

AN ASSESSMENT OF POST-DISASTER PSYCHOLOGICAL STRESS IN HAZARDOUS WASTE  
OPERATIONS AND EMERGENCY RESPONSE (HAZWOPER) WORKERS

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2012

## **DEDICATION**

With love and gratitude, to my dear Mom, Mary Jane Calcote



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Personnel involved in natural or man-made disaster response and recovery efforts may be exposed to a wide variety of physical and mental stressors that can exhibit long-lasting and detrimental psychopathological outcomes. In a disaster situation, huge numbers of “secondary” responders can be involved in contaminant clean-up and debris removal and can be at risk of developing stress-related mental health outcomes. The Occupational Safety and Health Administration (OSHA) worker training hierarchy typically required for response workers, known as “Hazardous Waste Operations and Emergency Response” (HAZWOPER), does not address the mental health and safety concerns of workers. This study focused on the prevalence of traumatic stress experienced by secondary responders that had received or expressed interest in receiving HAZWOPER training through the National Institute of Environmental Health Sciences Worker Education and Training Program (NIEHS WETP). The study involved the modification of two preexisting and validated survey tools to assess secondary responder awareness of physical, mental, and traumatic stressors on mental health and sought to determine if a need existed to include



traumatic stress-related mental health education in the current HAZWOPER training regimen.

The study evaluated post-traumatic stress disorder (PTSD), resiliency, mental distress, and negative effects within a secondary responder population of 176 respondents. Elevated PTSD levels were seen in the study population as compared to a general responder population (32.9% positive vs. 8%-22.5% positive). Results indicated that HAZWOPER-trained disaster responders were likely to test positive for PTSD, whereas, untrained responders with no disaster experience and responders who possessed either training or disaster experience only were likely to test PTSD negative. A majority (68.75%) of the population tested below the mean resiliency to cope score (80.4) of the average worker population. Results indicated that those who were trained only or who possessed both training and disaster work experience were more likely to have lower resiliency scores than those with no training or experience. There were direct correlations between being PTSD positive and having worked at a disaster site and experiencing mental distress and negative effects. However, HAZWOPER training status does not significantly correlate with mental distress or negative effect.

The survey indicated clear support (91% of respondents) for mental health education. The development of a pre- and post-deployment training module is recommended. Such training could provide responders with the necessary knowledge and skills to recognize the symptomology of PTSD, mental stressors, and physical and traumatic

stressors, thus empowering them to employ protective strategies or seek professional help if needed. It is further recommended that pre-deployment mental health education be included in the current HAZWOPER 24- and 40-hour course curriculums, as well as, consideration be given towards integrating a stand-alone post-deployment mental health education training course into the current HAZWOPER hierarchy.

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## INTRODUCTION

Personnel involved in natural or man-made disaster response and recovery efforts may be exposed to a wide variety of physical and mental stressors that may have long-lasting and detrimental psychopathological outcomes. For the purpose of this study, a “*disaster*” was defined as a natural or man-made event that causes significant localized or widespread damage, destruction, injury, loss of life, and/or substantial changes to the natural or built environment. Because of the unique aspects of their jobs, civilian “*first responders*”— police, fire, and emergency medical service (EMS) – and military service members have been shown to experience stress-related physiological, cognitive, psychological, and behavioral disorders at elevated rates.<sup>1</sup> When a disaster occurs, first responders are typically in charge of securing the disaster site, providing life-saving medical care, organizing immediate response activities, and directly risking their personal health and safety to safeguard the lives of victims.

When a large-scale disaster occurs, huge numbers of “secondary” responders can be involved in contaminant clean-up and debris removal. In this study, “*secondary responders*” will be defined as emergency response and recovery workers not belonging to the traditional first responder and medical caregiver groups of police, fire, and EMS. These response personnel are typically involved in non-immediate search and rescue, cleanup, and recovery operations at the site of a disaster. Secondary responders may be at risk of developing traumatic stress-related mental health outcomes due to the harsh working conditions and unsettling experiences associated with large-scale destruction.

The hazards associated with disaster response are many and varied. Responders sometimes must contend with: flooding and drowning; blood-borne and other pathogens; electrocution; airborne smoke and dust; flammable and toxic environments; insufficient oxygen; confined spaces; slip, trip or fall hazards; fire; crushing and shearing hazards; extremes of temperature; having to witness or experience tragedy, death, serious injuries, and threatening situations; mental and physical fatigue; and dehydration.<sup>2</sup> Because emergency responders can be potentially exposed to a wide variety of health and safety hazards, a standardized training regimen, known as the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, has been developed by the U.S. Occupational Safety and Health Administration (OSHA).

The HAZWOPER training regimen consists of a series of standardized courses of varying lengths dependent on the type of work to be performed by a responder. HAZWOPER training has become the generally accepted standard training regimen for virtually all emergency response personnel in the U.S. Training topics focus predominantly on teaching safe handling and removal procedures for risks representing physical harm to worker health. Although this information is important, very little attention is provided to the mental health aspects inherent to and affected by emergency response. In fact, currently, there is no mental health education component in OSHA's suggested HAZWOPER training guidelines (29 CFR 1910.120).<sup>3</sup>

*"Critical Incident Stress"* is defined by OSHA as the inability to function during response activities resulting from the witnessing or experiencing of traumatic events during an emergency or disaster situation. To date, OSHA has not promulgated any standards that apply



to the hazards associated with critical incident stress.<sup>4</sup> Stress-related mental health disorders may adversely affect a responder's job performance, employment sustainability, and their health status following retirement.<sup>5</sup> Bills et al. state that negative mental health outcomes of emergency response can include post-traumatic stress disorder (PTSD), major depressive disorder, panic disorder, alcohol abuse, and generalized anxiety disorder.<sup>6</sup> Stressors that can trigger these psychopathological effects in responders include: dealing with severely injured or deceased persons; being faced with individually-directed aggression or serious personal threat during fires, accidents, or other disasters; and witnessing the impact of crimes and accidents on innocent victims and their families.<sup>1</sup> As a way to prevent or mitigate these psychopathological effects, comprehensive and quality task-oriented training has been shown to be effective in increasing a responder's resiliency to cope with critical incident stress.<sup>6</sup>

This study examined traumatic stress experienced by secondary responders that had received or expressed interest in receiving HAZWOPER training through the National Institute of Environmental Health Sciences Worker Education and Training Program (NIEHS WETP). Specifically, a survey was developed and distributed among secondary responders to gauge their level of awareness, coping responses, and social support related to physical, mental, and traumatic stressors. The survey tool was developed from pre-existing and validated diagnostic survey tools used to assess PTSD symptomology, resiliency to cope, and the effects of traumatic mental/physical stressors in first responders. Survey responses were used to determine if a need existed to include traumatic stress-related mental health education in the current HAZWOPER training regimen and if a pre- or post-deployment (e.g., stand-down) training

module should be considered to improve worker management of these issues and enhance the HAZWOPER force readiness posture.

**Disclaimer**

This study is not related to the National Institute of Environmental Health Sciences (NIEHS) Gulf Long-Term Follow-Up Study (GuLF STUDY) – a health study of oil spill response workers following the recent Deepwater Horizon Oil Spill in the Gulf of Mexico. The current study is applicable to and will investigate HAZWOPER-trained secondary responders, including trainees of the NIEHS Worker Education Training Program (WETP), and is not limited to those workers involved in the Gulf oil spill cleanup.

## BACKGROUND

Secondary responders to disasters may be at risk of developing the same traumatic stress-related psychopathological outcomes as first responders and military service members. As technology advances and human populations continue to increase and expand throughout the globe, large-scale disasters are encountered more frequently than they have been in the past.<sup>7</sup> Some of these disasters, such as the terrorist attacks of September 11, 2001 and Hurricane Katrina in 2005, have resulted in massive casualties, suffering, disease, and infrastructure damage. Table 1 presents the estimated number of first and secondary responders to a sampling of disaster events between the years of 2001-2011 in the United States.

**Table 1: Estimated Number of First and Secondary Responders at Selected Disasters in the U.S. (2001-2011)**

United States Disaster Event	Number of Responders
Terrorist Attacks of September 11, 2001	40,000+ <sup>6</sup>
Space Shuttle <i>Columbia</i> Disaster, 2003	2,475+ <sup>8</sup>
Hurricanes Katrina & Rita, 2005	302,000+ <sup>9,10</sup>
BP <i>Deepwater Horizon</i> Oil Spill, 2010	47,000+ <sup>11</sup>
Tornado – Tuscaloosa/Birmingham, AL, 2011	2,000+ <sup>12</sup>
Tornado – Joplin, MO, 2011	1,403+ <sup>13</sup>

Responding to these kinds of disasters requires a person to have a certain degree of safety knowledge and specialized training.

A standardized training regimen, known as the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, developed by OSHA, consists of a series of standardized courses based on the type of work to be performed by a responder. To date,

HAZWOPER training does not provide education on the mental and traumatic stressors that may be encountered during a disaster scenario. This study is designed to assess whether secondary responders perceive a need for increased education on these issues.

