depression (see above), stress ($r = .84$, $p < .001$), and impact of the Gulf Oil Spill ($r = .25$, $p < .001$) and negatively associated with perceived meaning in life ($r = -.31$, $p < .001$) and self-efficacy ($r = -.32$, $p < .001$). Higher anxiety scores were related to greater reports of depression, stress, and perceived impact, as well as lower scores on the meaning in life and self-efficacy measures. As seen in Table 3, these findings were overall consistent in their direction and magnitude whether considered by total sample, sex, or race/ethnicity.

With respect to the DASS-21 stress scores, total values were positively associated with depression, anxiety, and impact of the Gulf Oil Spill ($r = .23$, $p < .001$) and negatively associated with perceived meaning in life ($r = -.32$, $p < .001$) and self-efficacy ($r = -.30$, $p < .001$). Higher
stress scores were related to greater depression, anxiety, and perceived impact scores, as well as lower scores on the meaning in life and self-efficacy measures. As seen in Table 3, these findings were overall consistent in their direction and magnitude whether considered by total sample, sex, or race/ethnicity.

Perceived meaning in life total scores were positively associated with self-efficacy \((r = .61, p < .001)\) and negatively associated with depression, anxiety, and stress (Table 3). Perceived meaning in life was not significantly associated with perceived impact of the Gulf Oil Spill \((r = -.06, p = .061)\). Interpretively, higher meaning scores were related to higher self-efficacy scores, as well as lower scores on the measures of depression, anxiety, and stress. However, meaning and impact of the Gulf Oil Spill were not statistically related with respect to the total sample, female, or White individuals. For males and non-White individuals such that perceived meaning in life was significantly and negatively associated with depression, anxiety, stress and impact and positively associated with self-efficacy.

As for self-efficacy, total scores were positively associated with meaning and negatively associated with depression, anxiety, stress, and perceived impact of the Gulf Oil Spill \((r = -.13, p < .001)\). Higher self-efficacy scores were related to greater perceived meaning in life and lower scores on the indices of depression, anxiety, stress, and Gulf Oil Spill impact. This was also true for females, males, and non-White individuals. Results differed slightly for White individuals. While self-efficacy was significantly and positively associated with meaning and negatively associated with depression, anxiety, and stress, it was not significantly associated with the perceived impact of the Gulf Oil Spill. This means that for White individuals, higher scores of meaning were associated with higher scores of self-efficacy; lower scores of depression, anxiety, and stress; and was not associated with perceived impact of the Gulf Oil Spill.
As evident from the previous discussion and consideration of Table 3, perceived impact of the Gulf Oil Spill had mixed results. For the total sample and for females, higher scores of perceived impact of the Gulf Oil Spill were associated with higher reported symptoms of depression, anxiety, and stress; lower scores of self-efficacy; and not related to perceived meaning in life within the total sample as well as for females. For males and non-White individuals, higher scores of perceived impact of the Gulf Oil Spill were associated with higher scores of depression, anxiety, and stress and lower scores of self-efficacy and perceived meaning in life. For White individuals, higher scores of perceived impact of the Gulf Oil Spill were positively associated with high scores of psychological distress such as depression, anxiety, and stress but were not related to protective factors such as self-efficacy and perceived meaning in life.

**Moderation Analyses**

To test hypothesis 1, which examined the moderating effects of sex on the predictive power of self-efficacy and perceived meaning in life on the depression, anxiety, and stress variables, hierarchical multiple regression analyses were conducted. For hypothesis 1a, it was predicted that after controlling for the impact of the Gulf Oil Spill, sex would serve to modify the predictive ability of self-efficacy with respect to depression. Specifically, for females, self-efficacy and depression were predicted to share a greater percentage of variance than for males.

To determine whether sex modifies the relationship between self-efficacy and depression when controlling for the perceived impact of the Gulf Oil Spill (see Table 4), it was first determined that self-efficacy and sex accounted for a significant amount of variance in DASS-21 depression scores ($R^2 = .146, F(3, 839) = 48.36, p < .001$). Next, the interaction term between sex and self-efficacy was added to the regression model and while the model remained significant ($R^2 = .149,$
there was not a significant change with the addition of the interaction term ($\Delta R^2 = .001$, $\Delta F(1, 835) = 1.87$, $p = .235$, $b = -.182$, $t (839) = -1.188$, $p = .235$).

Therefore, sex did not serve to moderate the relationship between self-efficacy and depression. Examination of the interaction plot (Figure 1) showed a buffering effect. As self-efficacy increased, depressive symptoms decreased for both males and females.

For hypothesis 1b, it was predicted that after controlling for the impact of the Gulf Oil Spill, sex would serve to modify the predictive ability of self-efficacy with respect to anxiety. Specifically, for females, self-efficacy and anxiety were predicted to share a greater percentage of variance than for males. To determine whether sex modifies the relationship between self-efficacy and anxiety when controlling for the perceived impact of the Gulf Oil Spill (see Table 5), it was first determined that self-efficacy and sex accounted for a significant amount of variance in anxiety ($R^2 = .146$, $F(3, 845) = 47.87$, $p < .001$). Next, the interaction term between sex and self-efficacy was added to the regression model and not only did the model remain significant ($R^2 = .149$, $F(4, 845) = 36.87$, $p < .001$), there was also not a significant change with the addition of the interaction term ($\Delta R^2 = .003$, $\Delta F(1, 841) = 3.45$, $p = .064$, $b = -.283$, $t(845) = -1.858$, $p = .064$). Therefore, sex did not moderate the relationship between self-efficacy and DASS-21 anxiety scores. Examination of the interaction plot (Figure 2) showed a buffering effect. As self-efficacy increased, anxiety decreased in both males and females.

For hypothesis 1c, it was predicted that after controlling for the impact of the Gulf Oil Spill, sex would serve to modify the predictive ability of self-efficacy as relates to stress. Specifically, for females, self-efficacy and stress were predicted to share a greater percentage of variance than for males. To determine whether sex modifies the relationship between self-efficacy and stress when controlling for the perceived impact of the Gulf Oil Spill (see Table 6),
it was first determined that self-efficacy and sex accounted for a significant amount of variance in stress ($R^2 = .123$, $F(3, 839) = 39.07, p < .001$). Next, the interaction term between sex and self-efficacy was added to the regression model and while the model remained significant ($R^2 = .124$, $F(4, 839) = 29.50, p < .001$), there was not a significant change with the addition of the interaction term ($\Delta R^2 = .001$, $\Delta F(1, 835) = .831$, $p = .362$, $b = -.141$, $t(839) = -.911$, $p = .362$).

Therefore, sex did not serve to moderate the relationship between self-efficacy and stress.

Examination of the interaction plot (Figure 3) showed a buffering effect. As self-efficacy increased, reports of stress decreased in both males and females.

For hypothesis 1d, it was predicted that after controlling for the impact of the Gulf Oil Spill, sex would serve to modify the predictive ability of perceived meaning in life as relates to depression. Specifically, for females, meaning and depression were predicted to share a greater percentage of variance than for males. To determine whether sex modifies the relationship between perceived meaning in life and depression when controlling for the perceived impact of the Gulf Oil Spill (see Table 7), it was first determined that perceived meaning in life and sex accounted for a significant amount of variance in DASS-21 depression scores ($R^2 = .234$, $F(3, 808) = 82.12, p < .001$). Next, the interaction term between sex and perceived meaning in life was added to the regression model and while the model remained significant ($R^2 = .235$, $F(4, 808) = 61.79, p < .001$), there was not a significant change with the addition of the interaction term ($\Delta R^2 = .001$, $\Delta F(1, 808) = .85$, $p = .356$, $b = -.139$, $t(808) = -.923$, $p = .356$). Therefore, sex did not serve to moderate the relationship between meaning and depression. Examination of the interaction plot (Figure 4) showed a buffering effect. As perceived meaning in life increased, reports of depression decreased in both males and females.
For hypothesis 1e, it was predicted that after controlling for the impact of the Gulf Oil Spill, sex would serve to modify the predictive ability of perceived meaning in life as relates to anxiety. Specifically, for females, perceived meaning in life and anxiety were predicted to share a greater percentage of variance than for males. To determine whether sex modifies the relationship between perceived meaning in life and anxiety when controlling for the perceived impact of the Gulf Oil Spill (Table 8), it was first determined that perceived meaning in life and sex accounted for a significant amount of variance in DASS-21 anxiety scores ($R^2 = .153$, $F(3, 815) = 48.72, p < .001$). Next, the interaction term between sex and perceived meaning in life was added to the regression model and not only did the model remain significant ($R^2 = .157$, $F(4, 815) = 37.76, p < .001$), there was also a significant change with the addition of the interaction term ($\Delta R^2 = .004$, $\Delta F(1, 815) = 4.29, p = .039$, $b = -.327$, $t (815) = -2.071$, $p = .039$). Therefore, sex moderated the relationship between perceived meaning in life and anxiety. Examination of the interaction plot (Figure 5) showed a buffering effect. As perceived meaning in life increased, reports of anxiety decreased in both males and females. However, a comparison of the slopes in the interaction plot shows that females experienced lower levels of perceived meaning in life at the higher levels of anxiety when compared to males. Furthermore, higher levels of perceived meaning in life were associated with comparable levels of anxiety for both males and females in this sample.

For hypothesis 1f, it was predicted that after controlling for the impact of the Gulf Oil Spill, sex would serve to modify the predictive ability of perceived meaning in life as relates to stress. Specifically, for females, meaning and stress were predicted to share a greater percentage of variance than for males. To determine whether sex modifies the relationship between perceived meaning in life and stress when controlling for the perceived impact of the Gulf Oil Spill,
Spill (Table 9), it was first determined that perceived meaning in life and sex accounted for a significant amount of variance in DASS-21 stress scores ($R^2 = .151, F(3, 810) = 47.79, p < .001$). Next, the interaction term between sex and perceived meaning in life was added to the regression model and while the model remained significant ($R^2 = .153, F(4, 810) = 36.31, p < .001$), there was not a significant change with the addition of the interaction term ($\Delta R^2 = .002, \Delta F(1, 810) = 1.72, p = .190, b = -.208, t (810) = -1.311, p = .190$). Therefore, sex did not serve to moderate the relationship between meaning and stress. Examination of the interaction plot (Figure 6) showed a buffering effect. As perceived meaning in life increased, reports of stress decreased in both males and females.

For hypothesis 2a, it was predicted that after controlling for the impact of the Gulf Oil Spill, race/ethnicity would serve to modify the predictive ability of self-efficacy as relates to depression. Specifically, for non-White individuals, self-efficacy and depression were predicted to share a greater percentage of variance than for White individuals. To determine whether race/ethnicity modifies the relationship between self-efficacy and depression when controlling for the perceived impact of the Gulf Oil Spill (Table 10), it was first determined that self-efficacy and race/ethnicity accounted for a significant amount of variance in DASS-21 depression scores ($R^2 = .150, F(3, 835) = 48.80, p < .001$). Next, the interaction term between race/ethnicity and self-efficacy was added to the regression model and while the model remained significant ($R^2 = .151, F(4, 835) = 36.89, p < .001$), there was not a significant change with the addition of the interaction term ($\Delta R^2 = .001, \Delta F(1, 831) = 1.12, p = .290, b = .155, t (835) = 1.059, p = .290$). Therefore, race/ethnicity did not serve to moderate the relationship between self-efficacy and depression in this sample. Examination of the interaction plot (Figure 7) showed a buffering
effect. As self-efficacy increased, reports of depression decreased in both non-White and White individuals.

