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# Nurses' Posttraumatic Stress, Level of Exposure, and Coping Five Years After Hurricane Katrina

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ACCEPTANCE

This dissertation, NURSES' POSTTRAUMATIC STRESS, LEVEL OF EXPOSURE, and COPING FIVE YEARS AFTER HURRICANE KATRINA, by Wendy Hill Park was prepared under the direction of the candidate's dissertation committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Nursing in the Byrdine F. Lewis School of Nursing in the College of Health and Human Sciences, Georgia State University.

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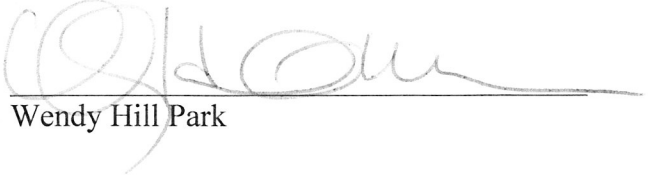

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ABSTRACT

NURSES' POSTTRAUMATIC STRESS, LEVEL OF EXPOSURE, and COPING FIVE YEARS AFTER HURRICANE KATRINA

by

WENDY HILL PARK

**Background:** Data indicate that first responders (emergency technicians, volunteers and firefighters) who participate in disaster situations are at risk of posttraumatic stress disorder (PTSD), yet little information exists about the risks for nurses. Because of nurses' unique role as professional and volunteer responders in times of disaster, there is a need to know more about risks of PTSD in this group.

**Methods:** Using a cross-sectional correlational design, associations between disaster exposure, problem focused coping (PFC), emotion-focused coping (EFC) and PTSD symptoms (Impact of Events Scale-Revised (IES-R) scale) were explored. A random sample of names (n= 995) was developed from a list of nurses registered in two Parishes from the New Orleans region. Each nurse was mailed an invitation to participate in an online survey. Non-responders were mailed up to three post-card reminders.

**Results:** The sample (N=108; 93.5 % female; 60.2% married, 75% Caucasian) was divided into two groups, nurses who participated in disaster activities (PIDA, n= 76) and those who did not (non-PIDA, n=32). Prevalence of PTSD in the PIDA nurses was

13.2%. Almost half the PIDA nurses (48.7%) reported experiencing symptoms of PTSD, and increased use of substances to cope (31.5%). Only 9.2% sought psychological care post event. Regression analyses, controlling for history of trauma, marital status, and gender found EFC accounted for a significant amount of the variance of symptoms of PTSD ($R^{2 =}$ 0.32, $F(1, 67) = 25.09$, $p < 0.001$) (B=0.4, SE=0.01, p<0.001). No mediating effects of either coping strategy were found on the relationship between exposure and PTSD.

**Discussion:** Prevalence of PTSD among the PIDA nurses was lower than other groups of professional responders (17.4% in firefighters, 15.4% in rescue workers), but greater than the general public (6.8%). The ongoing presence of PTSD in PIDA nurses five years after Hurricane Katrina is associated with increased use of EFC and substances, indicating that EFC strategies may be ineffective in reducing psychological stress. EFC may also result in unhealthy alternative coping methods and prolonged symptoms of PTSD following disaster participation. This supports the need to explore interventions to improve recovery outcomes, and demonstrates the need for ongoing psychiatric surveillance and intervention.

NURSES' POSTTRAUMATIC STRESS, LEVEL OF EXPOSURE, AND COPING

FIVE YEARS AFTER HURRICANE KATRINA

by

WENDY HILL PARK

A DISSERTATION

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"Life is a journey, not a destination."
― Ralph Waldo Emerson

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| | |
|---|---|
| EFC | Emotion Focused Coping |
| IES-R | Impact of Events Scale-Revised |
| NCPTSD | National Center for Posttraumatic Stress Disorder |
| NIH | National Institute of Health |
| Non-PIDA | Did Not Participate in Disaster Activities |
| PIDA | Participated in Disaster Activities |
| PFC | Problem Focused Coping |
| PTSD | Posttraumatic Stress Disorder |
| TDM | Tailored Design Method |
| TESS | Trauma Exposure Severity Scale |
| WOC-R | Ways of Coping –Revised |
| WTC | World Trade Center |

# CHAPTER I

## INTRODUCTION

Posttraumatic stress disorder (PTSD) in relief workers and first responders is a major concern following disaster response. PTSD is defined by the United States Department of Veterans Affairs as a psychological condition that impacts individuals who have experienced life-threatening and traumatizing experiences secondary to combat, natural disasters, violence, and severe accidents (United States Department of Veterans Affairs, 2009). Events such as the World Trade Center (WTC) bombing in 2001 and Hurricane Katrina in 2005 have provided an opportunity to investigate PTSD in groups involved in emergency and disaster response ( Adams, 2007; Cetin et al., 2005; Creamer & Liddle, 2005). Nurses participate in disaster response as both professionals and volunteers in relief teams, as well as in nearby hospitals and medical facilities. As participants in disaster response, they are susceptible to developing PTSD, which has the potential to cause psychological difficulties for years to come if not identified and treated appropriately. Only a few studies address the subject of nurses working in disaster response, and the majority focus on the period immediately following the event (Battles, 2007; French, Sole, & Byers, 2002; James, et al., 2007; Nasrabadi, Naji, Mirzabeigi, & Dadbakhs, 2007; Rhoads, Mitchell, & Rick, 2006). The nurse responder is at greater risk of developing PTSD if they are participating in a voluntary rather than a professional capacity (Hagh-Shenas, Goodarzi, Dehbozorgi, & Farashbandi, 2005; Lali, Bukmir, &

Ferhatovi, 2007). Understanding of psychological sequelae of being involved in a disaster response is important, and can lead to more effective training and post-disaster interventions that may reduce the likelihood of the development PTSD in disaster responders.

**Statement of the problem**

Hurricane Katrina resulted in a tragic and prolonged disaster response in the Gulf Coast region. This response entailed the mobilization of the National Guard, and the involvement of volunteer organizations such as The American Red Cross (ARC). Local medical facilities in New Orleans were severely impacted and faced dire circumstances; most were without electricity and many hospitals were evacuated. Nurses were faced with difficult decisions regarding patient management and their own personal circumstances. The severity of the situation resulting from Hurricane Katrina put nurses and other medical staff at risk for psychological stress disorders, including PTSD. At present, there is little information regarding the long term-effects of Hurricane Katrina on the nurses involved through either professional or volunteer participation.

**Background**

Nurses were exposed to the Hurricane Katrina disaster from a variety of perspectives. Some were already on the ground during the landfall of the hurricane working in local shelters and hospital emergency rooms. These nurses were already actively engaged in the disaster response through their professional or volunteer roles. Because these local nurses also had family and property at risk, they experienced the event at a different level than responders who came from other parts of the country, or were participating in the response from an area beyond the initial landfall.

Measuring trauma exposure by comparison of different studies is difficult because many investigators develop their own scales specific to each event, and populations studied often vary. PTSD and exposure to traumatic experiences has been extensively studied in groups of communities exposed to disaster (Abramson, Stehling-Ariza, Garfield, & Redlener, 2008; Adams, Ford, & Dailey, 2004; Bleich, Gelkopf, & Solomon, 2003; DeSalvo et al., 2007; Goto, Wilson, Kahana, & Slane, 2002; Guo et al., 2004; Hensley & Varela, 2008; Malta, 2009; Priebe et al., 2007), military exposure in combat (Bell & Nye, 2007; Campbell & Morrison, 2007; Cook et al., 2005; Dickerson et al., 2002; Dohrenwend, Turner, Turse, Lewis-Fernandez, & Yager, 2008; Frueh et al., 2005; Glass & Sim, 2006; Hoge, 2006; Koenen, Stellman, Sommer, & Stellman, 2008; Taft, Schumm, Panuzio, & Proctor, 2008), and emergency responders (Caldera, Palma, Penayo, & Kullgren, 2001; C.-M. Chang et al., 2003; Corneil, Beaton, Murphy, Johnson, & Pike, 1999; Dickerson et al., 2002; North et al., 2002). Exposure has been considered as either direct or indirect contact with the event (Long, Meyer, & Jacobs, 2007; Morren, Yzermans, van Nispen, & Wevers, 2005; North, et al., 2002; Silver, Holman, & McIntosh, 2002; Slottje et al., 2008; Zimering, Gulliver, Knight, Munroe, & Keane, 2006) or related to contact with individuals affected such as rescuers, survivors, and their families (Creamer & Liddle, 2005; Wang et al., 2000). Exposure has also been examined in the context of reduced personal and community resources (Benight, 2004; Chang et al., 2003; Elal & Slade, 2005; Hensley & Varela, 2008; Hobfoll, 2001; Long et al., 2007; Wang et al., 2000). PTSD is directly correlated with the level of exposure of individuals to traumatic events (Hensley & Varela, 2008; Hoge, 2006; Norris, 2002a; Taft, et al.,

2008). However, no consistent quantitative instrument has been used to measure exposure.

Longitudinal studies have identified PTSD in civilians, veterans and disaster responders years after the initial event (Brackbill et al., 2009; DiGrande, Neria, Brackbill, Pulliam, & Galea, 2011; Heinrichs et al., 2005; Koenen et al., 2008; McLaughlin et al., 2011; Osofsky et al., 2011; Smid, van der Velden, Gersons, & Kleber, 2011). Research conducted with members of the military, victims of violent crime, disaster survivors, and disaster responders demonstrated that PTSD has significant and lasting effects. Untreated PTSD can have a devastating impact on the individual and their family, with both physical and psychological effects (Al-Saffar, Borga, & Hallstroom, 2002; Gill, Szanton, Taylor, Page, & Campbell, 2009; Jamil, Nassar-McMillan, Salman, Tahar, & Jamil, 2006). PTSD can result in the loss of both personal relationships and occupational functioning (Hoge, 2006; Taft, Vogt, Mechanic, & Resick, 2007). Often this loss of functioning is related to problems with anger management and impulse control (Koenen et al., 2008; Solomon, Dekel, & Zerach, 2008), which may also result in family violence or self- mutilation (Sacks, Flood, Dennis, Hertzberg, & Beckham, 2008; Taft et al., 2008). In addition, substance abuse - particularly alcohol abuse - has been identified as a negative outcome of untreated PTSD which can have devastating effects (Adams, L.; Turner, M.; & Armstrong, , 2011; Bacharach, Bamberger, & Doveh, 2008; Kaysen et al., 2008; North et al., 2002; Osofsky et al., 2011; Stewart, Mitchell, Wright, & Loba, 2004).

While many studies related to PTSD have focused on other groups of responders, little has focused specifically on nurses. The psychological response of the nurse is a cause of concern for both volunteer organizations and local medical facilities which may

become involved in disasters like Hurricane Katrina. This may be particularly so if the psychological sequelae influence the ability of the nurse to be effective in future responses. There is a need to conduct studies which assist in identifying the long-term psychological consequences of nurses' participation in stressful experiences such as disaster responses.

The ability to deal psychologically with exposure to trauma has been shown to be related to the coping strategies used by the individual ( Benight & Harper, 2002; Chang, Lee, Connor, Davidson, & Lai, 2008; Staiger, Melville, Hides, Kambouropoulos, & Lubman, 2009). Coping strategies are the conscious or unconscious psychological approaches individuals employ in order to deal with stressful situations. Coping strategies may be healthy in nature, such as taking a time-out when feeling overwhelmed. They may also be unhealthy, such as using alcohol or abusing oneself or others to quell bad feelings. Studies specifically focused on disaster responders have also shown that their coping strategies are important in the development of psychological disorders in relationship to trauma exposure (Adams.; Turner; & Armstrong, 2011; Chung, Dennis, Easthope, Werrett, & Farmer, 2005; Karanci & Acarturk, 2005; Kenardy & Tan, 2006; Porter & Peace, 2007).

**Purpose Statement**

There has been little research on the development of exposure, coping, and PTSD focused specifically on nurses. Because of their unique role as professional and volunteer responders in times of disaster, there is a need to know more about the influences of exposure and coping strategies on the development of PTSD in this specific group. This study represents the beginning of a program of research aimed at improving the

psychological outcomes of nurses after disaster response. This approach is consistent with the current idea of using education as a preventative strategy through specific training. This prepares individuals to use problem-focused coping in psychologically traumatic experiences such as being taken as a prisoner of war (Taylor et al., 2009). The purpose of this project was to examine personal characteristics, level of exposure, coping strategies, and posttraumatic stress responses of nurses who were in the New Orleans region during Hurricane Katrina. This study explored the personal characteristics of the nurses, methods of coping, and PTSD in the sample. This study also explored the influence of level of exposure and coping in the development of PTSD in these nurses. This was be done by performing a cross-sectional correlational study in nurses five years after Hurricane Katrina.

**Significance of the Study**

Understanding the effects of exposure and coping on the psychological response of nurses after participation in a disaster response is of importance in maintaining the responders' physical and emotional wellness. It is also an area of interest for professionals and volunteer organizations for whom these responders participate. By increasing understanding of the association between level of exposure, coping strategies, and the development of PTSD we can gain insight into ways to improve training programs, as well as to develop effective post-disaster services and interventions. PTSD has long-term consequences both personally and professionally. Because of the integral role nurses' play in disaster response, there is a need to conduct studies which assist in identifying the long-term psychological consequences of their involvement in traumatic exposures.

**Theoretical Considerations**

The conceptual model for this study (Figure 1.) was derived from the Transactional Theory of Stress and Coping developed by Folkman and Lazarus (1987). This theory provided a framework in which coping is seen as a mediating factor in the development of PTSD. In contrast, other theories propose coping as the outcome variable influenced by the psychological response to stress (Folkman & Lazarus, 1985). Folkman and Lazarus theorize that there are two primary coping strategies, and these are identified as problem-focused coping (PFC) and emotion-focused coping (EFC). PFC strategies are engaged when the individual who is experiencing stress attempts to cope by altering the situation that is causing the distress. EFC strategies are based on the individual attempting to manage their emotional distress through an internally directed emotional focus (Folkman, 1984).

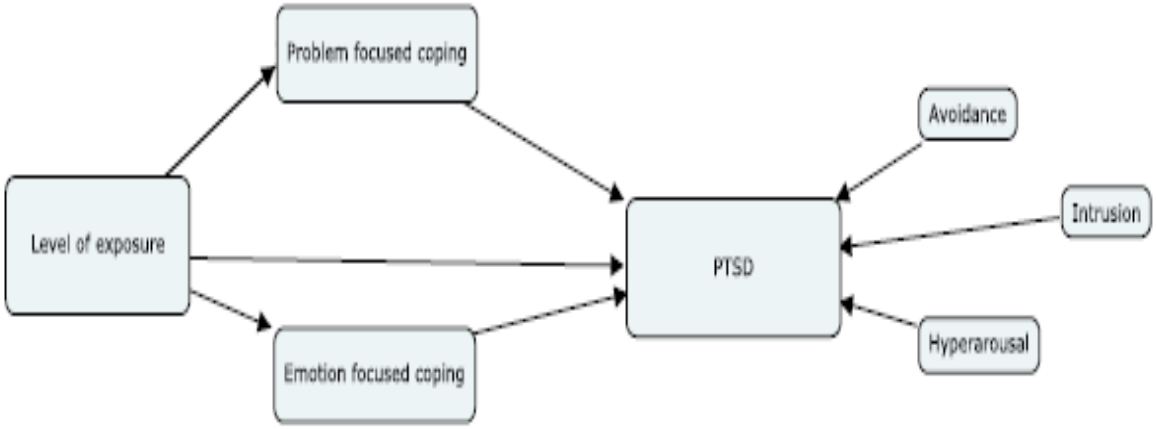


*Figure 1.*Conceptual model of the association of level of exposure, coping strategies, and symptoms of PTSD.

**Research Questions**

This study addressed the following research questions:

RQ1a. What are the demographic and psychosocial characteristics of a sample of nurses who were present in the New Orleans region during Hurricane Katrina?

RQ1b: What are the demographic and psychosocial characteristics associated with participating in Hurricane Katrina in a sample of nurses in the New Orleans region?

RQ2a. What is the prevalence of PTSD in a sample of nurses who were in the New Orleans region during Hurricane Katrina?

RQ2b. What proportion of a sample of nurses present in the New Orleans region during Hurricane Katrina participated in disaster related activities?

RQ2c. What is the prevalence of PTSD in a sample of nurses in the New Orleans region who participated in Hurricane Katrina?

RQ3a. What coping strategies were utilized in a sample of nurses who were in the New Orleans region during Hurricane Katrina?

RQ3b. What coping strategies were utilized in a sample of nurses in the New Orleans region that participated in Hurricane Katrina?

RQ4a. What is the association between level of exposure, coping strategies, and symptoms of PTSD in a sample of nurses in the New Orleans region who participated in the Hurricane Katrina?

RQ4b. Does coping mediate symptoms of PTSD in a sample of nurses in the New Orleans region who participated in Hurricane Katrina?

## Operationalization of Definitions

### PTSD.

PTSD was defined for this study as the presence of symptoms of avoidance, intrusion, and hyperarousal as defined in the Diagnostic and Statistical Manual IV. PTSD will be operationalized using the Impact of Events Scale–Revised (IES-R) (Weiss, 1997).

### Exposure.

Level of exposure was defined for this study as the nurses' level of contact with the event, survivors, and responders through participation in the disaster. Loss of resources was also considered in defining level of exposure. Direct exposure was defined as the individual's direct exposure to horrific or grotesque events, the survivors, or the survivors' families, and loss of resources. Indirect exposure was defined as the effects of the knowledge of the individuals' family being affected by the disaster event. This construct was operationalized using the Trauma Exposure Severity Scale (TESS) developed by Elal and Slade (2005) for measuring disaster exposure in disaster events.

### Coping.

Coping was defined for this study as the utilization of particular strategies employed secondary to exposure to the traumatic event. The coping strategies were broken down into PFC and EFC strategies. PFC strategies were defined as coping through the use of externally focused strategies. EFC strategies were defined as the use of coping through the use of internally focused strategies. Coping strategies were operationalized using the Ways of Coping Revised Questionnaire (WOCQ) (Folkman & Lazarus, 1985).

**Summary**

A great deal of the current literature is focused on generalized groups of responders or very specific groups such as firefighters. In contrast, there are few studies that examine the effects of participation in disaster response on nurses specifically (Alden, Regambal, & Laposa, 2008; Armagan, Engindeniz, Devay, Erdur, & Ozcakir, 2006; Chang et al., 2003; Chang et al., 2008; Guo et al., 2004; Hagh-Shenas et al., 2005; Long et al., 2007; Morren et al., 2005; Pfefferbaum et al., 2006; Zimering et al., 2006). Most of the current research related to nurses and PTSD is focused on nurses in the workplace rather than their participation in disaster response (Acker, 1993; Laposa, Alden, & Fullerton, 2003; Mealer, Shelton, Berg, Rothbaum, & Moss, 2007; Rassin, Kanti, & Silner, 2005). At present there is little data concerning how nurses who are involved in providing care during a disaster cope, or how this relates to the development of PTSD. One of the few studies in this area so far examined a group of Turkish relief workers who had participated in a Tsunami response. The nurses had significantly higher scores on the PTSD scale - the Clinician Administered Posttraumatic Stress Disorder Scale (CAPS-1) - demonstrating greater intensity of PTSD symptoms ($p = 0.01$) than the physicians ($p = 0.03$), who also had direct contact with survivors. In addition, female gender and less disaster experience were associated with higher CAPS-1 scores (Armagan, et al., 2006). This kind of study sheds light on the challenges that nurses face when participating in disaster response activities, and suggests that nurses engaged in professional and volunteer functions in disaster response may be considered a high-risk group the development of psychological stress.

Gaining insight into the nurses' coping strategies and experiences of PTSD may provide direction for training prior to disasters, and for planning support strategies for nurses following the event. Also, because much research has been focused on the immediate post-disaster period, there is a lack of knowledge of the long-term needs of the nurses after disaster experiences. Some research suggests that there may be an association between the professional role and the development of PTSD in some groups of responders (Hagh-Shenas et al, 2005; Perrin et al., 2007), but we do not know if this is related to the particular coping strategies that are used to deal with the emotional stress. Understanding these coping strategies will enable improved support for nurses in their essential roles during disaster response and potentially decrease the development of long term psychological distress.

# CHAPTER II

## REVIEW OF THE LITERATURE

Since Freud's earliest descriptions of traumatic neurosis, we have known that traumatic events may trigger psychological consequences in individuals (Ray, 2008). We now know that other violent crimes such as sexual and physical assault, child abuse, and military combat also result in posttraumatic stress disorder (PTSD). Although historically the diagnosis of PTSD has been largely associated with victims of violent crime and military veterans, it has also been associated with individuals involved in disasters such as the World Trade Center (WTC) attacks in 2001 (Adams, 2007; Baschnagel, Gudmundsdottir, Hawk Jr, & Gayle Beck, 2009; Boscarino, Figley, & Adams, 2004; Brackbill et al., 2009; Cetin et al., 2005; Creamer & Liddle, 2005; Dickerson et al., 2002; Elhai et al., 2006; Perrin et al., 2007) and Hurricane Katrina (Abramson et al., 2008; Battles, 2007; Broussard, Myers, & Meaux, 2008; Cepeda, Saint Onge, Kaplan, & Valdez; DeSalvo et al., 2007; McLaughlin et al., 2011; Osofsky et al., 2011).

Understanding of PTSD provides an opportunity for informing the science from several standpoints, and has the potential for usefulness in practice. PTSD research can increase understanding about factors which make certain individuals more vulnerable, and inform training. Research focused on understanding how individuals cope with PTSD also allows for improved therapeutic interventions for trauma survivors. Considering the impact of PTSD on disaster survivors and first responders after the WTC attacks and

Hurricane Katrina there is a particularly timely need to gain a greater understanding of the effects of trauma, coping, and the development of PTSD. The purpose of this chapter is to define the diagnosis of PTSD, describe characteristics of the individual and event which predispose the individual to development of PTSD, and review the state of the science as it relates to the level of exposure, coping, and the diagnosis of PTSD.

## Posttraumatic Stress Disorder (PTSD)

### Development of the Diagnosis.

The Diagnostic and Statistical Manual (DSM) was developed for the purpose of providing a framework for statistical analysis of psychiatric conditions, and provides the standard guidelines for the diagnosis of psychiatric disorders (Ray, 2008). The psychological symptoms experienced by trauma survivors were classified in the original DSM under Transient Situational Disorders as a Gross Stress Reaction connected to either a combat related or civilian catastrophe. The DSM-II, which was published in 1968, reclassified the psychological response to trauma under the classification of adjustment disorders as an Adjustment Reaction of Adult Life (Ray, 2008). These categories indicate the reactive and transitory way in which the psychiatric community regarded PTSD.