### **Current HAZWOPER Training**

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) was enacted by Congress in 1980 as a response to the Love Canal disaster of 1978. It was discovered that residents of a community near Buffalo, New York known as Love Canal were living in the midst of a hazardous waste disposal site (containing more than 21,000 tons of industrial waste) and were exhibiting severe health effects, like cancer, miscarriages, birth defects, and mental retardation.<sup>14</sup> CERCLA, also referred to as “Superfund”, was created to provide a funding source for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and the cleanup of inactive waste disposal sites.<sup>15</sup> In 1985, the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* was published through a joint agency effort spearheaded by the National Institute for Occupational Safety and Health (NIOSH), OSHA, the United States Coast Guard (USCG), and the United States Environmental Protection Agency (U.S. EPA). In 1986, CERCLA was amended by the U.S. EPA Superfund Amendments and Reauthorization Act (SARA) which charged OSHA with establishing guidelines to protect worker health and safety while on hazardous waste sites.<sup>14</sup> OSHA subsequently issued the Hazardous Waste Operations and Emergency Response (HAZWOPER) Interim Final Rule in 1986 and the Final Rule (29 CFR 1910.120) in 1990.<sup>16</sup> To comply with 29 CFR 1910.120, OSHA defined a series of training courses to qualify responders to effectively deploy to disaster settings. The HAZWOPER standard applies to all personnel who

are exposed, or will be potentially exposed, to hazardous substances – including hazardous waste – and who are engaged in one of the following five operations<sup>17</sup>:

1. Clean-up operations – required by a governmental body, whether federal, state, local, or other involving hazardous substances – that are conducted at uncontrolled hazardous waste sites
2. Corrective actions involving clean-up operations at sites covered by the Resource Conservation and Recovery Act of 1976 (RCRA) as amended (42 U.S.C. 6901)
3. Voluntary clean-up operations at sites recognized by federal, state, local, or other governmental body as uncontrolled hazardous waste sites
4. Operations involving hazardous wastes that are conducted at treatment, storage, and disposal facilities regulated by Title 40 Code of Federal Regulations Parts 264 and 265 pursuant to RCRA, or by agencies under agreement with the U.S. Environmental Protection Agency to implement RCRA regulations
5. Emergency response operations for releases of, or substantial threats of releases of, hazardous substances regardless of the location of the hazard.

The HAZWOPER training hierarchy is designed sequentially so that each subsequent training course builds upon the previous one. This sequence allows a worker the option to take only the level of training required to fulfill their duties. Table 2 displays the HAZWOPER training hierarchy:

**Table 2: OSHA HAZWOPER Training Course Hierarchy**

HAZWOPER Course	Hours in Length
HAZWOPER Awareness (Level 1)	1-2
HAZWOPER Operations (Level 2)	24
HAZWOPER Technician (Level 3)	40
Level 2 to Level 3 Upgrade	16
HAZWOPER Annual Refresher	8
HAZWOPER Supervisor	8

The training hierarchy begins with the HAZWOPER Awareness (Level 1) course, which is typically 1-2 hours in length. The next tier in the hierarchy is the HAZWOPER Operations (Level 2) course, which is 24-hours in length. The top tier of training is the HAZWOPER Technician (Level 3) course, which is a 40-hour gold standard class within the HAZWOPER hierarchy. A worker can choose to upgrade their training from Level 2 to Level 3 by attending the 16-hour Upgrade course. Every year, Level 2 and Level 3 responders need to take an 8-hour Refresher course to maintain their certification. HAZWOPER incident commanders and response supervisors must take an 8-hour Supervisor course, in addition to their 24-hour or 40-hour training courses. The Supervisor course must be re-taken annually. Thus, the HAZWOPER training hierarchy begins with the 1-hour introduction course and terminates at the 8-hour Supervisor course.

HAZWOPER training course topics focus predominantly on teaching safe handling and removal procedures for risks presenting physical harm to worker health, such as falling debris, unknown chemicals, infectious agents, and radioactive materials. Although this information is important, very little attention is provided to the mental health aspects inherent to and affected by emergency response. In fact, currently, there is no mental health education

component in OSHA's suggested HAZWOPER training guidelines (29 CFR 1910.120).<sup>3</sup> Not surprisingly, McFarlane et al. stated, to date, only one systematic review of the literature has been published addressing issues of mental health in emergency services personnel. That review, however, dealt predominately with post-traumatic stress disorder (PTSD) in disaster survivors and only briefly mentioned PTSD in first responders (e.g., police, fire, EMS).<sup>1</sup>

### **NIEHS and WETP**

A key proponent and provider of hazardous waste worker training (including HAZWOPER) is the National Institute of Environmental Health Sciences (NIEHS). The NIEHS is one of a few research institutes comprising the National Institutes of Health (NIH) and is a world leader in environmental health sciences and research. The mission of the NIEHS is "to reduce the burden of human illness and disability by understanding how the environment influences the development and progression of human disease."<sup>18</sup> The centerpiece of NIEHS training is the Worker Education and Training Program (WETP).

The federally-funded WETP supports the training and education of workers engaged in activities related to hazardous materials and waste generation, removal, containment, transportation, and emergency response.<sup>19</sup> The mission of the NIEHS WETP is "to fund non-profit organizations with a demonstrated track record of providing occupational safety and health education in developing and delivering high quality training to workers who are involved in handling hazardous waste or in responding to emergency releases of hazardous materials."<sup>20</sup>

## Post-Traumatic Stress Disorder

Post-traumatic stress disorder, or PTSD, is defined by the *Diagnostic and Statistical Manual of Mental Disorders – 4th Edition (DSM-IV)*<sup>21</sup> as:

“... the development of certain symptoms following exposure to an extreme traumatic stressor involving direct personal experience of an event that involves actual or threatened death or serious injury, or other threat to one's physical integrity; or witnessing an event that involves death, injury, or a threat to the physical integrity of another person; or learning about unexpected or violent death, serious harm, or threat of death or injury experienced by a family member or other close associate. The person's response to the event must involve intense fear, helplessness, or horror. The characteristic symptoms resulting from the exposure to the extreme trauma include persistent re-experiencing of the traumatic event, persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness, and persistent symptoms of increased arousal. The full symptom picture must be present for more than 1 month, and the disturbance must cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.”

In the past, PTSD diagnoses were limited to combat soldiers suffering from “battle fatigue”. In 1980, diagnoses were extended to civilians exposed to traumatic events. According to Berninger et al., PTSD is associated with poorer mental and physical health, violent behavior, adjustment issues, poor performance at work and school, altered lifestyle causing difficulty in functioning at home and at work, depression and anxiety, and changes in social and leisure habits – including reductions in physical activity.<sup>22</sup> The most robust risk factor for PTSD is the



“dose” – the intensity, severity, or number – of the exposure(s).<sup>23</sup> Perceived safety is typically lower in responders with greater exposure.

Fullerton et al. maintain that the perception of being safe – perceived safety – is an important component of health behavior and the ability to work after exposure to traumatic events.<sup>24</sup> They further state that responders with lower perceived safety showed higher emotional responses and greater peri-traumatic dissociation (depersonalization, de-realization, altered time sense, altered body image experiences, and memory disturbances), and were more likely to have PTSD and experience increased alcohol use. Responders can also experience conditioned reflexes later in life as a result of their exposure to a traumatic event.

Contextual stimuli or environmental cues presented during, but not associated with, a traumatic event can evoke conditioned responses. For example, if an explosion occurred on a hot and dusty day, similar climatic conditions encountered many years later, in locations distant from the original blast, can trigger unwanted memories of the event and evoke strong emotional reactions.<sup>23</sup> In addition, research has shown that disasters caused by human intent, such as terrorist attacks, create more negative psychological consequences in survivors than natural disasters. PTSD is one of the most prevalent and debilitating effects of terrorism-related incidents.<sup>22</sup>

### **Terrorist Attacks of September 11, 2001**

Many thousands of emergency responders, construction workers, concerned citizens, and other volunteers from all over the United States participated in rescue and cleanup activities at Ground Zero in New York City following the terrorist events of September 11, 2001.

On that day, two airliners – hijacked by radical Islamist terrorists – flew into the World Trade Center (WTC) “Twin” Towers leading to the collapse of the buildings and killing almost 3,000 people. Two other hijacked airliners also crashed – one in a rural Pennsylvania field and another into the Pentagon in Arlington, VA, just outside Washington D.C – further adding to the death toll. First response was almost immediate at all three crash sites and images of that fateful day have been burned into the tapestry of U.S. history.

