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Pepperdine University  
Graduate School of Education and Psychology

A SYSTEMIC PERSPECTIVE OF STRESS IN EMERGENCY MEDICAL  
PERSONNEL: EMERGENCY MEDICAL TECHNICIANS AND FIREFIGHTERS

A clinical dissertation proposal submitted in partial satisfaction

of the requirements for the degrees of

Doctor of Psychology

by

Rob W. Wennerberg

August, 2011

Robert deMayo, Ph.D. – Dissertation Chairperson

This clinical dissertation, written by

Rob W. Wennerberg

under the guidance of a Faculty Committee and approved by its members, has been submitted to and accepted by the Graduate Faculty in partial fulfillment of the requirements for the degree of

DOCTOR OF PSYCHOLOGY

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Let me first say I disdain the thought of having to cobble together a list of half-hearted and political sentiments of thanks. I do not wish to create an oscar-esque list of dedications beginning with Oprah and ending with a higher power. Instead I will be simple and short. I owe a huge debt of gratitude to my chairperson Dr. Robert deMayo who helped calm me when I was at wits end and guided me through this arduous process. I owe my committee for their diligence, my family for their support, retired deputy chief Michael Velasquez for his inspiration, and his daughter Autumn Velasquez for her patience. My final thanks go to all the emergency medical personnel that put themselves in harms way on a daily basis. As we use to say in my EMS organization “Keep on fighting natural selection!”

## VITA

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B.S. Neuroscience and Psychology, Department of Psychology Tulane University, New Orleans, LA, May, 2003

### **Professional Experience**

*Psychology Intern* (07/09-Present)  
University of California Davis, Davis, CA  
Supervisor, Rory Osborne PhD., Licensed Psychologist  
Responsibilities include individual, adolescent, and couples counseling, as well as community outreach, campus program development, and acting as a member of the Work Place Violence Prevention Committee.

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*Admissions Assistant* (08/05-01/08)  
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Responsibilities include; confidential student application processing, office organizational assistance, student liaisons and ongoing application contact, team problem solving, and processing development.

*Child Trauma Extern* (08/06-09/07)  
Harbor UCLA Medical Center, Torrance, CA  
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Harbor UCLA Medical Center, Torrance, CA  
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*Litigation Consultant Intern* (06/04-05/05)  
Persuasion Strategies, a Service of Holland & Hart LLP, Denver, CO  
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Responsibilities included but were not limited to, work with mock trials, witness preparation, trial strategy consulting, jury selection, jury research, high interpersonal contact and use of advanced communication skills and techniques, both verbal and non-verbal.

*Deputy Probation Officer* (12/03-06/04)  
17<sup>th</sup> Judicial District Probation Dept., Thornton, CO.  
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Responsibilities included supervision/case management of probationers, law enforcement and rehabilitative organization contact, facilitation of a conflict resolution group, and use of the statewide crime index for criminal research.

*Courtroom Assistant/Bailiff* (8/03-05/04)  
Aurora Municipal Court, Aurora, CO  
Responsibilities included courtroom management, judicial staff assistance, legal problem solving, assisting attorneys with municipal courtroom proceedings, dynamic response to different daily legal issues, maintaining courtroom decorum, and recording courtroom proceedings in the city database.



*Director of EMS Operations*

(10/01- 05/03)

Tulane Emergency Medical Service – Student Health Services, New Orleans, LA.  
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**Professional Involvement**

American Psychological Association

Napa Solano Psychological Association: Governmental Advocacy Representative

California Psychological Association

Pepperdine University PsyD Student Government President (08/07-05/08)

## ABSTRACT

Emergency medical personnel (firefighters and ambulance personnel) have higher levels of lifetime PTSD symptoms than the general population. Historically this has been attributed to the number of exposures to traumatic incidents, called the dose effect, but recent literature has suggested that there is a complex web of variables that affect an individual's experience of trauma. Through an interpretive review of the literature this dissertation takes the concepts supported by empirical research and organizes them into an integrated theoretical structure. With ecological psychology at the core, the integration uses Living Systems theory as a structure with which to organize and explore the different interactive ways that the environment in which emergency medical personnel live affects their experience of stress, coping skills, and overall resilience. At each level in the system, the effects on an individual's experienced or perceived resources are evaluated using Conservation of Resources theory. By using this theory, resources from variables as broad as global recessions to as precise as nutrition and brain functioning can be explored in a cohesive way that shows the interplay of resources across the system and the acute effects on individuals in the emergency medical field. This dissertation uses this model to identify junctures at each of the eight levels of living systems where resources can be addressed in a clinically relevant way. Limitations of current research data and implications for future research and clinical interventions are discussed.

## **Chapter 1. The Problem**

### **Background**

Traumatic experiences in emergency medical responders are not an uncommon occurrence. In a survey of 2000 medics and firefighters, 90% reported having been on a mission where they were exposed to individuals who were dead, dying, or severely injured (Beaton & Murphy, 1995). To an even greater extent, in a study of 86 paramedics in Canada 100% had been exposed to a critical incident, defined as risk to themselves, mass casualty, the death of a person in their care, death of a child, or death of a colleague (Regehr, Goldberg, & Hughes, 2002). Prevalence rates of PTSD symptomology are difficult to accurately identify due to underreporting, fear of diagnostic stigmatization (Levenson & Dwyer, 2003) and differing opinions on definitions of stress and trauma but it is in the range of three to five times greater than those in the general public (Bryant & Harvey, 1995; Corneil, Beaton, Murphy, Johnson, & Pike, 1999; McFarlane, 1989). They also exhibit negative coping strategies, have high levels of co-morbid substance abuse (McFarlane, 1998; Murphy, Beaton, Pike, & Johnson, 1999), and marital discord (Spitzer & Neely, 1992).

As a population Emergency Medical Technicians and Firefighters, collectively referred to as Emergency Medical Responders, are often heralded as “heroes” but internally may view themselves differently. Due in part to the culture that permeates the occupation, and a history of rough and tumble characteristics, this population is often overlooked. They are viewed by the public as strong and therefore must be strong.

However, many struggle with substance abuse, family discord, and mental health issues. It is because of this disconnect of individual experience and public persona that it is so important to identify the systemic cultural, social, and biological factors that contribute to the mental health of the emergency medical personnel who protect our country on the “front lines” of our health and safety needs.

Events in the past decade have highlighted the impact of trauma incidents on the emergency responder population. During the 2001, September 11th terrorist attacks in New York approximately 11,000 FDNY firefighters (Centers for Disease Control and Prevention [CDC], 2006) and many more emergency medical service professionals were involved directly with evacuation, treatment, or clean-up. During the following 11 months, 1,277 stress-related incidents were reported among the FDNY rescue workers. This represented a 17-fold increase compared with the 75 stress-related incidents reported the previous 11 months. This finding demonstrates the immense impact of a single traumatic incident on the system of emergency medical responders around the country. Research in the field of helper experienced trauma has also expanded our understanding of stress beyond the specific definition of Post Traumatic Stress Disorder (American Psychiatric Association, 2000) to theories such as Vicarious Trauma (McCann & Pearlman, 1990), Secondary Traumatic Stress (Figley, 1995), Compassion Fatigue and even more recently Emergency Responder Exhaustion Syndrome (ERES) developed specifically through work with emergency responders (Fay, Kamena, Benner, Buscho, & Nagle, 2006). In an effort to cohesively discuss these topics, some concepts must be first clarified as at times they are used in alternate and interchangeable ways.