For hypothesis 2b, it was predicted that after controlling for the impact of the Gulf Oil Spill, race/ethnicity would serve to modify the predictive ability of self-efficacy as relates to anxiety. Specifically, for non-White individuals, self-efficacy and anxiety were predicted to share a greater percentage of variance than for White individuals. To determine whether race/ethnicity modifies the relationship between self-efficacy and anxiety when controlling for the perceived impact of the Gulf Oil Spill (Table 11), it was first determined that self-efficacy and race/ethnicity accounted for a significant amount of variance in DASS-21 anxiety scores ($R^2 = .140, F(3, 840) = 45.50, p < .001$). Next, the interaction term between race/ethnicity and self-efficacy was added to the regression model and while the model remained significant ($R^2 = .140, F(4, 840) = 34.10, p < .001$), there was not a significant change with the addition of the interaction term ($\Delta R^2 = .000, \Delta F(1, 840) = .05, p = .818, b = .033, t(840) = .230, p = .818$). Therefore, race/ethnicity did not serve to moderate the relationship between self-efficacy and anxiety in this sample. Examination of the interaction plot (Figure 8) showed a buffering effect. As self-efficacy increased, reports of anxiety decreased in both non-White and White individuals.

For hypothesis 2c, it was predicted that after controlling for the impact of the Gulf Oil Spill, race/ethnicity would serve to modify the predictive ability of self-efficacy as relates to stress. Specifically, for non-White individuals, self-efficacy and stress were predicted to share a greater percentage of variance than for White individuals. To determine whether race/ethnicity modifies the relationship between self-efficacy and stress when controlling for the perceived impact of the Gulf Oil Spill (Table 12), it was first determined that self-efficacy and
race/ethnicity accounted for a significant amount of variance in DASS-21 stress scores \(R^2 = .120, F(3, 834) = 37.70, p < .001\). Next, the interaction term between race/ethnicity and self-efficacy was added to the regression model and while the model remained significant \(R^2 = .120, F(4, 834) = 28.25, p < .001\), there was not a significant change with the addition of the interaction term \(\Delta R^2 = .000, \Delta F(1, 830) = .016, b = -.018, t (834) = -.125, p = .901\).

Therefore, race/ethnicity did not serve to moderate the relationship between self-efficacy and stress in this sample. Examination of the interaction plot (Figure 9) showed a buffering effect such that as self-efficacy increased, reports of stress decreased in both non-White and White individuals.

For hypothesis 2d, it was predicted that after controlling for the impact of the Gulf Oil Spill, race/ethnicity would serve to modify the predictive ability of perceived meaning in life as relates to depression. Specifically, for non-White individuals, perceived meaning in life and depression were predicted to share a greater percentage of variance than for White individuals.

To determine whether race/ethnicity modifies the relationship between perceived meaning in life and depression when controlling for the perceived impact of the Gulf Oil Spill (Table 13), it was first determined that perceived meaning in life and race/ethnicity accounted for a significant amount of variance in DASS-21 depression scores \(R^2 = .225, F(3, 806) = 77.78, p < .001\). Next, the interaction term between race/ethnicity and meaning was added to the regression model and not only did the model remain significant \(R^2 = .230, F(4, 806) = 59.92, p < .001\), there was also a significant change with the addition of the interaction term \(\Delta R^2 = .005, \Delta F(1, 806) = 5.12, b = .321, t (806) = 2.263, p = .024\). Therefore, race/ethnicity moderated the relationship between meaning and depression. Examination of the interaction plot (Figure 10) showed a buffering effect. As perceived meaning in life increased, reports of depression decreased in both
non-White and White individuals. In examining the slope of the interaction plot, for non-White individuals, lower levels of perceived meaning in life were associated with lower levels of depression in comparison to White individuals. At average levels of perceived meaning in life, non-White and White individuals endorsed similar levels of depression. At higher levels of perceived meaning in life, non-White individuals reported higher levels of depression than did White individuals.

For hypothesis 2e, it was predicted that after controlling for the impact of the Gulf Oil Spill, race/ethnicity would serve to modify the predictive ability of perceived meaning in life as relates to anxiety. Specifically, for non-White individuals, perceived meaning in life and anxiety were predicted to share a greater percentage of variance than for White individuals. To determine whether race/ethnicity modifies the relationship between perceived meaning in life and anxiety when controlling for the perceived impact of the Gulf Oil Spill (Table 14), it was first determined that perceived meaning in life and race/ethnicity accounted for a significant amount of variance in DASS-21 anxiety scores ($R^2 = .141, F(3, 812) = 44.40, p < .001$). Next, the interaction term between race/ethnicity and meaning was added to the regression model and while the model remained significant ($R^2 = .142, F(4, 812) = 33.31, p < .001$), there was not a significant change with the addition of the interaction term ($\Delta R^2 = .000, \Delta F(1, 812) = .17, p = .681, b = .059, t (812) = .411, p = .681$). Therefore, race/ethnicity did not serve to moderate the relationship between meaning and anxiety. Examination of the interaction plot (Figure 11) showed a buffering effect. As perceived meaning in life increased, reports of anxiety decreased in both non-White and White individuals.

For hypothesis 2f, it was predicted that after controlling for the impact of the Gulf Oil Spill, race/ethnicity would serve to modify the predictive ability of perceived meaning in life as
relates to stress. Specifically, for non-White individuals, perceived meaning in life and stress were predicted to share a greater percentage of variance than for White individuals. To determine whether race/ethnicity modifies the relationship between perceived meaning in life and stress when controlling for the perceived impact of the Gulf Oil Spill (Table 15), it was first determined that perceived meaning in life and race/ethnicity accounted for a significant amount of variance in DASS-21 stress scores ($R^2 = .136, F(3, 807) = 42.11, p < .001$). Next, the interaction term between race/ethnicity and meaning was added to the regression model and while the model remained significant ($R^2 = .136, F(4, 807) = 31.56, p < .001$), there was not a significant change with the addition of the interaction term ($\Delta R^2 = .000, \Delta F(1, 807) = .06, p = .802, b = .036, t(807) = .250, p = .802$). Therefore, race/ethnicity did not serve to moderate the relationship between meaning and stress. Examination of the interaction plot (Figure 12) showed a buffering effect. As perceived meaning in life increased, reports of stress decreased in both non-White and White individuals.

**Mean Comparisons**

To test hypothesis 3, which examined differences in scores between males and females on measures of depression, anxiety, stress, self-efficacy, and perceived meaning in life, independent samples t-tests were conducted (Table 16). For depression, it was found that females ($n = 568, M = 15.13, SD = 13.09$) reported significantly more symptoms of depression than males ($n = 462, M = 12.40, SD = 12.24, t(1028) = -3.44, p = .001, d = .22$). For anxiety, it was found that females ($n = 574, M = 13.07, SD = 11.70$) reported significantly more symptoms of anxiety than males ($n = 460, M = 9.95, SD = 10.52, t(1032) = -4.45, p < .001, d = .28$). For stress, it was found that females ($n = 567, M = 17.58, SD = 12.39$) reported significantly more symptoms of stress than males ($n = 463, M = 14.49, SD = 12.01, t(998) = -4.05, p < .001, d = .25$). For self-efficacy, it
was found that females \( (n = 567, M = 26.15, SD = 6.96) \) reported a significantly lower level of self-efficacy than males \( (n = 465, M = 27.66, SD = 6.93, t(993) = 3.48, p = .001, d = .22) \). For meaning, females \( (n = 542, M = 18.71, SD = 5.76) \) and males \( (n = 455, M = 18.96, SD = 5.07) \) did not significantly differ in their meaning in life scores \( (t(995) = .70, p = .482, d = .05) \). These data support hypotheses 3a through 3e. Finally, while no specific hypothesis was offered with respect to sex differences in the Gulf Oil Spill variable, it is interesting to note that females \( (n = 498, M = 4.68, SD = .88) \) and males \( (n = 413, M = 4.61, SD = .80) \) did not significantly differ from one another \( (t(909) = 1.21, p = .227, d = .08) \). With regard to effect sizes, the aforementioned calculations are considered small (.10) to medium (.30) as noted by Cohen’s (1992) interpretive standards.

To test hypothesis 4, which examined differences in scores between non-White and White individuals on measures of depression, anxiety, stress, self-efficacy, and meaning, independent samples t-tests were conducted (Table 17). For depression, hypothesis 4a asserted that non-White individuals would report significantly higher levels of depression than White individuals. However, non-White \( (n = 299, M = 14.55, SD = 13.32) \) and White \( (n = 725, M = 13.35, SD = 12.46) \) individuals did not significantly differ in their depression reports \( (t(524) = -1.33, p = .185, d = .09) \), contradicting hypothesis 4a. For anxiety, non-White individuals \( (n = 303, M = 13.42, SD = 11.95) \) reported significantly more anxiety than White individuals \( (n = 724, M = 10.81, SD = 10.87, t(1025) = -3.40, p = .001, d = .23) \), supporting hypothesis 4b. For stress, it was hypothesized that non-White individuals would report significantly greater stress than White individuals. However, it was found that non-White \( (n = 299, M = 17.18, SD = 13.02) \) and White \( (n = 724, M = 15.58, SD = 11.82) \) individuals did not significantly differ in their stress reports \( (t(1021) = -1.91, p = .056, d = .13) \), which was incongruent with hypothesis 4c. For self-efficacy,
non-White individuals \((n = 301, M = 26.11, SD = 8.11)\) reported a significantly lower level of self-efficacy than White individuals \((n = 725, M = 27.16, SD = 6.42, t(1024) = 2.19, p = .029, d = .14)\), supporting hypothesis 4d. For meaning, it was found that non-White individuals \((n = 288, M = 19.06, SD = 6.27)\) and White individuals \((n = 704, M = 18.76, SD = 5.11)\) did not significantly differ in their reports of meaning in life \(t(990) = -.761, p = .447, d = .05\). These data support hypothesis 4e. Finally, while no specific hypothesis was offered with respect to racial/ethnic differences in the Gulf Oil Spill variable, it is interesting to note that non-White individuals \((n = 246, M = 4.80, SD = .78)\) reported a significantly higher level of impact than White individuals \((n = 659, M = 4.58, SD = .95, t(903) = -3.58, p < .001, d = .25)\). The aforementioned effect sizes range from small (.10) to medium (.30) by interpretive standards (Cohen, 1992).
IV. DISCUSSION

The purpose of this study was to investigate the interrelationships between indices of psychological distress, specifically depression, anxiety, and stress, with indices of protective factors, namely self-efficacy and perceived meaning in life. These relationships were considered with respect to the total sample, by sex, and by race/ethnicity, taking into account the perceived impact of the Gulf Oil Spill.

Descriptive Statistics and Reliability

Descriptive statistics were calculated for each measure administered (i.e., indices of depression, anxiety, stress, perceived meaning in life, self-efficacy, and perceived impact of the Gulf Oil Spill). The measures used to assess depression, anxiety, stress, self-efficacy, and perceived meaning in life yielded highly reliable scores. The perceived impact of the Gulf Oil Spill variable demonstrated respectable reliability.

A large portion of the sample endorsed symptoms of depression, anxiety, and/or stress in the severe and extremely severe ranges on the DASS-21. This was not a surprising finding. As noted previously, literature has shown that between 16% and 35% develop clinically significant symptoms of depression in the aftermath of disaster (e.g., Norris, Friedman, Watson et al., 2002; Palinkas, Petterson et al., 1993). These percentages encompass reports of females, males, non-White individuals, and White individuals. In the current study, whether examined by total sample, by sex, or by race/ethnicity, mean perceived levels of depression ranged from 12.40 (males) to 15.13 (females). These averages suggest that overall the sample would fall within the “mild” to “moderate” levels of depression based on the cut-off scores for the DASS-21
Moreover, more than one-fourth of the sample indicated that they experienced levels of depression that fall within the “severe” to “extremely severe” range. Thus, following the Gulf Oil Spill, many people reported experiencing some depression, and for some, these feelings of depression surpassed a threshold suggesting clinical significance. While diagnostic-specific information is not available for these data, and considering that no diagnosis should be made on the basis of a questionnaire score alone, it is quite possible that many of these individuals could be diagnosed with a disorder such as depression, as outlined in diagnostic systems such as the *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (*DSM-V*; American Psychiatric Association, 2013). While it is beyond the scope of this study, it is likely that the Gulf Oil Spill caused depression in some cases and exacerbated existing depression in other cases. Clearly, a large portion of individuals seeking mental health services following the Gulf Oil Spill were experiencing significant distress associated with depression.