Bills et al. stated the estimated risk of PTSD among September 11<sup>th</sup> rescue workers was 24% and those who experienced personal loss or exposure to death or bodily remains were significantly more likely to suffer from PTSD.<sup>6</sup> They provide two explanations to support this statement: (1) September 11<sup>th</sup> responders were subjected to severe, ongoing exposure (e.g., some working long shifts for many months at the WTC site) – some witnessed the initial impact scenes and the immediate aftermath, lost coworkers in the disaster, or worked directly with bereaved or searching family members; and, (2) almost 40,000 people participated in rescue and recovery efforts at Ground Zero in New York City, representing a responder population magnitudes larger than anything previously reported. Earlier start date at Ground Zero with long work shifts were significant risk factors for the development of PTSD in all occupations except police.<sup>6</sup>

In a study by Berninger et al., they reported a significant increase in difficulty with functioning at home or at work for WTC rescue, recovery, and clean-up workers. They also discovered that firefighters performing supervisory responsibilities during the Twin Towers collapse – tasks that were not normally assigned to them – were nearly twice as likely to have

risks for elevated PTSD compared to officers trained in supervision.<sup>22</sup> Perrin et al. found PTSD rates were lowest in police officers and highest in unaffiliated volunteers. They concluded that performing tasks not common to one's occupation led to increased rates of PTSD.<sup>25</sup>

### **Cognitive Models of PTSD Development**

Simple exposure to a traumatic event is not a good indicator of subsequent PTSD development. Boscarino and Adams suggest nearly 90% of all adults have experienced at least one traumatic event in their life, with only a minority of those exposed developing PTSD.<sup>26</sup> Bryant & Guthrie point out that cognitive models of trauma response suggest an individual's appraisal of a traumatic event and capacity to respond to the experience, is pivotal in how that individual adapts to the experience.<sup>27</sup> This perspective holds that catastrophic appraisals and perceptions about oneself, others, and the world lead to exaggerated estimates of likely harm and negative outcomes in the future. Catastrophic thinking in the temporal confine just after a traumatic exposure can predict subsequent onset of PTSD for two reasons – (1) a traumatic event violates one's beliefs that the world is a safe place or, (2) a traumatic event supports one's beliefs that they are helpless and the world is a dangerous place.<sup>27</sup>

Individual differences among responders in their perception of being in control may also be an important factor in the development of PTSD. Based in social cognitive theory, Whealin et al. suggest that people's appraisals about their own capabilities to manage events – coping self-efficacy – are central determinants of behavioral and cognitive responses to traumatic situations. Perceived self-efficacy is a key component of "hardiness", which is correlated with

absence of PTSD in survivors of traumatic events. Self-efficacy increases feelings of controllability and is associated with positive emotions.<sup>23</sup>

## **Resilience**

Whealin et al. define “*resilience*” as the capacity of individuals or groups to implement early, effective adjustment processes to alleviate strain imposed by stress exposure. They explain that resilient individuals are more likely to have personality traits such as extraversion, optimism, and hardiness and report stronger social bonds and more social resources during stress than do those who develop PTSD.<sup>23</sup> Further, responders who are resilient to PTSD are more likely to engage in adaptive coping strategies such as problem solving, goal-setting, stress management, and use of social support – strategies that may promote self-efficacy during highly stressful situations. Psychosocial factors associated with stress resilience include positive emotions, cognitive flexibility, meaning, social support, and active coping style.<sup>28</sup>

Southwick et al. state that resilient individuals are generally optimistic and are characterized by high positive emotionality. Optimism has been associated with greater life satisfaction and increased psychological well-being and health. Optimism and positive emotionality play important roles in the capacity to tolerate stressful events, and have been associated with reduced stress-related illness and greater use of medical services, as well as with reduced mood disturbances. Humor, in particular, can decrease the severity of depressive symptoms by: reframing a situation as less threatening and thereby fostering a positive perspective on challenging circumstances; reducing tension and discomfort; and attracting social support.<sup>28</sup>

Resilient individuals possess an explanatory style that allows them to persevere, embrace challenges, and grow from failure. Southwick et al. explain that resilient individuals do not blame themselves or others for a problem, imagine that a problem is unsolvable, or worry that a problem will affect all areas of their life. Instead, they place blame where it realistically belongs, assess difficulty as temporary and usually solvable, and view a problem as affecting only limited areas of their life. Similarly, the ability to reappraise, reframe, or find positive meaning in an adverse event is characteristic of many resilient individuals. Resilience is associated with perceiving potentially stressful events in less-threatening terms and remaining optimistic about the ability to cope with stressors.<sup>28</sup>

Increased social support has a protective and buffering effect on mental and physical illness. Rich social networks and emotional support may enhance mental and physical health by: reducing the rate at which individuals engage in high-risk behaviors; fostering effective coping strategies; encouraging less-debilitating threat appraisals; counteracting feelings of loneliness; increasing feelings of self-efficacy; reducing functional disability; and increasing treatment compliance.<sup>28</sup>

### **Interpersonal Relationships**

Traumatic events can have major impacts on the interpersonal relationships of responders. The traumatic experience can become embedded in the memory of an individual causing a progressive avoidance of interpersonal triggers that may have subsequent detrimental effects on self-awareness, intimacy, sexuality, and communication – all of which

are key elements of healthy interpersonal relationships.<sup>29</sup> Responders follow a general pattern of relationship behavior after experiencing a traumatic event.

McFarlane and Bookless explain that a series of shifts in group dynamics among responders is typically observed in the aftermath of a traumatic event.<sup>29</sup> First, there is an intensification of individual attachments to those people with whom the disaster or trauma was shared. There is the potential for close bonding between responders because of the support and unspoken understanding they have of each other's predicaments and roles. There is also a significant reinforcement of the substance and dynamic of the group helping responders deal with the vigilance, excitement, and fear they feel after an event. The closeness of these relationships can be a considerable threat to intimacy with a spouse or significant other because there is a sense of exclusion by the fact of not having shared the experience. There is a non-verbal quality to this group bonding that makes it difficult to communicate or explain to others who observe it from outside the group.<sup>29</sup>

As the traumatic event begins to recede into the past, a tension develops between the persistence of these tight group bonds and the prior patterns of interpersonal relationships. McFarlane and Bookless stress that the persistence of post-traumatic patterns of attachment is a feature that dominates the attachments of people who are not successfully recovering from the traumatic event, such as those suffering from PTSD. If a responder has developed PTSD, conflict will spark irritability, thereby disrupting family relationships. The detrimental effects of this disruption are exacerbated by the numbing experienced in PTSD. "*Numbing*" is described as a loss of a sense of empathy and as hardening. At times, the responder will be behaving in

an increasingly agitated and anxious way, and at other times they will be in a state of apparent detachment and apathy. The effects of this increasing conflict on the family will become reinforced because of the responder's progressive loss of social contact and decreasing social circle – which normally act to mitigate irritable disruptions. The intense and persistent bonding which occurs among returning military service personnel is perhaps one of the most recognizable forms of this pattern in any society and limits the restitution that can come from outside this social circle.<sup>29</sup>

### **The U.S. Military**

A large number of soldiers serving in Operations Enduring Freedom and Iraqi Freedom (OEF/OIF) are returning from their deployments with PTSD, depression, and related psychological problems that impair their functioning and quality of life.<sup>30</sup> Marmar et al. suggest that soldiers with limited training and often unrealistic conceptions of combat, based in part on media portrayals of heroism, are more likely to develop chronic post-traumatic distress than career military personnel who are more psychologically prepared for the realities of war.<sup>31</sup> It has been proposed by Pietrzak et al. that social support may enhance the functioning of returning soldiers by fostering effective coping strategies, reducing involvement in high-risk behaviors or avoidance coping, promoting self-efficacy, and reducing loneliness.<sup>32</sup> They also state that resilience and social support operate synergistically to decrease the likelihood of developing PTSD and depression.

Berninger et al. agree with Pietrzak and associates and suggest that factors such as coping resources and perceived social support from family and friends are protective against

PTSD onset.<sup>22</sup> An example of an intervention geared towards social support is “*well-being therapy*”. This intervention focuses on enhancing personal growth, purpose in life, autonomy, self-acceptance, and positive relations with others, and has been shown to improve symptoms associated with mood and anxiety disorders.<sup>30</sup>

## **Interventions and Treatments**

Many interventions have been shown to help improve psychosocial functioning in responder populations. These interventions include: psycho-education about traumatic stimuli; rehearsal of task-related behaviors; mental planning; exposure interventions; cognitive challenging; stress-inoculation interventions; stress management; guided self-dialogue; attentional distraction techniques; behavioral activation; and social skills interventions.<sup>23</sup>

Interventions that increase the predictability of traumatic stimuli by reducing their unexpectedness can increase feelings of control and self-efficacy within responders during disaster response operations. These interventions include: increasing workers’ perceptions of controllability and predictability of traumatic stimuli through exposure to traumatic stimuli under controlled conditions; addressing attentional and performance factors; and increasing workers’ perceptions of controllability and predictability of fear responses through deliberate and repeated hyperarousal under controlled conditions.<sup>23</sup>

Bills et al. state that more training leads to more resiliency to cope in disaster response workers.<sup>6</sup> Realistic training experiences that include a leadership component are valuable for practicing anxiety management because they allow for in vivo use of skills and can result in superior performance compared to “training as usual”.<sup>23</sup> Rehearsal of distraction techniques



during realistic training allows for practice in remaining task-focused during traumatic work-related events and can help decrease the intensity of distress during response operations.