## **Definitions of Stress, Trauma, and Trauma Reactions**

In common vernacular the terms “Stress,” “stressor,” “trauma,” “stressed,” and “traumatic” are often used synonymously. However, it is important to delineate different terms when discussing the complex reactions associated with a critical incident.

**Stress.** This is defined as an antecedent or causal event: “...any force that when applied to a system causes some significant modification of its form, usually with the connotation that the modification is a deformation or distortion” (Reber & Reber, 2001). For example gravity is a stress just as much as physical injury. Each exerts a force on the human body that in turn creates a physiological counter-force. Hobfoll (1988) defined stress ecologically as either (a) the threat of a net loss of resources (b) the net loss of resources. or (c) the lack of resource gain following investment of resources (p. 25). Each of these definitions plays an important role in the discussion of resource strain on a system.

**Stressor.** This language is often used to identify the event in post traumatic stress disorder that causes the body’s experience of stress. Sapolsky (2000) clarified by defining a stressor as “...anything that throws your body out of allostatic balance” (p. 7). The world trade center attacks could be considered a stressor for firefighters. It is important to also note that a stressor does not have to be a concrete event instead it can be the anticipation of an event or an imagined or remembered event as well.

**Critical incident.** This term is found often in literature associated with emergency responders. A critical incident is defined as an incident that includes risk to the emergency medical responder, mass casualty, death of a person in the emergency

medical responders care, death of a child, or death of a colleague (Regehr, Goldberg, Glancy, & Knott, 2002).

**Trauma.** Trauma is used often both to identify the stressor that causes a traumatic experience and the experience itself. For the purpose of this paper trauma will refer to the emotional experience associated with a stressor.

**Traumatic.** This is a descriptor referring to a quality of a stressor (i.e., post traumatic-stress disorder) that indicates it has elicited an emotional experience of trauma. For example a traumatic event is defined in the DSM-IV TR criteria of Post-Traumatic Stress Disorder (PTSD). Criteria A states the following:

1. The person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others.
2. The person's response involved intense fear, helplessness, or horror  
(American Psychiatric Association, 2000, pp. 467-468).

This definition elucidates several domains of trauma but leaves out the temporal and dose effect hypothesis of multiple traumas over a period of time.

**Complex trauma.** Courtois and Ford (2009) identified complex trauma as being a chronic experience of trauma not only associated with experiences of horror and threat to self or others, but also associated with the disruption of psychological and biological self-regulation and secure attachments. The experience of complex trauma is described as a culmination of adversities. Vogt, King, and King (2007) identified several social groups particularly affected by complex cumulative trauma and noted emergency responders as

one of these at-risk groups due to the nature of their work and repetitive traumatic stressors.

**Post Traumatic Stress Disorder (PTSD).** PTSD is the most commonly discussed disorder with regards to trauma reactions. It was first officially accepted in 1980 in the DSM-III after Vietnam veterans had begun presenting to the medical field with a cohesive set of psychiatric symptoms. This set of symptoms was further refined in the DSM-IV to our modern understanding of PTSD (American Psychiatric Association, 2000). However, research has struggled to find a standard measure of PTSD. It has been found to be often underreported and difficult to quantify without using a full diagnostic interview. Attempts to capture the complexity of PTSD have included use of the Impact of Event Scale (Horowitz, Wilner, & Alvarez, 1979), which measures the traumatic nature of the experience, but has been criticized for leaving out the symptomatic responses of intrusion and avoidance (Amdur & Liberzon, 2001). There has been use of the Structured Clinical Interview for DSM-IV (Guthrie & Bryant, 2005), but the length of the interview and training required to administer it makes this a difficult instrument to use with large populations. In the literature there has been inconsistent and varied use of a dozen different measures and cutoffs of those measures, often in different combinations, to appropriately capture the complex and diverse nature of PTSD symptoms. This has led to widely different lifetime rates of PTSD (Bryant & Harvey, 1995; Corneil et al., 1999; McFarlane, 1989). This discrepancy is acutely evident when emergency responders are studied, often due to underreporting and a cultural pressure to avoid the stigma of chronic mental disease.

**Secondary Traumatic Stress (STS).** STS is a concept developed in 1993 (Figley, 1993) after PTSD symptoms were observed in individuals that did not meet the criteria of personally experiencing a traumatic incident, specifically in populations of nurses, social workers, and therapists. STS has been equated with Vicarious Trauma (McCann & Pearlman, 1990) and Compassion Fatigue (Figley, 1985) although STS has become the most common reference in the literature. The motivation for this further refinement of the diagnosis of PTSD arose when it was observed that individuals who had no direct first-hand experience of a critical incident were presenting with symptoms of avoidance, emotional numbing, and re-experiencing the events reported to them by others (McCann, Sakheim, & Abrahamson, 1988).

**Emergency Responder Exhaustion Syndrome (ERES).** ERES (Fay et al., 2006) is a term used recently to describe a cluster of variables observed by clinicians treating emergency medical responders, in an attempt to de-stigmatize and move away from formal diagnosis. The concept strives to take into account the specific environment and factors experienced by emergency responders. ERES addresses domains of organizational stressors, job-specific environmental factors, critical incidents, and social support. According to Cantrell (2010), “The core elements of ERES are depression, isolation, and physical and emotional exhaustion.” While this definition is not of common use within the psychological community yet, the factors associated with the experiences of firefighters and emergency personnel clearly delineate a complex system of traditions, social environment, and expectations that contribute in a multi-faceted way to the traumatic experience of emergency medical personnel.

**Protective Factors.** Protective factors are variables either environmental or



individual that reduce the likelihood that an individual exposed to a traumatic incident will develop post-traumatic stress symptoms. These factors are often times active factors in the individual's life such as problem solving, relationships, spirituality, optimism (Madsen & Abell, 2010), social support, and self-efficacy (Regehr, Hill, Knott, & Sault, 2003).

### **Definition of the Population**

When identifying the population of emergency medical responders for this dissertation, terminology presents difficulty. The term "Emergency Medical Responders" identifies the group often referred to as "helpers" and is defined by the National Highway Traffic Safety Administration (NHTSA):

Emergency Medical Responder – The primary focus of the Emergency Medical Responder is to initiate immediate lifesaving care to critical patients who access the emergency medical system. This individual possesses the basic knowledge and skills necessary to provide lifesaving interventions while awaiting additional EMS response and to assist higher level personnel at the scene and during transport. Emergency Medical Responders function as part of a comprehensive EMS response, under medical oversight. Emergency Medical Responders perform basic interventions with minimal equipment (National Highway Traffic Safety Administration, 2007).

While the guidelines from NHTSA do not clearly exclude police officers, for the purpose of this dissertation we will limit the terminology to include firefighters and EMTs that respond to emergencies with the express purpose of safety and medical treatment. It is possible for a police officer to become certified as an emergency medical

responder but this is not a minimum requirement as it is for firefighters and EMTs. Research conducted with fire, medical, and police personnel has shown that the types of critical incidents reported by police officers are significantly different from fire and medical personnel (Pendleton, Stotland, Spiers, & Kirsch, 1989). While many of the domains discussed might be applicable to police officers, for the purpose of this dissertation the research done with emergency medical responders has been the focus.

Another reason for inclusion of fire and medical personnel under one common group is the widespread potential that these personnel are subsumed under one organizational umbrella. Many fire departments internally consider emergency medical services a portion of the fire department and have EMTs and ambulances as part of their organization. Almost all of the research reviewed did not distinguish firefighter status as EMT, EMT Paramedic, or strictly fire. Instead, most often the personnel studied were either firefighters or ambulance personnel and did not focus on the specific training in either category. Due to this generalization, the two groups, firefighters and ambulance personnel, are often grouped together and functionally respond to similar incidents. In 2000, 60% of all emergency calls to fire departments were for emergency medical services and less than 10% were identified as being for fire response (LaTourrette, Peterson, Bartis, Jackson, & Houser, 2003). This overlap shows the similarity in their response aid type and likelihood of responding to similar incidents.