In terms of anxiety, as previously noted the number of individuals who endorse clinically significant symptoms of anxiety post-disaster ranges from less than 1% to 46%, considering a range of samples and contexts (e.g., Arata et al., 2000; Galea et al., 2007; Palinkas, Pettersen, et al., 1993) In the current study, mean anxiety scores ranged from a low of 9.95 (males) to a high of 13.42 (non-White individuals). Based on the cut-off scores for the DASS-21, these averages fall predominantly in the “moderate” range In addition, almost one-third of the sample endorsed symptoms ranging from “severe” to “extremely severe”. Similar to interpretations for the depression scores, it is quite possible that many of these individuals could be diagnosed with an anxiety-related disorder. It is likely that the Gulf Oil Spill caused anxiety in some cases and exacerbated existing anxiety in other cases. What does seem apparent is that many people
seeking mental health services following the Gulf Oil Spill were experiencing significant distress associated with anxiety.

Stress is a common experience in the aftermath of a disaster, and stress can be experienced in many diverse ways (e.g., Bonanno et al., 2010; Gill & Picou, 1998; Norris, Watson, Friedman et al., 2002). In the current investigation, considering total scores as well as scores by sex and race/ethnicity, mean stress scores ranged between 14.49 (males) and 17.58 (females). These scores fall predominantly in the “mild” range. Moreover, one-fourth of the sample endorsed symptoms in the “severe” to “extremely severe” range. Similar to interpretations for the depression and anxiety scores, many of these individuals could be diagnosed with a stress-related disorder. While it is beyond the scope of the current study to answer definitively, the Gulf Oil Spill likely caused stress in some cases and exacerbated existing stress in other cases. Many people seeking mental health services following the Gulf Oil Spill were experiencing significant stress.

With respect to protective factors relevant to this study, self-efficacy data are discussed first, followed by the perceived meaning in life data. Considering the total sample, sex, and race/ethnicity, self-efficacy scores ranged from 26.12 (non-White individuals) to 27.66 (males). While cut-off scores are typically not used with the GSES, potential scores range from 10 to 40. Higher scores suggest greater levels of self-efficacy. Thus, responses tended toward the higher ranges of the scale. Normative data provided by the creator of the GSES has shown that average GSES scores among a sample of 1,594 individuals from the American adult population average to be 29.48 with a standard deviation of 5.13 (Schwarzer, 2014). Scores found in the current disaster-affected sample are lower than the community sample described above suggesting that disaster may have an impact on self-efficacy scores.
As for the perceived meaning in life data, considering the total sample, sex, and race/ethnicity in the current study mean PIL-SF scores ranged from 18.71 (females) to 19.06 (non-Whites). Cut-off scores are typically not used with PIL-SF data. Potential scores range between 4 and 28. Higher scores suggest greater levels of perceived meaning in life. In college samples, the PIL-SF tends to yield mean scores of 22.67-22.73 (Schulenberg et al., 2011; Schulenberg et al., 2014) Scores found in the current disaster-effected sample are lower than the college samples described in the normative studies for this measure. This suggests that disaster may have had an impact on perceived meaning in life scores.

With respect to the perceived impact of the Gulf Oil Spill variable, considering data by total sample, sex, and race/ethnicity, scores ranged from 4.58 (White individuals) to 4.80 (non-White individuals). Scores on the measure range between 4 and 7. This suggests that this sample perceived that their situations worsened due to the Gulf Oil Spill in terms of their finances, social relationships, and physical health. Perceived impact of a disaster, in this case the Gulf Oil Spill, contributes to associated depression, anxiety, and stress, and potentially influences the ability of individuals to successfully tap into their internal resources, such as self-efficacy and perceived meaning. Next, discussion turns toward the interrelationships among the study variables.

**Correlational Analyses**

To determine how each of the measures utilized in this study were associated with each other, correlational analyses were conducted. As expected, depression, anxiety, and stress were significantly and positively associated with each other. Moreover, self-efficacy and perceived meaning in life were significantly and positively associated with each other. In addition, measures of psychological distress (e.g., depression, anxiety, and stress) were significantly and negatively associated with measures of protective factors (e.g., self-efficacy and perceived
meaning in life). Interpretively, individuals who reported higher levels of depression, anxiety, and stress tended to report lower levels of self-efficacy and perceived meaning in life, and vice versa. While there is some variability, this interpretation is consistent whether the data are considered by total sample, by sex, or by race/ethnicity. These findings are also consistent with the available literature (e.g., Norris, Friedman, Watson, Byrne, et al., 2002; Park, 2013; Weinrich, Hardin, & Garrison, 1994).

The degree to which the perceived impact of the Gulf Oil Spill was associated with measures of psychological distress and protective factors was also examined. In terms of the former indices, the perceived impact of the Gulf Oil Spill was positively associated with psychological distress. This means that individuals who reported a greater perceived impact of the Gulf Oil Spill also reported higher levels of depression, anxiety, and stress. These findings held true whether considering the data by total sample, by sex, or by race/ethnicity. These data are also consistent with previous research (e.g., Chou et al., 2005; Nolen-Hoeksema & Morrow, 1991; Seplaki, Goldman, Weinstein, & Lin, 2006). With respect to the latter indices, the perceived impact of the Gulf Oil Spill showed varying results when correlated with self-efficacy and perceived meaning in life. When correlated with self-efficacy, perceived impact of the Gulf Oil Spill was negatively associated with perceived meaning such that greater perceived impact led to lower perceived meaning in life. This was true for females, males, and non-white individuals. However, for White individuals, perceived impact of the oil spill was not significantly associated with self-efficacy. For males and non-White individuals, greater perceived impact was associated with lower levels of perceived meaning in life. However, for females and White individuals, perceived impact was not significantly associated with perceived meaning in life. Previous research has shown that the impact of a disaster can negatively affect
positive psychological factors (Florian & Mikulincer, 2004; Niederhoffer & Pennebaker, 2009). For those non-significant relationships, it is possible that the perceived impact of the oil spill did not affect perceived meaning in life for some individuals such that while the impact may have caused psychological distress, females and White individuals were able to continue to perceive life as meaningful. Similarly for White individuals, perhaps they were able to continue to feel confident in their ability to cope and be successful despite the occurrence of the Gulf Oil Spill.

**Hypothesis Testing**

Hypothesis 1 suggested that after controlling for the impact of the Gulf Oil Spill, self-efficacy and perceived meaning in life would significantly predict depression, anxiety, and stress for males and females. However, sex would influence the strength of the relationship between these variables. For instance, for females, self-efficacy and meaning in life were predicted to share a greater percentage of variance in depression, anxiety, and stress than for males.

Hypothesis 1 received little support. Sex did not serve as a moderator in the relationship between self-efficacy and depression (hypothesis 1a), self-efficacy and anxiety (hypothesis 1b), self-efficacy and stress (hypothesis 1c), meaning and depression (hypothesis 1d), or meaning and stress (hypothesis 1f). While self-efficacy was a significant predictor of depression, anxiety, and stress and perceived meaning in life was a significant predictor of depression and stress, the strength of these relationships was not influenced by sex. Therefore, it is interpreted that for males and females, self-efficacy is similarly predictive of depression, anxiety, and stress and perceived meaning in life is similarly predictive of depression and stress. Thus, in this sample self-efficacy is equally important for males and females as a protective factor in terms of buffering against depression, anxiety, and stress. Additionally, perceived meaning in life is
equally important for males and females as a protective factor in terms of buffering against depression and stress.

Alternatively, sex was a significant moderator on the relationship between perceived meaning in life and anxiety (hypothesis 1e). For perceived meaning in life, both males and females showed a negative relationship with anxiety such that lower levels of perceived meaning in life were associated with higher levels of anxiety. For females, lower levels of perceived meaning in life were associated with lower levels of anxiety than for males. However, high levels of perceived meaning in life were associated with similar levels of anxiety for females and males. While perceived meaning in life was a significant predictor of anxiety, the relationship differed for males and females. Perceived meaning in life appears to be a more important protective factor in buffering against anxiety for males than for females such that being male is associated with a greater decrease in anxiety as meaning is increased.

Hypothesis 2, suggested that after controlling for the impact of the Gulf Oil Spill, self-efficacy and perceived meaning in life would significantly predict depression, anxiety, and stress for non-White individuals and White individuals. However, race/ethnicity would influence the strength of the relationship between these variables. For instance, for non-White individuals, self-efficacy and perceived meaning in life were predicted to share a greater percentage of variance in depression, anxiety, and stress than for White individuals. Hypothesis 2 garnered limited support. Race/ethnicity did not serve as a moderator on the relationship between self-efficacy and depression (hypothesis 2a), self-efficacy and anxiety (hypothesis 2b), self-efficacy and stress (hypothesis 2c), meaning and anxiety (hypothesis 2e), or meaning and stress (hypothesis 2f). While self-efficacy was a significant predictor of depression, anxiety, and stress and perceived meaning in life was a significant predictor of anxiety and stress, the strength of
these relationships was not influenced by race/ethnicity. Therefore, for non-White individuals and White individuals, self-efficacy is similarly predictive of depression, anxiety, and stress and perceived meaning in life is similarly predictive of anxiety and stress. Thus, in this sample self-efficacy is equally important for non-White individuals and White individuals as a protective factor buffering against depression, anxiety, and stress. Additionally, perceived meaning in life is equally important for non-White individuals and White individuals as a protective factor buffering against anxiety and stress.

Alternatively, race/ethnicity was a significant moderator on the relationship between perceived meaning in life and depression (hypothesis 2d). Both Non-White and White individuals showed a negative relationship between depression and perceived meaning in life (i.e., lower levels of perceived meaning in life were associated with higher levels of depression). For White individuals, lower levels of perceived meaning in life were associated with higher levels of depression in comparison to non-White respondents. At average levels of perceived meaning in life, both non-White and White individuals reported comparable levels of depressive symptoms. At higher reported levels of perceived meaning in life, White individuals reported higher levels of depression than did non-White individuals. While perceived meaning in life was a significant predictor of depression in both White and non-White participants, the relationship differed somewhat. Perceived meaning in life may be a more important protective factor in buffering against depression for White individuals than for non-White individuals such that being White is associated with a greater decrease in depression as perceived meaning in life is increased.

Hypothesis 3, which examined differences in scores between males and females on measures of depression, anxiety, stress, self-efficacy, and meaning, was supported. As predicted,
females reported significantly higher levels of depression, anxiety, and stress than did males (hypotheses 3a, 3b, and 3c). These findings are congruent with the literature suggesting that females tend to report higher levels of psychological distress than males in the aftermath of disaster (e.g., Norris, Friedman, Watson, Byrne, et al., 2002). Also as predicted, males endorsed significantly higher levels of self-efficacy than did females (hypothesis 3d). While there are some conflicting findings in the literature in terms of sex differences (Scholz et al., 2002; Schwarzer et al., 1997), the results of this study are congruent with many other studies that suggest that reports of self-efficacy post-disaster tend to be higher in males in comparison to females (e.g., Bosmans et al., 2013; Hirschel & Schulenberg, 2009). There were no significant differences between males and females in reported levels of perceived meaning in life (hypothesis 3e). Research on sex differences in perceived meaning in life is somewhat limited, and is noticeably absent considering the post-disaster context, warranting further clarification. The current findings are congruent with research in various contexts suggesting that reported levels of perceived meaning in life tend to be comparable for both males and females (Kiang & Fuligni, 2009; Ryff, 1995; Steger et al., 2009). Findings from this study are important to the fields of both perceived meaning in life (and more broadly positive psychology) and disaster mental health.