Distraction techniques involve a purposeful refocusing of attention away from the threatening aspects of the situation to non-traumatic thoughts, objects, or events while still remaining alert to the task-related aspects of the event.<sup>23</sup>

It is important that training help prepare workers for low-success operations by preemptively shaping their cognitive appraisals of their work-related tasks into more adaptive and positive ones. Negative cognitive appraisals related to the way individuals felt or acted can contribute to high rates of event-related guilt and anger in response personnel.<sup>23</sup> Also, enhancing adaptive post-trauma coping techniques and reducing maladaptive coping will allow a responder to better obtain and maintain social support and engage in problem solving, goal setting, stress management, and help-seeking activities.<sup>23</sup>

OSHA recommends Critical Incident Stress Debriefing (CISD) as an effective intervention for addressing the mental health needs of response personnel. CISD is a facilitator-led group process consisting of seven steps: Introduction; Fact Phase; Thought Phase; Reaction Phase; Symptom Phase; Teaching Phase; and Re-entry Phase.<sup>4</sup> Participants describe their traumatic experiences and view a presentation on common stress reactions and stress management. CISD can provide group support and connect workers to further counseling and treatment services if necessary.<sup>4</sup>

This study was developed because current HAZWOPER training does not address the mental health of responders or the interventions that may be helpful in mitigating or

preventing mental distress and negative effects. The goal of this study was to assess the prevalence of PTSD, resiliency to cope, mental distress/negative effect, and the need for mental health education among HAZWOPER-trained secondary responder groups. If warranted, the results may be used to recommend the development of a mental health education module to be included in the current HAZWOPER course hierarchy.

## **METHODS**

### **Purpose**

The purpose of this study was to assess awareness of PTSD symptomology, resiliency to cope, and the effects of traumatic mental/physical stressors among secondary responders. This assessment was used to determine if a need existed to include traumatic stress-related mental health education in the current HAZWOPER training regimen and if a pre- or post-deployment (e.g., stand-down) training module should be considered to improve worker management of these issues and enhance the HAZWOPER force readiness posture.

### **Research Questions**

The specific research questions for this study included: (1) Are the secondary responders surveyed in this study aware of the mental health effects associated with disaster response? (2) Have they personally experienced any critical incident stress and how has this affected them? (3) Are they aware of strategies for mitigating the mental health stress associated with critical incident stress? (4) Does a distinct need exist to include traumatic stress-related mental health education in the current HAZWOPER training regimen? (5) Will a pre- or post-deployment mental health education training program provide HAZWOPER-trained secondary responders with the necessary knowledge and skills to recognize the symptomology of PTSD, mental stressors, and physical/traumatic stressors – empowering them to employ protective strategies or seek professional help? (6) Could this training enhance the force readiness posture of secondary responders and become an accepted component of the HAZWOPER training hierarchy?

## **Research Aims and Design**

The study was organized as follows:

1. Develop an internet-based<sup>33</sup> survey designed to collect data regarding PTSD, resiliency to cope, mental distress/negative effect, and perceived need for mental health education and distribute to populations of secondary responders.
2. Analyze survey results to assess the prevalence of PTSD, resiliency to cope, mental distress/negative effect, and the need for mental health education among secondary responder groups.
3. If warranted, propose a pre- or post-deployment training course after data analysis demonstrates a need for mental health education.
4. Propose a mechanism for documenting whether or not workers are informed of the traumatic exposures they may have encountered during HAZWOPER operations, the possible signs and symptoms of traumatic stress-related mental health disorders they may experience, and where to go for professional assistance to address these issues.

## **Data Sought**

The value and importance of this study revolves around the personal “real world” feedback from each participant as a HAZWOPER secondary responder. For those subjects who complete the survey, their responses provide quantitative data on: current knowledge and understanding of mental, physical, and traumatic stressors; if they have personally experienced any of these stressors during a disaster response; what was the impact on their health, job, and social interactions; and if they feel that this type of training is needed and would be beneficial to other secondary responders. Their opinions and personal experiences in disaster response

are critical in determining if a need exists to include traumatic stress-related mental health education in the current HAZWOPER training regimen and if a pre- or post-deployment training module should be considered to improve worker management of these issues and enhance the HAZWOPER force readiness posture.

### **Recruitment Process**

The investigator was blinded and had no direct interaction with any participant during the recruitment process. The investigator contacted secondary responder groups, including each member organization within the NIEHS WETP, seeking their assistance in notifying their worker and/or trainee memberships about the study survey. The NIEHS is one of a few research institutes comprising the National Institutes of Health (NIH) and is a world leader in environmental health sciences and research.<sup>18</sup> The centerpiece of NIEHS training is the WETP. The federally-funded WETP supports the training and education of workers engaged in activities related to hazardous materials and waste generation, removal, containment, transportation, and emergency response.<sup>19</sup> Each organization presumably contacted its membership through personal e-mail accounts. The method of notification was at the discretion of each organization.

### **IRB Review and Exemption**

The study protocol was reviewed and approved for “exempt” status according to 45 CFR 46.101(b)<sup>34</sup> by The University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects on August 22, 2011. See Appendix A for a copy of the IRB exemption letter.

## **Consent Process**

Subject participation was completely voluntary and anonymous. All participants were recruited and consented through an online, modified informed consent document (ICD) not requiring a signature (e.g., a consent letter), based on 21 CFR 56.109(c)(1), which states, “The IRB may, for some or all subjects, waive the requirement that the subject, or the subject’s legally authorized representative, sign a written consent form if it finds that the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside the research context.”<sup>35</sup> The modified ICD (Appendix B) explained the study, the purpose of the survey, how to access it on the internet, and addressed all the key elements of a written ICD. The ICD was attached to the online survey as a cover letter. In addition, each member organization e-mailed a copy of this modified ICD to their membership for their review. The investigator was totally blinded to this recruitment process. A subject’s willingness to complete the anonymous survey was tantamount to their consenting to participate in the study. The modified ICD instructed each participant on how to access and complete the survey via SurveyMonkey®.<sup>33</sup>

## **Risks and Benefits of Participation**

There were no known risks associated with this study. The online survey did not collect any identifying information. The identities of all participants of the study were totally anonymous, thereby minimizing any risk associated with the loss of confidentiality. No protected health information was collected; therefore, the investigator sought a HIPAA Authorization waiver for the study.

The possible benefit of a subject's participation in this study was to become self-aware of signs and symptoms of PTSD, mental stress, and physical/traumatic stressors that can affect their performance, health, and lifestyle following exposure to severe disasters as an emergency responder. There was no guarantee a subject would receive any direct benefit from their participation in the study.

### **Costs and Compensation**

The study was designed so there were no costs to the subject to participate in the study. Study subjects did not receive any monetary compensation for participating.

### **Alternatives to Participation**

Subjects were free to decline participation. Choosing not to participate in this study was a subject's alternative to volunteering for the study.

### **Subjects**

The study population was recruited from secondary responder groups, including the consortia comprising the membership of the NIEHS WETP. A web-link to access an electronic needs-assessment survey on SurveyMonkey® was sent to the consortia worker trainee populations – potentially thousands of survey respondents. A sample of 202 participants was collected, of which six respondents were excluded from the study for incomplete survey responses and 20 were excluded because they self-identified as “First Responders”. This left 176 completed surveys that were included for analysis. The results of the aforementioned survey helped determine if a stand-down mental health education program for secondary responders should be developed.

## Study Setting

The study was conducted virtually via the internet and the SurveyMonkey® website. There was no personal interaction between the investigator and study participants.

## Research Materials

A 25-item survey (Appendix C) was used to collect anonymous data to assess knowledge of PTSD symptomology, resiliency to cope, and the effects of traumatic mental/physical stressors within the secondary responder trainees associated with the NIEHS Worker Education and Training Program. Survey questions were drawn from the following preexisting and validated PTSD and stress-related instruments: the *PTSD Checklist – Civilian Version*<sup>36,37</sup>; and the *Connor-Davidson Resilience Scale*.<sup>38</sup> The PTSD Checklist is a 17-item self-report rating-scale instrument that parallels the DSM-IV diagnostic criteria B, C, and D for PTSD.<sup>37</sup> The Connor-Davidson Resilience Scale is comprised of 25 items, with higher scores reflecting greater resilience.<sup>38</sup> Both assessments use a 5-point Likert scale with associated values of: (1) “Strongly Disagree”; (2) “Disagree”; (3) “Neither Agree Nor Disagree”; (4) “Agree”; and (5) “Strongly Agree”.

In addition to the resilience and PTSD scales, seven other questions were presented in the survey that assessed a participant’s training and secondary responder background, including asking for their personal opinion about whether a mental health education training module would be needed or not. These questions used a 3-point scale with associated values of: (1) “Yes”; (0) “No”; and (2) “Do Not Know”. The survey took approximately 15 minutes to complete and was scored according to Appendix D.