Other terms used within the research can cause confusion. It is important to identify these and separate them from the population of focus (emergency medical responders) for this dissertation. Many sources use differing terminology when speaking of mixed groups. The terminology associated with emergency responders is broad and

often unclear. “First Responder” refers to a class of individuals with a general level of training as defined by homeland security.

The term “first responder” refers to those individuals who in the early stages of an incident are responsible for the protection and preservation of life, property, evidence, and the environment, including emergency response providers as defined in section 2 of the Homeland Security Act of 2002 (6 U.S.C. 101), as well as emergency management, public health, clinical care, public works, and other skilled support personnel (such as equipment operators) that provide immediate support services during prevention, response, and recovery operations (Homeland Security Act, 2002).

This level of training is the minimum for police, fire, and medical responders. It includes tasks not often associated with medical personnel such as evidentiary concerns and protection of property that, while a matter of note for emergency medical personnel, are not their primary concern as with police officers. Literature has indicated that police personnel fulfill a different role on scenes and often experience different types of stressors. The research has also indicated differing levels of symptom reporting and symptom typology (Brough, 2004). The term “emergency response provider” has also been used and is defined in the United States legal code. “The term ‘emergency response providers’ includes Federal, State, and local governmental and nongovernmental emergency public safety, fire, law enforcement, emergency response, emergency medical, (including hospital emergency facilities), and related personnel, agencies, and authorities” (Homeland Security Act, 2002).

However, this too encompasses a broad range of individuals and activities beyond the purview of on-scene emergency medical professionals.

### Characteristics of the Population

**Individual characteristics.** In 2008 there were 321,700 career firefighters (full-time paid service), 827,150 volunteer firefighters, (United States Fire Administration, 2009) and there were 138,000 EMTs in the United States (United States Department of Labor, 2009). Of these there was a significant difference in gender composition. In the firefighter statistics there is only a 4.8% female population and 30.2% in the EMT population (United States Department of Labor, 2009). While both of these statistics show significant difference from the general population, it is important to notice the higher female representation in the EMT population. There is also significant discrepancy from national statistics in ethnicity. In the EMT population the diversity is as follows: 90.6% Caucasian, 4.7% African American, 0.1% Asian, and 6.6% Hispanic (see Figure 1).

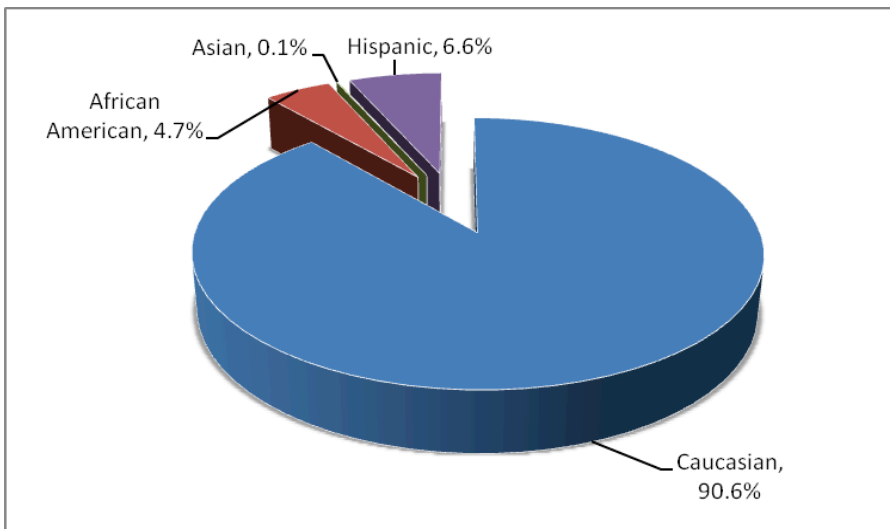
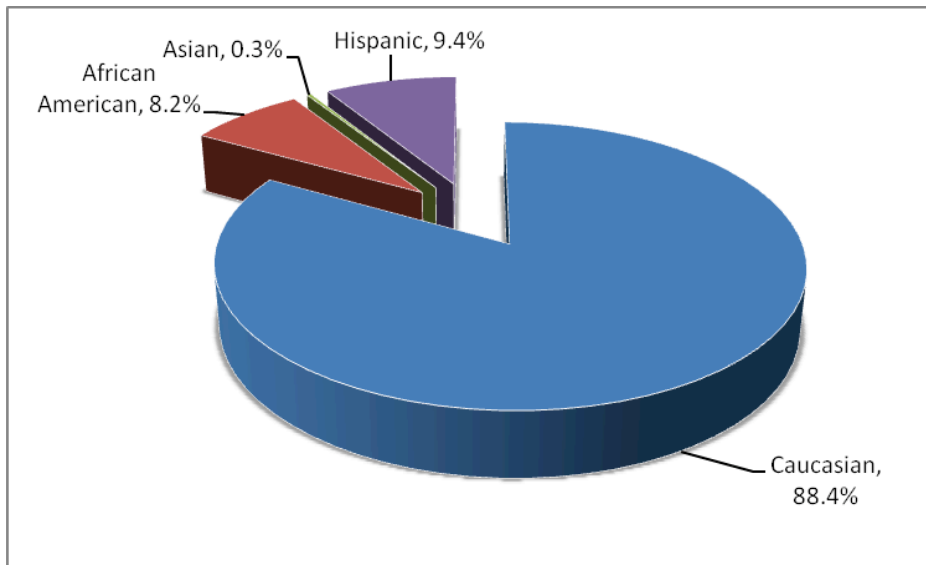


Figure 1. EMT/Paramedic Demographics by Ethnicity 2009 (United States Department of Labor, 2009)

In the firefighter population there is slightly more diversity: 88.4% White, 8.2% African American, 0.3% Asian, and 9.4% Hispanic (United States Department of Labor, 2009) (see Figure 2).



*Figure 2.* Firefighter Demographics by Ethnicity 2009 (United States Department of Labor, 2009)

The 1.25 million firefighters and Emergency Medical Technicians (EMTs), collectively referred to as “Emergency Medical Responders,” experience high levels of job-related stress. Anecdotal evidence also indicates that emergency medical responders have difficulty in marital relationships and high levels of divorce. However, no centralized research or data group has tracked or compared lifetime marital history in the population. Southworth (1990) suggested that it is exactly the characteristics that might be beneficial in an emergency environment that might also be inconsistent with a spousal relationship; taking control, springing to action, remaining emotionally detached, making quick decisive decisions, and questioning everything. Regehr, Goldberg, and Hughes,

(2002) also noted that emotional numbing is a common strategy in emergency medical personnel and that this might affect the ability of experiencing emotions with a spouse.

**Cultural characteristics.** Emergency medical responders live in a strong and tight knit hierarchical culture. One firefighter noted “I live and work the job” (Anonymous firefighter, personal communication, May 11, 2009). Emergency medical responders almost exclusively do shift work of 12, 24, or more hours per shift and during this time they often live under the same roof or spend long periods of time with their co-workers. Fire and EMT houses many times are just that, houses complete with kitchens, beds, and entertainment.