It was not until 1980, in the third version of the DSM (DSM-III), that PTSD was included as a distinct diagnosis. The need to redefine the diagnosis was partly a result of the increased attention to the traumatic stress responses of the returning Vietnam Veterans (Ray, 2008). The initial inclusion of the diagnosis of PTSD in the DSM-III and its removal from the adjustment disorder classification marked a major change in how the disorder was viewed. Adjustment disorders are characterized by a psychological response

to normal life stresses such as divorce or loss of a job. This is an important discerning characteristic which acknowledges that the symptoms of PTSD are responses to life stresses outside the range of normal experiences. In fact, an essential criterion for diagnosis of PTSD in the DSM-III requires that the individual must have experienced a stressor outside the range of the normal experiences anticipated in life, and that the experience must cause severe fear, horror, and helplessness. In the DSM-III PTSD also includes two distinct diagnostic criteria of reexperiencing and emotional numbing, along with a subcategory of symptoms such as insomnia and irritability. The DSM-III-R (the revised edition), consolidated this subcategory of symptoms into the criterion of hyperarousal (Ray, 2008).

**Diagnostic Criteria.**

In order to be diagnosed with PTSD the individual must present with a specific constellation of symptoms. The DSM-IV-TR, the most recent edition of the manual, includes six criteria that must be present for the diagnosis of PTSD. An essential prerequisite for the diagnosis is the individual's exposure to a significant and extreme stress which involves "actual or threatened death or serious injury, or threat to one's physical integrity" (APA, 2000, p. 467) (Criterion A). The DSM-IV-R not only allows inclusion of directly witnessed or experienced events, but also for having learned of such an event happening to a family member or close associate (APA, 2000). The addition of the diagnostic criteria to allow for the inclusion of the witnessing of a trauma to another person or the learning of the traumatic experience or loss of a loved one is a major move forward. The ability to allow the traumatic response to be experienced vicariously accounts for the experience of individuals who developed traumatic psychological

responses to events such as the assassination of President Kennedy, or the vicarious experience of PTSD by certain people across the country who witnessed the fall of the WTC. This is particularly relevant to this study because of the widespread and prolonged nature of the disaster caused by Hurricane Katrina. The level of exposure scale used for this study therefore includes exposure related to a loved one's experiences as well as the experiences of the nurse responder.

For the diagnosis of PTSD, in addition to having had exposure to the event (Criterion A), the individual must also have persistent re-experiencing of the traumatic event (Criterion B: intrusion). This involves more than just recalling of the event, and implies an unwanted and intrusive experience which may occur during the day as flashbacks, or be experienced at night as disturbing nightmares. Criterion C (Avoidance) involves the presence of three or more areas in which the individual is noted to be persistently avoiding triggers, or is experiencing emotional numbing related to activities or events which remind them of the incident. This may also be experienced as the refusal to discuss a traumatic event, avoiding using bridges or roads which were involved in the traumatic event, or becoming emotionally detached from family and friends. Criterion D (Hyperarousal) is the presence of two or more symptoms of hyperarousal as evidenced by insomnia, hypervigilence, irritability, or a heightened startle reflex. Criterion E requires that the symptoms must be present at a time 30 days or later following the triggering event. Finally, the individual must be experiencing a clinically significant level of distress and disruption in level of functioning to meet the diagnostic criteria for the disorder (APA, 2000).

Note that the specifiers of acute and chronic in PTSD relate to the presence of the symptoms over a specific time period. The acute specifier indicates the presence of symptoms for three months or less. The chronic specifier indicates the presence of symptoms for greater than three months. The onset of symptoms which appear more than six months following the event are defined as PTSD with delayed onset (APA, 2000).

**Effects of PTSD.**

***Early Effects.***

There are early and well-known responses to trauma that may cause some mild disruption to personal and occupational functioning. These include difficulty concentrating, nightmares about the event, and attempting to recreate the ending in the patient's mind. An elevated startle reflex, feelings of anger or irritability, or experiencing emotional numbness may be prevalent. Becoming tearful for unknown reasons, trouble sleeping, and becoming overprotective of family members is also common (Carson et al., 2007; NCPTSD, 2009; Rhoads et al., 2006).

Symptoms such as the loss of concentration can affect the individual's ability to focus and complete occupational tasks (Malta, 2009). Anxiety, depression, or somatic symptoms can also impact attendance at work. These early symptoms are anticipated to resolve within a few weeks after the event, and should not cause a substantial interference with functioning (NCPTSD, 2009; Rhoads et al., 2006). If these early effects become more disruptive and cause significant functional impairment, they may meet the criteria of Acute Stress Disorder. This disorder occurs in the 30 day period following an exposure to a traumatic event. Acute Stress Disorder has been identified as a predictor for the development of PTSD (Elklit & Brink, 2004). If these disruptive symptoms continue for

longer than a month then they may be a sign of the development of PTSD (NCPTSD, 2009; Rhoads et al., 2006).

***Long-Term Effects***.

PTSD has substantial long-term consequences (Ginzburg, Ein-Dor, & Solomon, 2009) including impaired cognitive functioning (Johnsen & Asbjornsen, 2008). Patients may suffer from fixation on the traumatic experience with intrusive thoughts or flashbacks, which have an impact on occupational, interpersonal, and overall functioning (Bovin, Jager-Hyman, Gold, Marx, & Sloan, 2008; Griffin, 2008). In an examination of 233 outpatients in a one year longitudinal study, Al-Saffar (2004) found that individuals without a prior diagnosis of PTSD, who met the criteria for PTSD after reevaluation, reported significantly poorer health and were significantly more likely to be working below their occupational capabilities.

Symptoms of avoidance are common and can cause difficulty in reconnecting with family and friends, increasing the symptoms of depression and isolation (Koenen et al., 2008). Additionally, hyperarousal may cause irritability or insomnia which could potentially interfere with emotional and physical closeness (Taft et al., 2008). Wives of veterans from Operation Iraqi Freedom have reported relationships have suffered and that there is an emotional disconnect in their husbands (Renshaw, Rodrigues, & Jones, 2008).

In order to conquer their symptoms, some individuals will find themselves unconsciously and compulsively re-exposing themselves to the traumatic experiences. This may include abusive behaviors to others, self-inflicted injury, and changes in the individuals' sense of safety in the world around them (Al-Saffar, 2004; Sacks et al., 2008). These symptoms may also be directed outward, resulting in disruption of

relationships with the family and impacting family functioning. Wives of veterans who had been prisoners of war reported that their husbands have difficulty with anger outbursts and verbal abuse (Solomon et al., 2008).

**Predisposing Factors.**

Understanding the factors which predispose an individual to the development of PTSD has several advantages. For example, this may be particularly relevant in disaster management activities, because knowledge of the factors which make an individual vulnerable to PTSD allows the disaster manager to use better decision making when determining assignments (Paton, 2003; Reissman & Howard, 2008). In addition, educating responders about predisposing factors that may make them more vulnerable to psychological distress allows them to make better decisions regarding the risk of psychological distress related to participation in particular tasks (Reissman & Howard, 2008).

***Gender.***

Female gender has been found to be a predisposing factor for the development of PTSD (Caldera et al., 2001; Moser, Hajcak, Simons, & Foa, 2007; Norris, 2002a; Priebe et al., 2007; Silver et al., 2002; Tolin & Foa, 2006). The National Center for Posttraumatic Stress Disorder (NCPTSD) reports that in the general population women are twice as likely as men to get PTSD in their lifetime, with rates reported to be 5% in men, and 10% in women (NCPTSD, 2009). Because approximately 94% of nurses are women (U.S. Department of Health and Human Services, 2004), and because nurses are engaged in disaster response activities in such a variety of ways, understanding the influence of gender on development of PTSD is particularly important.

One study of 33 Red Crescent relief workers consisting of doctors, nurses, and logistics workers who had responded to the 2004 Tsunami in Asia partially supported the predictive nature of female gender on the severity of PTSD symptoms. PTSD was diagnosed in 24.2 % of the sample, and although there were no significant differences between men and women in frequency of diagnosis of PTSD, the level of severity of symptoms measured by the CAPS-1 was significantly higher for women than men in the sample ($p = 0.01$) (Armagan et al., 2006). The landmark review of disaster literature by Norris et al. (2002) which provided an analysis of 160 disaster victims also supports gender as a predictor for PTSD. The review included qualitative research focused on disaster published between 1981 and 2001. One aspect of the analysis focused on psychological consequences and the development of PTSD in individuals who have experienced disaster. The analysis of the literature supported female gender and middle age as increasing the likelihood of PTSD.

Brewin, Andrews, and Valentine (2000) conducted a meta-analysis of 14 risk factors for the development of PTSD in adults who had trauma exposure. They reviewed the literature from 1980 through 2000, resulting in 85 datasets for analysis, looking for risk factors which were present across at least four studies. Both military and civilian studies were examined. The use of interrater reliability with 90%-100% agreement between raters and a ($k = 0.69, -1.00$) supported the reliability of the results. Previous trauma was found to be a predictor of later development of PTSD, but the meta-analysis did not find gender as a predictor across all studies. In particular female gender was not a significant predictor in the military studies, but was a significant predictor in civilians. This supports the hypothesis that exposure to trauma in the service of one's job or during

occupational functioning may be less psychologically distressing than exposure as a civilian. This could imply that there is a protective element to the participation in disaster in the service of one's job. It was noted that in the military samples, greater effects were associated with younger age, lack of education, race (minority status), history of childhood adversity, trauma severity, and lack of social support (Brewin, Andrews, & Valentine, 2000). This would indicate that although there may be some level of protection in serving in an occupational role, other factors also influence the responses to the traumatic exposure.

***Prior Trauma.***

A prior experience of trauma has been considered as a risk factor in subsequent experiences of a traumatic nature, and this is indeed supported by the literature (Hedtke et al., 2008; Ozer, Best, Lipsey, & Weiss, 2003). A longitudinal study of interpersonal violence also supports the potential of the prior violence as a predictor for the development of PTSD from a later event (Hedtke et al., 2008). This two-year study followed 4008 women, using structured telephone interviews to assess their lifetime violence history. The results confirmed that the odds of PTSD increased as incidence of lifetime violence increased (OR = 3.92, P <0.001) (Hedtkeet al., 2008). These results have implications when considering the frequent exposure of disaster responders to traumatic events in times when there are several events that require response in a short period of time.

However, not all research supports the theory that a prior trauma is a predictor of PTSD (Johansen, Wahl, Eilertsen, & Weisaeth, 2007; Littleton & Henderson, 2009). A study of 70 participants recruited from an emergency department in Oslo, Norway,

reported experience of violence which was not connected to a family member or partner (Johansen et al., 2007). Prior experience of violence or trauma was not shown to be predictive of PTSD in this sample of physical assault victims who had experienced non-domestic violence. This contrasts with other studies which show a predictive correlation between a history of abuse or violence and development of PTSD in response to a later traumatic experience (Brewin et al., 2000; Elklit & Brink, 2004; Nishith, Mechanic, & Resick, 2000; Ozer et al., 2003).

***Role: Volunteer vs. professional.***

One factor which has been shown to influence the development of PTSD in disaster responders is the individual's role in the response as a volunteer (Karanci & Acarturk, 2005). This is important because the very nature of disaster response requires the involvement of both professional responders as well as volunteers, and the nature of training may be significantly different for the two groups. For example, disaster responders may be employed at the local fire department, or may be faith-based volunteers from the local church. Volunteers are often not formally trained, and because of this they may be more susceptible to development of PTSD. Moreover, the volunteer may be less likely to receive the opportunities for ongoing support which are available to the professional responder. Some individuals in affected communities will experience the event as both a survivor, as well as a responder due to being in a certain place at a certain time or their subsequent participation in either professional or volunteer organizations such as the American Red Cross (ARC). In one area in Turkey, community members are organized to participate in Neighborhood Disaster Support teams in order to prepare for

events such as earthquakes which can be common in the region (Karanci & Acarturk, 2005).

There also appears to be a greater risk associated with participating in disaster response when the participant has limited affiliation with a disaster response organization. A study of disaster responders after an earthquake in Iran found that 34% of student workers reported experiencing symptoms of PTSD, with a much smaller number of the professionals (6% of Red Crescent Workers and 3% of firefighters) reporting symptoms (Hagh-Shenas et al., 2005). This is supported by Perrin et al. (2007) who examined the prevalence of PTSD in relationship to participants' level of exposure and occupational role in 28,962 rescue and recovery workers involved in the response to the WTC attacks. As part of the goal of the study, the researchers wanted to understand the effect of participating in the response as a volunteer or professional. They also wanted to understand the effect of participating in activities which were outside of the responder's usual occupational role. The findings indicated that there is a larger prevalence of PTSD in those who were unaffiliated with a response organization, ranging from 6.2% for police to 21.2% for volunteers. The study also identified a greater rate of PTSD in workers who participated in activities outside of their normal occupational role (Perrin et al., 2007). This supports the hypothesis that disaster responders who participate in their professional capacity will experience fewer negative psychological effects than volunteers. As well, those who participate with the lack of support of an agency or outside of their usual profession are at an even greater risk.

More studies are needed related to the possible protective nature of occupational role on the development of PTSD. This may address the issues of whether there are

protective factors in the professional's role, prior exposure to traumatic situations, personality traits and coping skills, or the training involved in their profession. By understanding the factors which influence the development of PTSD in professional and volunteer nurses who participate in providing care during disasters, we have the potential to target training activities toward those individuals who are more vulnerable to development of PTSD.

**Event-related factors.**

The nature of the traumatic event - whether it is natural or man-made - has an impact on the psychological consequences to the individual. A man-made disaster such as an act of terrorism may cause additional psychological distress for responders because of its purposeful nature which causes an internal level of uncertainty and an essential experience of fear that is not experienced in a natural disaster. For example, a review by Norris (2002a) found that the subjects of studies who had experienced mass violence or terrorism had severe levels of impairment when compared to those involved in natural disasters. In Hurricane Katrina there were multiple factors which impacted the responders. The fact that there were safety concerns related to going into the city to respond, and the fact that the local hospitals had to be evacuated amid dangerous circumstances increased the potential for further effects due to event-related factors. Also, many nurses who were working in the city were at risk of losing their own homes.

Norris (2002a) also identified the salience of the location of the disaster on psychopathology, and found increasing severity of impairment correlated with the decreasing economic development of the country affected. Norris found that 78% of the samples from underdeveloped countries experienced severe or very severe impairment as

a result of disaster. This makes sense considering the minimal resources available in these countries. As well, an increase in psychological consequences such as PTSD was more likely in events where there was an extended impact on the community (Norris, 2002a). This is especially relevant in considering the prolonged impact of Hurricane Katrina on New Orleans, with the largest impact on an area of the city that was known to be economically depressed - the Ninth Ward.

Research has clearly shown that predisposing factors can play a role in development of PTSD. The meta-analysis (Norris, 2002a, 2002b) supports the importance of individually-based factors, but also indicates the importance of factors related to the nature and severity of the trauma. This suggests that despite efforts to provide prevention activities aimed at preparing for exposure, there remain sufficient event-specific characteristics which may not be controlled, which play an important role in the development of PTSD.

### ***Level of Exposure.***

#### *Exposure defined.*

There are a variety of definitions of level of exposure in disaster research depending on the approach to the event being studied. Attempting to compare the variables of exposure between traumatic events that are experienced in substantially different ways presents a challenge. For example, level of exposure to the WTC attack has been defined in a number of ways: by the proximity to the traumatic event as direct or indirect exposure; as exposure to the survivors and their families; and as exposure to the deceased (Long et al., 2007; Ozer et al., 2003; Silver et al., 2002; Zimering et al., 2006). Some studies also include another measure of exposure related to loss of resources

(Benight, 2004; Sumer, Karanci, Berument, & Gunes, 2005). In the widely accepted conservation of resources theory, Hobfall (1989) identified the loss of personal and physical resources as an exposure variable which has a psychological effect on the individual. During the Hurricane Katrina disaster, nurses who were working and lived in the Louisiana area were an example of this. Nurses who were employed or responding as a volunteer and remained in service may have been at risk of losing their own residence and belongings. They would therefore be defined as experiencing a greater level of exposure than someone who was coming into the area to assist.

***Proximity.***

An individual's level of exposure is most often defined as the proximity of the individual to the event (Silver et al., 2002; Wang et al., 2000). The advent of mass media has allowed the exposure of individuals to traumatic events to be experienced in real time and has increased the potential for exposure to events in distant geographical areas. Even when exposed to horrific events from a great distance, individuals can still experience vicarious psychological distress (Collimore, McCabe, Carleton, & Asmundson, 2008). For example, the media provided 24 hour coverage of the WTC attacks and recovery efforts for weeks after the event, with continuous visual representations of the disaster. This extensive and repetitive exposure caused many individuals across the country to be traumatized.

One longitudinal nationwide survey after the WTC attacks defined severity of exposure by proximity (Silver et al., 2002) . The researchers used the following 5 point Likert scale: (0) indicating no first-hand exposure to the attacks as they happened; (1) watching the attack live on television; (2) talking on the phone with someone at the

WTC, Pentagon, or on a plane during the attacks; (3) being close enough to hear or feel the attacks; (4) being close enough to witness the attacks, the building collapse, or people being evacuated, falling, or jumping from the WTC or the Pentagon; (5) being within a few blocks of the WTC, Pennsylvania crash site, or the Pentagon at the time of the attacks (Silver et al., 2002). This demonstrates the distance with which one could still be considered exposed despite geographic proximity. One could be at home across the country and watching the event and still be considered mildly exposed to the event.

***Direct and indirect exposure.***

Direct exposure refers to being close to or at the disaster scene, and being exposed to the survivors, responders, or to the deceased. Nurses may be exposed to any or all of these scenarios either as volunteers, or as professionals in their occupational role. Nurses who were working in the hospitals, clinics, and shelters in New Orleans during the landfall of Katrina were directly exposed to the actual event. In addition, they were exposed to the survivors who required medical care in the emergency rooms, and patients who were already receiving medical care and required evacuation to more stable medical environments. Nurses involved in volunteer activities were exposed to the scene during search and rescue operations and through contact with the survivors and responders. Nurses in receiving facilities in outlying areas were exposed to the survivors as they arrived to seek assistance.

Direct exposure is associated with an increase in symptoms of PTSD (Norris, 2002a; Zimering et al., 2006). A study of 109 ground zero relief workers defined direct exposure as involvement at the disaster site, and indirect exposure as witnessing the survivors verbal recounting of their experience (Zimering et al., 2006). Another survey

of 3055 ARC disaster workers who responded to the WTC attacks defined direct exposure as involvement at the disaster site, and also with the responders, the deceased, and survivors and their families. The indirect exposure group was identified as those responders who had no involvement at the site, or with responders, survivors, or the deceased (Long et al., 2007). Because exposure is defined in a variety of ways this can make the comparison of findings difficult quantitatively, however, the attempt to quantify this aspect of the conceptual representation in studies often outweighs the disparity.

A correlation between combat exposure and PTSD was found using structural equation modeling in a sample of 1,512 Veterans from Operation Desert Storm. This study identified an association between higher levels of combat exposure and PTSD symptom severity ($p < 0.001$). This association was not gender specific. Combat exposure also negatively correlated with family functioning (Taft et al., 2008). This observation is consistent with other research and reflects the types of issues which may be problematic in reintegration after service in combat (Renshaw et al., 2008; Solomon et al., 2008).

It should be emphasized that if an individual is not directly exposed to an event this does not preclude the development of PTSD. Although there is greater support for the development of PTSD in individuals who have been directly exposed to traumatic events, there is also evidence to support the presence of PTSD in individuals who are indirectly exposed (Zimering et al., 2006).

**Coping**

Coping is defined by Folkman, Lazarus, Gruen and DeLongis (1986) as the individual's cognitive and behavioral effort to manage the emotional responses resulting from exposure to stressful experiences. When an individual encounters a stressful situation, they utilize coping strategies to assist them in handling the stressor, and to assist in the processing of the experience in a way that does not have a negative impact on their life. However some coping strategies are less effective than others in achieving positive long-term outcomes. This study used a theoretical framework derived from the Folkman and Lazarus transactional theory of stress and coping. This theory proposed that individuals who experience stress appraise the stressor and their own ability to handle the stressor. They then used two primary coping strategies in order to address the psychological response to stressors. The two strategies, PFC and EFC, as described earlier are utilized by individuals when confronted by a stressful experience (Folkman & Lazarus, 1980). These two primary coping strategies can also be subcategorized for further delineation. This study used the coping and psychological response aspect of the stress and coping theory to examine the research questions. Specifically, it used the PFC and the EFC constructs to define the coping strategies (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986).

PFC strategies are engaged when an individual experiencing stress attempts to cope by altering the situation that is causing the distress. PFC may be further broken down into the strategies of planful problem solving and confrontive coping. EFC strategies are based on the individual attempting to manage their psychological distress through an internally directed emotional focus. EFC can further be broken down into

strategies of distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, and positive reappraisal (Folkman, Lazarus, Dunkel-Schetter, et al., 1986). Although these additional subcategories of both PFC and EFC have been identified, the primary constructs of PFC and EFC were used in this study because of their relevance to current training approaches and intervention strategies which are based on these larger constructs.

The type of coping strategy engaged can result in a positive or negative outcome depending on the strategies used and on the specific situation. The use of EFC strategies (such as distancing) may be experienced as dissociative episodes by trauma survivors in future exposures to triggering events. The use of alcohol to cope with the symptoms of intrusive thoughts or insomnia related to hyperarousal can result in the loss of a marriage or a job. In contrast, the use of PFC (such as planful problem-solving) to organize a chaotic event such as a disaster response may result in a promotion or possible recognition in the occupational setting.

**Influence of coping on PTSD.**

The ability to identify strategies which influence the development of psychiatric conditions such as PTSD provides insight into methods for training and treatment. It is known that coping can influence the development of psychiatric disorders, and specifically coping has been shown to have an effect on the development of PTSD. The use of PFC has been found to be a more effective coping strategy in groups of trauma survivors (Braun-Lewensohn et al.,2009; Chang et al., 2003; Chung et al., 2005; Goldenberg & Matheson, 2005; Kenardy & Tan, 2006; Lali et al., 2007). A recent study which surveyed 228 survivors of Hurricane Katrina examined the association of coping

strategies, social support, and hope, in relationship to psychological stress. The study found that PFC was negatively associated with the development of PTSD (Glass, Flory, Hankin, Kloos, & Turecki, 2009). This finding is supported by studies that have examined other groups of responders. Eighty-four firefighters were surveyed five months after participating in the response to a 7.3 (Richter scale) earthquake in Taiwan. The rate of PTSD in the rescue workers was found to be 24% using the IES. Firefighters who used more EFC strategies were found to have significantly greater issues with psychiatric morbidity (chi square = 4.58, p = 0.03) (Chang et al., 2003).