## **Protection of Subjects and Information**

All participants are anonymous to the investigator and were recruited and consented through an online, modified informed consent document not requiring a signature. The survey data contained no identifying information, thus protecting the confidentiality and privacy of the study participants. Further, all digital data were stored in an encrypted computer database and password-protected. Access was restricted. There were no planned linkages with external databases, nor was there transmission of the data for collaborative use. Without additional IRB approval, the research data will not be utilized for further research activity beyond the protocol stipulations. All study-related data will be retained for three years following completion of the study and will be destroyed in compliance with policies implemented by The University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects.

## **Data Analysis and Reporting**

The survey responses were tallied, averaged, and reported automatically by the SurveyMonkey® software. Fisher's Exact Test analysis at the 95% and 99% significance levels ( $p = 0.05$  and  $0.01$ ) was performed to compare the relationships between HAZWOPER training status, disaster work experience, mental distress, negative effect, PTSD status, and support of pre- or post-response mental health education. One-way ANOVA analysis at the 95% and 99% significance levels ( $p = 0.05$  and  $0.01$ ) and Bonferroni correction to address the effect of multiple comparisons were performed to determine the impact of HAZWOPER training status, disaster work experience, mental distress, negative effect, PTSD status, and support for mental health education on PTSD score and resiliency level. One-sample  $t$ -tests were performed at the 95% and 99% significance levels ( $p = 0.05$  and  $0.01$ ) to determine the impact of different

grouping variables on PTSD score, resiliency level, mental distress, and negative effects experience. These data were used to determine the need for pre- or post-disaster mental health education.

**Duration of Study**

The duration of the study was approximately 6 months for data collection, data analysis, and reporting. The SurveyMonkey® web-link was open for 6 weeks to capture as many respondents as possible.

## RESULTS

### Descriptive Statistics

A total of 202 surveys were completed, of which six respondents were excluded for incomplete survey responses and 20 were excluded because they self-identified as “First Responders”. This left 176 completed surveys that were included in the analysis. Respondent survey data were grouped by “yes/no” answers to two questions involving the characteristics of HAZWOPER training status and disaster work experience. Data were grouped using these characteristics because disaster work experience and HAZWOPER training status are highly correlated with a respondent’s level of mental distress and resiliency to cope, as shown previously. Group 0 was composed of individuals who did not possess either characteristic. Group 1 was composed of individuals who possessed disaster work experience, but were not HAZWOPER-trained. Group 2 was composed of individuals who possessed HAZWOPER training, but no disaster work experience. Group 3 was composed of individuals who possessed both HAZWOPER training and disaster work experience. Table 3 presents a 2x2 table of actual (top) and expected (bottom) cell frequencies for the study population divided by their disaster work experience and HAZWOPER training status.

**Table 3: 2x2 Table of Secondary Responder Population Grouped by Disaster Work Experience and HAZWOPER Training; Actual and Expected Cell Frequencies Shown**

		HAZWOPER Training		
		No	Yes	Totals
Disaster Work Experience	No	44 (25.0%) (36 expected) Group 0	55 (31.2%) (63 expected) Group 2	99 (56.2%) (99)
	Yes	20 (11.4%) (28 expected) Group 1	57 (32.4%) (49 expected) Group 3	77 (43.8%) (77)
	Totals	64 (36.4%) (64)	112 (63.6%) (112)	176 (100%) (176)

The key variables analyzed in this study include the categorical variables of HAZWOPER training status, disaster work experience, mental distress, negative effect, and support of mental health education; and the discrete variables of PTSD score and resiliency score. Table 4 provides a summary of the categorical variables and Table 5 summarizes the discrete variables.

**Table 4: Descriptive Statistics for Key Categorical Variables**

Variable	N	% of Respondents
HAZWOPER-Trained	112	64
Disaster Work Experience	77	44
Suffers Mental Distress	33	19
Suffers Negative Effects	14	8
Supports Mental Health Education	160	91

**Table 5: Descriptive Statistics for Key Discrete Variables**

Variable	Obs	Mean Score	SD	Min Score	Max Score
PTSD Score	176	38.86*	11.72	17	74
Resiliency Score	176	76.30**	10.98	44	100

\*PTSD Positive Cutoff  $\geq 44$ ; \*\*General Worker Population Score = 80.4

Almost half of all respondents (44%) indicated that they had responded to a disaster event. Almost two-thirds of all respondents were HAZWOPER-trained (64%). Almost a fifth of all respondents (19%) reported suffering mental distress from their disaster work experience and of those, 8% suffered negative effects. A clear majority of respondents (91%) supported mental health education.

The recommended base-line PTSD level on the *PTSD Checklist – Civilian Version* is a score of 44.<sup>36</sup> The cut-off point for being PTSD negative is a score of 34 or less. Scores between 35 and 43 are considered PTSD probable. The mean PTSD score for the study population was 38.86 – within the range to test “PTSD Probable”. The higher the score on the *Connor-Davidson Resilience Scale*, the more resilient a person is. The scale ranges from 0-100. Mean resiliency in the general worker population is represented by a score of 80.4.<sup>38</sup> The mean resiliency score for the study population was 76.30 – below the national average of 80.4.

#### ***PTSD Checklist – Civilian Version Analysis of Means***

Table 6 shows the distribution of survey respondents by their PTSD status. The table shows that 1/3 of respondents, 32.9%, scored at or above the cut-off point for PTSD positivity and 30.7% of respondents scored in the PTSD probable range.

**Table 6: Percentages of Respondents who are PTSD Negative, Probable, and Positive on the *PTSD Checklist – Civilian Version***

PTSD Negative	PTSD Probable	PTSD Positive
36.4 (n=64)	30.7 (n=54)	32.9 (n=58)

Table 7 describes the mean differences on the dependent variable, PTSD score, of different nominal and dichotomous independent variables. One-way ANOVA tests with Bonferroni corrections and one-sample *t*-tests to compare groups were used.

**Table 7: Mean Differences for PTSD Score (Mean, SD, and Dichotomy Significance)**

Variable		Mean	SD	F-value/t-Value
HAZWOPER:	No	37.16	11.26	2.15
	Yes	39.84	11.92	
Disaster Work:	No	38.56	11.79	0.16
	Yes	39.26	11.70	
Mental Distress:	No	37.93	11.83	4.95 <sup>*</sup>
	Yes	42.91	10.50	
Negative Effect:	No	38.17	11.60	7.19 <sup>**</sup>
	Yes	46.79	10.50	
Support Training:	No	37.88	15.37	0.12
	Yes	38.96	11.35	
Group:	0	38.52	10.98	-2.71 <sup>**</sup>
	1	34.15	11.56	-3.42 <sup>**</sup>
	2	38.58	12.50	-2.62 <sup>**</sup>
	3	41.05	11.31	-1.30

<sup>\*\*</sup> $p \leq 0.01$ ; <sup>\*</sup> $p \leq 0.05$

Results indicated no mean differences in PTSD scores in terms of the two grouping characteristics. HAZWOPER-trained responders showed a higher average PTSD score vs. non-trained responders, but the difference was not statistically significant. The same held true for responders with disaster work experience vs. those with no disaster work experience. Results also indicated that those who supported mental health education had slightly higher PTSD scores than those who did not support the training, but again the difference was not significant.

Statistically significant mean differences were found for PTSD scores in terms of mental distress, negative effect, and group status. Results indicated that those who experienced

mental distress and negative effects after responding to a disaster were significantly more likely to have higher PTSD scores than those who did not experience mental distress or negative effects after a disaster. Group means were compared to an average mean of 43 (the high-end of the PTSD Probable range) in one-sample *t*-tests, as described by Blanchard et al.<sup>36</sup> Results indicated that the groups corresponding to possession of no disaster work experience or HAZWOPER training (Group 0), only disaster work experience (Group 1), and only HAZWOPER training (Group 2) were significantly less likely to be PTSD positive than responders possessing both characteristics (Group 3). Participants in Group 3 showed no significant difference from the average mean of 43 in terms of PTSD positivity.

### ***Connor-Davidson Resilience Scale Analysis of Means***

Table 8 shows the percentages of respondents who scored above or equal to and below the population mean on the resiliency scale. The table shows that over 2/3 (68.75%) of respondents scored below the resilience level of the general population.

**Table 8: Percentages of Respondents who are Above or Equal to ( $\geq$ ) and Below ( $<$ ) the Population Mean on the *Connor-Davidson Resilience Scale***

$\geq 80.4$	$< 80.4$
31.25 (n=55)	68.75 (n=121)

Table 9 describes the mean differences on resiliency score of different nominal and dichotomous independent variables. One-way ANOVA tests with Bonferroni corrections and one-sample *t*-tests to compare groups were used.