In addition to the bonds developed through modern work and living together, the heritage of firefighting and EMS brings a generational cultural component to bear as well. With strong cultural heritage comes a devotion to tradition and self-reliance. These factors are maintained today and are often seen in traditional roles of firefighters. Repeatedly researchers have found that resilience to critical incidents is related to a balance between work and social life (Figley, 1995; Hesse, 2002; Pearlman & Saakvitne, 1995). However, in the emergency personnel culture there is a consistent and prominent overlap between these domains. One Assistant Chief of Emergency Medical Services noted that one lives, eats, and plays with one’s “family” of firefighters. Even the terminology strongly denotes a familial bond within the departments.

In emergency medical personnel culture there are also strong historic ethnic and religious affiliations. In the 1800s during a time of great population growth in the United States as well as a time of industrial development, there was an increased need for firefighters. At this time in history the position was very different from the modern

firefighter and required minimal training and high risk. Adding to the selectivity, during the genesis of the fire department, communities disallowed free African Americans from participating as firefighters. Because of this and the niche between the middle and upper class, Caucasian immigrants often held the positions. During this time there was also a large Irish immigration, and in the late 1800s (Byron, 1999) there was a culture clash that identified firefighters as a “rough” group associated with the lower class Irish immigrants. This cultural identity has lasted for many generations and to this day fire departments are still strongly linked to the Irish communities.

The religious affiliation has been a strong part of the culture’s trauma history as well. Many fire departments in early years were not staffed or serviced by a psychologist but, instead, would have a department priest with whom members could discuss the varieties of their experiences. In modern fire departments there continues to be a designated religious figure that has become more non-denominational but still fulfills a counseling role that is often perceived as less stigmatizing for discussing traumatic incidents and the emotional and behavioral fallout of work life. This thread can be seen even in cutting edge treatment modalities such as the Post-Trauma Retreat developed by Dr. Fay and his colleagues in Inverness, California where a non-denominational religious figure is a member of the multi-disciplinary team treating emergency personnel with extreme cases of PTSD (Fay et al., 2006).

### **Purpose of the Study**

While many studies have measured protective factors, critical incident factors, dose effects, training, personality characteristics, and organizational factors independently, there has been little focus on synthesizing the research into an overall

understanding of the chronic systemic etiology of stress experienced by emergency medical responders.

The purpose of this dissertation is to investigate the complex systemic factors that emergency medical responders might be subject to during their lifetime and consider these factors in the multi-dimensional system of traumatic stress. The author intends to use Miller's biopsychosocial living systems model (Miller, 1995) to integrate cultural, social, and biological factors into the intricate psychological experience beyond discrete traumatic events. While studies have been able to explore the individual organism's reaction to a traumatic event and often times the effects trauma have on the individuals biology, organs, and cells, there has been little discussion on the effects of trauma on all levels of living systems in relation to the population of emergency medical responders.

Diez-Roux (1998) in research on public health issues noted that "ignoring relevant group-level variables in a study of individual-level associations may lead to... the psychological fallacy, that is, assuming that individual-level outcomes can be explained exclusively in terms of individual-level characteristics." It therefore was pertinent to move the focus from the individual as the identified client in trauma reactions to identifying the broader system as the client with the individual acting as one level in a larger system of cultural trauma among emergency medical responders.

Figley (1993) first suggested the use of Miller's (1978) biopsychosocial living systems model in 1993 when he used it as a framework to analyze the systemic stressors experienced by military families during times of war. Miller's Living Systems Theory can provide a general framework with which to assess all levels of living systems and how at each level there can be traumatic experiences that affect the broader system.



Similarly Regehr and Bober in their research and book *In the line of fire: Trauma in the emergency services* (Regehr & Bober, 2005) focused on an ecological model of stress in fire departments. She cursorily used modern trauma and crisis theory as well as Hobfoll's (1989) Ecology of Stress and conservation of resources theory to discuss broad social and environmental issues as they relate to emergency medical responder's experiences of traumatic stress and social support. This model was also used and expanded upon to evaluate how at each level of Miller's system, resources are strained that can contribute to elevated levels of stress and potentially a greater level of post traumatic symptoms.

This dissertation explores how the theory, research, and psychology of individual traits and experiences fits in a global understanding of Miller's (1995) eight levels of living systems: Cell, Organ, Organism, Group, Organization, Community, Society, and Supranational. From the top down and from the bottom up, our biology affects our supranational system and global politics can ultimately affect our biology. This important viewpoint on understanding trauma takes the theory out of the lab and through inductive reasoning identifies the gaps in our current knowledge of the complex systems of trauma in our society.

Studies have explored a gamut of factors, including individual personality, historic trauma, and incident stressors in an effort to more clearly grasp the effects of critical incidents on individuals of this population. However, many of the pieces have been studied in a isolation. Factors of individual personality are studied without considering family system stressors, family of origin, and work performance. Many studies report that their results explain a portion of the trauma symptoms seen in the population but no one factor has been shown to be 100% responsible for the elevated

symptoms. Through an interpretive review of the literature, the findings below unify concepts from many different studies in a more robust and complete theory of chronic stress in emergency medical responders.

### **Role of Researcher**

A 29-year-old Caucasian male researcher in a clinical psychology doctoral program will conduct this interpretive review. Because the type of review is qualitative in nature and relies strongly on inductive reasoning by the researcher it is important to understand the potential biases that might affect this review.

The aforementioned student attends graduate school within the Los Angeles metropolitan area, but lives in the Northern California Bay Area. The researcher is originally from the rural community of Arcata in extreme Northern California. This review is being conducted as part of a doctoral dissertation project. The researcher did have prior experience as an emergency medical technician in New Orleans, Louisiana driving an ambulance for three years from 2001 to 2004 both for private and public emergency medical systems. The researcher has friends and family that work as firefighters throughout the country and have different anecdotal experiences of stress in the workplace. The researcher also has received academic and clinical training that emphasizes the conceptualization of systemic issues from a family systems model.

## **Theoretical Framework**

This paper integrates two theories associated with resources, stress, and systems into a complete model of stress reactions. The theories of focus are Conservation of Resources (COR), and Living Systems.

**Conservation of Resources (COR).** Hobfoll was the progenitor of the theory of conservation of resources as a psychological stress model. The theory's origins were based on the Le Chatelier Principle: "A stable system under stress will move in that direction which tends to minimize the stress." The basic premise is that people have an innate as well as a learned desire to conserve the quality and quantity of their resources and to limit any state that might jeopardize the security of these resources (Hobfoll, 1988, p. 25). When there is a stress on the system, there is a predictable direction of behavior to return the system to allostatic balance.

Through this basic premise Hobfoll identifies the ecological impact of the environment. The model notes that while an individual might be the focus of the resources and research on stress, it is the environmental circumstances that provide the threat to an individual's resources. The model incorporates the work of previous theorists and includes the concept of human perception of loss as well as actual quantifiable loss, and the physiological reaction to stress.

This model of stress goes beyond that of previous models. The theory not only takes into account physical reactions, and individual coping, but also includes the predictive ability to identify the direction of an individual's coping strategy. In studies of resource loss in fire emergency workers, resource loss predicted the impact of critical incidents on the emergency worker's depressive and anger symptoms (Monnier,

Cameron, Hobfoll, & Gribble, 2002). The theory is based on the general principle of minimization of loss and maximization of gain commonly used in other fields. Through this model general areas of behavior can be identified when an individual is confronted with loss.

The theory posits that when an individual is confronted with the loss of resources the individual will act in a way to minimize this loss, or to produce gain in an order of magnitude similar or greater to the loss. The model is not as simple in its application as it is in its theory. Individuals perceive losses differently and gains are always seen through the personal perspective of the individual. However, overarching themes and social norms show an emergence of common values of loss. Holmes and Rahe (1967) surveyed individuals and identified events that required an individual to substantially readjust their lives. This research produced the Holmes & Rahe Social Adjustment Rating Scale that identified 43 life events in rank order and identified a value system associated with the amount of readjustment or using this model, resources required in reaction to the life events.