Further support for the relationship between the use of certain coping strategies and the development of PTSD has been found in studies on the military. Because of the potential for military personnel to become prisoners of war, they are trained to prepare for this possibility. This involves classroom-based didactic training, as well as simulation exercises which utilize mock captivity exercises. Such training results in the development of acute stress symptoms for some individuals (Taylor et al., 2009). A prospective study of acute stress reactions to intense training exercises in 35 Navy personnel found that EFC predicted acute stress symptoms related to their training experience, whereas PFC did not (Taylor et al., 2009). This is particularly relevant because acute stress symptoms are a known predisposing factor for PTSD (Elklit & Brink, 2004). Consistent with this, a study of Palestinian political prisoners found the use of PFC was associated with lower levels of short-term posttraumatic stress symptoms (Kanninen, PunamÃ¤ki, & Qouta, 2002). One finding of particular interest was that EFC was associated with lower levels of posttraumatic stress symptoms in the longer term. More research is needed to

determine if this study was an outlier, or if there is a relationship between the coping strategies over time. This study seeks to address this question.

**Influence of exposure on coping.**

There are a few studies that have examined nurses' exposure to stress and the use of EFC or PFC. Studies have primarily focused on the role of coping in relationship to nurses' exposure to occupational stress. In rural areas, higher levels of stress were associated with an increase in use of EFC in local nurses (LeSergent & Haney, 2005). This observation is supported by other studies that indicate greater use of EFC predicts an increased level of work-related stress (Chang et al., 2007; Gellis, 2002). Situations involving occupational exposure to stress were also associated with an increased use of task-oriented and PFC coping strategies (Gellis, 2002). This could indicate that the occupational role is psychologically protective.

Direct exposure to traumatic events has been found to have an influence on the use of particular coping strategies. This was studied in a group of adolescents in Israel who have been exposed to frequent terrorist attacks related to the political atmosphere. The study found that greater exposure to danger was associated with an increase in the use of EFC strategies, and the use of EFC strategies was associated with an increase in symptoms of PTSD (Braun-Lewensohn, et al., 2009). In a prospective study of undergraduate students who were indirectly exposed to the WTC attacks in 2001, the use of EFC was found to be a predictor of PTSD symptoms at 1 month and 3 months after the event (Baschnagel et al., 2009). This study was unique in the prospective nature of the design. The researcher was in a unique position to study the results of indirect exposure because he had previously been evaluating coping strategies in a group of university

students in New York City, and had administered a coping measure to the students just prior to the event. This enabled him to use the prior responses as a baseline measure.

These studies, among others, have been used to inform the science related to training exercises used by the military. This has led to training using cognitive behavioral techniques in order to increase the use of PFC strategies in the event of capture by an enemy. Similar techniques could be employed in a modified form for those nurses and disaster responders who are exposed directly to stresses that could result in psychological distress for the responder.

**Alternative coping strategies.**

Alternative coping strategies such as substance abuse may also be employed in response to the symptoms of PTSD. The victims may find themselves attempting to numb the emotional symptoms through the use of alcohol or other substances. Alcohol abuse has been identified as a dysfunctional response to PTSD in samples of disaster workers, ARC responders, and firefighters (Bacharach et al., 2008; Osofsky et al., 2011; Simons, Gaher, Jacobs, Meyer, & Johnson-Jimenez, 2005; Stewart et al., 2004). North et al. (2002) in a study of 181 firefighters who served as rescue and recovery workers in response to the Oklahoma City bombing, reported that drinking alcohol was the second most common coping mechanism after seeking interpersonal support. It is important to note that those with an active alcohol use disorder reported higher levels of alcohol use to cope after the response when compared with those without an active alcohol use disorder (44% vs. 11%). Drinking as a coping mechanism was associated with lower levels of functioning (40% vs. 22%), which was related to their PTSD symptoms, indicating that

there is an effect on the individual both personally and occupationally (North et al., 2002).

**Summary**

Nurses play a wide variety of roles in providing care in disasters. They may be in the midst of performing their everyday professional job as an emergency room nurse, be engaged in providing care at a shelter as a volunteer with the ARC, or be managing the response at the local hospital. Because nurses are involved in disaster response in such a variety of roles, their psychological response to the experience of participating in the event may also be varied. Research on general groups of disaster responders has identified some factors which may make individuals more vulnerable to developing psychological sequelae such as PTSD. These factors include gender, prior history of violence or trauma, or status as a volunteer. Occupationally this places nurses at greater risk of PTSD, as 94% of nurses were identified as female in a 2004 national nursing survey. This risk is increased further by the fact that nurses are ever present in disaster response roles. This increases the importance of gaining understanding of their psychological responses.

Exposure to the disaster is a predictor in the development of PTSD; the more direct the exposure the greater the rates of PTSD. Because of the ability of the media to expose individuals indirectly to events such as the WTC bombing, exposure is sometimes measured in individuals many miles from the actual event. Additionally, exposure may be measured by the prolonged impact of the event on the community, as well as the community's economic status. Hobfall's conservation of resources theory also includes the loss of resources and the threat of loss of resources a component of exposure

(Hobfoll, 1989). This was a particular concern during Hurricane Katrina. Nurses who were in New Orleans when Katrina hit were at great risk of losing both property and family.

Coping strategies such as EFC and PFC, defined in Folkman and Lazarus' transactional theory of stress and coping, provide a framework for understanding how nurses deal with stress caused by providing care during disasters. Research has found that the use of EFC is positively associated with the development of acute stress disorder and PTSD, whereas the use of PFC has been negatively associated with the development of PTSD in most studies. The finding that nurses who are engaged in their professional roles are more likely to use PFC strategies may indicate that they experience the professional role as protective in some way. Therefore, there is a need to understand the possible mediating effects of coping on the nurses' exposure to disaster. The theoretical frameworks approach to coping as a strategy, and as a process relative to the situation, provides an opportunity to develop training to encourage the use of effective coping approaches. To do this, further insight is needed on the dynamics of nurses coping strategies.

Understanding nurses' experience related to the development of PTSD provides an opportunity to inform the science from several standpoints, and has the potential for usefulness in practice. Further research can increase understanding about factors which make individuals vulnerable to PTSD, and help to identify the most effective training approaches to deal with extreme stress. Research on the ways in which individuals cope with PTSD also provides insight into possible therapeutic interventions for survivors of

trauma. Considering the impact of PTSD on disaster survivors and first responders after events such as the WTC attacks and Hurricane Katrina, there is a need to examine nurses psychological experiences and it is the aim of this study to do so.

# CHAPTER III

# METHODOLOGY

Identifying nurses who were in the New Orleans area during Hurricane Katrina disaster presents a particular challenge when considering data collection methods. Nurses who were involved in the Hurricane Katrina disaster faced many challenges. Many of their homes were either damaged or destroyed, and many relocated as a result. In addition, identifying nurses who had been engaged in disaster activities either in the hospital, on the frontlines, or in support of the response was anticipated to be difficult. Although many nurses employed in New Orleans were displaced as a result of Hurricane Katrina, it was hoped that some of these nurses may have returned and resettled in the area. As a result of the need to reach these nurses over a specific geographic area, the use of a survey approach was considered appropriate for this study. A survey methodology allowed the sample to come from a fuller range of the target population of nurses who have had a traumatic experience, with the intent to increase the external validity of the findings. A cross-sectional correlational method was used, aimed at examining the association between nurses' level of exposure to trauma related to the Hurricane Katrina disaster, coping strategies, and symptomatology of posttraumatic stress disorder (PTSD) five years after experiencing the Hurricane Katrina disaster.

**Design**

The study used a Tailored Design Survey Method (TDM) based on social exchange theory and the concepts of rewards, costs, and trust (Dillman, 2007). This method provided a framework for improving survey reliability by increasing the effectiveness of survey techniques and improving response rates while minimizing errors related to sampling, coverage, measurement and non-response (Dillman, 2007). Data was collected five years after the landing of Hurricane Katrina in New Orleans using Survey Monkey, a web-based survey technology, which allowed the participant to sign on and complete the survey online. The Survey Monkey program has secure encryption through a secure sockets layer (SSL) for added security making it appropriate for this confidential survey.

Potential participants were identified and sampled from the Louisiana Nursing Board database of Jefferson and Orleans parishes. Participants were mailed a series of invitations by postcard with requests to respond. Each survey invitation had a unique participant ID number to ensure that the participant only responded once. Four waves of mailings were completed, with two weeks between each mailing. The mailings invited the nurse to sign on to the survey website. The four wave mailing design was based on the TDM and allowed for a well-defined and validated approach to the web-based survey method.

Individuals who were interested in participating signed on to the study website and reviewed the cover letter and consent information. The participant then accessed the full survey through a link on the study website. The participant was considered consented by virtue of the actions of completing the survey. The full survey consisted of a

Participant Characteristics Form designed for use with this survey (Appendix A), a Disaster Participation History Form (Appendix B), an Alternative Coping Strategies Form (Appendix C), the Impact of Events Scale-revised (IES-R) (Appendix D), the Ways of Coping Scale-revised (WOC-R) (Appendix E), and the Traumatic Stress Severity Scale (TESS) (Appendix F).

## Sample

### Sample Recruitment.

The sample was comprised of registered nurses (RNs) who were in the New Orleans region during the Hurricane Katrina disaster. The sample was recruited by obtaining names of RNs through the Louisiana Nursing Board database that were identified as having a mailing address in Jefferson and Orleans parishes. These parishes were directly impacted by the hurricane. Systematic sampling was used identifying every eighth nurse in the database for inclusion in the sampling frame. This provided a total of 995 nurses' names in the sampling frame, allowing for over sampling. A thirty percent response rate would be anticipated using the TDM. The potential participants were contacted by postcard through the mail and invited to participate using four phase mailing. Postcards were sent out every two weeks.

### Inclusion Criteria.

Participants had to be able to read and write in English in order to complete the survey documents. The participant was required to be an RN who was in the New Orleans area during Hurricane Katrina. The participant was required to be currently listed on the Louisiana Board of Nursing database as residing in Orleans or Jefferson parish.

All efforts were made to include an ethnically diverse sample, as well as to include male and female participants.

### Exclusion Criteria.

There were no exclusion criteria. Minorities were not excluded from this study. No children were recruited because the sample criteria required the participant be an adult. No vulnerable populations were actively recruited for this study.

### Sample Size.

The Free Statistics Calculators Website (Faul, 1992) was used to determine the required sample size. Using a formula which analyzed the most complicated model of analysis for the study (the regression analysis), and setting the significance at the 0.05 level, a sample size of (n = 108) was anticipated to provide power of 0.80 for the study. Over sampling was utilized to account for lack of response and to allow for adequate power of the study.

## Instruments

### Characteristics of the Sample Form.

Research question one examined the demographic characteristics of the sample. Demographic data was collected using a data collection tool designed for the survey. Data was collected related to the participants' age, gender, ethnicity, and marital status. Specific information related to highest level of nursing education, years of nursing experience, and primary area of nursing was also collected.

### Disaster Participation History Form.

Research question one also examined the demographic characteristics related to the nurses' disaster experiences. Disaster response history was collected using a form

designed for this study. Data was collected related to the participants' disaster experience. This included information related to the number of disasters and the specific nature of the disasters the participant has been involved in. Information was collected related to the participants' disaster training experience, as well as post disaster interventions such as Critical Incident Stress Debriefing. Data related to the particular role, either as professional or volunteer, and manner of participation - i.e. shelter, hospital, and emergency room was also collected.

**Alternative Coping Strategies Form.**

Research question three investigates the alternative coping strategies used by nurses in disaster experiences. Data related to the participants' use of alternative coping strategies was collected for this study using this form. This included information related to trauma prior to Hurricane Katrina, psychological symptoms related to Hurricane Katrina, and prior diagnosis and treatment for psychological symptoms related to Hurricane Katrina. In addition this included data related to use of alcohol, other substances, or use of medications to cope. This was intended to provide a larger picture of the variety of ways in which respondents attempted to cope with the stress of Hurricane Katrina.

**Ways of Coping Questionnaire – Revised (WOC-R).**

Research questions three and four addressed coping strategies used by nurses in response to disaster experiences. Coping was measured in this study using the WOC-R (Folkman & Lazarus, 1985). The instrument was developed to help provide greater insight into coping strategies in stressful situations based on the work of Lazarus and Folkman on stress and coping (Folkman & Lazarus, 1985). The intention of the

instrument is not to explain coping styles or traits, but to measure coping as a process which is used in response to each situation (Folkman & Lazarus, 1985). The questions can be analyzed and categorized into the constructs of PFC strategies or EFC strategies. These constructs were developed using the subscales as identified in the literature by the author (Folkman, Lazarus, Dunkel-Schetter, et al., 1986). Empirically identified questions were used to comprise the subscales. PFC strategies were defined for this study as those comprised of the planful problem solving strategy and the confrontive coping strategy subscales, and the subscale was developed by combining these subscales. The PFC strategy was applicable in this study of PTSD symptoms because it provided the conceptual representation of the nurses' use of strategies to externally focus during the event, which has been documented to affect PTSD by being a significant predictor in post trauma growth (Karanci & Acarturk, 2005) and in some studies has been found to not be a predictor of PTSD (Baschnagel, et al, 2009; Glass et al, 2009).

EFC strategies were defined as those comprised of accepting responsibility strategy, distancing strategy, escape avoidance strategy, positive reappraisal strategy, seeking social support strategy, and self-controlling strategy subscales. The EFC subscale was developed by combining these subscales. The EFC strategies were applicable in this study because they provided the conceptual representation of the nurses' uses of emotionally and internally directed coping strategies and, these strategies have been shown to be a predictor in the development of PTSD (Baschnagel et al, 2009; Kanninen et al, 2002).

***Scoring.***

The original WOC scale ( the Ways of Coping Checklist) was revised in 1985 to remove redundant items, and to alter the response format to a Likert scale form from a yes/no response choice (Folkman & Lazarus, 1985). The current measure, the Ways of Coping- Revised is a 66 item scale in Likert response format asking about coping behaviors and is anchored by a rating of 0 for "not used" and a rating of 3 for "used a great deal". Higher scores indicate greater use of the particular coping strategy. The PFC and EFC scales were used for this study. The range for the PFC scale was 0 – 36 and the range for the EFC scale was 0 – 114. Although this scale has 66 items, 16 of these are not scored.

***Reliability.***

Because the instrument was designed to measure the process of coping as opposed to coping as a trait or style, the changing nature of the process, though appropriate for the current model, is not appropriate for assessing test retest reliability. In a sample comprised of 75 middle-aged couples, Folkman piloted the test and found acceptable levels of reliability. The lowest reliability was reported for the distancing scale ($\alpha = 0.61$), and the highest was for the positive appraisal subscale ($\alpha = 0.79$). Further testing has resulted in the instrument demonstrating good reliabilities in a sample of 135 intensive care nurses, with ($\alpha = 0.93$) for the EFC strategies scale and ($\alpha = 0.86$) for the PFC strategies scale (Hays, All, Mannahan, Cuaderes, & Wallace, 2006).

***Validity.***

Despite the fact that the WOC-R has been a longstanding coping measurement tool, research establishing validity has been limited, and the results of the analyses have been

varied. Researchers are often attempting to revise the scale and validate the newly revised measure for their specific populations. Folkman and Lazarus propose that construct validity has found the scale to be consistent with the theoretical concept of coping as a process (Folkman & Lazarus, 1980). The validity of the two theoretically identified constructs of PFC and EFC has been supported in the literature, and the scale has demonstrated validity in disaster responders (Braun-Lewensohn, et al.; Lali, et al., 2007).

The original scale was evaluated for psychometric properties in a mixed multivariate analysis by Vitaliano, Russo, Carr, Maiuro, and Becker (1985), and used three sample groups in order to provide support for the reliability and validity of the measure. The three groups were comprised of psychiatric outpatients (n = 83), spouses of Alzheimer patients (SPAT) (n = 62), and medical students (n = 425) (Vitaliano, et al., 1985). Construct validity was identified by attribution of a source for the participants' stress, and distress related to same. All three groups identified sources of distress. Distress was measured using the Beck Depression Index (BDI) in all groups. For the SDAT group the Hamilton Depression scale (HAM-D) was also used. And for the medical student group, the Symptom Checklist-90 Depression (SCL-D) scale was also used. In addition, the Symptom Checklist-90 for Anxiety (SCL-90-A) was used to assess distress related to anxiety. The coping measure significantly predicted distress for the SDAT group ($F(22, 94) = 2.29$, $p < 0.005$), with 58% of the variance explained by the SCL-A and the BDI. The coping measure also significantly predicted distress ( $F_{22,84} = 3.18$, $p < 0.001$) and accounted for 70% of the variance in the SCL-A and BDI in the psychiatric outpatient group (Vitaliano et al., 1985).

Criterion validity was established by assessing the inclusion of the medical student group in the support group for fit and second year students. The support group was identified as a behavioral criterion identified by the researchers in prior studies. The basis of this criterion was identified as consistent because the inclusion in the support group indicated the attempt by the students to manage their distress. Coping was found to significantly predict participation in the support group ($F (7, 216) = 6.71$, $p < 0.001$) (Vitaliano et al., 1985).

**Impact of Events Scale– revised (IES-R).**

Research question two examined the prevalence in the samples, and research question four examined the symptoms of PTSD in the samples related to the coping variable. The IES-R (Weiss, 1997) was used to measure the symptoms of PTSD. The original IES was a self-report instrument that was developed to assess the impact of stressful life events on individuals. It was comprised of the full scale, and two subscales of intrusion and avoidance. It was subsequently revised to address concerns related to internal validity of the original instrument. This revision was made by adding an additional 7 items to address the addition of hyperarousal to the diagnostic criterion for the diagnosis of PTSD, which was not an identified symptom when the original scale was developed. The use of IES-R was supported for use in disaster responders and is one of the more commonly used instruments to assess PTSD, and it has strong reliability and validity (Elhai et al., 2006; Goto et al., 2002; Long et al., 2007). The IES-R asks the individual to report the amount of distress they experienced related to a specific event in the last seven days. It was designed to be adapted to ask the participant to consider specific traumatic events (Weiss, 1997). Despite the fact that the author originally cited

the use of the scale for a specific 7 day time period, the instrument has been frequently used for a variety of time frames. (Horowitz, Wilner, & Alvarez, 1979). In this study it was used as designed for the 7 day time frame and related to the event of Hurricane Katrina. The IES-R was considered appropriate for use in this study because of the well accepted reliability and validity of the instrument.

***Scoring.***

The instrument is comprised of 22 questions on a Likert-type scale which have a range of 0 (not at all) to 4 (extremely). The scores can be reported as a total score, or subscale scores for each symptom. The full scale was devised by summing all the responses to the items. The subscales were devised for this study using the empirically accepted approach for summing items identified by Weiss (1997). Higher scores on the IES-R indicate greater event-related distress (Weiss, 1997). The full scale score was used in this study and the range was (0 – 88). The range for the subscale of intrusion was (0 – 32); the subscale of avoidance was (0 -32); and the subscale of hyperarousal was (0 – 24). Scoring for the scale does not specify a specific cut off score for diagnosis of PTSD, but the cut off of 33 has been identified as a reliable indicator of the diagnosis of PTSD ( Creamer, Bell, & Failla, 2003) and was used for this study.

This instrument was used to assess subjective experiences of distress in disaster workers after the WTC attacks (Elhai et al., 2006; Long et al., 2007), in nurses during the severe acute respiratory syndrome (SARS) outbreak (Chen, et al., 2007), in childhood sexual abuse survivors (Cieslak, Benight, & Lehman, 2008), and in symptoms of combat stress reactions in military (Joseph, 2000). The fact that it has been widely used in

disaster studies, and in varied samples, allows for greater comparison of the findings across studies and makes it appropriate for use in this study.

***Reliability.***

The psychometric properties of the IES-R were investigated in a study by Creamer et al. (2003) using two samples of Vietnam Veterans; one was a community sample (n =151), and the other consisted of veterans with a known diagnosis of PTSD (n = 120). The study found that the reliability for the total sample resulted in a total scale Cronbachs ($\alpha = 0.96$), and subscale correlations were reported to be ($\alpha = 0.94$) for the intrusion subscale, ($\alpha = 0.87$) for the avoidance subscale, and ($\alpha = 0.91$) for the hyperarousal subscale. The community sample reliabilities were noted to be higher than the veteran sample (Creamer et al, 2003). The strong reliabilities indicate that the revised version may have resolved some of the prior issues which were a part of the consideration for the revision. Additionally, in a sample of 779 paid and unpaid ARC disaster workers involved in the WTC response in 2001 good reliabilities were demonstrated with a total scale ($\alpha = 0.83$), avoidance subscale ($\alpha = 0.80$), hyperarousal ($\alpha = 0.85$), and intrusion ($\alpha = 0.87$) (Simons et al., 2005).

***Validity.***

Using the total sample of veterans (n = 271) in the study by Creamer et al. (2003), the IES-R demonstrated concurrent validity with the Posttraumatic Checklist (PCL) scores, and was highly correlated with total scores of the PCL (0.84, $p < 0.001$) (M. Creamer et al., 2003). Creamer et al., also found that using a cut off total score of 33 the IES-R to predict PTSD was able to demonstrate a positive predictive power of 0.90 and

negative predictive power of 0.84, a sensitivity of 0.91, and a specificity of 0.82 (M. Creamer et al., 2003).

**Trauma Exposure Severity Scale (TESS).**

Research question four examines the relationship between trauma exposure and PTSD symptomatology as identified by scores on the IES- R and explores whether mediating effects of coping exist within this relationship. Exposure to traumatic events was measured using the occurrence scale of the TESS. The TESS was developed specifically to assess disaster related trauma (Elal & Slade, 2005). It includes assessment of loss of resources as an aspect of the level of exposure, which is consistent with the conservation of resources theory in the disaster literature (Hobfoll, 1991). The ability to include the loss of resources in the scale made it more appropriate than many of the other measures of exposure currently in use. The lack of quantitative assessment tools was identified as a motivation for development of this tool, which has demonstrated reliability and validity in preliminary testing (Elal & Slade, 2005).

***Scoring.***

The TESS instrument consists of 24 questions. It is comprised of the two scales of occurrence and distress. Each of these scales has five subscales of resource loss, damage to home, personal harm, concern for others, and exposure to the grotesque. The occurrence scale is scored based on the responders having the experience and is scored with (0 = no) and (1= yes). The scores for items are summed and totaled for each scale independently. Although this tool is not yet in widespread use, the ability to provide a quantitative measure of the level of exposure through use of a standardized tool will provide a greater ability to compare the construct across studies.

***Reliability.***

The psychometric properties of the instrument were examined in a sample of earthquake survivors in Marmara Turkey (n = 151). Each of the subscales demonstrated good reliability. Cronbach's alpha for the total occurrence subscale was $\alpha = 0.78$, for resource loss $\alpha = 0.65$, the damage to others subscale $\alpha = 0$ .69, the personal harm subscale $\alpha = 0.73$, the concern for others $\alpha = 0.72$, the exposure to the grotesque subscale $\alpha = 0.64$. (Elal & Slade, 2005). Although these reliabilities are somewhat low, this is anticipated in a newly developed instrument.