**Table 9: Mean Differences for Resiliency Score**

Variable		Mean	SD	F-value/t-Value
HAZWOPER:	No	78.47	10.23	4.01 <sup>*</sup>
	Yes	75.05	11.24	
Disaster Work:	No	76.01	11.42	0.15
	Yes	76.66	10.46	
Mental Distress:	No	76.65	11.36	0.80
	Yes	74.76	9.17	
Negative Effect:	No	76.25	11.10	0.04
	Yes	76.86	9.80	
Support Training:	No	77.19	10.75	0.12
	Yes	76.21	11.03	
PTSD:	No	80.06	9.98	8.11 <sup>**</sup>
	Yes	72.36	12.39	
	Probable	76.06	8.98	
Group:	0	77.80	10.72	-1.61
	1	79.95	9.14	-0.22
	2	74.58	11.85	-3.64 <sup>**</sup>
	3	75.51	10.72	-3.44 <sup>**</sup>

<sup>\*\*</sup> $p \leq 0.01$ ; <sup>\*</sup> $p \leq 0.05$

Results indicated few mean differences in resiliency scores in terms of disaster work experience, mental distress, and negative effect. Responders with disaster work experience show a higher average resiliency score than responders with no disaster work experience, however, the difference was not statistically significant. Those who suffered mental distress showed a lower average resiliency score than those who have not suffered mental distress. Those who suffered negative effects showed a slightly higher resiliency score than those who did not suffer negative effects. Results also indicated that those who supported mental health education had slightly lower resiliency scores than those who did not support the training, but again the differences were not statistically significant.



Significant mean differences were found for resiliency scores in terms of HAZWOPER training status, PTSD status, and group. Results indicated that those who were not HAZWOPER-trained had significantly higher resiliency scores than HAZWOPER-trained responders. Also, responders who were PTSD negative have significantly higher resiliency scores than those who were classified as PTSD positive. Group means were compared to an average mean of 80.4 in one-sample *t*-tests, as suggested by Connor and Davidson.<sup>38</sup> Results indicated that the groups corresponding to the possession of HAZWOPER training only (Group 2) and both disaster work experience and HAZWOPER training (Group 3) were significantly more likely to have lower resiliency scores than Groups 0 and 1, which showed no significant differences from the average mean of 80.4 in terms of resiliency score.

### **Mental Distress and Negative Effect**

Table 10 shows the number and percent of respondents affected by mental distress and negative effects grouped by key categorical variables.

**Table 10: Number and Percent Affected by Mental Distress and Negative Effect Grouped by Key Categorical Variables**

			Suffered Mental Distress		Suffered Negative Effect	
Variable		N	Obs	%	Obs	%
HAZWOPER:	No	64	10	16	4	6
	Yes	112	23	21	10	9
Disaster Work:	No	99	2	2	1	1
	Yes	77	31	40**	13	17**
Mental Distress:	No	143	--	--	0	0
	Yes	33	--	--	14	42**
Negative Effect:	No	162	19	12	--	--
	Yes	14	14	100**	--	--
PTSD:	No	64	7	11	2	3
	Yes	58	18	31*	11	19**
	Probable	54	8	15	1	2
Group:	0	44	2	5	1	2
	1	20	8	40**	3	15**
	2	55	0	0	0	0
	3	57	23	40**	10	18**

\*\* $p \leq 0.01$ ; \* $p \leq 0.05$

The table shows statistically significant relationships between disaster work experience, PTSD positivity, and group status in terms of suffering mental distress and negative effects. Responders with disaster experience were more likely to suffer mental distress and negative effects than responders without disaster work experience. Responders with mental distress were more likely to suffer negative effects than responders who did not have mental distress. Similarly, responders suffering negative effects were more likely to have mental distress than responders who did not suffer negative effects.

Responders testing positive for PTSD were more likely to have mental distress and suffer negative effects than responders who were classified as PTSD negative and PTSD probable. Responders possessing disaster work experience only (Group 1) and both disaster work

experience and HAZWOPER training (Group 3) were more likely to have mental distress and suffer negative effects than responders with neither training nor disaster work experience (Group 0) or responders possessing HAZWOPER training only (Group 2). No one in Group 2 suffered mental distress or negative effects.

There was no statistically significant relationship between mental distress and HAZWOPER training status. Similarly, there was no significant relationship between suffering negative effects and HAZWOPER training.

### Support of Training

Table 11 shows the number and percent of respondents that support mental health education grouped by key categorical variables.

**Table 11: Number and Percent of Respondents that Support Mental Health Education Grouped by Key Categorical Variables**

Variable		N	Supports Mental Health Education	
			Obs	%
HAZWOPER:	No	64	61	95
	Yes	112	99	88
Disaster Work:	No	99	90	91
	Yes	77	70	91
Mental Distress:	No	143	129	90
	Yes	33	31	94
Negative Effect:	No	162	147	91
	Yes	14	13	93
PTSD:	No	64	56	88
	Yes	58	53	91
	Probable	54	51	94
Group:	0	44	42	95
	1	20	19	95
	2	55	48	87
	3	57	51	89

\*\* $p \leq 0.01$ ; \* $p \leq 0.05$

Results indicated no statistically significant relationships between any variable for support of mental health education. Support for mental health education was not related to HAZWOPER training status, disaster work experience, mental distress, negative effect, PTSD status, or group. Disaster workers showed the same average support of training as non-disaster workers. Mental distress sufferers showed a higher support of training than non-sufferers, but the difference was not statistically significant. The same holds true for negative effect sufferers vs. non-sufferers and PTSD probable vs. PTSD negative and positive respondents. HAZWOPER-trained respondents showed less support of mental health education than did those who did not receive HAZWOPER training, but the difference was not significant. Respondents belonging to Groups 0 and 1 were more likely to support training vs. respondents who were HAZWOPER-trained only (Group 2) or possessed both characteristics (Group 3), but again, differences were not statistically significant.

## **DISCUSSION**

This study sought to examine PTSD, resiliency to cope, mental distress/negative effect, and the need for mental health education among HAZWOPER-trained secondary responder groups and, if warranted, to use the results to recommend the development of a mental health education training curriculum to be included in the current HAZWOPER course hierarchy. A clear need for training was demonstrated.

### **PTSD**

Elevated PTSD levels were seen in the study population (32.9% positive; 30.7% probable). Bills et al. stated the prevalence of PTSD among September 11<sup>th</sup> rescue workers ranged between 8% and 22.5%.<sup>6</sup> A PTSD score (cut-off point) of 43 on the PCL was used to distinguish PTSD positive respondents from PTSD probable ones. Bliese et al. recommend a cut-off point between 30 and 34 for civilian primary care populations.<sup>39</sup> However, a score of 43 was used because it was a more realistic and appropriate cutoff point for a secondary responder population with disaster work experience.<sup>39</sup> Elevated PTSD levels were expected given the abundance of studies that showed increased PTSD incidence in first responder and military populations.<sup>6,22,24,25,26,29,30,32,39,40</sup> However, such a high prevalence of PTSD positivity among this study group of secondary responders – eclipsing that even of September 11<sup>th</sup> disaster responders (32.9% vs. 8%-22.5%) – was not expected. Some possible factors that may have contributed to the high prevalence of PTSD could involve: (1) the study population was minimally or improperly prepared and trained to cope with their disaster response experiences; (2) these responders have witnessed or participated in a particularly severe traumatic event; (3) the responders were experiencing a cumulative effect of critical incident stress exposure (i.e. –

the stress from multiple disaster deployments added-up to cause severe mental distress, leading to PTSD, in the responders); (4) secondary responders, as a group, are less prepared for the traumatic experiences they encounter in their work than other groups previously studied; and/or (5) secondary responders have a higher baseline PTSD tendency than other groups studied, for unknown reasons.

Results indicated that responders possessing both grouping characteristics (HAZWOPER training and disaster work experience) were likely to test positive for PTSD, whereas, respondents possessing none or only one of the characteristics were likely to test PTSD negative. These findings imply an additive, or perhaps synergistic, relationship between the variables that resulted in increased levels of PTSD among HAZWOPER-trained disaster workers. This makes intuitive sense, as being HAZWOPER-trained may make a worker more likely to encounter a disaster scenario and, thus, will result in them being at a higher risk of developing PTSD.

### **Resiliency**

A majority (68.75%) of the study population tested below the mean resiliency score (80.4) of the average worker population. This was unexpected given the many research studies showing that responder populations are generally hardier and more resilient than their civilian counterparts.<sup>5,6,23,25,27</sup> Results further indicated that those who were HAZWOPER-trained only (Group 2) or who possessed both grouping characteristics (Group 3) were significantly more likely to have lower resiliency scores than those who had not received training or had disaster

work experience only. This finding was unexpected as the literature shows that, in general, the more comprehensive a person's training, the higher their resiliency.<sup>6,23</sup>

An inverse relationship was observed between resiliency score and PTSD status. Lower PTSD scores coincided with higher resiliency scores – and vice versa – as expected. Also, the groups possessing no characteristics (Group 0) or disaster work experience only (Group 1) showed no differences from the general worker population mean resiliency score. Similar to the findings for PTSD status, these results indicate that an additive, or synergistic, relationship may exist among the grouping variables, especially HAZWOPER training status, resulting in decreased resiliency in responders. It is not clear, however, why HAZWOPER training seems to negatively affect the resiliency of workers – regardless of their disaster work experience. Some possible explanations for this finding could include: (1) the study population was minimally or improperly prepared in their HAZWOPER training to cope with their disaster response experiences; (2) these responders had other factors in their lives – not related to disaster response work – actively and negatively affecting their ability to cope with stress; and (3) the finding may have been an artifact of not evaluating a large enough HAZWOPER-trained secondary responder population.