Hypothesis 4, which examined differences in scores between non-White and White individuals on measures of depression, anxiety, stress, self-efficacy, and perceived meaning in life, was partially supported. Non-White individuals reported higher levels of depression, anxiety, and stress than White individuals (hypotheses 4a, 4b, and 4c). However, differences in depression and stress scores were not statistically significant. Differences in levels of anxiety were statistically significant. For anxiety, these results are congruent with previous research
suggesting that non-White individuals may be more likely to develop symptoms of psychological distress such as anxiety post-disaster in comparison to White individuals (e.g., Norris, Friedman, Watson et al., 2002; Perilla, Norris, & Lavizzo, 2002). However, in this sample non-White and White individuals endorsed comparable levels of depression and stress. While these findings were not anticipated, it is important to recognize that non-White and White individuals seeking mental health treatment following the Gulf Oil Spill reported similar levels of depression and stress.

With further regard to hypothesis 4, as predicted, White individuals reported significantly higher levels of self-efficacy than did non-White individuals (hypothesis 4d), albeit the data approximate a small effect size. Several studies have shown differences based on race/ethnicity in terms of self-efficacy (e.g., Buchanan & Selmon, 2008; Constantine, Okazaki, & Utsey, 2010); however, there have been no studies examining these differences in the aftermath of a disaster. Therefore, these findings are an important addition to the self-efficacy literature. Previous research on perceived meaning in life has shown mixed findings in terms of differences in race/ethnicity in general as well as after a disaster (Alim et al., 2008; Feder et al., 2013; Holmes & Hardin, 2009; Ishida, 2011; Kalayjian et al., 2010; Suhail et al., 2009; Zhang & Xu, 2011). However, the majority of studies conducted on race/ethnicity differences in perceived meaning in life have been conducted outside of the United States. As predicted, the current study found no significant differences in levels of perceived meaning in life between non-White individuals and White individuals.

Overall, the results from the study analyses suggest that, regardless of sex or race/ethnicity, variables such as self-efficacy and perceived meaning in life are important protective factors to consider for individuals who have experienced a disaster. In terms of sex
differences in symptom reporting, females reported more psychological distress than did males. Males reported higher levels of self-efficacy, while reports of perceived meaning in life were comparable for males and females. In terms of differences in symptom reporting by race/ethnicity, significant differences only existed for anxiety and self-efficacy (i.e., non-White individuals reported greater anxiety and lower self-efficacy). White and non-White individuals reported comparable levels of depression, stress, and perceived meaning in life. Such findings are important additions to their respective literatures, with implications for intervention efforts discussed in greater detail below.

**Strengths, Limitations, and Directions for Research**

This study has many strengths. For example, the data come from a large sample of individuals directly affected by the Gulf Oil Spill, data that are difficult to collect for a variety of reasons (e.g., time, money, logistical challenges working with many different sites) (Drescher et al., 2012; 2014). Despite such challenges to data collection, it is crucial to add to the existing literature on the impact of disasters on mental health. Disasters such as the Gulf Oil Spill are unpredictable, but continued research will help to clarify the existing literature, allowing researchers and clinicians to develop a stronger foundation that will help to better understand and assist those affected by such events. Every disaster is different, with different characteristics and complexities that affect individuals in many ways. It is important to understand each disaster event in its own right. The Gulf Oil Spill is unique in that it is the largest disaster of its kind. While research in this area is growing, there is still little psychological research that has been published with individuals affected by the Gulf Oil Spill. Therefore, the current research will aid in guiding future educational, research, and intervention efforts in anticipation of the next oil spill. Continued research on technological and man-made disasters will afford opportunities for
mental health professionals, researchers, and the general public to gain a better understanding of the impact of disaster on well-being.

Another strength of this study is that the sample included almost as many males as females. This is important in terms of the mean comparison analyses utilized in this study such that similar sub-sample sizes have greater power (Cohen, 1988). While the sub-samples of racial/ethnic groups were not equal in number, the relatively large proportion of non-White individuals is considered a strength. This is especially important because research in psychology tends to lack representation of non-White individuals. Additionally, this study examined the mental health effects of the Gulf Oil Spill among treatment-seeking individuals. Research has shown that non-White individuals are less likely to seek psychological services (Dinwiddie, Gaskin, Chan, Norrington, & McCleary, 2013). Therefore, new research on the impact of disasters on the mental health of treatment-seeking non-White individuals will greatly add to the existing literature, providing a more comprehensive understanding of potential racial/ethnic differences in the variables studied.

An additional aspect of diversity that necessitates further review relates to socioeconomic status (SES). Individuals of lower SES tend to experience more psychological distress as a result of disaster experiences than individuals of higher SES (Norris et al., 2002). In another study, one that accessed the data used in the present investigation, individuals reporting income below the poverty line ($14,999 and below) experienced greater perceived psychological distress following the Gulf Oil Spill than those who had reported an income above the poverty line (Drescher et al., 2014). Based on such findings, future studies of disaster effects should examine psychological distress and protective factors with samples that include a greater range of diversity (e.g., socioeconomic status as well as different racial/ethnic groups). Moreover, researchers should
study groups that are non-treatment seeking as well as those that are treatment-seeking, as there may be differences across groups.

With regard to additional study strengths, the measures included in the study were chosen based on their strong psychometric support. The current data add to the literature on the psychometric properties of these measures. This is important because empirically supported measures are more likely to produce data that are representative of the sample studied (DeVellis, 2012). While this feature strengthens the study, the methodology employed may also be seen as a limitation. For example, the data collected were self-report, with only one source of information representing the symptoms endorsed. The literature would benefit from future studies that employ a multi-method approach to data collection (Brewer & Hunter, 2006; Drescher et al., 2012; 2014; Morgan, 2014; Teddlie & Tashakkori, 2009). Using different assessment methods and multiple sources of information can increase the quality of the data collected. Researchers can be increasingly confident in their results when there is thematic support across methods and sources. In this study, it was not feasible for multiple methods of assessment to be used given financial and logistical constraints of working with many diverse sites. Therefore, future research would benefit from taking multiple methods and multiple sources into account. For instance, self-report paper-pencil measures could be combined with clinical interviewing, as well as other sources of information such as available collateral records and collateral information from family members, spouses, friends and/or treatment providers. Thus, a greater and more comprehensive understanding of functioning and response to disaster could be achieved.

Additionally, there may have been biases in the self-report of the individuals completing the measures. For example, responders may have wanted to present themselves more favorably or more negatively based on their perceptions of who may review their data (e.g., researchers,
Nederhof (1985) and Booth-Kewley, Larson, and Miyoshi (2007) suggested that social desirability bias is the most common type of bias in research and can be expected when gathering data. The use of computer-assisted assessment may interact with social desirability. Fox and Schwartz (2002) found that the use of computers in data collection may increase participant social desirability. However, Dodou and de Winter (2014) conducted a meta-analysis which determined that levels of social desirability are comparable between computer-assisted data collection and paper-pencil data collection. Furthermore, several studies found that the use of computer-assisted assessment has increased the accuracy of self-report due to the elimination of an examiner (Kreuter, Presser, & Tourangeau, 2008; Morrison-Beedy, Cary, & Tu, 2006; Tourangeau & Yan, 2007). Nederhof (1985) suggested several methods to attempt to limit social desirability bias. These techniques include incorporating a social desirability scale among the other measures administered, use of forced-choice items, self-administration of the questionnaire, randomized response techniques, careful selection of the interviewers, and use of proxy subjects. In this study, respondents were exposed to forced-choice options, however, no other techniques were within the researchers’ control. Therefore, future research should implement the techniques suggested. Additional techniques regarding the implementation of disaster research in multiple contexts such as using face-to-face, telephone-based, web-based, school-based, and qualitative approaches have also been discussed in the literature in this area (e.g., Bromet & Havenaar, 2006; Galea, Bucuvalas, Resnick, Boyle, Valhov, & Kilpatric, 2006; La Greca, 2006; Palinkas, 2006; Schlenger & Silver, 2006).

Further relating to financial and logistical constraints, the current data were collected at a single point in time, after the disaster event. Therefore, it is not clear if symptoms were present prior to the disaster since there is no baseline data for comparison. However, because of the
unpredictable nature of many different kinds of disasters, baseline data are rarely obtained. This is a common design flaw in research on disaster impact (Drescher, 2012; 2014; Galea, Maxwell, & Norris, 2008; North & Norris, 2006). Information on the premorbid functioning of the current disaster-affected sample would reveal relevant diagnostic history and course of symptoms, which would aid in determining whether and to what extent the disaster experience, did in fact, facilitate or exacerbate symptomatology. While disaster researchers are typically not able to collect data both before and after the event, future research should strive to do this. One means of collecting baseline data could involve researchers establishing relationships with communities frequently affected by disasters (the Mississippi Gulf Coast being one example). In this sense, researchers could periodically administer measures and collect data via other means. Such methods would allow for comparisons before and after a given disaster, as well as across disasters when multiple events have occurred. In this way, our understanding of the cumulative impact of multiple disasters on well-being would be enhanced.

Another related limitation is that the analyses were correlational in nature and relationships between variables cannot be considered causal. This limitation is also associated with this study’s posttest design. To account for this issue in future studies, data could be collected over multiple time points. Research using such longitudinal designs will help to better inform our understanding of the relationship between disaster experiences, psychological distress, and protective factors associated with disasters. Additionally, this type of design would aid in the assessment of the course of symptomatology in the aftermath of disaster (Drescher et al., 2012; 2014). For example, while some data exist (e.g., Bosmans et al., 2013; Fullerton et al., 2004; Meewisse et al., 2011; van der Velden et al., 2013), continued research would allow
researchers as well as mental health professionals to gain a better understanding of how long specific symptoms typically persist for certain types of disasters.

As reported, a large number of treatment-seeking individuals in this study experienced clinically significant symptoms of depression, anxiety, and stress following the Gulf Oil Spill. This finding was consistent whether considering the total sample, sex, or race/ethnicity. These data gathered from this study are compelling and support the need for continued education, research, and intervention with respect to this technological disaster and its effects on mental health, presently and in the years to come.
LIST OF REFERENCES


Boxall, B. (2011, April 20). Post-spill Gulf environment appears to have escaped catastrophe, for now. *Los Angeles Times*, p.1A.