***Validity.***

Content validity during development of the instrument included input from experts in trauma as well as survivors of the earthquake. Concurrent validity of the instrument was also examined in the sample from the Marmara earthquake and the total scale demonstrated significant moderate correlations with the Beck Depression Index (Occurrence Scale: $r = 0.30$, $p < 0.01$; Distress Scale $r = 0.38$, $p < 0.01$); the IES- R (Occurrence Scale: $r = 0.39$, $p < 0.01$); the Peritraumatic Distress Inventory (Occurrence Scale: $r = 0.33$, $p < 0.01$), and the Mental Defeat Questionnaire (Occurrence Scale: $r = 0.33$, $p < 0.01$) (Elal & Slade, 2005). The TESS occurrence scale, used to measure exposure to disaster, was reported to have a predictive power of 15% with the IES-R (Elal & Slade, 2005). Although the TESS has had limited use, this study can serve to assist in validating the instrument by testing it in this population.

**Data Collection Procedures**

Data collection took place using a web-based survey. The survey contact procedure followed the TDM recommendations for four progressive and unique contacts

with participants as outlined in Table 3.1. The survey consisted of all instruments presented using the Survey Monkey web-based technology. The initial page of the survey provided detailed information related to the study purpose, confidentiality, and consent process (Appendix G). This page contained a link to the survey itself. The first item of the survey requested entry of the unique participant identifier that was listed on the postcard. Instruments were presented in order of saliency to increase the chance of response. The instruments were presented in the following order: Participant Characteristics Form, Disaster History Form, Alternative Coping Strategies, IES-R, WOC-R, and the TESS. This followed the TDM recommendations for survey format that allows for ease of use, minimizes measurement error by loss of data due to confusing format, and increases response by presenting topics of the most interest to the participant (Dillman, 2007).

A pilot survey was developed to be completed by a small sample of five nurses who were involved in Hurricane Katrina. This was done in order to provide face validity for the survey. The pilot was implemented a month prior to the full survey implementation. The nurses were recruited by word of mouth and snowballing, and indicated willingness to participate. They were asked to provide feedback related to issues with the validity of the survey. The pilot directed the participant to complete the survey and fill out an open ended question at the end of the survey.

**Table 3.1**
*Contacts and Postcard Content*

| Contact | Postcard Content | Sent |
|---|---|---|
| One | Initial invitation to participate | February 4, 2011 |
| Two | Thank you and reminder | February18, 2011 |
| Three | Follow-up reminder | March 4th, 2011 |
| Four | Final request to participate | March 18th, 2011 |

Contact One (Appendix H) - the initial contact - was made with a postcard sent to the potential participant notifying them of the study and requesting their participation.

Contact Two was a thank you postcard (Appendix I) sent to all the potential participants two weeks after the pre-notice and served to remind those who may not have mailed out their survey to do so and to thank those who had (Dillman, 2007).

Contact Three (Appendix J) was sent a month after the initial invitation postcard, and was only sent to the non-respondents. This postcard was sent as a reminder (Appendix I), which notified the potential participant that their survey had not been received and urged them to sign on to the website and complete the survey. As recommended by TDM, this postcard also included a statement regarding the possibility that the participant was not responding because they are not eligible, and requested they sign on to the website and request their name be removed from future mailings (Dillman, 2007).

Contact Four (Appendix K) - the final contact – was sent out six weeks after the initial invitation. This postcard was intended to make the participant aware that there was

limited time to respond and to urge them to do so, as recommended by TDM (Dillman, 2007) (Appendix J).

**Human Subjects Protection.**

The study was approved through the Georgia State University Institutional Review Board (IRB). No vulnerable populations were actively recruited for participation in this study, but because one of the variables being explored was PTSD, contacts for a national and local behavioral health hotline were provided. As RN's were assumed to be adults and able to consent, participants were considered consented by virtue of the act of their return of the survey. Surveys had no identifying data regarding the participant. The analysis section of the survey was password protected. Data was encrypted using SSL technology. Internet protocol addresses were not collected. These measures ensured that the participants remained anonymous and could not be traced back to the participant. The main database containing the names and addresses of participants and corresponding participant codes were kept separately in a locked file cabinet in the researcher's office. Data kept on computer was kept behind a firewalled, password protected computer. Only the principal investigator (PI) and the research assistant had access to the survey responses.

**Incentives.**

No financial incentive was offered.

**Risks and benefits.**

Risks to the participant by filling out the survey itself were expected to be no more than may be experienced from stress in everyday life, and anticipated to be minimal and short-lived. No long-term risks were expected by participating in this study. Despite

this, the fact that the topic of interest was related to PTSD there was a chance that a participant may be experiencing psychological symptoms and thus completion of the survey may result in increased psychological stress. Because of this, the PI contact information was available on correspondence in the event there was a concern. The phone number of a local crisis line in the New Orleans area and the phone number for Behavioral Health Link, a National Crisis Hotline, was also included in the cover letter to provide participants with a resource in the event they experienced emotional distress related to participation in the study, or in the event they determined they were in need of psychological assistance due to participation in the study. There were no anticipated direct benefits to the participants from participating in this study, but the information gained may benefit nurse responders and other first responders in the future.

**Analysis**

Quantitative data were downloaded into SPSS-15 for analysis, which included two components. The first component focused on those respondents who participated in the disaster activities (PIDA). The second component compared the PIDA respondents to the non-PIDA respondents using independent two sample t-tests and chi-square analyses. The analytic sample used was dependent upon the research questions, which, along with the analytic plans, are outlined below.

**Research Question 1a (RQ1a).**

What are the demographic and psychosocial characteristics of the sample of nurses who were present in the New Orleans region during Hurricane Katrina?

**Research Question 1b (RQ1b).**

What are the demographic and psychosocial characteristics associated with participation in Hurricane Katrina in a sample of nurses in the New Orleans region?

***Analysis RQ1a and RQ1b***: Descriptive statistics were used to describe both the full sample and PIDA group in relationship to age, gender, nursing education and primary role, disaster experience history, alternative coping strategies, and psychological/mental health treatment.

**Research Question 2a (RQ2a**).

What is the prevalence of PTSD in a sample of nurses who were in the New Orleans region during Hurricane Katrina?

**Research Question 2b (RQ2b**).

What proportion of a sample of nurses present in the New Orleans region during Hurricane Katrina participated in disaster related activities?

**Research Question 2c (RQ2c**).

What is the prevalence of PTSD in a sample of nurses in the New Orleans region who PIDA during Hurricane Katrina?

***Analysis RQ2a and RQ2b****:*

Individuals whose IES-R scores were 33 or greater were categorized as having PTSD. The prevalence of PTSD among all respondents was ascertained by determining the proportion of the sample who scored 33 or greater on the IES-R. Respondents were then categorized by PIDA or non-PIDA status.

**Research Question 3a (RQ3a**).

What coping strategies were utilized in a sample of nurses who were in the New Orleans region during Hurricane Katrina?

**Research Question 3b (RQ3b**).

What coping strategies were utilized in a sample of nurses in the New Orleans region that PIDA during Hurricane Katrina?

***Analysis RQ3a and RQ3b*:** Coping strategies of PFC and EFC for the PIDA and non-PIDA samples were identified using the WOC-R scale. Independent two sample t-tests were used for analyses to determine differences in proportion of the samples that used either PFC or EFC strategies. The alternative coping strategies reported were also be analyzed.

**Research Question 4a (RQ4a**).

What is the association between level of exposure to trauma during the Hurricane Katrina disaster, coping strategies, and symptoms of PTSD in a sample of nurses in the New Orleans region who participated in Hurricane Katrina?

**Research Question 4b (RQ4b**).

Does coping mediate the relationship between level of exposure and symptoms of PTSD in a sample of nurses in the New Orleans region who participated in Hurricane Katrina?

***Analysis RQ4a and RQ4b***: In order to examine the associations between of the key variables of exposure, coping, and PTSD symptomatology a linear regression analysis was completed and accounted for the control variables of gender, marital status, history of trauma, and professional versus volunteer role. To examine the potential

mediating effects of the variable of coping on the relationship between exposure and symptomatology of PTSD, a path analysis was conducted using the Hayes and Preacher mediation macro program. This program utilizes bootstrapping, and also allows for the direct and indirect effects of the variables to be determined. In order to establish mediation the relationship between the predictor variable of exposure and the mediator variable of coping (PFC or EFC) was determined (path *a*); the relationship between the mediator variable of coping (PFC or EFC) and the outcome variable of was determined (path *b*), and the predictor variable of exposure and the outcome variable was determined (path *c*). The analysis technique of bootstrapping allows for resampling which is advantageous for a small sample size, and exploring mediation in multiple potential mediators (Preacher, Kristopher, Hayes, & Andrew, 2008).

**Summary**

A cross-sectional correlational study designed to examine the experiences of nurses who were in the New Orleans region during Hurricane Katrina was initiated five years after landfall of the hurricane. Nurses identified through the Louisiana Nursing Board were invited to participate. The study used an online survey format to gather information using forms designed for the study related to demographic characteristics, disaster experience history, and alternative coping strategies use including information related to substance use and psychological responses to the disaster. The IES-R was used to measure the outcome variable of symptoms of PTSD. The WOC-R was used to measure the variables of PFC and EFC, defined by Folkman and Lazarus (1985) in their research on stress and coping, and widely accepted as a coping measure in psychosocial research. The TESS, an instrument developed for use in disaster research, was used for

measuring the variable of level of exposure. This instrument provided the opportunity to evaluate exposure with the additional component of loss of resources, which is particularly salient in this study.

Major aims of the study were based on the research questions as identified earlier in this chapter, and focused on the relationships between the variables of level of exposure to a trauma, the coping variables of PFC and EFC, and the outcome variable of PTSD symptoms. Descriptive data were analyzed. Prevalence for the full sample and the PIDA group was ascertained. The full analysis undertaken included the use of both regression analysis and multiple mediation path analysis to explicate the aspects of the research question related to the associations of the major study variables and mediation effects of the coping variables. The results of these analyses are presented in the following chapter.

# CHAPTER IV

# RESULTS

This study, which used a cross sectional correlational design, was intended to examine nurses coping and psychological symptomatology after being exposed to the traumatic experience of Hurricane Katrina in a five year interval following the event. The use of the online survey, with invitations mailed to nurses in the Orleans and Jefferson parishes based on the Louisiana Board of Nursing database, was anticipated to provide the opportunity to reach nurses who had been in the region during Hurricane Katrina. Goals of the study were to identify the demographics related to the study variables in the nurses in the region, to specifically examine nurses who had participated in disaster activities (PIDA), and to evaluate the association of the variables. In addition, the effect of the variable of coping was examined to determine if there was a mediating effect on the relationship between level of exposure and symptoms of PTSD. This chapter reviews the results of the data, and addresses each of the research questions specifically.

## Analysis

### Pilot.

A pilot survey was initiated a month prior to the survey release date. The participants were recruited by word of mouth through nurses who were known to have responded to Hurricane Katrina. The intention was to have a small sample sign on and complete an open ended question at the end of the survey regarding the validity of the

survey that asked “For the pilot: Please provide information related to the validity of the survey.” Despite several follow up attempts, of the nurses who had expressed an interest in participating only one signed on and completed the open ended question as a part of the pilot. This individual did feel the survey was appropriate and valid to the topic and experience, and emailed the investigator their name and phone number in the event there was a need for more information. Due to the lack of participants no analysis could be conducted.

Although the pilot aspect of the survey initially appeared to be unsuccessful, an unexpected event arose spontaneously in the data collection. The area identified for validity remarks for the pilot was spontaneously completed by 40 participants. Participants who responded indicated overall validity in the survey, and expressed gratitude for the continued interest in their experiences. Despite the instruction that this open ended response area was for the validating the pilot only, numerous qualitative responses were included in this section. And while some of these comments did address the question of validity and indicated the survey was appropriate to their experiences. Some responses indicated they felt the questions should have focused on the hospital conditions, or the working environment more. But more often the responses documented the dire circumstances that the nurses experienced and the continued impact of the experience on their lives today.

**Preliminary data analysis**

The variables of level of exposure, coping, and PTSD symptoms were examined, assessing for missing data and outliers. In examining the data it was determined that of the 24 question Trauma Exposure Severity Scale (TESS), two questions were

inadvertently omitted from the survey questionnaire. One question was from the resource loss scale, and one question was from the concern for significant others scale. Neither accounted for greater than 20% of the scale they represented. The two subscales were examined, and Cronbach's alpha for the resource loss subscale was 0.66, and 0.49 for the concern for significant others subscale. In the Impact of Events Scale (IES) and the Ways of Coping (WOC) scale, data missing at random due to non-response was imputed if the missing item did not account for greater than 20% of the scale or subscale in order for more participants to be retained in the analysis. This imputation was conducted by sample means replacement.

After completion of the data cleaning, a separate dataset for analysis specific to the nurses that PIDA was derived from the full survey dataset. This subset was derived by identifying all the respondents who had indicated they were not involved in the response to the question which asked the respondent to "identify their role as a participant in Hurricane Katrina." If the respondent indicated "I did not participate," they were removed from the data set. In other areas of the survey if the respondent had indicated not responding, this was disregarded, as the screening question required that the respondent identify a particular role in the response and not just participation versus non participation, and thus was felt to clearly identify the appropriate respondents. It may be possible that the other questions may have been marked because other options did not apply in the question.

Descriptive statistics (Table 4.1) were used to examine the variables of level of exposure, coping, and PTSD symptoms while assessing both assumptions of normality and measures of central tendency. Chi square, Fisher exact tests, and independent two

sample t- tests were performed to determine whether there were differences between the PIDA and non-PIDA groups for any of the variables used in analyses, and revealed no significant differences between the groups in any area. Variables in which the cell size prohibited comparison were reported as demographic data only. Correlational analyses appropriate for the research questions were conducted within each dataset to assess for interrelatedness of the variables included in the study. Reliability analyses of the instruments were conducted (Table 4.2). Linear regression model diagnostics were performed as the models were run. This included assessments of the assumptions of linearity, multicollinerity, and homoscedasticity. In the results reported in the tables, the p- values reported are comparing the PIDA and non-PIDA groups on each variable of interest in the sample.

**Assumptions of normality, measures of central tendency, and reliability.**

***Full sample.***

The problem focused coping (PFC) scale was comprised of two subscales from the WOC: the confrontive coping subscale and the planful problem solving scale. The mean score of the PFC subscale was 11.37 (SE = 6.89), and scale statistics indicated no departures of the scale scores from normality, with a skew statistic of 0.08, a kurtosis statistic of -0.86, and a Shapiro-Wilk statistic of 0.97 (p=0.17). Cronbach's alpha was calculated as the measure of reliability for the PFC scale, and was determined to be 0.87. The distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, and positive reappraisal subscales of the WOC were used to comprise the emotion focused coping (EFC) scale. The mean score of the EFC subscale was 32.42 (SE = 18.02), and scale statistics for skew and kurtosis indicated no departures of the scale

scores from normality (0.33 and -0.23), as did the Shapiro-Wilk test ($W_n = 0.99$, $p = 0.48$). The reliability measure of the EFC scale was calculated to be $\alpha = 0.93$. In addition, there was a good correlation between the EFC scale and the PFC scale ($r = 0.78$, $p = 0.01$).

The PTSD symptomatology variable was calculated by summing all 22 items on the IES-R as designed (Weiss, 1997). A score of 33 and above was used as a cut off for presence of the diagnosis of PTSD for determining prevalence (M. Creamer et al., 2003). Summary data of the PTSD symptom variable showed the minimum score was 0, while the maximum score was 85, which was investigated as an outlier of the data. The outlier was conceptually consistent with the study because the respondent indicated being on disability for PTSD related to Hurricane Katrina, and was left in the data. The statistical influence of the outlier was examined by removing this respondent's response from the data, but this resulted in no differences in the distribution of the PTSD symptom variable. A log transformation was applied to normalize the IES score. The reliability for the IES-R scale was excellent for the full scale ($\alpha = 0.95$), as well as the subscales of Intrusion ($\alpha = 0.93$), Hyperarousal ($\alpha = 0.87$), and Avoidance ($\alpha = 0.88$).

Level of exposure to trauma was measured by summing the total of the TESS Occurrence subscales for Resource Loss/Being in Need, Damage to Home and Goods, Personal Harm, Concern for Significant Others, and Exposure to the Grotesque. The measures of central tendency were explored and no departures from normality were found (skewness statistic=-0.01, kurtosis statistic=-0.01, and $W_n = 0.99$, $p = 0.31$). The reliability for the TESS full scale was moderate ($\alpha = 0.78$). Reliabilities for the subscales were not as strong as the full scale, ranging from ($\alpha = 0.14 – 0.76$).

***PIDA group.***

Among the sample of nurses who PIDA, the mean PFC subscale score was (SE = 6.64), and the mean EFC subscale score was 32.64 (SE =16.57). The EFC scale statistics for skew and kurtosis suggested no departures from the normal distribution (0.35 and - 0.23), and the scale had a non-significant Shapiro-Wilk ($W_n = 0.98$, $p = 0.46$). The PFC scale statistics were consistent with normality of the data based on skew (0.14), kurtosis (-0.84), and the Shapiro-Wilk test ($W_n = 0.98$, $p = 0.16$). Reliabilities for the PFC ($\alpha = 0.85$) and EFC ($\alpha = 0.92$) were appropriate. In addition, there was a good correlation between the EFC and PFC scales of ($r = 0.78$, $p = < 0.01$). The mediation model did not require running of the subscales separately, as this model is designed for use for multiple mediation path analysis.

The PTSD symptom variable was calculated by summing all 22 items on the IES-R as designed. The IES-R scores ranged from 0-85, with 25% of the sample scoring 3 or less, 50% scoring 9 or less, and 75% scoring 22 or less, and a mean of 14.93 (SE=16.64). The total scale revealed a lack of normality of the data ($W_n = 0.80$, $p < 0.01$), and a quantile-quantile plot of the IES-R scores suggested the data followed a non-normal distribution. As a result, the log transformation was applied to the IES-R scores, which normalized the measure. The mean of the transformed IES-R score was 2.23 (SE=1.13), skewness was -0.22, kurtosis was -0.63, and reliabilities were high for the full scale ($\alpha = 0.96$), intrusion subscale ($\alpha = 0.93$), hyperarousal subscale ($\alpha = 0.89$), and the avoidance subscale ($\alpha = 0.89$).

The TESS full scale (M = 7.07, SE = 3.24) was found to have no departures from normality among the PIDA group (skewness statistic = 0.12 kurtosis statistic =-0 .05, and

$W_{n=}$ 0.985, p = 0.51). The reliability for the TESS full scale was moderate (α = 0.75), although the subscale reliabilities for Resource Loss/Being in Need (α = 0.67), Damage to Home and Goods (α = 0.71), Personal Harm (α = 0.71), Concern for Significant Others (α = 0.49), and Exposure to the Grotesque (α = 0.72) were lower.

**Table 4.1:**
*Descriptive statistics for the Trauma Exposure Severity Scale (TESS), Ways of Coping – Revised (WOC-R), Impact of Events Scale – Revised (IES-R) scales and subscales for full, PIDA, and non-PIDA groups*

| | Full Sample | | | PIDA group | | | Non-PIDA group | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | Mean | SE | n | Mean | SE | n | Mean | SE | test statistic | p-value |
| TESS | | | | | | | | | | | |
| Total Score | 108 | 7.62 | 0.31 | 76 | 7.96 | 0.37 | 32 | 6.81 | 0.54 | t = 1.73 | 0.09 |
| Resource Loss | 108 | 3.63 | 0.13 | 76 | 3.67 | 0.15 | 32 | 3.53 | 0.25 | t = 0.49 | 0.62 |
| Damage to Home | 108 | 2.05 | 0.10 | 76 | 2.07 | 0.12 | 32 | 0.00 | 0.19 | t = 0.29 | 0.77 |
| Personal Harm | 108 | 0.25 | 0.05 | 76 | 0.26 | 0.60 | 32 | 0.22 | 0.07 | t = 0.42 | 0.67 |
| Concern for Significant Others | 108 | 1.11 | 0.09 | 76 | 1.21 | 0.11 | 32 | 0.88 | 0.13 | t = 1.79 | 0.08 |
| Exposure to the Grotesque | 108 | 0.60 | 0.10 | 76 | 0.79 | 0.37 | 32 | 0.16 | 0.08 | t = 4.06 | <0.01 |
| PFC | | | | | | | | | | | |
| Total Score | 108 | 12.07 | 0.69 | 76 | 12.92 | 0.79 | 32 | 10.06 | 1.34 | t = 1.91 | 0.06 |
| Confrontive Coping | 108 | 3.70 | 0.29 | 76 | 3.99 | 0.33 | 32 | 3.03 | 0.55 | t = 1.53 | 0.13 |
| Planful Problem Solving | 108 | 8.37 | 0.46 | 76 | 8.93 | 0.53 | 32 | 7.03 | 0.92 | t = 1.89 | 0.61 |
| EFC | | | | | | | | | | | |
| Total Score | 108 | 32.50 | 1.73 | 76 | 32.64 | 16.57 | 32 | 32.16 | 3.75 | t = 0.13 | 0.90 |
| Distancing | 108 | 4.03 | 0.28 | 76 | 3.93 | 0.32 | 32 | 4.25 | 0.56 | t = -0.52 | 0.61 |
| Self Controlling | 108 | 6.61 | 0.44 | 76 | 6.63 | 0.51 | 32 | 6.56 | 0.87 | t = 0.07 | 0.94 |
| Seeking Social Support | 108 | 5.82 | 0.38 | 76 | 5.99 | 0.44 | 32 | 5.44 | 0.73 | t = 0.67 | 0.51 |
| Accepting Responsibility | 108 | 1.89 | 0.21 | 76 | 1.89 | 0.23 | 32 | 1.88 | 0.45 | t = 0.04 | 0.97 |
| Escape Avoidance | 108 | 1.89 | 0.21 | 76 | 4.26 | 0.40 | 32 | 5.62 | 0.84 | t = - 1.46 | 0.97 |
| Positive Reappraisal | 108 | 9.48 | 0.46 | 76 | 9.93 | 0.53 | 32 | 8.41 | 0.92 | t = 1.52 | 0.13 |
| IES-R | | | | | | | | | | | |
| Total Score | 108 | 10.96 | 0.12 | 76 | 14.93 | 1.92 | 32 | 10.97 | 2.19 | t = 1.21 | 0.23 |
| Avoidance | 108 | 0.55 | 0.63 | 76 | 0.66 | 0.09 | 32 | 0.55 | 0.10 | t = 0.73 | 0.47 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intrusion | 108 | 0.58 | 0.75 | 76 | 0.83 | 0.10 | 32 | 0.58 | 0.12 | t = 1.45 | 0.15 |
| Hyperarousal | 108 | 0.32 | 0.45 | 76 | 0.50 | 0.90 | 32 | 0.32 | 0.10 | t = 1.13 | 0.26 |

PIDA= participated in disaster activities  Non-PIDA= no participation in disaster activities