The COR theory outlines a model mechanism through which loss and gain of resources are identified. The mechanism includes two major domains, raw resources and “evaluated” resources, and an individual process of evaluation of the raw resources. The raw resources Hobfoll identified fall in the domains of objects (e.g., food, water, shelter), conditions (e.g., marriage, job seniority, citizenship), feelings (e.g., love, esteem, affection), and energies (e.g., money, credit, knowledge). These raw resources are processed through the individual’s evaluative systems, which are biophysiological, cognitive, and unconscious to produce higher-value evaluative resources such as pride,

status, satisfaction, self esteem, biological components, and honor to name a few. This process is important because an individual's reaction to a loss of raw versus evaluated resources might be significantly different and provide a different type of stress on the individual.

**Living systems.** Miller (1995) defined a system as “a set of interacting units with relationships among them” (p. 16). In this description he then identified eight levels of interaction: cell, organ, organism, group, organization, community, society, and supranational. Miller identified that the primary focus of his theory was on concrete open systems. Concrete systems are a “non-random accumulation of matter-energy... organized into interacting interrelated subsystems” (p. 16). An open system is a system that has semi-permeable boundaries such as a human where biological matter and information can be transmitted. Miller noted that all living systems fit within this structure of levels of systems. In a general theory of living systems humans and individual characteristics and issues are an integral part but are only one portion of a greater ecological understanding of a supranational system.

Living systems at every level experience stress, strain, change, equilibrium, negative and positive feedback loops, and a variety of other processes. One of the predominant theoretical frameworks posited by Miller is that at each level in his eight levels of living systems there are 20 subsystems that fulfill critical roles.

Miller's theory is very pragmatic, mathematical, and organized. The theory is based heavily on rules of physics as well as cybernetics. He extrapolates and systematically explains these concrete rules through scientific hypothesis and philosophical proofs that are manifested in living systems.

*Eight levels of living systems.* It is important to understand that Miller defines the eight levels of living systems as levels that have a complex organization of subsystems and he defines these subsystems in great detail, such as the converter, the reproducer, or the ingestor to name a few. However, for the purpose of this theoretical paper the eight levels of living systems are the focus of general understanding of living systems theory. The eight levels are discussed below.

*Cell.* The cell is the smallest of living systems. Miller explains that while viruses are smaller, they are not considered alive, and require a living cell for reproduction. A living cell can live independently of a larger organism and are then called free-living cells. In this paper we will consider cells in the context of their effects at the cellular level of a larger living organ and organism. The cell is vitally important because it is at the cellular level that an organism produces energy and in the field of psychology the intricate and complex actions of the brain are the result of cells. It is also important when discussing stress to consider the cellular level because the effects of chemical compounds like hormones and neurotransmitters act directly on the cells as their first step of action.

*Organ.* Cells form to create tissue and organs are made up of cellular tissue. The organ is the second level of living systems and important in the study of trauma due to the organ's involvement in hormone production and secretion in the human body. The organ as defined by Miller does not refer to the common understanding of the major organs of the human body. Instead he identifies the organ as "all the components which carry out the processes of a given subsystem of a given organism" (Miller, 1995, p. 315). This differentiation is important because Miller describes organs in a different manner than in strict medical physiology terms. The theory considers the organ not restricted to

its physical limits but is defined by its process within the organism. For example, the pancreas contains endocrine and exocrine cells that are parts of two different organs or subsystems in the organism, each having specific functions in different processes of the organism. In psychological research there is rarely a differentiation between organ and cell in a way that is consistent with Miller's levels. Because of this lack of differentiation, it is more accurate to discuss biological functioning that subsumes both of these levels. Due to this, this paper in discussion will refer to these two levels of Miller's system's theory as one.

*Organism.* In living-systems theory the organism prescribes to the usual biological understanding excluding free-living cells that Miller identifies as "cells" and not "organisms." The organism is a collection of organs that carry out the 20 different complex subsystems. The organism is an autonomous unit that works within the environment and makes up a group.

*Group.* A group is a collection of organisms that over time is defined through their recurrent "face-to-face" interactions. Miller limits groups to animals in his definition. The group is significantly different from the next higher level because the members of the group are close enough that they can see or hear each other, they can communicate directly with other members, and there are no echelons. Miller identifies some common groups such as immediate families, work groups, committees, and juries. These combinations of members interact with each other directly over a period of time. Groups are not permanent and can be transitional in nature. In the domain of this paper a work-shift of medics or firefighters would be considered a work group. However, the fire department would fall under the next level of organization.

*Organization.* Organizations are significantly differentiated from groups in that they are formed from a multi-echelon hierarchical system (e.g., a fire department or health department with multiple levels of administration and hierarchies such as chief, deputy chief, etc). Specifically, they must have at least two echelons of deciders. The organization is a concrete system constructed of concrete living systems. It is important to note that what is commonly discussed as an “organization” such as Toyota or Sony might actually constitute a higher level supranational system with organization components within different societies.

*Community.* In Miller’s work, he expresses ambivalence on including community as an intermediary between organization and society and cites Anderson and Carter (1974) who identify it as one of the major levels of biological systems. Miller notes that a community, city, or metropolis does not constitute an organization as they might be made up of many separate organizations that are sub-systems of a society and that are not substantial enough to be considered. Even given this, Miller identifies and refers to community systems several times and given the community-based nature of fire departments and health departments this level of living systems will be considered for this paper.

*Society.* Miller’s definition of a society encompasses concrete living systems that include present-day nation states and some communities and are strictly identified as totipotential systems. Societies are identified as the highest complete living system. They are often differentiated from supranational systems because of their completeness. A society contains all of the matter and information processing subsystems necessary for perpetuation of the society. Miller is quick to point out that often societies are out of



balance and are dependent on other societies for “one or more of these subsystems” (Miller, 1995, p. 747).

*Supranational.* The supranational system contains two or more societies that are under one decider above even the highest level of each society’s echelons. Miller argues that “suprasocietal” is a more accurate title as societies are not necessarily nation states but he borrows this language from political science because of its popularity in the literature. Miller contends that at this date there are no supranational systems. The supranational system requires that its components are societies that relinquish control to the supranational decider. For instance an argument could be made for the United Nations being a supranational system. However, as is politically evident, the components of the United Nations do not solely follow the control of the decider. The United States and the U.S.S.R. were both at one time supranational systems with one decider organizing and controlling many different societies. However, as the federal control increased, and the contact between the federal system and smaller components of the societies (states) increased, the systems became large societies and were no longer considered supranational.

### **Significance of the Study**

Both of the theories referenced above search beyond the individual or the experience and take into account the context of the trauma, the history of trauma, the culture of family of origin, the effects of global politics, and psychic load. By exploring the complex factors in a greater detail of networked stress factors rather than purely individual risk factors, treatment modalities can be identified with greater fidelity. The ability to identify alternative interventions is particularly important with the population of

emergency medical responders who consistently under-report PTSD symptoms (Wagner, Heinrichs, & Ehlert, 1998) and avoid clinical treatment. The outcome of this paradigmatic assessment will be to de-personalize the problem and to shift the focus to identifying a greater systemic source. Therefore by identifying a system in crisis, treatment options beyond individual psychological interventions can be identified and implemented at a broader level. From training options, to organizational shifts, intervention points in the system will be identified through an integration of the literature across domains.