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doi:10.1037/0022-006X.68.2.290

doi:10.1089/ec0.2012.0009


doi:10.1007/s004060070034


doi:10.1016/j.psychres.2012.02.017

doi:10.1111/pcn.12022


APPENDIX 1. 21-ITEM DEPRESSION ANXIETY STRESS SCALES
21-Item Depression Anxiety Stress Scales

Please read each statement and place the number (0, 1, 2 or 3) in the blank beside each statement, which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did not apply to me at all</td>
<td>Applied to me to some degree, or some of the time</td>
<td>Applied to me a considerable degree, or a good part of the time</td>
<td>Applied to me very much, or most of the time</td>
</tr>
</tbody>
</table>

1. _____ I found it hard to wind down.
2. _____ I was aware of dryness of my mouth.
3. _____ I couldn't seem to experience any positive feeling at all.
4. _____ I experienced breathing difficulty (for example, excessively rapid breathing, breathlessness in the absence of physical exertion).
5. _____ I found it difficult to work up the initiative to do things.
6. _____ I tended to over-react to situations.
7. _____ I experienced trembling (for example, in the hands).
8. _____ I felt that I was using a lot of nervous energy.
9. _____ I was worried about situations in which I might panic and make a fool of myself.
10. _____ I felt that I had nothing to look forward to.
11. _____ I found myself getting agitated.
12. _____ I found it difficult to relax.
13. _____ I felt down-hearted and blue.
14. _____ I was intolerant of anything that kept me from getting on with what I was doing.
15. _____ I felt I was close to panic.
16. _____ I was unable to become enthusiastic about anything.
17. _____ I felt I wasn't worth much as a person.
18. _____ I felt that I was rather touchy.
19. _____ I was aware of the action of my heart in the absence of physical exertion (for example, sense of heart rate increase, heart missing a beat).
20. _____ I felt scared without any good reason.
21. _____ I felt that life was meaningless.
APPENDIX 2. CUT-OFF SCORES FOR THE DASS-21
### Cut-off Scores for the DASS-21

<table>
<thead>
<tr>
<th></th>
<th>Depression</th>
<th>Anxiety</th>
<th>Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>0 – 9</td>
<td>0 – 7</td>
<td>0 – 14</td>
</tr>
<tr>
<td>Mild</td>
<td>10 – 13</td>
<td>8 – 9</td>
<td>15 – 18</td>
</tr>
<tr>
<td>Moderate</td>
<td>14 – 20</td>
<td>10 – 14</td>
<td>19 – 25</td>
</tr>
<tr>
<td>Severe</td>
<td>21 – 27</td>
<td>15 – 19</td>
<td>26 – 33</td>
</tr>
<tr>
<td>Extremely Severe</td>
<td>28+</td>
<td>20+</td>
<td>34+</td>
</tr>
</tbody>
</table>
APPENDIX 3. GENERAL SELF-EFFICACY SCALE
General Self-Efficacy Scale

For each of the following statements, please indicate your choice that is closest to how true you think it is for you by putting the appropriate number in the blank beside each statement. The questions ask about your opinion. There are no right or wrong answers.

1. _____ I can always manage to solve difficult problems if I try hard enough.
2. _____ If someone opposes me, I can find the means and ways to get what I want.
3. _____ It is easy for me to stick to my aims and accomplish my goals.
4. _____ I am confident that I could deal efficiently with unexpected events.
5. _____ Thanks to my resourcefulness, I know how to handle unforeseen situations.
6. _____ I can solve most problems if I invest the necessary effort.
7. _____ I can remain calm when facing difficulties because I can rely on my coping abilities.
8. _____ When I am confronted with a problem, I can usually find several solutions.
9. _____ If I am in trouble, I can usually think of a solution.
10. _____ I can usually handle whatever comes my way.
APPENDIX 4. PURPOSE IN LIFE TEST – SHORT FORM
Purpose in Life test – Short Form

Directions: For each of the following statements, circle the number that would be most nearly true for you. Note that the numbers always extend from one extreme feeling to its opposite kind of feeling. “Neutral” implies no judgment either way; try to use this rating as little as possible.

1. In life I have:
   
   1 2 3 4 5 6 7

   no goals or aims at all (neutral) very clear goals and aims

2. My personal existence is:
   
   1 2 3 4 5 6 7

   utterly meaningless without purpose (neutral) very purposeful and meaningful

3. In achieving life goals I have:
   
   1 2 3 4 5 6 7

   made no progress whatsoever (neutral) progressed to complete fulfillment

4. I have discovered:
   
   1 2 3 4 5 6 7

   no mission or purpose in life (neutral) clear-cut goals and a satisfying life purpose
APPENDIX 5. DESCRIPTIVE STATISTICS
**Descriptive Statistics for Measures of Psychological Distress, Protective Factors, and Perceived Impact of the Gulf Oil Spill by Total Score, Sex, and Race/Ethnicity**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Sample</th>
<th>(N) or (n)</th>
<th>Min</th>
<th>Max</th>
<th>(M)</th>
<th>(SD)</th>
<th>(\alpha)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Depression (DASS-21)</strong></td>
<td>Total</td>
<td>1043</td>
<td>0</td>
<td>42</td>
<td>13.88</td>
<td>12.79</td>
<td>.94</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>568</td>
<td>0</td>
<td>42</td>
<td>15.13</td>
<td>13.09</td>
<td>.94</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>462</td>
<td>0</td>
<td>42</td>
<td>12.40</td>
<td>12.24</td>
<td>.93</td>
</tr>
<tr>
<td></td>
<td>Non-White</td>
<td>299</td>
<td>0</td>
<td>42</td>
<td>14.55</td>
<td>13.32</td>
<td>.94</td>
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<tr>
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<td>0</td>
<td>42</td>
<td>13.35</td>
<td>12.46</td>
<td>.94</td>
</tr>
<tr>
<td><strong>Anxiety (DASS-21)</strong></td>
<td>Total</td>
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<td>0</td>
<td>42</td>
<td>11.68</td>
<td>11.29</td>
<td>.89</td>
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<td></td>
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<td>574</td>
<td>0</td>
<td>42</td>
<td>13.07</td>
<td>11.70</td>
<td>.89</td>
</tr>
<tr>
<td></td>
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<td>460</td>
<td>0</td>
<td>42</td>
<td>9.95</td>
<td>10.52</td>
<td>.89</td>
</tr>
<tr>
<td></td>
<td>Non-White</td>
<td>303</td>
<td>0</td>
<td>42</td>
<td>13.42</td>
<td>11.95</td>
<td>.90</td>
</tr>
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<td></td>
<td>White</td>
<td>724</td>
<td>0</td>
<td>42</td>
<td>10.81</td>
<td>10.87</td>
<td>.89</td>
</tr>
<tr>
<td><strong>Stress (DASS-21)</strong></td>
<td>Total</td>
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<td>0</td>
<td>42</td>
<td>16.22</td>
<td>12.29</td>
<td>.92</td>
</tr>
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<td></td>
<td>Female</td>
<td>567</td>
<td>0</td>
<td>42</td>
<td>17.58</td>
<td>12.89</td>
<td>.92</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>463</td>
<td>0</td>
<td>42</td>
<td>14.49</td>
<td>12.01</td>
<td>.92</td>
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<td>Non-White</td>
<td>299</td>
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<td>42</td>
<td>17.17</td>
<td>13.02</td>
<td>.93</td>
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<td>0</td>
<td>42</td>
<td>15.58</td>
<td>11.82</td>
<td>.91</td>
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<tr>
<td><strong>Self-efficacy (GSES)</strong></td>
<td>Total</td>
<td>1010</td>
<td>10</td>
<td>40</td>
<td>26.82</td>
<td>7.00</td>
<td>.93</td>
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<td>10</td>
<td>40</td>
<td>26.15</td>
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<td>.93</td>
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<td></td>
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<td>468</td>
<td>10</td>
<td>40</td>
<td>27.66</td>
<td>6.93</td>
<td>.93</td>
</tr>
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<td>40</td>
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<td>8.11</td>
<td>.94</td>
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<td>728</td>
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<td>40</td>
<td>27.16</td>
<td>6.42</td>
<td>.92</td>
</tr>
<tr>
<td><strong>Meaning (PIL-SF)</strong></td>
<td>Total</td>
<td>1050</td>
<td>4</td>
<td>28</td>
<td>18.83</td>
<td>5.45</td>
<td>.88</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>542</td>
<td>4</td>
<td>28</td>
<td>18.71</td>
<td>5.76</td>
<td>.90</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>455</td>
<td>4</td>
<td>28</td>
<td>18.96</td>
<td>5.07</td>
<td>.85</td>
</tr>
<tr>
<td></td>
<td>Non-White</td>
<td>288</td>
<td>4</td>
<td>28</td>
<td>19.06</td>
<td>6.27</td>
<td>.91</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>704</td>
<td>4</td>
<td>28</td>
<td>18.76</td>
<td>5.11</td>
<td>.86</td>
</tr>
<tr>
<td><strong>Impact</strong></td>
<td>Total</td>
<td>923</td>
<td>4</td>
<td>7</td>
<td>4.63</td>
<td>.83</td>
<td>.74</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>515</td>
<td>4</td>
<td>7</td>
<td>4.61</td>
<td>.80</td>
<td>.71</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>413</td>
<td>4</td>
<td>7</td>
<td>4.68</td>
<td>.88</td>
<td>.77</td>
</tr>
<tr>
<td></td>
<td>Non-White</td>
<td>268</td>
<td>4</td>
<td>7</td>
<td>4.80</td>
<td>.95</td>
<td>.77</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>678</td>
<td>4</td>
<td>7</td>
<td>4.58</td>
<td>.78</td>
<td>.72</td>
</tr>
</tbody>
</table>

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; DASS-21 = 21 Item Depression Anxiety Stress Scale; GSES = General Self-Efficacy Scale; PIL-SF = Purpose in Life test – Short Form.
APPENDIX 6. PERCENTAGES
### Percentage of Individuals by Total Sample, Sex, and Race/Ethnicity Meeting Respective Qualitative Standards for the DASS-21 Depression, Anxiety, and Stress Scales

<table>
<thead>
<tr>
<th></th>
<th>Depression</th>
<th></th>
<th>Anxiety</th>
<th></th>
<th>Stress</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cut-off</td>
<td>% (N or n)</td>
<td>Cut-off</td>
<td>% (N or n)</td>
<td>Cut-off</td>
<td>% (N or n)</td>
</tr>
<tr>
<td>Normal</td>
<td>Total</td>
<td>0 – 9</td>
<td>41.6(466)</td>
<td>0 – 7</td>
<td>41.0(459)</td>
<td>0 – 14</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td></td>
<td>37.7(231)</td>
<td></td>
<td>36.4(223)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td>46.2(227)</td>
<td></td>
<td>46.8(230)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-White</td>
<td></td>
<td>39.9(130)</td>
<td></td>
<td>34.3(112)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>White</td>
<td></td>
<td>43.5(333)</td>
<td></td>
<td>44.8(343)</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>Total</td>
<td>10 – 13</td>
<td>9.2(103)</td>
<td>8 – 9</td>
<td>7.2(81)</td>
<td>15 – 18</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td></td>
<td>8.6(53)</td>
<td></td>
<td>7.5(46)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
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<td>10.0(49)</td>
<td></td>
<td>7.1(35)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-White</td>
<td></td>
<td>5.5(18)</td>
<td></td>
<td>7.7(25)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>White</td>
<td></td>
<td>11.0(84)</td>
<td></td>
<td>7.3(56)</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Total</td>
<td>14 – 20</td>
<td>15.5(174)</td>
<td>10 – 14</td>
<td>13.6(152)</td>
<td>19 – 25</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td></td>
<td>16.2(99)</td>
<td></td>
<td>13.2(81)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td>15.1(74)</td>
<td></td>
<td>14.1(69)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-White</td>
<td></td>
<td>19.0(62)</td>
<td></td>
<td>13.8(45)</td>
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</tr>
<tr>
<td></td>
<td>White</td>
<td></td>
<td>14.2(109)</td>
<td></td>
<td>13.3(102)</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>Total</td>
<td>21 – 27</td>
<td>8.8(98)</td>
<td>15 – 19</td>
<td>7.5(84)</td>
<td>26 – 33</td>
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<tr>
<td></td>
<td>Female</td>
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<td>9.5(58)</td>
<td></td>
<td>8.5(52)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td>7.9(39)</td>
<td></td>
<td>6.3(31)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-White</td>
<td></td>
<td>6.7(22)</td>
<td></td>
<td>6.4(21)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>White</td>
<td></td>
<td>9.3(71)</td>
<td></td>
<td>7.8(60)</td>
<td></td>
</tr>
<tr>
<td>Extremely Severe</td>
<td>Total</td>
<td>28+</td>
<td>18.1(202)</td>
<td>20+</td>
<td>24.1(270)</td>
<td>34+</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td></td>
<td>20.7(127)</td>
<td></td>
<td>28.1(172)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td>14.9 (73)</td>
<td></td>
<td>19.3(95)</td>
<td></td>
</tr>
<tr>
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<td>Non-White</td>
<td></td>
<td>20.6(67)</td>
<td></td>
<td>30.7(100)</td>
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<td>White</td>
<td></td>
<td>16.7(128)</td>
<td></td>
<td>21.3(163)</td>
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</tbody>
</table>