### **Mental Distress and Negative Effect**

Responders with disaster experience were more likely to suffer mental distress and negative effects than responders with no disaster experience. A statistically significant relationship between mental distress and negative effect was observed where responders with mental distress were more likely to suffer negative effects than responders who did not have

mental distress, and vice versa. As expected, responders testing positive for PTSD were more likely to suffer mental distress and negative effects than responders classified as PTSD negative and PTSD probable.

Results indicated that there was a direct correlation between having worked at a disaster site and experiencing mental distress and negative effects. Responders possessing disaster work experience only (Group 1) and both disaster work experience and HAZWOPER training (Group 3) were more likely to have mental distress and suffer negative effects than responders belonging to Groups 0 or 2. These results are similar to those found by McFarlane and Bookless, who state that those who suffered mental distress as a result of their experiences at a disaster work site were likely to also experience negative effects.<sup>29</sup> No one in Group 2 (HAZWOPER training only) suffered mental distress or negative effects. There were no statistically significant relationships between HAZWOPER training status and mental distress or negative effect. Overall, these results support the effect of responder status as the primary influence on mental distress and negative effects in this sample.

### **Support of Training**

Results showed clear support (91% of respondents) for mental health education. There were no statistically significant differences across any variable in terms of support of training. Support was high regardless of which group (0, 1, 2, or 3) a respondent belonged to, PTSD status, level of resiliency to stress, mental distress, or negative effects experience. Unexpectedly, HAZWOPER-trained respondents were less likely to support mental health education than did those with no training. This result was not statistically significant however,



and subsequent analysis of a larger population might reverse this negative trend and show positive support for mental health education.

All variables were compared with each other in terms of the independent variable of “support of training”. A reason for the non-significance in the above findings is that the overall support of mental health education was very high – 91% participant support. This high level of support inherently skewed all of the comparative analyses into non-significance – a complication that could be avoided in the future by surveying a larger study population.

### **Mental Health Education Program**

In light of the high supporting percentage among secondary responders in this study for mental health education, the development of a pre- and post-deployment training module is strongly recommended. It is further recommended that pre-deployment mental health education be included in the current HAZWOPER 24- and 40-hour course curriculums, as well as, consideration be given towards integrating a stand-alone post-deployment mental health education training course into the current HAZWOPER hierarchy. This training should provide responders with the necessary knowledge and skills to recognize the symptomology of PTSD, mental stressors, and physical and traumatic stressors, thus empowering them to employ protective strategies or seek professional help if needed. A documentation mechanism can be woven into this training that would allow concerned parties to track which workers were informed about the traumatic exposures that could be encountered during HAZWOPER operations, as well as, the possible signs and symptoms of traumatic stress-related mental

health disorders that may be experienced as a result of these exposures. This mechanism can also be used to identify disaster response and remediation workers for long-term follow-up.

Whealin et al. state that providing verbal information about what may happen during a future event should help decrease the novelty and unexpectedness of any traumatic situations that may be encountered during the event. They explain that, although informational preparation strategies have received little formal evaluation, these strategies have been used in military training for years and, today, many first responder and military organizations utilize informational preparation as a key training element.<sup>23</sup>

In a study investigating the mitigation of stress during complex tasks, Inzana et al. found that preparatory information had a positive effect on reducing anxiety and enhancing performance accuracy in both high-stress and normal-stress task conditions.<sup>41</sup> They state that preparatory information mitigates negative reactions to stress in several ways: (1) preparatory information provides a preview of the stress environment and renders the task less novel and unfamiliar, leading to a more positive expectation of self-efficacy; (2) knowledge regarding an upcoming event increases predictability, which can decrease the attentional demand and distraction of having to monitor and interpret novel events; and (3) preparatory information may enhance the sense of behavioral or cognitive control over a traumatic event by providing the individual with the means to respond to the stress.<sup>41</sup> They conclude by saying that preparatory information (pre-event training) that is tailored to the specific event that is likely to be encountered will provide a more effective mitigation of mental distress.

## **CONCLUSION**

A clear need for mental health education was demonstrated in this study and the development of a course to address this need was suggested. Personnel involved in natural or man-made disaster response and recovery efforts can be exposed to a wide variety of physical and mental stressors that can have long-lasting and detrimental psychopathological outcomes. Almost 2/3 of the study population showed elevated PTSD levels and more than 2/3 of the population showed lower-than-average resiliency scores. Hence, the importance of teaching responders about their mental health and how to safeguard it should not be underestimated or ignored.

### **Limitations**

This study had a few limitations. First, the study would have benefitted from a larger secondary responder study population which would have increased our statistical power to examine group differences and make more powerful conclusions. This would allow for multivariate regression analysis where the impact of group status on mental health outcomes could be explored, while controlling for other outcomes. Because of the small study population, the results were descriptive in nature. Secondly, a more targeted distribution of the survey would have been helpful. An unintended consequence of the study recruitment method used was that the stress survey was distributed to a larger responder audience than expected. This audience included first responder personnel, which were subsequently removed from the study. Thirdly, collectors for standard demographic data, such as gender, race/ethnicity, educational background, geographic location, etc., would have been helpful to include in the survey. These data could have been used to investigate differences between and

within certain responder groups and may have helped better characterize and explain the findings of this study. Fourthly, a cross-sectional study design was used which did not allow for the determination of temporal associations among the study variables. Finally, PTSD and resiliency symptomology was self-reported and could have resulted in biases in the results. For example, a participant, for whatever reason, could have exaggerated answers on the *PTSD Checklist*, thus resulting in a higher or lower than actual PTSD score. Similarly, answers on the *Resilience Scale* could have been exaggerated so as to reflect a higher or lower than average resiliency score. However, there is no reason to believe that the participants exaggerated their answers due to the fact that this survey was anonymous and there was no compensation offered to the participants for their answers.

### **Strengths**

This study also had important strengths. The *PTSD Checklist – Civilian Version* and the *Connor-Davidson Resilience Scale* were included, in their entirety, on the survey sent to study participants. Both instruments are widely recognized for their accuracy and are thoroughly vetted and validated in the literature. Secondly, volunteer selection bias was minimized due to the fact that the survey was administered almost exclusively (first responders were removed from analysis) to a secondary responder population, as previously described.

### **Recommendations**

As suggested, a mental health education course module should be developed and included in the HAZWOPER training hierarchy. Future research should investigate the efficacy of this training intervention to reduce or eliminate traumatic stress-induced mental health

sequelae in secondary responders. Research has shown that more training equates to higher resiliency against traumatic stress. The mental health of our secondary responder population can no longer be glossed-over or ignored within the current OSHA HAZWOPER training hierarchy. We need to safeguard those that sacrifice so much to help others in the line of duty.

## **APPENDICES**

Appendix A: IRB Exemption Letter

Joshua Calcote  
UT-H - SPH - SW Center Occupational & Environmental Health

August 22, 2011

HSC-SPH-11-0450 - *An Assessment of Post-Disaster Psychological Stress in Hazardous Waste Operations and Emergency Response (HAZWOPER) Workers*

The above named project is determined to qualify for exempt status according to 45 CFR 46.101(b)

**CATEGORY #2** : *Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:*

- a. information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; AND ,*
- b. any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.*

*(NOTE: The exemption under Category 2 DOES NOT APPLY to research involving survey or interview procedures or observation of public behavior when individuals under the age of 18 are subjects of the activity except for research involving observations of public behavior when the investigator(s) do not participate in the activities being observed.)*

**CHANGES:** Should you choose to make any changes to the protocol that would involve the inclusion of human subjects or identified data from humans, please submit the change via iRIS to the Committee for the Protection of Human Subjects for review.

**STUDY CLOSURES:** Upon completion of your project, submission of a study closure report is required. The study closure report should be submitted once all data has been collected and analyzed.

Should you have any questions, please contact the Office of Research Support Committees at 713-500-7943.

## Appendix B: Informed Consent Letter for Survey



An Assessment of Post-Disaster Psychological Stress in Hazardous Waste  
Operations and Emergency Response (HAZWOPER) Workers

INFORMED CONSENT LETTER

Personnel involved in natural or man-made disaster response and recovery efforts can be exposed to a wide variety of mental, physical and traumatic stressors that can have long-lasting and detrimental physiological, psychological, and behavioral effects. The purpose of this study is to assess the awareness aspects of PTSD symptomology, resiliency to cope, and the effects of traumatic mental/physical stressors within secondary responders. This assessment will be used to determine if a need exists to include traumatic stress-related mental health education in the current HAZWOPER training regimen and if a post-deployment training module should be considered to improve worker management of these issues and enhance responder force readiness.