## **Chapter 2. Method**

### **Plan of Action**

A synthesis of the literature was conducted on emergency medical personnel and stress related topics by following general guidelines set by Galvan (1999). Literature was selected for its applicability to the population, and from the literature common domains of stress were identified. Due to the small amount of research on any one domain, once the domains were identified articles were found with general populations and were utilized to compliment the population specific articles. Theory based articles were used in the fields of Conservation of Resources and Living Systems Theory.

### **Literature Sources**

The emergency medical responder population historically has been the focus of little trauma research due to cultural resistance. There is some background from the fallout of the Loma Preita earthquake in 1989, but the findings have been vague and often included large disparate groups that include firefighters, emergency medical technicians, and other emergency response occupations. Due to the small number of peer-reviewed quantitative articles, and secondarily because of Miller's noted criticism of the specialization and compartmentalization often found in scientific research, this theoretical paper included trade journals from the fire and emergency medical field as well as other social science journals, and recent dissertations.

**Selection of pertinent literature.** Specific criteria for inclusion and exclusion at first were approached in an ongoing and flexible fashion. Much of the research uses varied descriptors and has no unified terminology. As literature from the keyword searches were

identified, further references, background research, and theoretical papers became available. This process allowed for a continuously developing evaluation of the applicability and pertinence of literature. The references also provided valuable resources as they provided articles and research not generally available through the databases used. These references from articles, books, and non-peer reviewed literature were used to ensure as expansive of a literature review as possible. For this dissertation, literature that met the following criteria was included:

1. Quantitative studies on predictive factors of trauma with emergency medical technicians or fire fighter populations.
  - (a) The specific domains of predictive factors
  - (b) Lifetime rates and effects of stress
  - (c) Complex trauma
2. Qualitative studies on the life, culture, and experiences of firefighters and emergency medical populations.
3. Non-peer reviewed trade articles with emergency medical technicians or fire fighter populations, regarding topics of stress, trauma, organization, and culture.
4. Books of a historic nature that focus on cultural heritage and history of the development of emergency medical responders.
5. Theoretical articles and books on Conservation of Resources and Living Systems.
  - (a) Qualitative and quantitative research supporting these theoretical perspectives.

(b) Qualitative and Quantitative research articles that integrate or use these theories and the specific emergency medical responder population.

Articles were included with specific discussion if they included police officers or other first responders in the research population. This is due to the large body of research with the police populations and research that indicates police officers and other first responders have overlap in duties of emergency medical personnel, and the possibility that some duties generally associated with law enforcement might have separate and sometimes more profound psychological impacts (Pendleton et al., 1989).

Due to the ongoing and evolving process, literature for inclusion was identified through use of word searches below. Other keywords were identified subsequently and used in order to identify the broadest inclusion of the literature. Literature was also found through alternate sources: recommendations from experts in the field, and search of references. However, in general, the below keywords were used to develop a foundation from which to expand the search:

- Firefighter
- Fire Service
- Emergency Medical Technician
- Emergency Medical Responder
- First Responder
- Trauma
- PTSD
- Secondary Traumatic Stress
- STS
- Vicarious Trauma
- Compassion Fatigue
- Systems Theory

- Conservation of Resources
- COR
- Stress
- Risk Factors
- Predictive Factors
- Fire Departments
- Fire
- Complex Trauma

**Databases.** The databases used were primarily used because of their focus on scientific research. However, some databases such as Scopus and ProQuest were used because of their breadth of multi-disciplinary articles. Due to the specialized population of interest, many journals were not available through the Pepperdine Library. To provide a more encompassing literature review, the University of California library database was also used because of its size and diversity. The following databases were used:

- Scopus
- EBSCO
- PubMed
- University of California Library Database
- Pepperdine University Library Database
- ProQuest
- United States Census Bureau
- United States Department of Labor

**Non-peer reviewed literature.** Due to the recent social interest in the identified population, much of the most recent literature was found in dissertations that have not yet been published or professional non-peer reviewed trade journals such as *Fire Chief* or *JEMS*. Dissertations were specifically accessed through the EBSCO database and the

ProQuest database. Trade journals were identified through Google searches and consultation with professionals in the field. Trade journals were used to identify trends and research within the specialized field. While it will be important to note the lack of peer-review of these articles it was important to include these resources because of its inclusion in the culture itself. Not only did these trade journals provide information for the paper they also play a role in the system that is being studied and should be considered two-fold.

### **Literature Analysis**

The analysis of the literature was an interpretive review (Noblit & Hare, 1988) and consisted of “subsuming concepts... into a higher-order theoretical structure,” identifying research information and synthesizing it into a new systemic perspective of traumatic stress in emergency medical personnel. While the analysis was theoretical in nature, it also includes methodological, population, and cultural considerations given that research with the population can be inconsistent. Due to the nature of the research sources, the differences, and interrelationships of literature was carefully identified and when there was conflicting research it was discussed. Ultimately gaps in the research help highlight needs for future research and guide recommendations for possible clinical interventions. The interpretive review includes a synthesis of findings from multiple literature sources on topics of stress, trauma, and theory related to experiences of stress in emergency medical personnel. The overarching theoretical framework of living systems provided the scaffolding for organization and review of articles.

When articles were identified through a brief review of the abstracts they were categorized into electronic files labeled with the eight levels of living systems in Miller’s

living systems theory. If the articles were found in physical format they were stored in a banker's file box in folders labeled with the eight levels of living systems. When articles were read, notes were taken on the front page of physical copies or for digital copies in a Microsoft Word document with appropriate references. The manner in which the notes were taken was consistent, keeping track of population, methodology, and pertinent data regarding topics such as predisposing factors, PTSD symptoms, biological factors, coping skills, personality, culture, secondary traumatic stress, religion, and organizational factors.



### **Chapter 3. Synthesis**

The interpretive review of the literature allows a synthesis of the theoretical frameworks of COR and Living Systems Theory into a more integrated theoretical structure. Living Systems theory provides a framework for the interpretation and organization of resource distribution. By using the eight levels of systems theory as scaffolding and COR theory, a cohesive model of potential resource gain and loss in the lives of emergency medical responders can be highlighted.

At each level of the system positive and negative resources cycles affect the availability and access to resources of the individual. While a macroeconomic affect on a global scale might not have a direct psychological impact on an individual, it might affect the individual's available resources and therefore reduce his or her ability to cope with the sequelae of a traumatic event. In a study of military personnel results indicated there was a cascading affect of resource loss set in motion by traumatic experiences that could begin a chain reaction of events leading to a feedback loop which in turn increased experiences of PTSD (Vinokur, Pierce, Lewandowski-Romps, Hobfoll, & Galea, 2011).

By using the eight levels of Miller's living system model, the multitude of ecological factors that affect an individual's resource management can be systematically explored. It can be seen that an action at each level from the supranational to the cellular affects the experience of stress, resource gain, and resource loss at the individual level. This will be emphasized through a discussion of resource impact experienced at each level, and how individual level impacts affect the system with "trickle down" results. Because psychological research rarely focuses on macro effects of global politics, many

theoretical concepts borrowed for discussion of resource gain and loss, come from sociological, anthropological, and economics literature. By using systems theory, the discussion of macroeconomics bares a direct impact on societal politics, which then affects community resources, and subsequently individual resources. Throughout the synthesis the focus is on conceptual integration of theories supported by empirical literature.