Note. % = percentage of sample; N = total sample size; n = sub-sample size.
APPENDIX 7. CORRELATIONS
### Correlations between Measures of Psychological Distress, Protective Factors, and Perceived Impact of the Gulf Oil Spill by Total Sample, Sex, and Race/Ethnicity

<table>
<thead>
<tr>
<th>Measure</th>
<th>Sample</th>
<th>Anxiety $r(N \text{ or } n)$</th>
<th>Stress $r(N \text{ or } n)$</th>
<th>Meaning $r(N \text{ or } n)$</th>
<th>Self-efficacy $r(N \text{ or } n)$</th>
<th>Impact $r(N \text{ or } n)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>Total</td>
<td>.79**(1018)</td>
<td>.86**(1016)</td>
<td>-.44**(966)</td>
<td>-.37**(1005)</td>
<td>.22**(880)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>.79**(554)</td>
<td>.86**(547)</td>
<td>-.45**(517)</td>
<td>-.39**(544)</td>
<td>.20**(472)</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>.78**(452)</td>
<td>.86**(456)</td>
<td>-.43**(436)</td>
<td>-.34**(447)</td>
<td>.25**(396)</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>.76**(708)</td>
<td>.84**(708)</td>
<td>-.47**(680)</td>
<td>-.36**(701)</td>
<td>.19**(632)</td>
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<tr>
<td></td>
<td>Non-White</td>
<td>.85**(291)</td>
<td>.89**(289)</td>
<td>-.39**(270)</td>
<td>-.40**(286)</td>
<td>.28**(232)</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Total</td>
<td></td>
<td>.84**(1019)</td>
<td>-.31**(972)</td>
<td>-.32**(1009)</td>
<td>.25**(884)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>.84**(553)</td>
<td>-.34**(526)</td>
<td>-.36**(552)</td>
<td>.25**(477)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>.83**(454)</td>
<td>-.26**(436)</td>
<td>-.26**(445)</td>
<td>.25**(396)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>.82**(708)</td>
<td>-.28**(682)</td>
<td>-.29**(702)</td>
<td>.23**(631)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-White</td>
<td>.87**(292)</td>
<td>-.36**(274)</td>
<td>-.38**(290)</td>
<td>.26**(237)</td>
<td></td>
</tr>
<tr>
<td>Stress</td>
<td>Total</td>
<td></td>
<td>-.32**(972)</td>
<td>-.30**(1004)</td>
<td>.23**(884)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>-.35**(518)</td>
<td>-.31**(544)</td>
<td>.23**(474)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>-.29**(436)</td>
<td>-.26**(447)</td>
<td>.24**(396)</td>
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<tr>
<td></td>
<td>White</td>
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<td>-.26**(698)</td>
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<tr>
<td></td>
<td>Non-White</td>
<td>-.36**(271)</td>
<td>-.38**(288)</td>
<td>.24**(235)</td>
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</tr>
<tr>
<td>Meaning</td>
<td>Total</td>
<td></td>
<td></td>
<td>.61**(980)</td>
<td>-.06(857)</td>
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<tr>
<td></td>
<td>Female</td>
<td>.64**(523)</td>
<td></td>
<td>-.02(453)</td>
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</tr>
<tr>
<td></td>
<td>Male</td>
<td>.57**(444)</td>
<td></td>
<td>-.12*(392)</td>
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</tr>
<tr>
<td></td>
<td>White</td>
<td>.57**(688)</td>
<td></td>
<td>-.02(618)</td>
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</tr>
<tr>
<td></td>
<td>Non-White</td>
<td>.70**(275)</td>
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<td>-.14*(223)</td>
<td></td>
<td></td>
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<tr>
<td>Self-efficacy</td>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>-.13**(885)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td>-.15**(475)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td>-.13*(498)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>White</td>
<td></td>
<td></td>
<td></td>
<td>-.07(632)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-White</td>
<td></td>
<td></td>
<td></td>
<td>-.24**(237)</td>
<td></td>
</tr>
</tbody>
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Note. * $p < 0.05$; ** $p < 0.001$; $r =$ correlation; $N =$ total sample size; $n =$ sub-sample size; DASS-21 = 21 Item Depression Anxiety Stress Scale; GSES = General Self-Efficacy Scale; PIL-SF = Purpose in Life test – Short Form.
APPENDIX 8. SEX MODERATING SELF-EFFICACY AND DEPRESSION
The Effects of the Impact of the Gulf Oil Spill, Self-Efficacy, and Sex Predicting DASS-21 Depression Scores and Moderating Effect (N = 483)

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<td>B</td>
<td>SE of B</td>
<td>β</td>
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<td>Impact</td>
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<td>.243</td>
<td>.187</td>
<td>1.412</td>
<td>.243</td>
<td>.187</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>-.269</td>
<td>.029</td>
<td>-.298</td>
<td>-.163</td>
<td>.094</td>
<td>-.180</td>
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<tr>
<td>Sex</td>
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<td>.401</td>
<td>.078</td>
<td>2.830</td>
<td>1.612</td>
<td>.227</td>
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<tr>
<td>Sex*Self-efficacy</td>
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<td></td>
<td></td>
<td>-.068</td>
<td>.057</td>
<td>-.182</td>
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<tr>
<td>$R^2$</td>
<td>.148</td>
<td></td>
<td></td>
<td>.149</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F_{\text{change}}$</td>
<td>48.361**</td>
<td></td>
<td></td>
<td>1.412</td>
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</tr>
</tbody>
</table>

Note. * $p < 0.05$; ** $p < 0.001$; $SE$ = Standard Error; Impact = perceived social, financial, and physical effects of the oil spill.
APPENDIX 9. SEX MODERATING SELF-EFFICACY AND ANXIETY
The Effects of the Impact of the Gulf Oil Spill, Self-Efficacy, and Sex Predicting DASS-21 Anxiety Scores and Moderating Effect (N = 849)

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<td>SE of B</td>
<td>β</td>
<td>B</td>
<td>SE of B</td>
<td>β</td>
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<tr>
<td>Impact</td>
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<td>.214</td>
<td>.219</td>
<td>1.455</td>
<td>.213</td>
<td>.219</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>-.201</td>
<td>.025</td>
<td>-.256</td>
<td>-.056</td>
<td>.082</td>
<td>-.071</td>
</tr>
<tr>
<td>Sex</td>
<td>1.249</td>
<td>.353</td>
<td>.114</td>
<td>3.771</td>
<td>1.402</td>
<td>.343</td>
</tr>
<tr>
<td>Sex*Self-efficacy</td>
<td></td>
<td></td>
<td>.093</td>
<td>.050</td>
<td></td>
<td>-.283</td>
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<tr>
<td>$R^2$</td>
<td>.146</td>
<td></td>
<td></td>
<td>.149</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F_{\text{change}}$</td>
<td>47.867**</td>
<td></td>
<td></td>
<td>3.451</td>
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<td></td>
</tr>
</tbody>
</table>

Note. * $p < 0.05$; ** $p < 0.001$; SE = Standard Error; Impact = perceived social, financial, and physical effects of the oil spill.
APPENDIX 10. SEX MODERATING SELF-EFFICACY AND STRESS
The Effects of the Impact of the Gulf Oil Spill, Self-Efficacy, and Sex Predicting DASS-21 Stress Scores and Moderating Effect (N = 843)

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<td>Se of B</td>
<td>β</td>
<td>B</td>
<td>Se of B</td>
<td>β</td>
</tr>
<tr>
<td>Impact</td>
<td>1.539</td>
<td>.244</td>
<td>.206</td>
<td>1.537</td>
<td>.244</td>
<td>.206</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>-.201</td>
<td>.029</td>
<td>-.227</td>
<td>-.120</td>
<td>.094</td>
<td>-.136</td>
</tr>
<tr>
<td>Sex</td>
<td>1.356</td>
<td>.403</td>
<td>.110</td>
<td>2.766</td>
<td>1.599</td>
<td>.224</td>
</tr>
<tr>
<td>Sex*Self-efficacy</td>
<td></td>
<td></td>
<td>-.052</td>
<td>.057</td>
<td>-.141</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>.123</td>
<td></td>
<td></td>
<td>.124</td>
<td></td>
<td></td>
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<tr>
<td>$F_{change}$</td>
<td>39.068**</td>
<td></td>
<td></td>
<td>.831</td>
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<td></td>
</tr>
</tbody>
</table>

Note. * $p < 0.05$; ** $p < 0.001$; SE = Standard Error; Impact = perceived social, financial, and physical effects of the oil spill.
APPENDIX 11. SEX MODERATING MEANING AND DEPRESSION
The Effects of the Impact of the Gulf Oil Spill, Meaning, and Sex Predicting DASS-21 Depression Scores and Moderating Effect (N = 809)

<table>
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<th>Model 2</th>
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<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE of B</td>
<td>β</td>
<td>B</td>
<td>SE of B</td>
<td>β</td>
</tr>
<tr>
<td>Impact</td>
<td>2.876</td>
<td>.472</td>
<td>.188</td>
<td>2.906</td>
<td>.473</td>
<td>.190</td>
</tr>
<tr>
<td>Sex</td>
<td>2.421</td>
<td>.769</td>
<td>.097</td>
<td>4.975</td>
<td>2.873</td>
<td>.200</td>
</tr>
<tr>
<td>Meaning</td>
<td>-.981</td>
<td>.071</td>
<td>-.425</td>
<td>-.766</td>
<td>.243</td>
<td>-.332</td>
</tr>
<tr>
<td>Sex*Meaning</td>
<td></td>
<td></td>
<td></td>
<td>-.134</td>
<td>.146</td>
<td>-.139</td>
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<tr>
<td>$R^2$</td>
<td>.234</td>
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<td></td>
<td>.235</td>
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<tr>
<td>$F_{change}$</td>
<td>82.118**</td>
<td>.852</td>
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</table>

Note. * $p < 0.05$; ** $p < 0.001$; SE = Standard Error; Impact = perceived social, financial, and physical effects of the oil spill.
APPENDIX 12. SEX MODERATING MEANING AND ANXIETY
The Effects of the Impact of the Gulf Oil Spill, Meaning, and Sex Predicting DASS-21 Anxiety Scores and Moderating Effect (N = 816)

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<tr>
<td>Impact</td>
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<td>.208</td>
<td>2.841</td>
<td>.434</td>
<td>.212</td>
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<td>Meaning</td>
<td>-.580</td>
<td>.065</td>
<td>-.291</td>
<td>-.138</td>
<td>.223</td>
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<tr>
<td>Sex</td>
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<td>7.864</td>
<td>2.601</td>
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<td>Sex*Meaning</td>
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<td></td>
<td>-.273</td>
<td>.132</td>
<td>-.327</td>
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<tr>
<td>$R^2$</td>
<td>.153</td>
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<td></td>
<td>.157</td>
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<tr>
<td>$F_{\text{change}}$</td>
<td>48.715**</td>
<td></td>
<td></td>
<td>4.289*</td>
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Note. * $p < 0.05$; ** $p < 0.001$; SE = Standard Error; Impact = perceived social, financial, and physical effects of the oil spill.
APPENDIX 13. SEX MODERATING MEANING AND STRESS
The Effects of the Impact of the Gulf Oil Spill, Meaning, and Sex Predicting DASS-21 Stress Scores and Moderating Effect (N = 811)