You are being asked to volunteer to participate in this study because you are a HAZWOPER-trained secondary responder. Your participation in this study will be to complete a totally anonymous web-based survey comprised of 25 questions. It will take you approximately 15 minutes to complete. No personal identifiers will be requested on the survey, thereby protecting your complete confidentiality. There will be no direct links back to you. You will complete the survey on SurveyMonkey®, a web-based software program. Your responses will highlight: your current knowledge and understanding of mental, physical, and traumatic stressors; if you have personally experienced any of these stressors during a disaster response; what was the impact on your health, job, and social interactions; and if you feel that this type of training is needed and would be beneficial to other secondary responders. All responses to the survey will be reported in aggregate form (e.g., grouped together) and not by individual. Your willingness to complete the anonymous survey on SurveyMonkey® is tantamount to you consenting to participate in the study. You can access the survey through SurveyMonkey® by the following procedure: click on the web-link provided to you in the SurveyMonkey® notification e-mail and you will be taken to the survey where you may complete it.

There are no known risks anticipated by participating in this study. There is no guarantee you will receive any direct benefit from your participation in the study. However, you could become more self-aware of the signs and symptoms of mental, physical, and traumatic stressors and their effect on your performance, health, and lifestyle following exposure to severe disasters as an emergency responder. Your candid feedback during the study may also help other responders in the future. There is no cost to you to participate in the study and you will not be compensated for your participation. Your voluntary decision to participate or not participate in this study is entirely yours. No one can coerce or intimidate you into participating against your will. You may withdraw from participating in this survey at any time.

If you have any questions, please feel free to contact me at (713) 500-9447. Thank you for taking valuable time from your busy schedule to support this vital research effort for HAZWOPER responders.

Sincerely,

Joshua Calcote, DrPH (candidate), MPH, MBIOT

## Appendix C: SurveyMonkey® Survey

## NIEHS Stress Survey

### INFORMED CONSENT LETTER

Personnel involved in natural or man-made disaster response and recovery efforts can be exposed to a wide variety of mental, physical and traumatic stressors that can have long-lasting and detrimental physiological, psychological, and behavioral effects. The purpose of this study is to assess the awareness aspects of PTSD symptomology, resiliency to cope, and the effects of traumatic mental/physical stressors within secondary responders. This assessment will be used to determine if a need exists to include traumatic stress-related mental health education in the current HAZWOPER training regimen and if a post-deployment training module should be considered to improve worker management of these issues and enhance responder force readiness.

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There are no known risks anticipated by participating in this study. There is no guarantee you will receive any direct benefit from your participation in the study. However, you could become more self-aware of the signs and symptoms of mental, physical, and traumatic stressors and their effect on your performance, health, and lifestyle following exposure to severe disasters as an emergency responder. Your candid feedback during the study may also help other responders in the future. There is no cost to you to participate in the study and you will not be compensated for your participation. Your voluntary decision to participate or not participate in this study is entirely yours. No one can coerce or intimidate you into participating against your will. You may withdraw from participating in this survey at any time.

If you have any questions, please feel free to contact me at (713) 500-9447. Thank you for taking valuable time from your busy schedule to support this vital research effort for HAZWOPER responders.

Sincerely,

Joshua Calcote, DrPH (candidate), MPH, MBIOT

## NIEHS Stress Survey

**The following seven questions will ask you about your work, training, and disaster response history. Please select the answer you most identify with. Please answer all questions and do not skip any.**

**1. Are you currently employed in law enforcement, firefighting, or EMS?**

☐ Yes

☐ No

**2. Have you ever completed 24-hour or 40-hour HAZWOPER training?**

☐ Yes

☐ No

**3. A “disaster” is defined as a natural or man-made event that causes significant localized or widespread damage, destruction, injury, loss of life, and/or substantial changes to the natural or built environment.**

**Have you ever been deployed as a response worker to a disaster?**

☐ Yes

☐ No

**4. Have you experienced mental distress during or after a disaster that you worked at?**

☐ Yes

☐ No

**5. If YES, did your mental distress negatively affect your relationship with your family, friends, or co-workers?**

☐ Yes

☐ No

**6. What types of social support are available to you? (Check all that apply).**

☐ Spouse/Significant Other

☐ Family

☐ Friends

☐ Co-workers

☐ Military Associations

☐ Religious Associations

☐ Professional Counseling

☐ Other (please specify)

**7. Based on your experience and knowledge of mental stressors in disaster response, should mental health awareness training be provided to secondary responders?**

☐ Yes

☐ No

## NIEHS Stress Survey

**The following series of questions are related to stress and how you may have experienced stress in your personal life. Please select the answer you most identify with.**

**Please answer all questions and do not skip any.**

**8. Please select the answer you most identify with.**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
I am able to adapt to change.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I see the humorous side of things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coping with stress strengthens me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I bounce back after illness or hardship.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If things look hopeless, I don't give up.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know where to turn for help.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think of myself as a strong person.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can handle unpleasant feelings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a strong sense of purpose.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am in control of my life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have close and secure relationships.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sometimes fate or God can help.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**9. Past success gives me confidence for new challenges.**

- ☐ Strongly Disagree  
☐ Disagree  
☐ Neither Agree Nor Disagree  
☐ Agree  
☐ Strongly Agree

**10. I can make unpopular and difficult decisions.**

- ☐ Strongly Disagree  
☐ Disagree  
☐ Neither Agree Nor Disagree  
☐ Agree  
☐ Strongly Agree

## NIEHS Stress Survey

**11. Please select the answer you most identify with.**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
I can deal with whatever comes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Things happen for a reason.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I give my best effort no matter what.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can achieve my goals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Under pressure, I focus and think clearly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I take the lead in problem solving.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am not easily discouraged by failure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You have to act on a hunch.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like challenges.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I work to attain my goals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have pride in my achievements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**12. I have had repeated, disturbing memories or thoughts of a stressful experience from the past.**

- ☐ Strongly Disagree  
☐ Disagree  
☐ Neither Agree Nor Disagree  
☐ Agree  
☐ Strongly Agree

**13. I have had repeated, disturbing dreams of a stressful experience from the past.**

- ☐ Strongly Disagree  
☐ Disagree  
☐ Neither Agree Nor Disagree  
☐ Agree  
☐ Strongly Agree

## NIEHS Stress Survey

**14. I have suddenly acted or felt as if a stressful experience were happening again (like I was reliving it).**

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Neither Agree Nor Disagree
- ☐ Agree
- ☐ Strongly Agree

**15. I have felt very upset when something reminded me of a stressful experience from the past.**

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Neither Agree Nor Disagree
- ☐ Agree
- ☐ Strongly Agree

**16. I have had physical reactions (e.g., heart pounding, trouble breathing, sweating) when something reminded me of a stressful experience from the past.**

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Neither Agree Nor Disagree
- ☐ Agree
- ☐ Strongly Agree

**17. I have avoided thinking about or talking about a stressful experience from the past or avoided having feelings related to it.**

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Neither Agree Nor Disagree
- ☐ Agree
- ☐ Strongly Agree

## NIEHS Stress Survey

**18. I have avoided activities or situations because they reminded me of a stressful experience in the past.**

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Neither Agree Nor Disagree
- ☐ Agree
- ☐ Strongly Agree

**19. I have had trouble remembering important parts of a stressful experience from the past.**

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Neither Agree Nor Disagree
- ☐ Agree
- ☐ Strongly Agree

**20. I have felt emotionally numb or unable to have loving feelings for those close to me.**

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Neither Agree Nor Disagree
- ☐ Agree
- ☐ Strongly Agree

**21. I have lost interest in things I used to enjoy.**

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Neither Agree Nor Disagree
- ☐ Agree
- ☐ Strongly Agree



## NIEHS Stress Survey

**22. I sometimes feel that my future will be cut short somehow.**

- ☐ Strongly Disagree  
☐ Disagree  
☐ Neither Agree Nor Disagree  
☐ Agree  
☐ Strongly Agree

**23. Please select the answer you most identify with.**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
I feel distant or cut off from people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have trouble falling or staying asleep.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have had irritable or angry outbursts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have had difficulty concentrating.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have been super-alert or on guard.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel jumpy or am easily startled.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**24. How were you made aware of this study and survey?**

- ☐ E-mail  
☐ Telephone  
☐ Mailed Letter  
☐ Meeting/Conference  
☐ Word of Mouth  
☐ Other (please specify)

**25. Do you have any comments you'd like to share?**

**THANK YOU FOR YOUR PARTICIPATION!**

## Appendix D: SurveyMonkey® Survey Coding and Scoring Sheet

## SurveyMonkey® Survey Coding and Scoring Sheet

### Questions 1-5, 7:

Yes = 1

No = 0

Do Not Know = 2

### Question 6:

Spouse/Significant Other = 1
Family = 2
Friends = 3
Co-workers = 4
Military Associations = 5
Religious Associations = 6
Professional Counseling = 7
Other = 8 (also, record any comments)

**Question 8-11:** Score range of 0-100 ... higher the score = more resilient the individual

Strongly Disagree = 0   Disagree = 1   Neither Agree Nor Disagree = 2   Agree = 3   Strongly Agree = 4

**Questions 12-23:** A total score of 34 or less is PTSD negative; 35-43 is PTSD probable; and 44 or more is PTSD positive.

Strongly Disagree = 1   Disagree = 2   Neither Agree Nor Disagree = 3   Agree = 4   Strongly Agree = 5

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