### **Supranational**

The supranational living system's level is one that is often left out of psychological research and is the domain of sociologists or political scientists. However, the resulting effects of the supranational system, in light of increasing influences of globalization, often affect the individual's availability of resources. In COR theory every resource effect is important to the overall level of strain on the individual. Miller is very clear in noting that he does not believe that there is *one* "supranational system" present in our world today. This would require multiple societies that act under the control of a single entity called a decider that makes unilateral decisions by which the supranational system functions (Miller, 1995). While such organizations as the United Nations or the European Union might control certain aspects of different societies, most would argue that the control is limited and often times non-existent. For example the United Nations did not support the war in Afghanistan, yet the United States still engaged. Instead when discussing supranational systems it is more applicable to explore the interactions of different societies in an inter-societal way, Miller (1995) calls these international accommodations— the way societies interact with one another in the context of global

politics, often in the exchange of raw resources such as credit, money, knowledge, and natural resources.

This concept of international accommodation is particularly important in the discussion of resource distribution in a globalized economy. Availability of raw resources is constantly affected by the actions of societies throughout the world. This then affects the economy of the society and has a trickle down effect to the individual level. Some major actions of inter-societal accommodation are evidenced by trade agreements such as the North American Free Trade Agreement, that allows for financial benefit between societies, and armed conflicts that require a great deal of resources but are often used to settle disputes between societies.

The United States society currently participates in two active major armed conflicts, Operation New Dawn in Iraq and Operation Enduring Freedom in Afghanistan. These conflicts affect and are affected by the functioning of our society. Since the society depends on a global economy for raw resources, evidenced by the United States imports of \$1.94 trillion in goods and services in 2009 (U.S. Department of Commerce, 2011), the wars we participate in, and the subsequent international accommodations that other nations make in reaction, affect our resource flow. Economic studies have shown that there is a crowding out effect when a country is at war (Berthelemy, Herrera, & Sen, 1995) that has a negative impact on funding for education and an overall negative effect on economic growth.

In fact many global conflicts are a result of resource differentials as well, whether it is petroleum, or other natural resources, or a function of economic power struggles in the case of economic war (Coulomb, 2004). Sociological theories such as Neo-

Machiavellianism, Marxism, and Liberalism all build their theories of war on different resources— whether it's power for Neo-Machiavellianism, a function of esteem of others and control of raw resources: a Marxist view that antagonism is created by a social class system inherently created by differentials in raw resources of money or credit: or Liberalism where conflict is seen as a stage of social development during which sovereign societies battle with independence and interdependence of other societies over economic, ecological, and geo-political resources (Ausenda, 2002).

When there is conflict between societies the effects can be attacks on one's own soil, like that of the 9/11 attacks on the world trade center (Brown, 2003). A similar attack on the same building in 1993 could also be attributed to ongoing conflicts with other societies (e.g. Al Qaeda or the Taliban). These interactions between societies affect the members of the society. For example, after the 9/11 attacks a new government organization was developed called the Department of Homeland Security (Borja, 2008). Subsequent laws were changed that altered some of the freedoms of the people (USA Patriot Act, 2001) and the social tone of the society was distorted. It is difficult to travel anywhere without the constant reminder of the "threat level." We are always put on alert to be aware of potential threats of terrorism (Kramer, Brown, Spielman, Giosan, & Rothrock, 2003; Siegel, 2005). This societal hypervigilance has an impact on the resources of the individual in time, evaluated resources such as physiological energy that is required for increased sensory arousal, and the individual's evaluative process that is changed through a generalization of the hyperarousal to other situations and resource interactions (van der Kolk, McFarlane, & Weisaeth, 1996).

Not only does the supranational impact bare on the average individual, the 9/11 attacks themselves caused the largest single loss of life for emergency services personnel specifically (Rhodes, 2006). The loss of life of a member of a national organization such as EMS can have a detrimental effect on the member's evaluated resources of security, mastery, and status. Post 9/11 there was a large increase in self-reported trauma symptoms reported by emergency medical responders in the FDNY (Greene, Kane, Christ, Lynch, & Corrigan, 2006) and there was a 17-fold increase in reported stress claims after the traumatic experiences of 9/11. This is an example of the potential effects of supranational interactions affecting individual resource loss. The results of the political global climate at the supranational level affect each of the levels below and have a cumulative psychological affect on the individuals within the system.

## **Society**

The society is governed by a decider, our federal government, which acts to sustain the allostatic balance of the subsystems of our society (Miller, 1995). Our federal government provides resources of object (natural resources), condition (laws that govern jobs, marriage, citizenship), and energy (credit, money, education) to the parts of the system. Federal funding is used by every community in the United States. The Society also provides for a natural resource distribution subsystem that allows one to access a grocery store and choose vegetables that come from hundreds, if not thousands, of miles away; or access a gas station and pump gas that might have come from another society.

The societal influence on the individual emergency medical responder is directly evident through a variety of ways. The effects of macroeconomics at the societal level provide one clear measure of resource control by the society. At the societal level there

are federal laws and federal regulators. For example, these regulators have an influence on national banking (Blas, Callan, Chung, & Tett, 2007). When a banking system has a flaw like the recent mortgage crisis, it can be seen as a collection of organizations having an effect on the society as a whole. This in turn affects municipal and state funding resources, as well as the national unemployment climate that over the past 5 years (as of April 10, 2011) has risen from an average of 5.1% to 8.8% in the United States (Bureau of Labor Statistics, 2011). Unemployment at the societal level has been shown in previous recessions to have a detrimental affect on the health of the individual. In a study of the effects of unemployment, individuals from 23 countries were given personal health surveys. In all of the countries surveyed, unemployment predicted higher rates of poor health (Bambra & Eikemo, 2009). Similarly in a meta-analytic study of 104 different empirical studies evaluating unemployment effects on wellbeing, it was shown that unemployed individuals had significantly lower physical and psychological wellbeing than employed individuals (McKee-Ryan, Song, Wanberg, & Kinicki, 2005).

The energy resources (monetary funding) limit numbers of emergency responders hired and laid off. In a recession environment federal and state funding is reduced, and municipalities cut funding in reaction, thereby reducing employment levels of emergency responders (Associated Press, 2011) and thus increasing stress load at a group and organization level. Unemployment has also been suggested to negatively affect the evaluated resources of self-esteem and economic security, correlating with higher levels of depression and anxiety (Lennon & Limonic, 2010). Beyond the effects that the current societal debt crisis has on municipal funding there is also an effect on the individual

emergency responder's resources through whatever financial situation that individual might be in, such as personal debt crisis, mortgage, or retirement concerns.

Another way in which societal factors influence the individual's resources can be seen in a national disaster response. Given Hurricane Katrina, the communities directly affected were unable to cope with the overwhelming loss of resources. At the societal levels, resources in the form of personnel were mobilized from across the nation (Department of Homeland Security, 2008). Emergency medical responders were some of these resources that were removed from their local communities and deployed in other parts of the nation in a national response. More than 4,000 firefighters alone responded in reaction to requests from the Department of Homeland Security (DHS) and the Federal Emergency Management Agency (FEMA) for help (International Association of Fire Chiefs, 2005). FEMA also called on and deployed 6,300 medical personnel including, nurses, physicians, and emergency medical personnel (Department of Homeland Security, 2008b). This deployment had resource impacts on the organization through costs associated with personnel absences and travel expenses paid for by the individual organizations and communities, as well as on an individual level through time, physical energy, and safety resource loss.

Thus, the control of the societal decider has resource effects on communities, organizations, and groups, within. This effect often results in resource gain or loss and highlights the importance of taking into account societal level resource deficit has on the individual.

## **Community**

There are several ways in which the resources of the society affect the resources of the community through raw object (food water), energy (money), and condition resources (laws). The community also provides resources to the organizations within.