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<td>B</td>
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<tr>
<td>Impact</td>
<td>2.927</td>
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<td>.194</td>
<td>2.967</td>
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<tr>
<td>Meaning</td>
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<td>.073</td>
<td>-.300</td>
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<td>Sex</td>
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<td>.120</td>
<td>6.701</td>
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<tr>
<td>Sex*Meaning</td>
<td>2.978</td>
<td>.802</td>
<td>.120</td>
<td>6.701</td>
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<td>.153</td>
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<td>F change</td>
<td>47.792**</td>
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<td>1.718</td>
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Note. * p < 0.05; ** p < 0.001; SE = Standard Error; Impact = perceived social, financial, and physical effects of the oil spill.
APPENDIX 14. RACE/ETHNICITY MODERATING SELF-EFFICACY AND DEPRESSION
The Effects of the Impact of the Gulf Oil Spill, Self-efficacy, and Race/Ethnicity Predicting DASS-21 Depression Scores and Moderating Effect (N = 840)

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<td>B</td>
<td>SE of B</td>
<td>β</td>
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<td>Self-efficacy</td>
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<td>.029</td>
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<td>-.372</td>
<td>.086</td>
<td>-.415</td>
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<tr>
<td>Race/ethnicity</td>
<td>.030</td>
<td>.451</td>
<td>.002</td>
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Note. * $p < 0.05$; ** $p < 0.001$; SE = Standard Error; Impact = perceived social, financial, and physical effects of the oil spill.
APPENDIX 15. RACE/ETHNICITY MODERATING SELF-EFFICACY AND ANXIETY
The Effects of the Impact of the Gulf Oil Spill, Self-efficacy, and Race/Ethnicity Predicting DASS-21 Anxiety Scores and Moderating Effect (N = 845)

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<td>$F_{\text{change}}$</td>
<td>45.501**</td>
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Note. * $p < 0.05$; ** $p < 0.001$; $SE =$ Standard Error; Impact = perceived social, financial, and physical effects of the oil spill.
APPENDIX 16. RACE/ETHNICITY MODERATING SELF-EFFICACY AND STRESS
The Effects of the Impact of the Gulf Oil Spill, Self-efficacy, and Race/Ethnicity Predicting DASS-21 Stress Scores and Moderating Effect (N = 839)

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<td>SE B</td>
<td>B</td>
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<td>1.479</td>
<td>.245</td>
<td>.200</td>
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<td>.029</td>
<td>-.255</td>
<td>-.214</td>
<td>.086</td>
<td>-.244</td>
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<td>Race/ethnicity</td>
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<td>.349</td>
<td>1.644</td>
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<td>-.018</td>
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<td>.120</td>
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Note. * $p < 0.05$; ** $p < 0.001$; SE = Standard Error; Impact = perceived social, financial, and physical effects of the oil spill.
APPENDIX 17. RACE/ETHNICITY MODERATING MEANING AND DEPRESSION
The Effects of the Impact of the Gulf Oil Spill, Meaning, and Race/Ethnicity Predicting DASS-21 Depression Scores and Moderating Effect (N = 807)

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<td>.071</td>
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<td>.881</td>
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<td>Race/Ethnicity*Meaning</td>
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<td>$R^2$</td>
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<td>$F_{change}$</td>
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</tbody>
</table>

Note. * $p < 0.05$; ** $p < 0.001$; SE = Standard Error; Impact = perceived social, financial, and physical effects of the oil spill.
APPENDIX 18. RACE/ETHNICITY MODERATING MEANING AND ANXIETY
The Effects of the Impact of the Gulf Oil Spill, Meaning, and Race/Ethnicity Predicting DASS-21 Anxiety Scores and Moderating Effect (N = 813)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE of B</td>
</tr>
<tr>
<td>Impact</td>
<td>2.706</td>
<td>.440</td>
</tr>
<tr>
<td>Meaning</td>
<td>-.581</td>
<td>.065</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td>1.474</td>
<td>.811</td>
</tr>
<tr>
<td>Race/Ethnicity*Meaning</td>
<td></td>
<td>.056</td>
</tr>
<tr>
<td>(R^2)</td>
<td>.141</td>
<td></td>
</tr>
<tr>
<td>(F_{\text{change}})</td>
<td>44.400**</td>
<td>.169</td>
</tr>
</tbody>
</table>

Note. * \(p < 0.05\); ** \(p < 0.001\); SE = Standard Error; Impact = perceived social, financial, and physical effects of the oil spill.
APPENDIX 19. RACE/ETHNICITY MODERATING MEANING AND STRESS
The Effects of the Impact of the Gulf Oil Spill, Meaning, and Race/Ethnicity Predicting DASS-21 Stress Scores and Moderating Effect (N = 808)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE of B</td>
</tr>
<tr>
<td>Impact</td>
<td>2.877</td>
<td>.494</td>
</tr>
<tr>
<td>Meaning</td>
<td>-.663</td>
<td>.073</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td>.676</td>
<td>.914</td>
</tr>
<tr>
<td>Race/Ethnicity*Meaning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>.136</td>
<td>.136</td>
</tr>
<tr>
<td>$F_{change}$</td>
<td>42.112**</td>
<td>.063</td>
</tr>
</tbody>
</table>

Note. * $p < 0.05$; ** $p < 0.001$; SE = Standard Error; Impact = perceived social, financial, and physical effects of the oil spill.
Differences between Females and Males on Measures of Psychological Distress, Protective Factors, and Perceived Impact of the Gulf Oil Spill

<table>
<thead>
<tr>
<th>Measure</th>
<th>Sample</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>t(°)</th>
<th>p</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>Female</td>
<td>568</td>
<td>15.13</td>
<td>13.09</td>
<td>-3.44</td>
<td>&lt;.001</td>
<td>.22</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>462</td>
<td>12.40</td>
<td>12.24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>Female</td>
<td>574</td>
<td>13.07</td>
<td>11.70</td>
<td>-4.45</td>
<td>&lt;.001</td>
<td>.28</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>460</td>
<td>9.95</td>
<td>10.52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress</td>
<td>Female</td>
<td>567</td>
<td>17.58</td>
<td>12.39</td>
<td>-4.05</td>
<td>&lt;.001</td>
<td>.25</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>463</td>
<td>14.49</td>
<td>12.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Female</td>
<td>567</td>
<td>26.15</td>
<td>6.96</td>
<td>3.48</td>
<td>&lt;.001</td>
<td>.22</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>465</td>
<td>27.66</td>
<td>6.93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meaning</td>
<td>Female</td>
<td>542</td>
<td>18.71</td>
<td>5.76</td>
<td>.70</td>
<td>.482</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>455</td>
<td>18.96</td>
<td>5.07</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact</td>
<td>Female</td>
<td>498</td>
<td>4.68</td>
<td>.88</td>
<td>1.21</td>
<td>.227</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>413</td>
<td>4.61</td>
<td>.80</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. n = sample size; M = mean score; SD = standard deviation of scores; t = t-test results; d = effect size.
### Differences between Non-White Individuals and White Individuals on Measures of Psychological Distress, Protective Factors, and Perceived Impact of the Gulf Oil Spill

<table>
<thead>
<tr>
<th>Measure</th>
<th>Sample</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>Non-White</td>
<td>299</td>
<td>14.55</td>
<td>13.32</td>
<td>t(524) = -1.33, p = .185</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>725</td>
<td>13.35</td>
<td>12.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>Non-White</td>
<td>303</td>
<td>13.42</td>
<td>11.95</td>
<td>t(1025) = -3.40, p = .001</td>
<td>.23</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>724</td>
<td>10.81</td>
<td>10.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress</td>
<td>Non-White</td>
<td>299</td>
<td>17.18</td>
<td>13.02</td>
<td>t(1021) = -1.91, p = .056</td>
<td>.13</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>724</td>
<td>15.58</td>
<td>11.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Non-White</td>
<td>301</td>
<td>26.11</td>
<td>8.11</td>
<td>t(1024) = 2.19, p = .029</td>
<td>.14</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>725</td>
<td>27.16</td>
<td>6.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meaning</td>
<td>Non-White</td>
<td>288</td>
<td>19.06</td>
<td>6.27</td>
<td>t(990) = -.761, p = .447</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>704</td>
<td>18.76</td>
<td>5.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact</td>
<td>Non-White</td>
<td>246</td>
<td>4.80</td>
<td>.78</td>
<td>t(903) = -3.58, p &lt; .001</td>
<td>.25</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>659</td>
<td>4.58</td>
<td>.95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. $n =$ sample size; $M =$ mean score; $SD =$ standard deviation of scores; $t =$ t-test results; $d =$ effect size.
APPENDIX 22. MODERATING EFFECT OF SEX ON SELF-EFFICACY AND DEPRESSION
Modest moderating effect of sex on the relationship between self-efficacy and depression.
APPENDIX 23. MODERATING EFFECT OF SEX ON SELF-EFFICACY AND ANXIETY
Moderating effect of sex on the relationship between self-efficacy and anxiety.
APPENDIX 24. MODERATING EFFECT OF SEX ON SELF-EFFICACY AND STRESS
Moderating effect of sex on the relationship between self-efficacy and stress.
APPENDIX 25. MODERATING EFFECT OF SEX ON MEANING AND DEPRESSION
Moderating effect of sex on the relationship between meaning and depression.
APPENDIX 26. MODERATING EFFECT OF SEX ON MEANING AND ANXIETY
Moderating effect of sex on the relationship between meaning and anxiety.
APPENDIX 27. MODERATING EFFECT OF SEX ON MEANING AND STRESS
Moderating effect of sex on the relationship between meaning and stress.
APPENDIX 28. MODERATING EFFECT OF RACE/ETHNICITY ON SELF-EFFICACY AND DEPRESSION
Moderating effect of race/ethnicity on the relationship between self-efficacy and depression.
APPENDIX 29. MODERATING EFFECT OF RACE/ETHNICITY ON SELF-EFFICACY AND ANXIETY
Moderating effect of race/ethnicity on the relationship between self-efficacy and anxiety.
APPENDIX 30. MODERATING EFFECT OF RACE/ETHNICITY ON SELF-EFFICACY AND STRESS
Moderating effect of race/ethnicity on the relationship between self-efficacy and stress.
APPENDIX 31. MODERATING EFFECT OF RACE/ETHNICITY ON MEANING AND DEPRESSION
Moderating effect of race/ethnicity on the relationship between meaning and depression.
APPENDIX 32. MODERATING EFFECT OF RACE/ETHNICITY ON MEANING AND ANXIETY
Moderating effect of race/ethnicity on the relationship between meaning and anxiety.
APPENDIX 33. MODERATING EFFECT OF RACE/ETHNICITY ON MEANING AND STRESS
Moderating effect of race/ethnicity on the relationship between meaning and stress.
VITA

Brandy J. Baczwaski, M.A.

Personal Information:

brandyjoyb@gmail.com

Education:

Doctor of Philosophy
University of Mississippi
Clinical Psychology
Dissertation: Meaning, Self-Efficacy, and Psychological Distress: A study of Mississippi Coastal Residents Affected by the Gulf Oil Spill
Dissertation Advisor: Stefan Schulenberg, Ph.D.
Committee Members: Laura Johnson, Ph.D., C. Veronica Smith, Ph.D., and Steve Skultety, Ph.D.