**Table 4.2:**
*Reliabilities for the Trauma Exposure Severity Scale (TESS), Ways of Coping – Revised (WOC-R), Impact of Events Scale – Revised (IES-R) scales and subscales for full, PIDA group, and non-PIDA group*

| | | | | **Full Sample** | | | **PIDA group** | | | **Non-PIDA group** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of items | Possible Range | n | α | Actual range | n | α | Actual range | n | α | Actual range |
| TESS | Total Score | 22 | 0 - 44 | 108 | 0.78 | 0 - 17 | 76 | 0.75 | 1 -12 | 32 | 0.79 | 0 - 12 |
| | Resource Loss | 5 | 0 - 10 | 108 | 0.64 | 0 - 5 | 76 | 0.67 | 0 - 5 | 32 | 0.66 | 0- 5 |
| | Damage to Home | 3 | 0 - 6 | 108 | 0.67 | 0 - 3 | 76 | 0.71 | 0-3 | 32 | 0.58 | 0 - 3 |
| | Personal Harm | 5 | 0 - 10 | 108 | 0.14 | 0 - 2 | 76 | 0.17 | 0-2 | 32 | ** | 0 - 1 |
| | Concern for Significant Others | 5 | 0 - 10 | 108 | 0.49 | 0 - 5 | 76 | 0.49 | 0-5 | 32 | 0.48 | 0 - 2 |
| | Exposure to the Grotesque | 4 | 0 - 8 | 108 | 0.71 | 0 - 4 | 76 | 0.72 | 0-4 | 32 | 0.36 | 0 - 2 |
| PFC | Total Score | 12 | 0 - 58 | 108 | 0.87 | 0 -27 | 76 | 0.85 | 0 - 27 | 32 | 0.84 | 0 - 23 |
| | Confrontive Coping | 6 | 0 - 24 | 108 | 0.84 | 0 -12 | 76 | 0.85 | 0-12 | 32 | 0.75 | 0 - 10 |
| | Planful Problem Solving | 6 | 0 - 24 | 108 | 0.67 | 0 -18 | 76 | 0.82 | 0-18 | 32 | 0.84 | 0 - 16 |
| EFC | Total Score | 38 | 0 - 152 | 108 | 0.93 | 0 - 79 | 76 | 0.92 | 1 - 79 | 32 | 0.95 | 0 - 78 |
| | Distancing | 6 | 0 - 24 | 108 | 0.67 | 0 - 14 | 76 | 0.65 | 0 - 14 | 32 | 0.70 | 0 - 10 |
| | Self Controlling | 7 | 0 - 28 | 108 | 0.80 | 0 -21 | 76 | 0.80 | 0 - 21 | 32 | 0.83 | 0 - 19 |
| | Seeking Social Support | 6 | 0 - 24 | 108 | 0.78 | 0 -17 | 76 | 0.76 | 0 - 17 | 32 | 0.82 | 0 - 14 |
| | Accepting Responsibility | 4 | 0 - 16 | 108 | 0.61 | 0 -11 | 76 | 0.50 | 0 - 9 | 32 | 0.77 | 0 - 11 |
| | Escape Avoidance | 7 | 0 - 28 | 108 | 0.64 | 0 -19 | 76 | 0.53 | 0 - 13 | 32 | 0.77 | 0- 19 |
| | Positive Reappraisal | 7 | 0 - 28 | 108 | 0.80 | 0 -2 | 76 | 0.79 | 0 - 2 | 32 | 0.82 | 0 - 20 |
| IES-R | Total Score | 22 | 0 - 88 | 108 | 0.95 | 0 - 85 | 76 | 0.96 | 0 - 85 | 32 | 0.94 | 0 - 57 |
| | Avoidance | 8 | 0 - 32 | 108 | 0.88 | 0 - 3.63 | 76 | 0.89 | 0 - 3.63 | 32 | 0.79 | 0 -1.75 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Intrusion | 8 | 0 - 32 | 108 | 0.93 | 0 - 4 | 76 | 0.93 | 0 - 4 | 32 | 0.92 | 0 - 3.25 |
| Hyperarousal | 6 | 0 - 24 | 108 | 0.87 | 0 - 4 | 76 | 0.89 | 0 - 4 | 32 | 0.80 | 0 - 2.83 |

PIDA= participated in disaster activities Non-PIDA= did not participate in disaster activities ** No variance

**Findings Related to Research Questions**

**RQ1a. What are the demographic and psychosocial characteristics of a sample of nurses who were present in the New Orleans region during Hurricane Katrina?**

The demographic and psychosocial characteristics of the sample are described in full in Table 4.3 and Table 4.4. Of the 995 nurses who were invited to participate, 108 (11.9%) completed the full survey. The majority of those who responded were women (93.5%, n = 101) and were married (60.2%, n = 65). The mean age was 50.04 years of age (SE = 11.82), with a range of 26 to 83 years of age. The majority of respondents were Caucasian/White (75%, n = 81), with a smaller number of African Americans/Blacks (19.4%, n = 21), and Latinos/Hispanics (2.8%, n = 3). A very small proportion of the sample identified as Asian/ Pacific Islander (1.9%, n = 2), and one respondent who self-identified as Cajun (< 1%, n = 1).

The participants represented a spectrum of educational levels with bachelor level (30.6%, n = 33), associate level (25%, n = 27), master level (24.1%, n = 26), diploma level (16.7%, n = 18), and Doctor of Philosophy (PhD) level nurses (2.8%, n = 3). Primary nursing occupations were identified as medical-surgical (34.3%, n = 37), intensive care (12%, n = 13), critical care (10.2%, n = 11), administration (10.2%, n = 11), operating room (10.2%, n = 11), pediatrics (7.4%, n = 8), psychiatry (5.6%, n = 6), obstetrics- gynecology (6.5%, n = 7), and emergency room (3.7%, n = 4). Less than half of the respondents had received disaster response training (40.7%, n = 44), but of those who had, the majority had received this training in the workplace (36.1 %, n = 39). Other

professional roles represented included legal nurses consulting, education, nurse anesthetist, community health, and long term care.

The majority of the nurses who responded did so in a professional role (45.4%, n = 49), but a few reported participation in a volunteer role (4.6%, n = 5). Several reported participating as both (5.6%, n = 6). Almost half of the respondents, 43.5% (n = 47), worked in a hospital setting, while 4.6% (n = 5) worked on the frontlines and with direct exposure to the event. The remaining worked in shelters (4.6%, n = 5), provided logistical or administrative support (4.6%, n = 5), emergency rooms (<1%, n = 1), and other areas (12%, n = 13). The fact that the greatest number of respondents reported having been engaged in their professional role during the disaster was consistent with the fact that medical surgical nursing was the primary work role reported (34.3%, n = 37) of the respondents, with critical care the second highest role (10.2%, n = 11). This would mean these nurses were most likely hospital based.

**RQ1b**: **What are the demographic and psychosocial characteristics associated with participation in disaster activities (PIDA) during Hurricane Katrina in a sample of nurses who were present in the New Orleans region?**

**RQ2b.What proportion of a sample of nurses present in the New Orleans region during Hurricane Katrina participated in disaster related activities?**

The demographic and psychosocial characteristics of the PIDA group are described in full in Table 4.3 and Table 4.4. Seventy six of the 108 respondents (70.4%) reported having participated in disaster activities in New Orleans during Hurricane Katrina. The majority of those were women (92.1%, n = 70), and were married (60.5%, n = 46). The mean age was 50.32 years of age (SE = 11.40), with a range of 27 to 83 years

of age. The majority were Caucasian/White (75%, n = 57) with fewer African American/Black (18.4%, n =14), Latino/Hispanic (2.63%, n = 2), Asian/ Pacific Islander (2.63%, n=2) and one self-identified Cajun (<2%, n = 1).

The participants in this sample also reflected a similar educational profile to the larger sample, educated at the bachelor level (29%, n = 22), associate level (26.3%, n = 20), master level at (22.4%, n = 17), diploma level (17.1%, n = 13), and PhD level (4%, n = 3). Of the respondents The participants identified the primary work setting to be medical-surgical nursing (34.2%, n = 26), intensive care/critical care (15.8%, n = 12), administration (10.5%, n = 8), operating room (6.6%, n = 5), pediatrics (7.9%, n = 6), psychiatry (4%, n = 3), OB-GYN (5.3%, n = 4), and emergency room (4%, n = 3), with the remainder in other areas not listed. More than half of the respondents had not received disaster response training (52.6%, n = 40), But of these almost all received this in the workplace (40.8%, n = 31).

The majority of the nurses responded in a professional role (64.5%, n = 49), but a few reported they had participated in a volunteer role (6.6%, n = 5); and many of those reported participating as both (7.9%, n = 6). More than half of the PIDA group, 61.8% (n = 47), worked in a hospital setting, while 6.6% (n = 5) reported working on the frontlines. The remaining worked in shelters (6.5%, n = 5), provided logistical or administrative support (6.6%, n = 5), emergency rooms (1.3%, n = 1), and “other areas” (16.9%, n = 13).

In summary, the majority of the nurses who participated in this study were Caucasian, female, with a median age of 50 years. The majority of the sample was educated at the bachelor’s level, and the work setting for their primary occupational role

was medical- surgical nursing. The demographics for both the full sample, and the PIDA group, and the non-PIDA group had no significant differences. A large portion of the sample participated in disaster activities, and most were engaged in these activities as professionals, though some nurses reported volunteering, and a few others reported participating as both professional and volunteer responders. Of the PIDA group, just under half reported that they had received disaster training, and most received this at work.

**Table 4.3:**
*Demographic characteristics of full, PIDA, non-PIDA groups*

| | Full sample (n=108) | | PIDA groups (n=76) | | Non-PIDA group (n=32) | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | SE | Mean | SE | Mean | SE | test statistic | p-value |
| Age | 50.04 | 11.82 | 50.32 | 11.40 | 49.16 | 13.31 | t = -0.02 | 0.98 |
| | N | % | N | % | N | % | | |
| Gender | | | | | | | *Fisher exact test* | 0.67 |
| Male | 7 | 6.48 | 6 | 7.89 | 1 | 3.13 | | |
| Female | 101 | 93.51 | 70 | 92.11 | 31 | 96.88 | | |
| Marital status* | | | | | | | *Fisher exact test* | 0.92 |
| Single (never married) | 19 | 17.59 | 14 | 18.42 | 5 | 15.63 | | |
| Married | 65 | 60.19 | 46 | 60.53 | 19 | 59.38 | | |
| Partnered | 3 | 2.78 | 2 | 2.63 | 1 | 3.13 | | |
| Divorced | 16 | 14.81 | 10 | 13.16 | 6 | 18.75 | | |
| Widowed | 3 | 2.78 | 2 | 2.63 | 1 | 3.13 | | |
| Separated | 2 | 1.85 | 2 | 2.63 | 0 | 0.00 | | |
| Divorced/Widowed/Separated | | | | | | | | |
| Ethnicity** | | | | | | | $\chi 2 = 0.11$ | 0.74 |
| Caucasian/White | 81 | 75.00 | 57 | 75.00 | 24 | 75.00 | | |
| African American/ Black | 21 | 19.44 | 14 | 18.42 | 7 | 21.88 | | |
| Latino/ Hispanic | 3 | 2.78 | 2 | 2.63 | 1 | 3.13 | | |
| Cajun | 1 | 0.93 | 1 | 1.32 | 0 | 0.00 | | |
| Asian/Pacific Islander | 2 | 1.85 | 2 | 2.63 | 0 | 0.00 | | |
| Education*** | | | | | | | $\chi 2 = 0.54$ | 0.76 |
| Diploma | 18 | 16.67 | 13 | 17.11 | 5 | 15.63 | | |
| Associates | 27 | 25.00 | 20 | 26.32 | 7 | 21.88 | | |
| Bachelors | 33 | 30.56 | 22 | 28.95 | 11 | 34.38 | | |
| Masters | 26 | 24.07 | 17 | 22.37 | 9 | 28.13 | | |
| PhD | 3 | 2.78 | 3 | 3.95 | 0 | 0.00 | | |
| DNP | 1 | 0.93 | 1 | 1.32 | 0 | 0.00 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Area of usual practice**** | | | | | | | NA |
| Pediatrics | 8 | 7.41 | 6 | 7.89 | 2 | 6.25 | |
| Intensive care | 13 | 12.04 | 12 | 15.79 | 1 | 3.13 | |
| Critical Care | 11 | 10.19 | 9 | 11.84 | 2 | 6.25 | |
| Emergency department | 4 | 3.70 | 3 | 3.95 | 1 | 3.13 | |
| Medical-surgical | 37 | 34.26 | 26 | 34.21 | 11 | 34.38 | |
| Operating room | 11 | 10.19 | 5 | 6.58 | 6 | 18.75 | |
| Administration | 11 | 10.19 | 8 | 10.53 | 3 | 9.38 | |
| Psychiatry | 6 | 5.56 | 3 | 3.95 | 3 | 9.38 | |
| Obstetrics/Gynecology | 7 | 6.48 | 4 | 5.26 | 3 | 9.38 | |

PIDA = participated in disaster activities Non-PIDA = did not participate in disaster activities
*Analysis combined married/partnered, divorced/widowed/separated
**Ethnic differences analyzed as Caucasian, and African American/Black, and Latino
***This was analyzed as diploma + associate; bachelor; master + DNP; PhD was excluded from analysis due to cell size
****Reported for demographic purposes

**Table 4.4:**
*Disaster experience history for full, PIDA, and non-PIDA groups*

| | Full sample (n=108) | | PIDA group (n=76) | | Non-PIDA group (n=32) | | | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | test statistic | p-value |
| Disaster response training? | | | | | | | $\chi 2 = 3.63$ | 0.16 |
| Yes | 44 | 40.74 | 35 | 46.05 | 9 | 28.12 | | |
| No | 63 | 58.33 | 40 | 52.63 | 23 | 71.88 | | |
| Choose not to answer | 1 | 0.93 | 1 | 1.32 | 0 | 0.00 | | |
| Type of disaster response training* | | | | | | | $\chi 2 = 4.60$ | 0.32 |
| Training at work | 39 | 36.11 | 31 | 40.79 | 8 | 25.00 | | |
| Volunteer training with a faith based group | 2 | 1.85 | 1 | 1.32 | 1 | 3.12 | | |
| Volunteer training with a volunteer organization | 5 | 4.63 | 5 | 6.58 | NA | NA | | |
| No training | 59 | 54.63 | 36 | 47.37 | 23 | 71.88 | | |
| Other type of training | 3 | 2.77 | 3 | 3.95 | 0 | 0 | | |
| Participation as volunteer or professional | | | | | | | | |
| Professional | 49 | 45.37 | 49 | 64.47 | N/A | N/A | N/A | |
| Volunteer | 5 | 4.63 | 5 | 6.58 | N/A | N/A | | |
| Both | 6 | 5.56 | 6 | 7.89 | N/A | N/A | | |
| Did not act as nurse | 48 | 44.44 | 16 | 21.05 | 32 | 100 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Primary Practice Area of participation ** | | | | | | | |
| Did not participate | 32 | 29.63 | 0 | 0.00 | 32 | 100 | N/A |
| Worked in a hospital | 47 | 43.52 | 47 | 61.84 | N/A | N/A | |
| Worked in a shelter | 5 | 4.63 | 5 | 6.58 | N/A | N/A | |
| Worked in an emergency room | 1 | 0.93 | 1 | 1.32 | N/A | N/A | |
| Provided logistical or administrative support | 5 | 4.63 | 5 | 6.58 | N/A | N/A | |
| Worked on frontlines | 5 | 4.63 | 5 | 6.58 | N/A | N/A | |
| None of the above | 13 | 12.04 | 13 | 17.11 | N/A | N/A | |
| Post event critical incident stress debriefing*** | | | | | | | NA |
| Yes | 8 | 7.41 | 8 | 10.53 | N/A | N/A | |
| No | 63 | 58.33 | 58 | 76.32 | 5 | 15.63 | |
| Did not participate | 37 | 34.26 | 10 | 13.16 | 27 | 84.38 | |

PIDA = participated in disaster activities Non-PIDA = did not participate in disaster activities
*Chi square calculated on training vs. no training due to cell size less than 5
**Question used to determine participation *** descriptive only due to cell size

**RQ2a.What is the prevalence of PTSD in a sample of nurses who were present in the New Orleans region during Hurricane Katrina? (Table 4.5)**

The prevalence of PTSD within the full sample, identified by scores of 33 or greater on the IES-R, was 10.2% (n=11). This was greater than the lifetime prevalence reported by the National Institute for Mental Health (NIMH) for the United States population (6.8%), but consistent with the 10% for women identified by the National Center for Post-traumatic Stress Disorder (NCPTSD). A small portion, less than a quarter of the sample, reported prior history of trauma and treatment for psychological care (14.8%, n = 16). Almost half of the participants reported experiencing psychological symptoms they attributed to Hurricane Katrina (38.89%, n = 42), but very few reported being diagnosed with PTSD related to Hurricane Katrina (3.7%, n = 4). The majority did not receive Critical Incident Stress Debriefing (58.3%, n = 63). One participant reported currently being on disability for PTSD related to Hurricane Katrina.

**RQ2c.What is the prevalence of PTSD in a sample of nurses who were present in the New Orleans region who PIDA during Hurricane Katrina? (Table 4.5)**

The prevalence of PTSD symptoms for the portion of the PIDA group identified by scores of 33 or greater on the IES-R, was 13.2% (n = 10). Almost a quarter of the sample reported prior history of trauma (18.4%, n = 14) and prior history of psychological care (18.4%, n = 14). There was no significant difference between the PIDA and non-PIDA groups in the experience of psychological symptoms secondary to HK ($x^2 = 0.54$, p 0.76). Although almost half reported experiencing psychological symptoms post event that they attributed to Hurricane Katrina (48.7%, n = 37), only a

few reported they were formally diagnosed with PTSD related to Hurricane Katrina (5.3%, n = 4) and few reported receiving psychological care following the event (9.2%, n = 7). The majority did not receive Critical Incident Stress Debriefing (76.3%, n = 58). Table 5 describes the psychological experiences of the full sample, and both the PIDA and non-PIDA groups.

To summarize, the prevalence of PTSD was determined by using a score of 33 or greater on the IES-R as a criteria for the diagnosis of PTSD in this study. The IES-R accounts for the three symptoms of avoidance, intrusion, and hyperarousal which are part of the diagnostic criteria for determining the diagnosis of PTSD. In the full sample 10.2%, of the sample was identified as meeting this criterion. For the PIDA sample, the prevalence of PTSD was noted to be higher, with a rate of 13.2%, which although lower than rates in other responder groups, was higher than the general public (14.4%; 6.8% respectively). There was no significant difference between the PIDA and non-PIDA groups in the experience of psychological symptoms secondary to Hurricane Katrina ($\chi^2 = 0.31, p = 0.75$).

**Table 4.5:**
*Psychological experiences of the full, PIDA, and non-PIDA groups*

| | Full sample (n=108) | | PIDA group (n=76) | | Non-PIDA group (n=32) | | | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | test statistic | p- value |
| History of trauma prior to HK* | | | | | | | | |
| Yes | 16 | 14.81 | 14 | 18.42 | 2 | 6.25 | *Fishers exact test* | 0.14 |
| No | 91 | 84.26 | 61 | 80.26 | 30 | 93.75 | | |
| Choose not to answer | 1 | 0.90 | 1 | 1.32 | 0 | 0.00 | | |
| Psychological treatment prior to HK* | | | | | | | | |
| Yes | 16 | 14.81 | 14 | 18.42 | 2 | 6.25 | *Fishers exact test* | 0.32 |
| No | 88 | 81.48 | 60 | 78.95 | 28 | 87.50 | | |
| Choose not to answer | 4 | 3.70 | 2 | 2.63 | 2 | 6.25 | | |
| Psychological symptoms experienced related to HK* | | | | | | | $\chi 2 = 0.31$ | 0.78 |
| Yes | 42 | 38.89 | 37 | 48.68 | 5 | 15.63 | | |
| No | 37 | 34.26 | 31 | 40.79 | 6 | 18.75 | | |
| Did not participate | 26 | 24.07 | 6 | 18.80 | 20 | 9.00 | | |
| Choose not to answer | 3 | 2.77 | 2 | 2.63 | 1 | 3.13 | | |
| Sought psychological care after HK* | | | | | | | | |
| Yes | 9 | 8.33 | 7 | 9.21 | 2 | 6.25 | *Fishers exact test* | 0.32 |
| No | 70 | 64.81 | 62 | 80.58 | 8 | 25.00 | | |
| Did not participate | 28 | 25.93 | 6 | 7.89 | 22 | 68.75 | | |
| Choose not to answer | 1 | 0.90 | 1 | 1.32 | 0 | 0.00 | | |
| Diagnosed with PTSD related to HK* | | | | | | | *Fishers exact test* | 0.24 |
| Yes | 4 | 3.70 | 4 | 5.26 | 0 | 0.00 | | |
| No | 100 | 92.59 | 69 | 90.78 | 31 | 96.88 | | |
| Chose not to answer | 4 | 3.70 | 3 | 3.95 | 1 | 3.13 | | |
| Met criteria for PTSD on IES-R in this study | | | | | | | *Fishers exact test* | 1.68 |
| Yes | 11 | 10.19 | 10 | 13.15 | 1 | 3.13 | | |
| No | 97 | 80.56 | 66 | 86.84 | 31 | 96.88 | | |

PIDA = Participated in disaster activities Non- PIDA = did not participate in disaster activities *Responses only calculated

**RQ3a. What coping strategies were utilized in a sample of nurses in the New Orleans region during Hurricane Katrina?**

Comparing the coping scales of EFC and PFC in the full sample, EFC scores (M=32.42, SD=18.02) were noted to be higher than the PFC scores (M=11.37, SD=6.89), indicating a greater use of EFC strategies in the sample. Because research has identified gender and role as a professional or volunteer, an independent two sample t-test was conducted. This found no significant difference by gender in the use of EFC ($p = 0.50$) or PFC ($p = 0.73$). There was also no significant difference between role as volunteer or professional and EFC ($p = 0.91$) or PFC ($p = 0.24$).

Alternative coping strategies were identified as increased use of medications, substances (both legal and recreational), and seeking psychological care. As noted above, more than a quarter of the full sample reported experiencing psychological symptoms they attributed to Hurricane Katrina (39.9%, n = 42) but despite this only 8.3% (n = 9) reported receiving psychological care following the event (Table 4.5). Alternative coping strategies using substances were also identified by many respondents, with 28.7 % (n = 31) reporting an increased use of cigarettes, medications, or recreational substances to help cope; alcohol (13%, n = 14) and cigarettes (6.5%, n =7) were reported as the most frequently increased substances. A small portion of the sample, 7.4% (n = 8), reported they experienced alcohol and/or drug problems they thought were related to Hurricane Katrina (Table 4. 6).

**RQ3b. What coping strategies were utilized in a sample of nurses who were present in the New Orleans region that PIDA during Hurricane Katrina?**

Comparing the coping scales of EFC and PFC in the PIDA group, EFC scores were noted to be higher than the PFC scores (M=32.70, SD=16.54 vs. M=12.17, SD=6.61) indicating a greater use of EFC strategies in the sample. As above, the independent two sample t-test conducted found that there was no significant difference by gender in the use of EFC ($p = 0.19$) or PFC ($p = 0.41$) strategies. There was also no significant correlation between role as volunteer or professional and the use of EFC ($p = 0.91$) or PFC ($p = 0.24$) strategies.