Master of Arts
Minnesota State University, Mankato, May 2010
Clinical Psychology
Thesis Advisor: Sarah Sifers, Ph.D.
Committee Members: Jeffrey Buchanan, Ph.D. and Christine Black-Hughes, BSSW

Bachelor of Arts
University of South Dakota, May 2008
Major: Psychology
Minor: Spanish
Advisor: Jean Caraway, Ph.D.
Clinical Experience:

2014-present  University of Kansas Medical Center, Kansas City, Missouri
  • Position: Intern Therapist
  • Rotation 1: Adult Inpatient Unit (July-September)
    • Supervisor: Albert Poje, Ph.D.
    • Attended multidisciplinary treatment team rounds, conducted psychodiagnostic and neurocognitive assessments, and provided individual and group therapy.
    • Supervised three medical students on assessment and therapy.
  • Rotation 2: Child Inpatient Unit (October-December)
    • Supervisor: Teri Smith, Ph.D.
    • Attended multidisciplinary treatment team rounds; conducted psychodiagnostic, intelligence, and achievement assessments; provided feedback and recommendations to patients, family, and staff; provided individual and group therapy.
  • Rotation 3: Neurorehabilitation (January-March)
    • Supervisor: Monica Kurylo, Ph.D.
    • Attend multidisciplinary treatment rounds, administer cognitive and emotional screens, and provide feedback and education to patients, family, and staff.
    • Patients seen include those with traumatic brain injury, stroke, brain tumor, spinal cord injury, as well as those admitted to the rehabilitation unit due to motor vehicle accident, amputation, or burn injuries.
    • Supervise a practicum student on screening instruments and providing feedback.
  • Rotation 4: Osawatomie State Hospital (April-June)
    • Supervisor: Aileen Dennis, Ph.D.
    • Will attend multidisciplinary treatment team rounds, administer psychological evaluations, and provide individual and group therapy.
  • Ongoing: Outpatient psychotherapy
    • Supervisors: Edward Hunter, Ph.D., Albert Poje, Ph.D., Teri Smith, Ph.D., and Elizabeth Penick, Ph.D.
    • Conduct intake assessments, develop treatment plans, and provide individual and family therapy.
    • Administer psychodiagnostic, intelligence, achievement, and neurocognitive assessments and provide feedback and recommendations.
  • Ongoing: Telemedicine
    • Supervisors: Edward Hunter, Ph.D. and Elizabeth Penick, Ph.D.
    • Conduct intake assessments, develop treatment plans, and provide individual and family therapy via ITV.
• Underserved Track Minor Rotation: Rural Breast Cancer Survivor Program (July-December)
  • Supervisor: Christie Befort, Ph.D.
  • Conducted structured group therapy on issues in weight management among breast cancer survivors. Group topics included: social support, body image, managing stress, acceptance and commitment, decision-making, mindful eating, and relapse prevention.
• Minor Rotation: Consultation and Liaison (July-September; January-March)
  • Supervisor: Albert Poje, Ph.D.
  • Provide supportive therapy to hospital patients with coexisting medical and psychological issues.
• Minor Rotation: Bariatric Evaluation (October-December)
  • Supervisor: Edward Hunter, Ph.D.
  • Conducted structured interviews, administered self-report measures, and provided feedback and recommendations regarding readiness for bariatric surgery.
• Advanced Rotation: Adult Inpatient Unit (October-December)
  • Supervisor: Albert Poje, Ph.D.
  • Attended multidisciplinary treatment team rounds, conducted psychodiagnostic and neurocognitive assessments, and provided individual and group therapy.

2013-2014 Communicare, Oxford, Mississippi
  • Supervisors: Dixie Church, LMFT and Alan Gross, Ph.D.
  • Position: Intern Therapist
  • Conducted intake assessments, developed treatment plans, and provided individual and family therapy.

2012-2014 Psychological Services Clinic, University of Mississippi
  • Position: Graduate Therapist
  • Conducted intake assessments, developed treatment plans, and provided individual, group, and family therapy.

2012-2014 International Programs, University of Mississippi
  • Supervisor: Laura Johnson, Ph.D.
  • Position (2013-2014): Leader of the Ole Miss Global Spouses & Partners Connection Program
  • Conducted a weekly support group for international nontraditional students and significant others of faculty and students to connect with similar individuals, discuss acculturation issues, and learn about diversity.
  • Position (2012-2013): Co-leader of the International Ladies Club
  • Conducted a weekly support group for international women to connect with other international students, discuss acculturation issues, and learn about cultures and diversity.
2012-2014 Office of Student Disability Services, University of Mississippi
   • Supervisor: Stefan Schulenberg, Ph.D.
   • Position: Verification Specialist
   • Conducted interviews and reviewed documentation for students applying for academic accommodations.

2011-2014 Psychological Assessment Clinic, University of Mississippi
   • Supervisors: Stefan Schulenberg, Ph.D. and Scott Gustafson, Ph.D.
   • Provided comprehensive psychological evaluations to assess for Learning Disabilities, Attention-Deficit/Hyperactivity Disorder, mood/anxiety disorders, and personality disorders.

2012-2013 Region IV Batesville Crisis Stabilization Unit, Batesville, Mississippi
   • Supervisors: Julie Garner, LPC and Scott Gustafson, Ph.D.
   • Position: Ph.D. Intern
   • Conducted intake assessments; developed treatment plans; and provided individual, group, and family therapy. Additionally, obtained prior authorization and conducted continued services reviews through Mississippi Medicaid.

2009-2010 Adult Child and Family Services, Mankato, Minnesota
   • Supervisor: Jeanne Burkhart, Ph.D. Licensed Counseling Psychologist
   • Position: In Home Skills Therapist
   • Worked with adolescent girls with emotional regulation problems, negativistic attitude, and low self-esteem. Developed treatment plans and interventions included psychoeducation on feelings, thoughts, and behaviors; stress management; and individual and family skills training.

2009-2010 Counseling Center at Minnesota State University, Mankato
   • Supervisor: Steven P. Gilbert, Ph.D. Licensed Counseling Psychologist
   • Position: Behavioral Stress Management Skills Instructor
   • Taught stress management skills to clients referred by counselors in the center and provided follow-up sessions. Skills taught included Deep Diaphragmatic Breathing, Visualization, Time Management, Sleep Hygiene, Cognitive Rehearsal, Conversation Skills, and Progressive Muscle Relaxation.
   • Developed a new skills training program on overcoming worry.

Research Experience:

2010-2014 Meaning in Life Research Lab, The University of Mississippi
Graduate Research Assistant under the supervision of Stefan Schulenberg, Ph.D.
Duties included entering, analyzing, and interpreting data collected from assessments pertaining to meaning in life, suicidality, and disaster. Supervised undergraduate students in research projects. Provided ad hoc reviews of literature including book chapters and journal articles in the fields of positive psychology and assessment.
2012-2014  Ole Miss Disaster Preparedness, The University of Mississippi
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, and conducting focus groups related to disaster preparedness.

2010-2014  UM Clinical-Disaster Research Center, The University of Mississippi
Graduate Research Assistant and Consultant under the supervision of Stefan
Schulenberg, Ph.D. Duties included working as a consultant with a state mental
health agency in managing several service providers responding to natural
and man-made disasters.

2009-2010  Master of Social Work Department, Minnesota State University, Mankato
Graduate Assistant under the supervision of Nancy Fitzsimons, Ph.D., MSW.
Duties included entering, analyzing, and interpreting data collected from
assessments pertaining to the development and progress of students in the MSW
program. Assisted in compiling materials related to the accreditation process.

2008-2010  Childhood Resilience Research Lab, Minnesota State University, Mankato
Graduate Research Assistant under the supervision of Sarah Sifers, Ph.D. Duties
include reviewing and critiquing literature in the field of childhood resilience,
specifically issues related to childhood depressive symptoms and inattention.
Trained research assistants, collected data from participants for two studies related
to childhood resilience, scored measures, and entered data.

2008-2009  Cognitive Neuroscience Research Lab, Minnesota State University, Mankato
Graduate Research Assistant under the supervision of Jonathan Page, Ph.D.
Duties included reviewing and critiquing literature in the fields of Auditory
Processing Disorder, cognitive neuroscience, and the discrepancies in the number
of traffic collisions made by police officers in pursuit between the United States
and the United Kingdom. Collected data from participants for a study related to
neuroscience and timed judgments. Analyzed data using software compatible with
an Electroencephalograph.

2006-2008  Research lab of Dr. Jean Caraway, University of South Dakota
Undergraduate Research Assistant under the supervision of Jean Caraway, Ph.D.
Duties included reviewing and critiquing literature in the field of parental
bereavement with an emphasis on likelihood of replacement children. Provided
assistance to a parental bereavement study by a graduate student in the Clinical
Psychology Department. Developed questionnaire items and collected data
pertaining to replacement children in conjunction with this study.
Peer-Reviewed Publications:


Book Chapters:


Non-Peer-Reviewed Publications:


**Professional Presentations:**


Campbell, S. W., Walters, A. B., Baczwaski, B. J., Schulenberg, S. E., Drescher, C. F., & Smith, C. V. (2012, September). Disaster-related research and consultation: Lessons learned from two events. Symposium presented at the annual meeting of the Mississippi Psychological Association in Gulfport, MS.

Lambdin, K. K., Baczwaski, B. J., & Schulenberg, S. E. (2012, September). Examining the incremental utility of the Purpose in Life test - Short Form. Poster presented at the annual meeting of the Mississippi Psychological Association, Gulfport, MS.

Powers, A. K., Baczwaski, B. J., & Schulenberg, S. E. (2012, September). Comparison of levels of meaning in life and depression about students with and without PTSD. Poster presented at the annual meeting of the Mississippi Psychological Association, Gulfport, MS.

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 120th annual meeting of the American Psychological Association, Orlando, FL.

Baczwaski, B. J., Schultz, K. V., Aiena, B. J., Campbell, S. W., 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 120th annual meeting of the American Psychological Association, Orlando, FL.


Baczewaski, B. J. (2010, April 28). Simple relaxation strategies. Public education presentation at Minnesota State University, Mankato Women’s Center: Returning Women’s Discussion Group, Mankato, MN.
Baczewaski, B. J. (2010, April 19). *Relaxation training for stress management*. Public education presentation at Minnesota State University, Mankato H2O: Healing, Hope, and Opportunities Counseling Center Presentations, Mankato, MN.

Baczewaski, B. J. (2010, April 12). *Managing workplace worry*. Public education presentation at Minnesota State University, Mankato H2O: Healing, Hope, and Opportunities Counseling Center Presentations, Mankato, MN.

Baczewaski, B. J. (2010, April 12). *Accepting uncertainty*. Public education presentation at Minnesota State University, Mankato Discovering Yourself Counseling Center Workshops, Mankato, MN.


Baczewaski, B. J. (2009, November). *Overcoming worry*. Public education presentation at Minnesota State University, Mankato Discovering Yourself Counseling Center Workshops, Mankato, MN.


**Service Work**

2011-2013 American Foundation for Suicide Prevention

- Duties include: planning and organizing walk activities, recruiting volunteers and walkers, and coordinating day of event.
2005-2012  American Red Cross
  - Member of the Disaster Services Human Resources System.
  - Certified in the following ARC trainings: Disaster Services: An Overview, Introduction to Disaster Response, Disaster Assessment, Mass Care: An Overview, Emergency Assistance to Families, Shelter Simulation, Shelter Operations, Foundations of Disaster Mental Health, and Psychological First Aid.

Grants Applied for:


References:

Available upon request.