A large portion of the PIDA group reported psychological issues related to their experiences in Hurricane Katrina, but although almost half reported they had psychological symptoms post event that they attributed to Hurricane Katrina (48.7%, n = 37), few reported seeking psychological care for these symptoms following the event (9.2%, n = 7). In examining the alternative coping strategies more than a quarter of the participants in the sample reported an increased use of cigarettes, medications, or recreational substances to help cope (31.6%, 24%). Of these, alcohol (15.8%, n = 12) and cigarettes (7.9%, n = 6) were the most frequently increased substances. Because of the impact on functioning, research has identified that increased use of alcohol as one of the more concerning coping strategy for many responders who experience disaster. In this sample less than 19.2% reported they experienced alcohol and /or drug problems they thought were related to Hurricane Katrina (9.2%, n = 7)**.**

In review, coping strategies identified as PFC and EFC strategies based on the Folkman and Lazarus Transactional Theory of Stress and Coping were operationalized

using the WOC-R. Both the full sample and the PIDA group were similar. Results found EFC scores were higher in both the full sample as well as the PIDA group when analyzed separately. Neither gender, nor role as a volunteer or professional, was found to be correlated with the use of either PFC or EFC in either the full sample or the PIDA group. Considering the alternative coping strategies identified in the questionnaire of the same name, the increased use of substances was identified, with alcohol and cigarettes reported to be the most frequently increased substances. Additionally, despite almost half of the participants identifying having psychological issues related to Hurricane Katrina, a very few identified actually having pursued psychological assistance.

**Table 4.6:**

*Alternative coping strategies by full sample, PIDA group, and non-PIDA*

| | Full sample (n=108) | | PIDA group (n=76) | | Non-PIDA group (n=32) | | | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | test statistic | p-value |
| Experienced alcohol or drug problems related to HK | | | | | | | *Fishers exact test* | 0.43 |
| Yes | 8 | 7.41 | 7 | 9.21 | 1 | 3.13 | | |
| No | 100 | 92.59 | 69 | 90.79 | 31 | 96.88 | | |
| Increased use of cigarettes, medications, or recreational substance to help cope after HK | | | | | | | $\chi 2 = 1.04$ | 0.59 |
| Yes | 31 | 28.70 | 24 | 31.57 | 7 | 21.88 | | |
| No | 56 | 51.85 | 38 | 50.00 | 18 | 56.25 | | |
| Do not use any of these | 21 | 19.44 | 14 | 18.42 | 7 | 21.88 | | |
| Type substances use increased * | | | | | | | | |
| Cigarettes | 7 | 6.48 | 6 | 7.89 | 1 | 3.13 | N/A | |
| Antidepressants | 6 | 5.56 | 4 | 5.26 | 2 | 6.25 | | |
| Sleep aid | 7 | 6.48 | 4 | 5.26 | 3 | 9.38 | | |
| Anti-anxiety medications | 2 | 1.85 | 2 | 2.63 | N/A | N/A | | |
| Alcohol | 14 | 12.96 | 12 | 15.79 | 2 | 6.25 | | |
| Recreational substances | 2 | 1.85 | 1 | 1.32 | 1 | 3.13 | | |
| Do not use any of these | 62 | 57.41 | 42 | 55.26 | 20 | 62.50 | | |
| Choose not to answer | 7 | 6.48 | 5 | 6.58 | 2 | 6.25 | | |

PIDA = participated in disaster activities Non-PIDA = did not participate in disaster activities

*Missing data accounts for the remainder of the sample in which columns for the variable do not total to 100%, and variable is included for descriptive purposes, small cell size prohibits analysis

**RQ4a.What is the association between level of exposure, coping strategies, and symptoms of PTSD in a sample of nurses that PIDA during Hurricane Katrina?**

Pearson correlational analyses were conducted on the PIDA group to examine the association between level of exposure, EFC, PFC, and IES-R scores. The results found that both PFC strategies and EFC were significantly correlated with the outcome variable of PTSD. There was a stronger correlation between the EFC strategies and the outcome variable ($r = 0.78$, $p < 0.01$) than the PFC strategies ($r = 0.39$, $p < 0.01$) and the outcome variable. Exposure was not significantly correlated to the PFC strategies ($r = 0.23$, $p = 0.05$), but was significantly related to EFC strategies ($r = 0.29$, $p = 0.02$). As would be anticipated and supported by research, exposure was found to be significantly correlated with increased scores on the IES-R ($r = 0.31$, $p = 0.01$). Previous research found a correlation between the symptoms of PTSD and the variables of gender, history of trauma, marital status, and role as volunteer or professional correlational analysis of these variables related to the outcome variable was also conducted. These variables did not covary. No significant correlation was found.

In order to examine the amount of variance that the variable of past history of trauma accounts for, a hierarchical regression analysis was conducted using the (Table 8). The history of trauma variable was entered into the equation first followed by the trauma variable, the PFC variable next, and finally the EFC variable. The model indicated that the variable of past history of trauma did account for a significant amount of the variance in the outcome variable ($R^2 = 0.07$, $p < 0.05$). The addition of the TESS indicated this variable did not account for additional variance ($r^{2 =} 0.07$, $p < 0.05$). The addition of the PFC variable did account for a significant amount of variance ($r^2 = 0.12$, 0.01). The

addition of the final variable of EFC resulted in the full model being statistically significant ($r^2$ = 0.10, $p < 0.01$), but the PFC and the TESS variables becoming non-significant (Table4.7). But because the two variables of exposure and PFC were not significant in the original model, a final model was built to evaluate the history of trauma and EFC variables on the symptoms of PTSD, which were significant. The final model, controlling for history of trauma, found that EFC accounted for 32% of the variance in symptoms of PTSD ($p = <0.001$) (Table 4.8).

**Table 4.7:**
*Regression Models for PIDA group and association of level of exposure, coping, and symptoms of PTSD*

| | Model 1 | | | Model 2 | | | Model 3 | | | Model 4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B | Beta | SE (B) | B | Beta | SE (B) | B | Beta | SE (B) | B | Beta | SE (B) |
| Intercept | | 0.62 | 3.55 | | 0.67 | 2.8 | | 0.68 | 2.05 | | 0.64 | 1.9 |
| History of Trauma | 0.26* | 0.33 | -0.72 | -0.27* | 0.32 | -0.74 | -0.25* | 0.3 | -0.68 | -0.24* | 0.28 | -0.68 |
| TESS | | | | 0.27* | 0.41 | 0.1 | 0.22* | 0.04 | 0.81 | -0.15 | 0.37 | 0.55 |
| PFC | | | | | | | 0.34** | 0.02 | 0.06 | -0.03 | 0.26 | -0.04 |
| EFC | | | | | | | | | | 0.50** | 0.11 | 0.35 |
| $R^2$ | | 0.07 | | | 0.07 | | | 0.12 | | | 0.10 | |

*p<0.05

**p<0.01

***p<0.001

Model 1 includes history of trauma

Model 2 = Model 1 + traumatic exposure scale score (TESS)

Model 3 = Model 2 + problem focused coping (PFC) score

Model 4 = Model 3 + emotion focused coping (EFC) score

PIDA = participated in disaster activities; PTSD = Posttraumatic stress disorder; B = Unstandardized coefficient; Beta = Standardized coefficient

**Table 4. 8:**
*Summary of Final Model for Hierarchical Regression Analysis for EFC and symptoms of PTSD (n=70)*

| | B | SE B | Beta | P - Value |
|---|---|---|---|---|
| Step 1: History of Trauma | -0.71 | 0.33 | -0.26 | $p < 0.001$ |
| Step 2: EFC | 0.40 | 0.01 | 0.51 | $p < 0.001$ |

*Note:* $R^2 = 0.07$ ($p < 0.03$) for Step 1, Step 2 $\Delta R^2 = 0.26$ ($p < 0.001$);
Full model $R^2 = 0.32$ ($p < 0.001$)

**RQ4b**. **Does coping mediate symptoms of PTSD in a sample of nurses who were present in the New Orleans region and PIDA during Hurricane Katrina?**

In order to gain greater understanding of the effect of the coping variable on the relationship between the exposure to the trauma associated with participation in the Hurricane Katrina and PTSD symptomatology a path analysis was conducted. Bootstrapping, a technique which resamples the data up to a thousand times to improve reliability and decrease Type 1 error, was employed due to the small sample in order to improve the potential to identify a significant relationship in the analysis. The use of the macro, a computer code written to execute commands in SPSS, which was developed by Preacher and Hayes (2008) allowed a multiple mediation analysis to be conducted which uses the bootstrapping technique (Table 4.9; Table 4.10). To explore the possible mediating effects of the potentially confounding variables of history of trauma, marital status, and gender on the relationship between exposure to trauma and symptoms of PTSD a multiple mediation path analysis using the Preacher and Hayes (2008) macro incorporating the bootstrapping technique was conducted. This mediation model found no significant mediating effects of history of history of trauma, marital status, and gender. The results of the mediation path analysis conducted, controlling for gender, marital status, history of trauma, and professional versus volunteer role revealed there was no relationship between exposure to trauma and PFC ($p = 0.40$), exposure to trauma and EFC ($p = 0.09$). EFC was found to be associated with the symptoms of PTSD ($p = 0.01$), and although there was a significant total effect of exposure on symptoms of PTSD ($p = 0.02$) there was no direct effect on symptoms of PTSD without going through the coping variable ($p = 0.09$). The total indirect effect of exposure through EFC is not different

from 0. And because the confidence interval for EFC includes zero, this indicates that EFC is not a significant mediator of the relationship between exposure and symptoms of PTSD.

**Table 4.9:**
*Mediation Models for PIDA group and the effect of history of trauma, and EFC and PFC on the relationship between level of exposure and PTSD symptoms (n=69)*

| | B | SE | p | |
|---|---|---|---|---|
| Trauma Exposure and Coping Measure Associations | | | | |
| EFC | 1.07 | 0.63 | 0.09 | |
| PFC | 0.23 | 0.27 | 0.40 | |
| Coping Measure and Log IES-R score Associations | | | | |
| EFC | 0.03 | 0.01 | 0.01 | |
| PFC | 0.00 | 0.03 | 1.00 | |
| Total Effect of Trauma Exposure on Log IES-R score | | | | |
| Trauma Exposure | 0.10 | 0.04 | 0.02 | |
| Direct Effect of Trauma Exposure on Log IES-R score | | | | |
| Trauma Exposure | 0.07 | 0.04 | 0.09 | |
| Partial Effects of Control Variables on Log IES-R score | | | | |
| History of Trauma | -0.64 | 0.29 | 0.03 | |
| Participatory Role | -0.12 | 0.09 | 0.19 | |
| Marital Status | 0.01 | 0.09 | 0.92 | |
| Gender | -0.35 | 0.52 | 0.51 | |
| Model Summary | $R^2$ | Adjusted $R^2$ | F | p-value |
| | 0.38 | 0.30 | 5.26 | <0.001 |

**Table 4.10:**
*Bootstrap Results for Indirect Effects of Exposure on symptoms of PTSD through PFC and EFC as Mediators*

| | | | | | Bias Corrected and Accelerated Confidence Intervals | | Percentile Confidence Intervals | |
|---|---|---|---|---|---|---|---|---|
| | Data | Boot | Bias | SE | 95% LCL | 95% UCL | 95% LCL | 95% UCL |
| TOTAL | 0.04 | 0.04 | <0.01 | 0.03 | -0.02 | 0.13 | -0.02 | 0.13 |
| EFC | 0.04 | 0.04 | <0.01 | 0.03 | -0.01 | 0.16 | -0.02 | 0.14 |
| PFC | <0.01 | <0.01 | <0.01 | 0.01 | -0.04 | 0.03 | -0.03 | 0.04 |
| EFC- PFC differences | 0.04 | 0.04 | <0.01 | 0.03 | -0.02 | 0.19 | -0.02 | 0.15 |

PIDA = participated in disaster activities  Non- PIDA = did not participate in disaster activities

Post hoc tests were conducted to analyze additional questions related to the data. The following section addresses these questions.

1. What is the relationship between area of clinical practice during Hurricane Katrina and symptoms of PTSD in the PIDA group (n = 76)? This was explored in order to understand the influence of nurse specific variables during the event on the development of symptoms of PTSD.

Linear regression was performed to evaluate the relationship between the nurses primary occupational role while PIDA and symptoms of PTSD. The analysis controlled for level of exposure, gender, marital status, and history of trauma. The variable of primary practice area of participation was analyzed as the recoded variable which collapsed the categories of emergency room and hospital as a type of participation due to small cell size, and categorical variables were dummy coded prior to analysis and entered into the regression. No significant relationships were suggested between PTSD symptoms and any of the variables included in the model, including primary practice area of participation ($F(1, 63) = 1.48$; $p = 0.23$).

2. Is there an association in the PIDA group between the nurses who were diagnosed with PTSD after Hurricane Katrina (n= 4) and those who met criteria for PTSD (IES-R score 33 or greater) in the study (n = 10)?

In order to analyze the association between PTSD and the participants diagnosis of PTSD related to Hurricane Katrina in the PIDA group a Fisher's exact test was conducted. This was used because of there were two cells with an expected cell size less than 5. The analyses indicated a significant association between PIDA

nurses with a PTSD diagnosis related to Hurricane Katrina and PTSD as defined by an IES-R score of 33 or greater. This indicated PIDA nurses who were found to have PTSD as defined in the study were significantly more likely to have been diagnosed with PTSD after Hurricane Katrina ($p < 0.01$, *Fishers exact test*).

3. Does marital status, gender, or history of trauma moderate the relationship the relationship between level of exposure and symptoms of PTSD?

Potential moderating effects of marital status, gender, and history of trauma on the relationship between level of exposure and symptoms of PTSD were evaluated using interaction terms within linear regression models. No significant moderating effect of the marital status ($F(1,63) = 0.43$, $p = 0.51$), gender ($F(1, 63) = 0.04$, $p = 0.84$), history of trauma ($F(1,63) = 0.18$, $p = 0.67$) were found on the relationship between level of exposure and symptoms of PTSD ($n = 70$).

4. Is the educational level of the nurses associated with decreased symptoms of PTSD in the PIDA group?

Linear regression was performed to evaluate the relationship between the PIDA nurses' educational background and symptoms of PTSD ($n = 65$). The analysis controlled for level of exposure, gender, marital status, and history of trauma. No significant association was suggested between PTSD symptoms and the educational level of the nurses in the PIDA group ($F (3, 56) = 0.24$; $p = 0.87$).

**Summary**

The majority of both the full sample, and the PIDA group were married, white women; and if they were involved in PIDA, they were more likely to be doing so in a professional role in a hospital setting. The majority of the nurses were educated at the

bachelor level. There were no major significant difference between the PIDA and non-PIDA groups in demographic and psychosocial characteristics.

The analysis of the prevalence of PTSD in the full sample was determined to be 10.2% (n = 11) by using scores of 33 or greater on the IES-R. The prevalence of PTSD in the PIDA group was 13.2%, and almost half (48.7%, n= 37) of this group reported issues with psychological symptoms related to Hurricane Katrina as opposed to the 15.6% (n =5) in the non-PIDA group. Despite this, there was no statistically significant difference between the PIDA and non- PIDA groups ($p = 0.76$) in experiencing psychological symptoms related to HK. In response to the stress of the event, there were no statistically significant differences in coping strategies when comparing the use of PFC, EFC, or other alternative coping strategies. A small portion on the full sample indicated increased use of substances such as alcohol or cigarettes in the aftermath as an adjunct to assist in coping. A deeper analysis using a linear regression was conducted to explore the relationships between the major study variables. Multiple mediation path analysis was used to further explore the relationships to determine if coping had a mediating effect on the relationship between exposure to trauma and symptoms of PTSD. No mediating or moderating effects of the variables of marital status, gender, and history of trauma was found on the relationship between level of exposure and symptoms of PTSD. Analysis also validated the PTSD diagnosis used by the scoring of the IES-R, with those who were diagnosed with PTSD in the study being significantly more likely to have been diagnosed with PTSD after Hurricane Katrina ($p < 0.01$, *Fishers exact test*). The following chapter includes a full discussion of these findings, significance of the findings, and recommendations for future research.

# CHAPTER V

# CONCLUSIONS

When Hurricane Katrina made landfall in 2005 it had a devastating effect on the Gulf region, and particularly on the city of New Orleans. The communities in the New Orleans region suffered not only from the impact of the hurricane itself, but also from the breakdown of the nearby levee. Breakdown of the levees resulted in a prolonged the impact of the event, and worsened the subsequent conditions. The situation quickly deteriorated, and loss of power and breakdowns in the local community structure resulted in chaos. Nurses and their families, and the surrounding communities suffered losses related to the hurricane, and many families were trapped in the attics of their homes. Many lives were lost. Even the shelter facilities in the city were devastated, and reports of dangerous situations have continued to emerge years after the event. Many of the local hospitals were closed due to lack of power and resources to provide care. These facilities were staffed by nurses and other professionals, who remained despite danger to themselves to provide care to the remaining patients who were too ill to be sent home. Many of these nurses, staff, and patients waited for days to be evacuated in the direst conditions. Caring for others during the disaster meant the nurses, the other staff, patients, and families endured significant exposure to traumatic experiences and because of this exposure were at risk for developing psychological sequelae related to this experience.

It is well known that exposure to traumatic experiences has the potential to result in psychological dysfunction for individuals as well as communities. The increased focus on disaster research over the last several decades has provided for a greater focus on psychological responses of individuals involved in disasters. Of these, posttraumatic stress disorder (PTSD) is a major concern. In a landmark study Norris found that individuals living in economically deprived areas affected for a prolonged time period are at increased risk for psychological disorders such as PTSD (Norris, 2002a, 2002b). In the New Orleans area both of these conditions were present and the delay in local and federal response to the event only served to complicate the issues. After Katrina, there were a number of studies initiated to examine the psychological responses of individuals and groups in the region, but few have been focused on the long term psychological responses to this disaster. This study was focused on examining the long term psychological responses of nurses in the New Orleans region five years after Hurricane Katrina.

In order to gain an understanding of the way in which individuals deal with psychological stressors, the concept of coping must be considered. A great deal of research related to the topic of coping in the context of traumatic events has been conducted. In particular, the Folkman and Lazarus theory of stress and coping has provided a framework for the study of coping in response to stressors such as disaster and is the theoretical framework for this study (Folkman & Lazarus, 1980; Folkman, Lazarus, Gruen, & DeLongis, 1986). This theory includes two primary coping strategies: problem focused coping (PFC) and emotion-focused coping (EFC). Problem focused coping strategies are directed externally in an attempt to change the stressful situation, and emotion focused coping strategies are internally directed efforts to quell the emotional

response. The Ways of Coping- Revised (WOC-R) scale was used to operationalize these concepts. Many studies are focused on general groups of responders. However, because of the unique role that nurses play as responders in volunteer organizations, in the hospitals and emergency rooms, and in emergency response teams it was deemed important to explore their unique experiences in relationship to disaster.

This cross-sectional correlational study examined the influence of level of exposure and use of the PFC and EFC coping strategies in predicting PTSD related outcomes in nurses who experienced the Hurricane Katrina disaster 5 years later. A random sample of nurses was identified using a database of nurses from two parishes in the New Orleans region. A total of 995 nurses were contacted to participate in an online survey through a four stage post card mailing which invited the recruit to sign on to the study website. The website provided the consent document and a link to the online survey. Only completed surveys were included in the final analysis. After all responses were reviewed, 108 surveys were complete and eligible for inclusion, with 76 of those identified as having participated in disaster activities related to the hurricane (PIDA). Analysis consisted of the full sample, nurses who participated in disaster related activities during Hurricane Katrina (PIDA) and nurses who did not participate in disaster related activities during Hurricane Katrina (non-PIDA). Gaining insight into the nurses' experiences, knowledge helped inform potential interventions to assist in decreasing nurses post event psychological sequelae for future events. This chapter provides a discussion of the findings, limitations of the research, and implications to practice as well as recommendations for future research.

## Discussion of Findings

### Demographics.

The initial research questions examined the demographic and psychosocial characteristics of the sample. The results of the analysis revealed no significant differences between the PIDA the non-PIDA group on demographic characteristics. The sample was compared to the demographics of the Orleans and Jefferson parishes using the 2010 national census, and comparison found that the Jefferson parish population was primarily Caucasian (62.9%) with more than half of the population female (51.9%). The population of Orleans parish was mostly African American (60.2%) and female (52%). In comparison the sample was primarily Caucasian (75%) and female (93.5%). This study does not ask the participant to identify their parish, this making it difficult to make a connection of the sample directly to the community. The fact that the majority of the sample was female was anticipated with the 94% presence of females in the nursing profession.

The majority of the nurses who participated in this study identified that they were educated at the bachelor level; with associate and master nurses the next most represented educational levels. This would be anticipated with sixty percent of nurses working in hospital based settings, and because the majority of nurses would be expected to be educated at the bachelor's level. The PIDA group included Doctor of Philosophy (PhD) and Doctor of Nursing Practice (DNP) level nurses. Consideration in the demographics data related to the nurses primary or usual, nursing role. Most were hospital based with medical surgical, critical care, and intensive care as the most represented of the specialties. Some consideration was given to the possible relationship between

demographics, including the primary role, coping strategies, and PTSD outcomes. No correlations were identified between these variables. Thus there was no evidence that the nurse based in the emergency room versus the critical care area was more likely to use a particular coping strategy over another, or more likely to have the symptoms of PTSD.

**Previous Disaster Training.**

The majority of the sample reported PIDA, and many did so in a professional role. Despite this, less than half of the group indicated that they had received disaster response training, and most training was obtained through the work setting. This result was somewhat surprising because of the fact that New Orleans has been in the path of many hurricanes, and had been impacted by other large hurricanes such as Hurricane Camille in 1969 which exceeded even the strength of Katrina. Although there may be an assumption that greater frequency of hurricanes would result in greater rates of disaster response training for hospital staff such as emergency department or floor nurses, these results did not indicate this is clearly true. A low rate of training would also stand to indicate a potential gap and need identified for the future evaluation. Only a small portion of the sample had engaged in PIDA through volunteer or faith based organizations, this may have been due to the degree of the impact of the hurricane on the individuals' and community resources, resulting in a loss of the ability to provide those services in the region. As noted, 100% of the respondents had to relocate. It is possible that the majority of the local nurses who were not working would have been engaged in managing their own safety and relocating.

**Exposure.**

This study used the TESS to determine the level of exposure to the Hurricane Katrina event in New Orleans. Developed by Elal and Slade the TESS provided information about level of exposure to disaster and catastrophic events (Elal, 2005). This instrument included an assessment of the impact of the loss of resources in the assessment of exposure (Hobfoll, 1991). Because of the severity of the storm and the length of time of the Hurricane Katrina disaster, the ability to measure the impact on the resources of the respondents was deemed to be essential for this study.

The study results indicate that the level of exposure was moderately low for some individuals in both groups, but slightly and insignificantly lower in the non-PIDA group. The results also indicate that even in non-work related capacities, nurses were exposed to difficult experiences during the event. Given that low scores on the TESS might reflect an effect over time, and with nurses' psychological responses to the experience of the event changing over time, this study was conducted five years after the event in an attempt to capture this change. Future research may be directed at a time sequenced approach to determine if the perception of the level of exposure changed over time.

One reason the Trauma Exposure Severity Scale (TESS) scores may have been low in this sample is the possibility that the TESS did not conceptually measure the type of exposure the majority of these nurses experienced during Hurricane Katrina. Although these nurses experienced a loss of resources in the face of the event due to power outages, the majority reported being engaged in Hurricane Katrina in their professional role, and in locations that were primarily hospital based. This may indicate that even though they had exposure to the event, they may not have experienced the events described in the

TESS such as having a loved one trapped in their home, lost a significant other, or had a major financial impact in the way described in the TESS.

The TESS subscales of resource loss, damage to home, personal harm, concern for significant others, and exposure to the grotesque were reviewed for differences between the PIDA and non PIDA groups, and the PIDA group mean grotesque subscale score was significantly higher than the non PIDA group (M = 0.79, SE = 0.37 versus 6.81, SE = 0.54; p = 0.01). The reliability of this subscale for the non-PIDA group was only $\alpha = 0.48$, but was $\alpha = 0.71$ for both the full scale and PIDA group. This may be explained by the small sample size for the non-PIDA group (n=32). The challenges that faced by the nurses in the PIDA group that described in accounts in forty written responses received spontaneously in the pilot section expressed the severity of the conditions the nurses were exposed to, but again were in contrast to the actual TESS scores, which were relatively low.

**Coping and PTSD Symptomatology.**

PFC and EFC strategies were utilized in this study to describe coping in the sample. Research has associated the use of EFC with the development of symptoms of PTSD (Chang et al., 2008), but the PFC associations with PTSD have been less clear (Braun-Lewensohn et al., 2009; Chang et al., 2003; Chung et al., 2005; Goldenberg & Matheson, 2005; Kenardy & Tan, 2006; Lali et al., 2007). The possible scores on the PFC scale range from zero to fifty eight, and the EFC from zero to one hundred fifty two. Scores in the PIDA group for the PFC scale had a high of twenty seven (M = 12.92, SE = 0.79), and the non-PIDA group PFC scale high was a twenty three (M =10.06, SE = 1.34). Scores for the EFC peaked at seventy nine (M= 32.64, SE = 16.57) for the PIDA

group and seventy eight (M = 32.16, SE = 3.75) for the non-PIDA group. This indicated that there was a greater use of EFC in both groups, but again there were no significant differences between the groups (p = 0.90). This may be accounted for by the fact that exposure, measured by the TESS score, was similar in the groups.

The results indicated that although there was a significant correlation between PFC and EFC in both samples, EFC was more highly correlated with PTSD than PFC. When comparing the two samples, this correlation was noted to be even stronger in the group which had PIDA. In addition, the nurses were asked about alternative coping strategies such as increasing use of substances or seeking psychological care. Increased alcohol use has been identified in the research as a potential negative coping mechanism in responders (Bacharach et al., 2008; Simons et al., 2005; Stewart et al., 2004) and this was consistent. Of the full sample, 13% reported increasing the use of alcohol after Hurricane Katrina in order to cope. In addition, 7.4% reported they experienced alcohol or drug problems related to Hurricane Katrina. Of the PIDA group, 15.4% reported increased use of alcohol and 9% reported they experienced alcohol or drug problems.

Because the concept of EFC in the conceptual model is inclusive of avoidance, it would be plausible that the increased use of substances to decrease emotional experiences and would be consistent with this notion. These findings are also consistent with previous studies of responder samples and suggests that exposure to disaster situations may be amplified by the potential complication of the development of the substance abuse issues (Bacharach et al., 2008; Simons et al., 2005; Stewart et al., 2004). These results also highlight the need to provide education regarding the normal stress responses and potential for unhealthy stress responses. Education related to the warning signs of

unhealthy coping allows for the possibility of mitigating the development of long term alcohol or drug problems in nurses who have been exposed to disaster. Having post event outreach and services may provide a mechanism for improving outcomes, as demonstrated by the finding that symptoms of PTSD in recovery workers five years after the WTC attacks at higher rates than at the two year evaluation (19.1% vs. 14.3%) (Brackbill et al., 2009). Additionally, the lack of recovery from the psychological consequences of disasters such as Hurricane Katrina and the World Trade Center (WTC) attacks demonstrated in current studies (McLaughlin et al., 2011; Perrin et al., 2007), combined with findings which have identified as much as a 40% increase in alcohol abuse behaviors two years after Hurricane Katrina provides support for the potential long term consequences for responders of untreated psychiatric issues such as PTSD (Osofsky et al., 2011).

In addition to increased use of substances, the participants were queried about seeking the use of psychological services after Hurricane Katrina. Although a large number of nurses felt they had experienced psychological symptoms or experienced issues with substance abuse they felt were related to Hurricane Katrina, few reported seeking psychological care for these symptoms. One possible explanation is that the symptoms had not required intervention. This study did not explore this aspect of the nurses' experiences. Another possible explanation for this would be related to the physical relocation that nurses experienced during and after the event. Many were no longer in close proximity to usual care providers. Because many nurses lost jobs, there may have been some lack of access to resources. However, a larger question which may be a consideration for future research would be related to nurses own thoughts and

feelings related to seeking help for psychological or chemical dependency issues. This study suggests a disparity which exists within the nursing community, as the symptoms did not trigger the nurses to seek medical treatment. Although the nurse would be anticipated to be more likely to seek help related to psychological issues due to the medical education, there is a known resistance among health care providers to seek treatment. Again, this may also be an area for exploring the impact of post event interventions such as education or outreach that could have the potential to improve psychological outcomes of nurses and other responders.

**PTSD symptomatology.**

A primary goal of this study was to examine PTSD in nurses who had been in the New Orleans region during Hurricane Katrina. PTSD prevalence was defined using the IES-R, and the score of 33 was used as a cut off for the identification of PTSD in the sample. Symptoms of PTSD were measured by IES-R scores, and higher scores indicated greater symptoms. The prevalence of PTSD in the full sample was 10.2% (n=11) and the PIDA group was 13.2% (n = 10). This was higher than the prevalence of PTSD in women (10%) and the general population (6.8%) (NCPTSD, 2009). The higher prolonged rate of PTSD in the PIDA group is consistent with the rates on other groups of responders (Hagh-Shenas et al., 2005; Perrin et al., 2007) but slightly lower than most. Because little research has been specifically focused on nurses, less is known about the rates in this group of responders. This study suggests that rates of PTSD in nurses who had PIDA may be slightly lower than in others (Hagh-Shenas et al., 2005; Perrin et al., 2007).

One possible explanation for the lower rate of PTSD in the nurses who had PIDA is that those nurses who had greater symptoms of PTSD, and would most likely have met

criteria for the diagnosis in this study, may have chosen not to participate due to these symptoms. In a study of survivors of Hurricane Katrina, non-respondents were surveyed to determine the reasons for the lack of participation. This study found that non-respondents reported greater symptoms of PTSD than those who had responded (Mclaughlin, 2011). An alternative explanation for the lower rate of PTSD could be that the PIDA nurses reported primarily working in professional setting, and primarily in the hospital which would have been their primary work setting. Perrin (2007) found that in a study of 28,962 first responders 2-3 years after the WTC attacks, those who were engaged in the response in their usual occupational roles were less likely to be diagnosed with PTSD than those who had engaged in the response outside their usual occupational role.

The study identified variables related to personal characteristics, nursing specific characteristics, and disaster experience to explore the possible correlation to the variables of interest. Neither of the variables of marital status or gender, which have previously been identified in research as predisposing factors, was found to be associated with PTSD in either the PIDA or non-PIDA groups. This study also did not identify any nurse specific factors, such as education or area of practice to be significantly associated with PTSD symptoms. The ability to identify these variables would assist in directing training and planning opportunities for future events.

Historically in research there has been a positive correlation demonstrated when considering an individual's history of trauma to the development of PTSD (Ozer, best, Lipsey, & Weiss, 2003). Although no correlation was found in this study, it did find in the regression model that history of trauma accounted for a significant amount of the

variance in symptoms of PTSD ($R^2 = 0.07$, $p < 0.05$). The question was also raised about the impact of the use of problem solving coping strategies needed in the work environment provided a protective factor. As stated, the correlational analysis did not identify significant correlations between the role as a professional in the event versus the role as a volunteer on the symptoms of PTSD.

**Mediating Effects of Coping on the Exposure and PTSD Association.**

A major aim of this study was to examine the mediating effects of the coping variables on the relationship between the level of exposure and PTSD symptoms. Level of exposure is well known to be a predictor of PTSD and PTSD symptoms in groups of civilian, military, and first responder populations. The study specifically broke down the strategies of EFC and PFC to determine the mediating effect of the differing strategies. The research that has been focused on coping strategies and the development of PTSD found varied results with EFC more often positively associated with PTSD than PFC. This study did not find that coping was a significant mediator in the relationship between level of exposure to the Hurricane Katrina disaster and PTSD symptoms in this sample. Further research is needed to evaluate PFC for a possible protective relationship with PTSD, but these results did not support such a relationship. The path analysis found the variable of exposure was significantly correlated with the outcome variable of symptoms of PTSD ($p = 0.02$). The relationship between exposure and PTSD symptomatology was positive and consistent with other research which found that exposure to the traumatic event is positively correlated with greater levels of PTSD symptomatology (Norris, 2002a; Silver et al., 2002; Zimering et al., 2006). Specifically, direct exposure has been identified as a predictor in samples of firefighter, and disaster workers (Norris, 2002a;

Zimering et al., 2006). The path analysis revealed that there was a significant relationship between exposure and the EFC, there was a significant relationship between the EFC and PTSD, and a significant relationship between exposure and PTSD. But the full model, using a bootstrapping technique for improved reliability, revealed that there was no significant direct effect between exposure and symptoms of PTSD.

**Experiences of nurses who participated in Hurricane Katrina.**

Nurses who were in the New Orleans region experienced severe conditions both occupationally as well as personally. In the qualitative responses that were documented in this study nurses reported extreme and devastating conditions and several stated that the term "before Katrina and after Katrina" has become integrated into the language of people in the area. In response to question one on the TESS, the scale for exposure, one hundred percent of the full sample reported having to relocate because of Hurricane Katrina. This demonstrates the severity of the impact of the event on the personal resources of the nurses who were in the region during the event. Despite this, 70% of the nurses who participated in this survey remained in New Orleans and PIDA. It is hard to know if this is representative of the region, or if the sample is more representative of nurses who had participated because they had a greater interest and responded.

**Open ended responses**

Although this was a quantitative survey, not addressing the spontaneously entered qualitative responses would be inappropriate. It was clear that many of these nurses needed to tell their stories. This section was intended to provide a snapshot of the content of those responses. Many of the statements made related to the content of the survey corresponded to the desire to share more about their particular experience in a way that

felt important to them and that they felt was missing from the study questions. Most5 comments indicated the respondent felt the study was valid to the topic and provided appropriate content and were glad to participate in the study to increase knowledge related to the event, and the dramatic and devastating nature of the experience.

Several nurses indicated that completing the survey brought back feelings of sadness related to Hurricane Katrina, and some expressed missing friends and life as it was prior to the storm. Many indicated that they continued to have difficulties during storms since experiencing Hurricane Katrina. One respondent indicated that they had left the field of nursing because they could not continue secondary to PTSD. This ongoing difficulty may provide an explanation for the low response rate. Another explanation for low the low response rate may be due to avoidance of PTSD as a possible health problem for one's self, or avoidance of the topic to decrease triggering symptoms of PTSD. One nurse described the ongoing struggles with recalling the event and their sense of the importance of preparation in the future:

> The survey is very general. There are so many details that are unable to be expressed. I could just go on. Just my families whole entire ordeal. From evacuation, caring for elderly parents including hospitalization and surgery on one of them, during this time. Along with a second evacuation within a month for Hurricane Rita. Which ended by being evacuated by the US Airforce to another state. And just finally making it back home to start the cleanup process. Then the fall out: family members dying, relationships ending, families members living together for extended periods of time & REBUILDING. Mine is only ONE

> story. EVERYONE here has one. I still live in the metro area back in my own home & I still work at my inner city clinic as I did prior to the storm. My clinic was flooded with about 5-6ft of water. But it was gutted and rebuilt. We lost so many pts. If they were unable to evacuate they went to the Superdome, which was a nightmare. Some perished in their attics or flooded houses. Even though I was not involved in any rescues, I've seen the pictures and have been told my pts stories of rescue and demise. I could just go on. As I type this I feel like I want to cry all over again. And yet I know I am Blessed compared to others. I think I can speak for everyone down here when I say that it has changed our lives forever. Thank you for doing this study. It lets me know that we have NOT been totally forgotten. I know I CAN'T forget. 5 yrs later and there are still daily reminders of what happened here and I pray that it never happens again. But as we, who live in this area know. And always keep in the back of our minds, that with every Hurricane season that comes & goes we need to be ready. So when the next one comes it won't be a repeat of Katrina.

This nurse provides a picture of the impact of Hurricane Katrina on the New Orleans region on the medical facilities, nurses and their patients; but she also provides a picture of the ongoing psychological stress of the event even five years later in her description of the inability to forget the experience and the ongoing daily triggers. The fact that she reports wanting to cry as she writes her narrative is evidence of the emotional impact on this respondent. Her approach to coping with the next event is

clearly identified by her call for the need to be prepared to avoid another disastrous outcome for the region. Another respondent described the difficulty experienced in one hospital during Hurricane Katrina, and in the end a re-dedication to the nursing profession and the patients:

> We went in for Code Gray Sun at noon. Code Gray is external disaster. Sunday we were on emergency power with no air conditioning. There were transformer problems but they could not be fixed because the Power Company had evacuated the city so their trucks would not be damaged. They should leave a couple to address any problems as we had at our hospital. This was Sunday at 1200 noon and we were without air conditioning--a full 24 hours before K hit. Most of our rooms had one window 6 in x 12 in without screens- because they were not made to be open. Tenet owed the hospital at the time. We had food and bottled water. We had no ice to eat or use in food prep because the city water system went down and no electricity to process it. People, anyone, took turns to fan the patients, we did have some portable fans plugged into emergency plugs. The heat was terrible-our newborns were just in diapers and after a while were running temps. Our hospital was finally closed [and] was evacuated late Thursday night. This was because we could not run any lab, x-rays etc because the computer chips were not functioning because of the heat. We had a Ham operator of our garage trying to call for help; we had no phone service-towers were down. The patients coming in were older diabetic and cancer patients. Random gunshots could be heard and we could see multiple fires.

> When there is a hurricane brewing, panic sets in- there is terror- God please help us, will the government fail us again, more people will evacuate, but will the levees hold, what will be left of our homes. I will drive to the hospital again, I will not leave my patients. But oh how I want to evacuate.

The severity of the situation experienced by nurses who remained to care for their patients was described clearly by this respondent. The written account of this nurse's experience during Hurricane Katrina also identified the stress on the hospital facilities resources, and the disruption in the stability of the social structure around the hospital as noted by the description of the fires and gun shots in the immediate area. And yet despite this, a re-dedication to the profession of nursing and the patients that are served is also very clearly present in this narrative.

## Limitations of the study

### Lack of pilot data.

This study had several limitations that need to be addressed. Issues related to the lack of the pilot data to provide a more formalized assessment of the face validity of the instrument and procedure prior to the full survey opening was a limitation. Although the additional comments provided by the full survey respondents did support the face validity of the study, a longer run in period would be advisable so that issues related to the participants in the pilot could be addressed. Because this pilot was timed to be initiated one month prior the opening of the survey, invitations to participate in the full survey had already gone out when the issue of limited pilot data was identified. Future pilots should be timed for completion prior to the survey invitations going out to allow for time to deal with issues such as the lack of response rate.

As identified earlier, the low response rate (10.9%) was also a limitation of the study. The Tailored Design Method, a process developed to improve response rates in surveys was anticipated to increase the response rate. Despite the fact that after each wave of invitations, an influx of responses was received, the mailing would have been much larger to achieve a larger sample with such a limited response. Small response rates can bias the results of the study and limit the ability to generalize the results by increasing the chance of sampling errors. In addition, data analysis may be affected by small cell sizes, which increase the chance of a Type II error, and impact the stability of the results. The small cell size did become a factor in this study as it limited the ability to compare some of the variables between the PIDA and non-PIDA group.

The small response rate may have also been an indication of a propensity of a participant to respond because of the level of their interest in the topic or the strength of their emotional response to the event, which also potentially biases and potentially self-limits the sample causing the results to not be representative of nurses in the area as a whole. The comparison of the census data for the parishes identified the difference in the ethnicity of the sample as not representative of the population in both parishes. In addition, the possibility that the nurses who were experiencing symptoms of PTSD such as avoidance behaviors may choose to avoid the survey, and the fact that some nurses may have wanted to “move on”, as stated by a respondent in the open ended responses, may have decreased response rate.

Another related limitation of the survey was the lack of ability to capture a larger geographic area through a larger sample size. A larger geographic area would have provided a greater potential for generalization of the findings. This also would have

improved the possibility of identifying significance in the analyses and provided the ability to detect more nuanced results. As indicated, the population represented in the study was also not ethnically consistent with both parishes in the sample with 75% of the sample Caucasian, whereas Orleans parish was primarily African American (60.2%). The study did not specifically ask participants to identify the parish in which their residence or work was located, so it is difficult to know if the sample was representative of the nurses in the region.

Although the study was identified as being adequately powered using a sample size of 108 using the Free Statistics calculator using the mediation analysis as the basis for the calculation, the fact that there was a focus on a subgroup, the PIDA group, required that for the best results a larger sample would have been preferable to increase the potential for statistical significance and the mediating effects of the coping variables. Despite this, a rapid response was noted to each of the waves of mailings. The rapid responses implied that that the nurses were interested and found the study important. This sense of importance was supported by the number of qualitative results that were provided in the "pilot only" section of the survey that allowed for open ended responses to be entered.

The length of the survey online may have presented a barrier for some respondents. There were noted to be a number of responses that were initiated, but not completed part way through. The WOC is a rather long survey, and the use of the online format may have made they survey seem onerous. In a survey completed by hand a participant can flip through and estimate the amount of the survey left to complete. Online, even with a bar to show progress, respondents may have felt the survey was too

time intensive. Provision of the survey at a nursing conference in the region may increase the ability to obtain a greater completion rate and increase sample size and geographic range.

The loss of data on the TESS related to the two inadvertent missing questions was an unfortunate limitation. In review it was determined that the wording on the two questions omitted was almost exactly the same as two other questions in the scale and was the most likely reason for the omission of the items. Although the reliability of the instrument was adequate ($\alpha$=0.76), the loss of the questions limits the ability to use the data to fully support the reliability of the instrument, and the ability to use this study in comparing the results to other studies. The fact that this instrument had not had widespread use was also a limitation of the study, but the ability to provide an instrument that takes into account the impact on resources was seen as a benefit that overrode the limitation. There remains a need in the disaster literature for exposure scales that take into account the loss of resources. Further use the TESS may yet serve this purpose. The fact that the TESS found that 100% of the respondents were forced to relocate secondary to Hurricane Katrina, describing the level of intensity of resource loss encountered in a disaster situation, provides support for the need for such a scale.

One limitation of the study that was identified was the lack of clarity of the conceptual definition of the term “history of trauma” used for this study. The study did not ask for defining information related to the respondents’ history of trauma such as the type of trauma experienced, or the number of traumas experienced. In addition there was no identification of the respondents’ recovery from or ongoing issues with symptoms related to the prior trauma, which would have allowed deeper analysis of the effect of

these aspects of the history of trauma on the symptoms of PTSD. Another conceptual concern related to the fact that the EFC scale and the IES-R. This study found a high correlation ($r = 0.78$) between the EFC strategies and the outcome variable of PTSD. The coping scale and the IES-R were analyzed for conceptual consistency, and the concept of avoidance was found to be represented in both scales. This raises questions as to validity of the results, and the usefulness of these instruments when used together for disaster research related to coping and PTSD. The fact that the concept is consistent for both coping and PTSD makes this a dilemma for measuring both of these concepts. This provides an area of possible concern related to interpreting results of this, as well as other studies using these instruments.

A final and significant limitation and issue related to the potential for generalization is the general experience in the city of New Orleans of a loss of social structure that has not been seen in many other disaster events. The length of time to response, the difficulty in engaging aid, and the general chaos that resulted in the city with looting and loss of order, which is not considered the norm in periods of rescue and recovery after disaster response may make generalizing the results of studies such as this to others difficult.

**Recommendations for future research**

This study provided a number of opportunities for future research, some of which have been mentioned previously in this discussion. In addition to these, we know that disaster response training has value in providing a level of predictability in an unpredictable situation, but we do not know what the barriers are to disaster response training in areas that are at high risk. The fact that less than half of the nurses in the New

Orleans region had disaster response training suggests that a barrier exists. Research may be directed at understanding the barriers and developing interventions to improve training opportunities. Some research in military arenas has found that teaching the use of PFC strategies may decrease the development of symptoms of PTSD. By identifying and testing strategies such as strategic pre-deployment evaluation of volunteers and professional responders for factors which put them at greater risk of developing PTSD, and developing training to boost skills in coping strategies, techniques may be developed to improve long term psychological outcomes. This study did find a significant association between the EFC and PTSD, but not between PFC and PTSD. Future research could provide a clearer understanding of the effects of this type of training through more clinical trial based intervention studies.

One major area of future research identified in this study was the need to develop a tool for use in operationalizing level of exposure in studies in a way that is reliable, valid, and useful for a variety of studies. The TESS has yet to provide a solid level of reliability across studies. Although there is a qualitative difference in the types of disasters that are studied, projects that would undertake the research and development of such a tool could move the research forward by allowing greater comparison of studies across these varied studies. The development of such a tool would require the researcher to devote a great deal of time to the project, or enlist others to assist in the validation process in order to properly assure the usefulness of the tool. The development of this type of quantitative instrument may also be of use to determine the impact of disasters on communities as well as individuals and other groups.

And finally, there is a need to develop studies to evaluate the impact of post event interventions such as outreach, and critical incident stress management (CISM). Very few of the respondents received CISM, and the reason is unknown. However, the fact that respondents are continuing to experience psychological distress five years following Hurricane Katrina, even to the point of disability and resulting in some nurses leaving the profession would indicate that the effects of the experiences were life changing, and that the psychiatric symptoms remain. Would an increased rate of participation in Critical Incident Stress Management (CISM) have improved outcomes? Few studies have emerged which have evaluated long term follow up for responders, let alone nurses. Studies need to be developed to assess the psychological response to varied levels of outreach, and other post participation interventions such as CISM to determine the effect, and if effective, to find the most impactful dose of follow up to improve outcomes.

**Summary**

Nurses are exposed to traumatic experiences in both occupational settings such as emergency rooms and hospital wards, and volunteer organizations such as the American Red Cross and faith based organizations. Nurses also play roles on the frontlines of disaster responses in many of the local, state, and federal response organizations which are mobilized in times of need. Because of the many roles nurses play in disasters, nurses have often been included in research that focuses on larger groups of disparate responders. This study has significance to nursing because it begins to provide a more detailed examination of the experiences specific to nurses' psychological responses to disaster and ways in which they cope with varying levels of exposure to traumatic experiences in disaster.

This cross sectional correlational analysis was aimed at examining experiences of those nurses who had been in the New Orleans regions during Hurricane Katrina. It was successful at doing so from several perspectives. It provided information related to nurses' experiences related to exposure, coping and PTSD. But it also provided an insight into the lived experiences of these nurses through their own unsolicited qualitative responses. The nurses who participated in this study did so with an intention to share what they considered important information. This came across clearly in the nature of the response pattern after each mailing of the post card invitations. The fact that the rate of PTSD was lower than many other responders, but higher than the national average (6.8%) suggests that there is an ongoing experience of psychological symptoms over time. This is consistent with recent research which indicates that rates of PTSD in responders five years after the WTC attacks is higher than it was at two years (14.4% vs. 19%) (Brackbill et al., 2009; Perrin et al., 2007), and that the level of rates of PTSD in responders remained elevated and unchanged after eighteen months (Osofsky et al., 2011). This also supports the need for future longitudinal studies to determine the prolonged impact of participation in disaster.

Nurses who have placed their personal lives aside to remain in the face of disaster such as Hurricane Katrina have already set themselves aside by nature of the fact that they are there. Little research has been focused on what types of nurses make up the cohort of individuals who remain in the face of such devastation to assist those in need. This study hoped to gain a greater insight into the coping strategies that are engaged by these individuals. The findings support the research that suggests there is a correlation between EFC and PTSD. Although this study identifies a relationship between the EFC

strategies of nurses who participate in disaster response and PTSD, there remains a need to continue to pursue research that is directed at understanding how to enhance coping mechanisms and strategies that may be protective in nature against the development of PTSD so that more strategic skills training may continue to be developed to promote these strategies in first responders. The high utilization of substances as a coping mechanism (31.5%) and low rates of seeking psychological assistance (9.2%), and the high percentage of the PIDA participants that reported either experiencing psychological symptoms related to HK (48.7%) or met criteria for the diagnosis for the study (13.5% ) suggests that the coping approaches used may have been ineffective.

The study does raise questions related to the ability to use a coping strategy as a training tool for prevention of PTSD. Coping as a mediator, although supported in some research, was not supported in this study. Finding ways to empower nurses to be more prepared for handling stressful experiences that have a level of unpredictability must include determining which interventions are most effective through research. More attention must be paid to the pursuit of longitudinal studies and time sequenced studies to provide a greater level of understanding of the nurses' experiences across time. Focus should involve determining factors which increase resilience. Unfortunately, the ongoing issue with both natural and man-made disasters will continue to provide a living lab for evaluation of the dynamics of just such issues.

Nurses provide care in a great deal of environments, and are dedicated to providing care to patients through the most difficult times. The effect of Hurricane Katrina on the New Orleans region provided a microcosm of experiences that culminated in nurses in the city being challenged to provide care in overwhelmingly dire and

difficult situations. The lack of resources such as power and running water, and safety concerns related to the breakdown of the local community caused this event to challenge even nurses who had been involved in prior hurricanes. Many nurses in the area who did not PIDA were involved in their own challenges as they tried to survive the event. Because of the significant impact on the local area, many of the nurses who PIDA had no way of knowing what condition their own homes were in as they worked. Despite this, many nurses remained to care for patients through the horrific event, or attended shelters as volunteers to assist others in the area. These nurses are true heroes, and reflect the nature of the nurse as caregiver. The nurse who provided one of the open ended responses may have said it best when she described the desire to go, and the commitment to stay by stating "I will drive to the hospital again, I will not leave my patients. But oh how I want to evacuate."

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## Appendix A: Participant Characteristics Form

Please provide information regarding the following personal characteristics. Your information will not be connected to any identifying data.

1. What is your **age**? _____

2. What is your **gender**? Male_____ Female_____

3. What is your **ethnicity**?

Asian/Pacific Islander_____

African American/Black_____

Caucasian/White_____

Native American/American Indian_____

Latino_____

Other_____

**4.** What is your **marital status**?

Single (never married) _____

Married _____

Partnered_____

Separated_____

Divorced_____

Widowed_____

5. What is your highest level of **nursing education**?

(One response only please)

Diploma_____

Associates _____

Bachelors_____

Masters_____

PhD_____

6. How many **years** have you been a nurse? _____

7. In what area of nursing do you normally work?

Pediatrics_____

Intensive Care Unit_____

Critical Care Unit_____

Emergency_____

Medical-Surgical_____

Operating Room_____

Administration_____

Psychiatry _____

Obstetrical /Gynecology_____

Other_____ (please specify)

## Appendix B: Disaster Participation History Form

**Please answer the following questions regarding your disaster participation history**

**1. How many** disasters have you been involved in? _____

**2**. What type of disasters?

Hurricane _____

Tornado _____

Terrorism _____

Flood _____

Other _____

3. Did you have disaster response **training**? Yes_____ No _____

What kind?

Training at work _____

Volunteer training with faith based group _____

Volunteer training with a volunteer organization (such as American Red Cross)

_____

3. Did you participate in the Hurricane Katrina disaster response as a **professional or volunteer**?

Professional _____

Volunteer_____

Both_____

Did not act as a nurse during Hurricane Katrina _____

4. How did you participate in the Hurricane Katrina disaster?

Worked in a hospital _____

Worked in a shelter_____

Worked in an emergency room_____

Provided logistical or administrative support _____

Worked on frontlines providing direct resources to the individuals affected_____

Other _____

5. Did you receive **Critical Incident Stress Debriefing** following your participation in disaster response?

Yes_____ No_____

6. Did you receive any formal psychological care after participating in Hurricane Katrina?

Yes_____ No_____

If so what type?

_____

_____

_____

_____

## Appendix C: Alternative Coping Strategies Questionnaire

**Please answer the following questions regarding your coping history**

**Psychological or mental health history:**

**1. Did you have a history of trauma prior to Hurricane Katrina?**

Yes _____No_____

2. After participating in the Hurricane Katrina disaster did you **experience psychological or emotional symptoms** you thought were **related to** participating in the Hurricane Katrina disaster response?

Yes _____No_____

3. Have you been **diagnosed with PTSD related to participating in Hurricane Katrina**?

Yes_____ No _____

4. Had you ever sought treatment for psychological services prior to Hurricane Katrina?

Yes_____ No_____

**Medication and substance use history:**

5. Did you experience **alcohol and/or drug problems** you thought were **related to** participating in the Hurricane Katrina disaster?

Yes _____No_____

6. Did you find that after Hurricane Katrina you experienced an **increase in your use** of cigarettes, medications, or recreational substances to help you cope?

Yes _____ No _____

7. If you **increased use of a substances**, which substances? (check all that apply)

Cigarettes _____

Antidepressants (such as Zoloft or prozac) _____

Sleep aids (such as benadryl or ambien) _____

Anti-anxiety medications (such as xanax or valium) _____

Alcohol _____

Other substances (such as marijuana, methamphetamine, cocaine) ____

Other (please specify) _____

## Appendix D: Impact of Events Scale-revised

***IMPACT OF EVENT SCALE-REVISED***

*Instructions:* The following is a list of difficulties people sometimes have after stressful life events. Please read each item, and then indicate how distressing each difficulty is for you with respect to Hurricane Katrina. How much have you been distressed or bothered by these difficulties?

| | | Not at all | A little bit | Moderately | Quite a bit | Extremely |
|---|---|---|---|---|---|---|
| 1 | Any reminder brings back feelings about it. | 0 | 1 | 2 | 3 | 4 |
| 2 | I have trouble staying asleep. | 0 | 1 | 2 | 3 | 4 |
| 3 | Other things keep making me think about it. | 0 | 1 | 2 | 3 | 4 |
| 4 | I feel irritable and angry. | 0 | 1 | 2 | 3 | 4 |
| 5 | I avoid letting myself get upset when I think about it or am reminded of it. | 0 | 1 | 2 | 3 | 4 |
| 6 | I think about it when I don't mean to. | 0 | 1 | 2 | 3 | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | I feel as if it hasn't happened or isn't real. | 0 | 1 | 2 | 3 | 4 |
| 8 | I stay away from reminders about it. | 0 | 1 | 2 | 3 | 4 |
| 9 | Pictures about it pop into my mind. | 0 | 1 | 2 | 3 | 4 |
| 10 | I am jumpy and easily startled. | 0 | 1 | 2 | 3 | 4 |
| 11 | I try not to think about it. | 0 | 1 | 2 | 3 | 4 |
| 12 | I am aware that I still have a lot of feelings about it, but I didn't deal with them. | 0 | 1 | 2 | 3 | 4 |
| 13 | My feelings about it are kind of numb. | 0 | 1 | 2 | 3 | 4 |
| 14 | I find myself acting or feeling like I was back at that time. | 0 | 1 | 2 | 3 | 4 |
| 15 | I have trouble falling asleep. | 0 | 1 | 2 | 3 | 4 |
| 16 | I have waves of strong feelings about it. | 0 | 1 | 2 | 3 | 4 |
| 17 | I try to remove it from my memory. | 0 | 1 | 2 | 3 | 4 |
| 18 | I have trouble concentrating. | 0 | 1 | 2 | 3 | 4 |
| 19 | Reminders of it | 0 | 1 | 2 | 3 | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | cause me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart. | | | | | |
| 20 | I have dreams about it. | 0 | 1 | 2 | 3 | 4 |
| 21 | I feel watchful and on guard. | 0 | 1 | 2 | 3 | 4 |
| 22 | I try not to talk about it. | 0 | 1 | 2 | 3 | 4 |

# Appendix E: Ways of Coping -Revised

**WAYS OF COPING (Revised)**

Please read each item below and indicate, by using the following rating scale, to what extent you used it in the situation you have just described.

| Not Used | Used Somewhat | Used Quite A Bit | Used A great deal |
|---|---|---|---|
| 0 | 1 | 2 | 3 |

_____ 1. Just concentrated on what I had to do next – the next step.

_____ 2. I tried to analyze the problem in order to understand it better.

_____ 3. Turned to work or substitute activity to take my mind off things.

_____ 4. I felt that time would make a difference – the only thing to do was to wait.

_____ 5. Bargained or compromised to get something positive from the situation.

_____ 6. I did something which I didn't think would work, but at least I was doing something.

_____ 7. Tried to get the person responsible to change his or her mind.

_____ 8. Talked to someone to find out more about the situation.

_____ 9. Criticized or lectured myself.

_____ 10. Tried not to burn my bridges, but leave things open somewhat.

_____ 11. Hoped a miracle would happen.

_____ 12. Went along with fate; sometimes I just have bad luck.

_____ 13. Went on as if nothing had happened.

_____ 14. I tried to keep my feelings to myself.

_____ 15. Looked for the silver lining, so to speak; tried to look on the bright side of things.

_____ 16. Slept more than usual.

_____ 17. I expressed anger to the person(s) who caused the problem.

_____ 18. Accepted sympathy and understanding from someone.

| Not Used | Used Somewhat | Used Quite A Bit | Used A great deal |
|---|---|---|---|
| 0 | 1 | 2 | 3 |

_____ 19. I told myself things that helped me to feel better.

_____ 20. I was inspired to do something creative.

_____ 21. Tried to forget the whole thing.

_____ 22. I got professional help.

_____ 23. Changed or grew as a person in a good way.

_____ 24. I waited to see what would happen before doing anything.

_____ 25. I apologized or did something to make up.

_____ 26. I made a plan of action and followed it.

_____ 27. I accepted the next best thing to what I wanted.

_____ 28. I let my feelings out somehow.

_____ 29. Realized I brought the problem on myself.

_____ 30. I came out of the experience better than when I went in.

_____ 31. Talked to someone who could do something concrete about the problem.

_____ 32. Got away from it for a while; tried to rest or take a vacation.

_____ 33. Tried to make myself feel better by eating, drinking, smoking, using drugs or medication, etc.

_____ 34. Took a big chance or did something very risky.

_____ 35. I tried not to act too hastily or follow my first hunch.

_____ 36. Found new faith.

_____ 37. Maintained my pride and kept a stiff upper lip.

_____ 38. Rediscovered what is important in life.

| Not Used | Used Somewhat | Used Quite A Bit | Used A great deal |
|---|---|---|---|
| 0 | 1 | 2 | 3 |

_____ 39. Changed something so things would turn out all right.

_____ 40. Avoided being with people in general.

_____ 41. Didn't let it get to me; refused to think too much about it.

_____ 42. I asked a relative or friend I respected for advice.

_____ 43. Kept others from knowing how bad things were.

_____ 44. Made light of the situation; refused to get too serious about it.

_____ 45. Talked to someone about how I was feeling.

_____ 46. Stood my ground and fought for what I wanted.

_____ 47. Took it out on other people.

_____ 48. Drew on my past experiences; I was in a similar situation before.

_____ 49. I knew what had to be done, so I doubled my efforts to make things work.

_____ 50. Refused to believe that it had happened.

_____ 51. I made a promise to myself that things would be different next time.

_____ 52. Came up with a couple of different solutions to the problem.

_____ 53. Accepted it, since nothing could be done.

_____ 54. I tried to keep my feelings from interfering with other things too much.

_____ 55. Wished that I could change what had happened or how I felt.

_____ 56. I changed something about myself.

_____ 57. I daydreamed or imagined a better time or place than the one I was in.

_____ 58. Wished that the situation would go away or somehow be over with.

_____ 59. Had fantasies or wishes about how things might turn out.

| Not Used | Used Somewhat | Used Quite A Bit | Used A great deal |
|---|---|---|---|
| 0 | 1 | 2 | 3 |

_____ 60. I prayed.

_____ 61. I prepared myself for the worst.

_____ 62. I went over in my mind what I would say or do.

_____ 63. I thought about how a person I admire would handle this situation and used that as a model.

_____ 64. I tried to see things from the other person's point of view.

_____ 65. I reminded myself how much worse things could be.

_____ 66. I jogged or exercised.

## Appendix F: Trauma Exposure Severity Scale

| | | |
|---|---|---|
| 1. | In the days following Hurricane Katrina did you have to spend the night somewhere other than your home? | Yes____ No_____ |
| 2. | Did you need food and water aid after hurricane Katrina? | Yes____ No_____ |
| 3. | Did you need clothes' aid after Hurricane Katrina? | Yes____ No_____ |
| 4. | Did you need shelter after Hurricane Katrina? | Yes____ No_____ |
| 5. | Was you home damaged in Hurricane Katrina? | Yes____ No_____ |
| 6. | Did you have to relocate because your house was structurally unsafe? | Yes____ No_____ |
| 7. | Did you lose movable goods in Hurricane Katrina? | Yes____ No_____ |
| 8. | Did you suffer financial difficulties because of Hurricane Katrina? | Yes____ No_____ |
| 9. | Did you need financial assistance from others because of Hurricane Katrina? | Yes____ No_____ |
| 10. | Were you physically injured in Hurricane Katrina? | Yes____ No_____ |
| 11. | Did you lose and organ or functioning of an organ in Hurricane Katrina? | Yes____ No_____ |

| | | |
|---|---|---|
| 12. | Did you become dependent on others because of the physical injuries/losses you suffered? | Yes____ No_____ |
| 13. | Were any members of your family or your loved ones physically injured in Hurricane Katrina? | Yes____ No_____ |
| 14. | Did any of your loved ones become dependent on you for physical care because of their injuries? | Yes____ No_____ |
| 15. | Where you trapped in your home for a period of time? | Yes____ No_____ |
| 16. | Was a member of your family or someone close to you trapped in their homes? | Yes____ No_____ |
| 17. | Was there a period of time when you knew your loved ones were trapped in their home but you were unable to reach them? | Yes____ No_____ |
| 18. | Was there a period where you were uncertain about the welfare of loved ones, when or were unable to establish contact or unable to locate them? | Yes____ No_____ |
| 19. | Were you involved in rescue work | Yes____ No_____ |
| 20. | Did you see any dead bodies or body parts during the rescue and clearing up period work? | Yes____ No_____ |
| 21. | Did you hear sounds and cries for help from individuals who were trapped because of Hurricane Katrina? | Yes____ No_____ |
| 22. | Did you experience the odor of dead bodies in the days following Hurricane Katrina? | Yes____ No_____ |
| 23. | Did you lose any members of your immediate family in Hurricane Katrina? | Yes____ No_____ |
| 24. | Did you lose any relatives in Hurricane Katrina? | Yes____ No_____ |

**Appendix G: Initial Webpage Cover Letter**

"Posttraumatic Stress, Coping, and Level of Exposure in Nurses Five Years after Hurricane Katrina"

Welcome to the website for a research study “Posttraumatic Stress, Coping, and Level of Exposure in Nurses Five Years after Hurricane Katrina". You have received an invitation to ask for your participation in a study of nurses who were present in the New Orleans region during the Hurricane Katrina disaster. This is a doctoral research study which aims to explore the experiences of the nurses who were present during Hurricane Katrina.

It is my understanding that you may have been in the New Orleans region during the Hurricane Katrina disaster. It is also possible that you may also have participated as either as a volunteer or professional. If so, it is possible that you could share knowledge essential in understanding the experience of the nurse during disaster. This invitation to participate is being sent to nurses like yourself across Jefferson and Orleans parishes. If you were in the New Orleans region during Hurricane Katrina, I hope you will agree to participate in the survey by clicking on the link below.

Although you are not anticipated to receive any direct benefit from participating in this study, the results of this study will have the potential to shed light on the psychological responses of nurses who have participated in disaster. This study also seeks to understand the impact that level of exposure and coping strategies have on the development of later psychological responses in nurses. By understanding these issues we may be able to improve disaster preparedness training and improve post response interventions, and decrease the potential for psychological stress in nurses after responding to disaster.

Because this is a survey study, informed consent to participate is deemed to be given when you complete the survey, and no other consent will be requested. If you choose to participate in this study your participation is voluntary, and you may stop participating at any time simply by not completing the survey. You do not need to give a reason why you chose to withdraw.

Any information you share will be confidential, and it will not be possible to connect this information to you in anyway once the questionnaire has been received. No internet protocol (IP) addresses will be collected, and the data will be encrypted through the survey website. No information will be able to be linked back to you, and all information will be summarized for use in written documents, such as the final dissertation project, or articles related to the study.

Although there are no anticipated risks to participating in this study, sometimes individuals who are recalling a traumatic event find they experience increase in stress-related symptoms. In the event you feel you need psychological assistance after taking this survey and you have no established therapeutic relationship you can contact the study investigator (Wendy Park) or contact the Behavioral Health Link (BHL), a national crisis line, to receive support or if needed a referral. The number for the BHL is 1-800-715-4225. The number to reach the investigator is (404) 499-XXXX.

I hope you will agree to participate. It is through the generosity of others that we are able to gain knowledge about important topics such as this. I look forward to your participation!
If you have any questions or concerns you may contact me at 404-499-XXXX.

Thank you again for your participation in this very important study,

Wendy Hill Park MS, APRN, BC

Please note:
If you are not eligible to participate in the survey and would like to be taken off the mailing list for the survey contact the researcher using the email address listed below wendypark@internetprovider

IN ORDER TO COMPLETE THE SURVEY CLICK ON THE LINK BELOW

www.nursescapes.com

## Appendix H: Initial Invitation to Participate

IMPORTANT NOTICE

Dear _____ Unique ID_____

Hello! 2010 marks five years after Hurricane Katrina devastated the GulfCoast and significantly impacted the lives of individuals and families. I am conducting a study on the psychological responses of nurses five years after Hurricane Katrina. I would like to invite you to participate in a web-based survey of nurses who were in the New Orleans region during Hurricane Katrina. I invite you to share your experiences, and potentially assist other nurses who are engaged in similar disasters in the future. All answers are confidential, and you will not be personally identified in any way by participating.

If you are willing and interested in participating in this important study, please sign on the following web address to learn more and complete the survey. Thank you in advance for providing your unique experiences to help nurses in the future

WEB ADDRESS HERE

Wendy Park MS, APRN, BC
Georgia State University
Doctoral Nursing Student
404-499-XXXX

## Appendix I: Thank You Post Card

IMPORTANT NOTICE

Hello! Unique ID:_____

Last week I sent you an invitation to participate in a survey about nurses who were in the New Orleans region during the Hurricane Katrina disaster. This postcard is being sent to let you know that I have not received your survey. If you have already completed the web-based survey I want to thank you! If you have not yet done so I would like to encourage you to take some time to sign on now and do so. It is through the generous sharing of information by nurses like yourself that we can hope to gain understanding of the needs of nurse's involved in future disasters.

The web address is WEB ADDRESS HERE

Again, thank you for your help with this important study.
Sincerely,

Wendy Hill Park MS, APRN, BC
Georgia State University
Doctoral Nursing Student
404-499-XXXX

## Appendix J: Letter Requesting Response

IMPORTANT NOTICE

Hello! Unique ID: _____

Approximately three weeks ago I sent you an invitation to participate in a web-based study on nurses who were in the New Orleans region during Hurricane Katrina. At this time I find that I have not received your survey.

Many nurses have provided information about their disaster experiences to benefit the nurses who participate in disaster in the future, and I hope you will take the time to sign on and complete the survey. It is important to get as many responses as possible to get complete and reliable results in studies such as this.

This study uses identification numbers to link questionnaires to respondents in order to track the receipt of the returned surveys, but no identifying data is connected to the results of this study and in no way will your information be identifiable in any way in the final analysis.

I hope you will choose to complete the survey by signing on to the web page!

WEB ADDRESS HERE

Wendy Hill Park MS, APRN, BC
Georgia State University
Doctoral Nursing Student
P.S. Please feel free to call me with any question or concern. I can be reached at 404-499-XXXX

## Appendix K: Final Request to Participate

**FINAL REQUEST**

Hello! Unique ID:

Over the last two months I have made a number of efforts to enlist your participation in a study about nurses who were in the New Orleans region during the Hurricane Katrina disaster. **The study is almost closed and time is of the essence**. This study is intended to benefit nurses by gaining understanding regarding their experiences and responses to participating in disasters and we need your help! It is very important we receive as many responses as possible to ensure a good representation of the nurses who have participated. I want to remind you that participation is voluntary and all information is kept confidential and cannot be traced back to you. I urge you to take a few moments to sign on to the website and complete the survey before the study closes.

I greatly appreciate your consideration of participation in this study. .

WEB ADDRESS HERE

Sincerely,
Wendy Hill Park MS, APRN, BC
Georgia State University
Doctoral Nursing Student
404-XXX-XXXX