The federal government is not often in each community actively deciding on resource use, but community members will see budget reductions from the societal level at the community level. While federal funding might be the genesis of the resource strain on states and municipalities, the communities are then tasked with distributing the resources throughout their boundaries. Often services or pensions are cut that result in an organizational effect on emergency medical responders (International Association of Fire Fighters, 2011). For example, the economic effects of the society can be seen most evident at the community level. This is evident in recent municipal emergency services cuts. NY1, a local news agency in New York, New York, reported in December, 2010, "...the department [NYFD] is already more than 300 members short..." They also reported further cuts proposed by the NYFD Chief: "The FDNY also proposed removing a fifth firefighter in 60 engine companies starting February 1st to save money, an idea the union says is unsafe and irresponsible." This is an example of a trend among communities struggling with a financial recession across the United States. Although emergency services are often considered a vital service to communities, they are not immune from the effects of a global recession and resource debt.

Cuts in funding often lead to cuts in personnel and increased workload for the remaining emergency medical responders. The decreased personnel levels increase shift loads of working emergency medical responders, which then affects the amount of



critical incidents an individual might experience. Studies have shown that there is a dose-effect prevalent in primary and secondary traumatic experiences. In a study of emergency care workers responding to the 9/11 attacks in New York, there was shown to be a “dose-response relationship” to experiences of vicarious trauma in the population (Warren, Lee, & Saunders, 2003). Regehr, while noting a complex relationship between exposure and PTSD symptoms beyond a simple dose-effect (Regehr, Hemsworth, & Hill, 2001), also identified that experience (measured as years of service) in a group of firefighters, when comparing new recruits to experienced personnel, was also correlated with increased levels of traumatic stress and depression (Regehr et al., 2003).

When discussing complex trauma, critical incidents are evaluated in two major ways. The first of these is the quantity of the traumatic stressors. The second is the quality or perception of the quality of the experience, which then affects the organism or group level. The former can be a byproduct of community level raw resources, predicated by the ratio of number of responders to traumatic incidents, and is one of the most commonly studied predictive factor of PTSD as noted by Vogt, King, and King (2007) in the *Handbook of PTSD: Science and Practice*. Extent of exposure to traumatic incidents has been studied in post New York residents 9/11 World Trade Center Attacks (Boscarino & Adams, 2009), in studies of United States Marines (Phillips, LeardMann, Gumbs, & Smith, 2010), in emergency management professionals (LaFauci Schutt & Marotta, 2011), and firefighters (Corneil et al., 1999). In the literature this aspect has been called the “dose effect” (Marmar et al., 1999; Resnick, Kilpatrick, Best, & Kramer, 1992). The “dose effect” takes into account the additive effects of trauma on an individual’s perception of peri-traumatic safety (Marmar, Weiss, Metzler, & Delucchi,

1996). This includes the quality of the traumatic incident and number of incidents. With a decrease in personnel there is an increase in the number of critical incidents. While the “dose effect” has been shown in recent literature to be only a part of the organism’s experience of trauma, for example, in a study of 164 firefighters using self report questionnaires, (Regehr et al., 2001) it still is a contributing factor to the overall system of traumatic stress in emergency medical responders (Corneil et al., 1999; Guthrie & Bryant, 2005; Philbrick, 2003).

The community level in living systems also has the ability to be a protective factor. In a study of rural men in Australia, “sense of community” buffered the effects of stress and were positively correlated with well-being in general (Kutek, Turnbull, & Fairweather-Schmidt, 2011). In the early years of development of the modern fire and emergency medical departments, the individuals were local community members (Rhodes, 2006). This helped the departments because there was a feeling of an extended family throughout the community that would support the emergency medical responders. In many communities to this day, local businesses provide reduced fee services, and community members provide raw feeling resources, through banners honoring fallen firefighters and through other forms of public recognition, for the services rendered by the emergency medical responders. However, one retired deputy fire chief noted the increasing number of “professional firefighters” as he called them (Anonymous firefighter, personal communication, September 24, 2009) that were no longer members of the community they served, but instead would travel long distances to work 48-hour shifts and return to their own community often disjointed from the community they served. This development of city sprawl has caused a separation of community from

service that increases time commuting and a sense of being disconnected (Putnam, 2000), which can potentially be detrimental to the individual's experience of emotional resource gain. In a study of 2,109 individuals from the 2002 National Study of the Changing Workforce, commuting time was shown to be one of the demands that was correlated with increased family conflict and elevated stress (Voydanoff, 2005). As the raw resources at the community level decrease there is increased strain on the organizational, group, and organism resources.

### **Organization**

The organization is where a great deal of resource distribution can be measured. For example the United Firefighter Association (UFA) maintains a fund of monetary resources to support the families of firefighters lost in the line of duty (Greene et al., 2006). The organization for emergency medical responders is the fire department or ambulance company for whom they work. An example would be the San Francisco Fire Department, Cal Fire, or American Medical Response, each may span multiple communities, but they have one hierarchy with multiple echelons and a single decider. When talking about organizational level resource strain it is also important to discuss the overall history and culture of the general organization of emergency medical responders.

In COR theory (Hobfoll, 1988) raw resources such as money, food, and shelter are evaluated through cognitive, biological, and unconscious internal structures. Values are essential to this process and often raw resources have different values within different cultures. Highlighted when talking about an organization's culture, is history and the process of trait selection of its members (Benedict, 1934).

**Culture.** The anthropological meaning of culture as defined by the Merriam-Webster Dictionary is “the customary beliefs, social forms, and material traits of a racial, religious, or social group” (Culture, 2011). The emergency medical responder culture is a strong and historic one containing many factors of beliefs, ethnic influences, and religious tendencies. The history of emergency medical personnel can be dated back to the 15<sup>th</sup> century when the king and queen of Spain took interest in the health of their military on the crusades. They organized medical personnel and equipment to be sent and stationed in tents on the battlefield. These tents were first called ambulancias. Later during the Napoleonic era the quick mobile response of medical personnel with a carriage to transport injured soldiers from the battlefield was developed.

**Ethnicity.** In the 1800s, during the time of great immigration to the United States as well as a time of industrial growth, there was an increased need for firefighters. At this time in history the position was very different from the modern firefighter and required minimal training; often times the position was held by individuals who were volunteers in the community, and not until the 1850s was there a development of the paid firefighter. During this time in United States history there was a large Irish and Italian immigration and in the late 1800s and the turn of the century there was a culture clash that identified firefighters as a “rough” group. Because of this they were not viewed in a positive light, but seen as a necessity for the comfort of the upper class. During this genesis of the fire department, out of fear, communities disallowed free African Americans from participating as firefighters. Because of this and the niche between the middle and upper class, Caucasian immigrants often held the positions (Tebeau, 2003).

Because of the language similarity among the groups, the Irish population quickly became dominant within the north-eastern historic fire departments. Departments slowly developed into a strong in-groups of Irish immigrants. Their specialized work also increased the isolation and “brotherhood” that continues to this day, although one retired Assistant Fire Chief spoke disdainfully of a new era of firefighters that have entered the work force out of economic gain with a lack of social dedication (Anonymous firefighter, personal communication, September 24, 2009). This generational conflict has also added a new dimension of stress within the organizations between those that view emergency medical responder work as a legacy and those that now view it purely as a job to provide individual resources.

With strong cultural heritage comes a devotion to tradition and self-reliance. These factors are maintained today and are often seen in traditional roles of firefighters. Repeatedly researchers have suggested that resilience to critical incidents is related to a balance between work and social life (Figley, 1995; Hesse, 2002; Pearlman & Saakvitne, 1995). In a more recent study of aged care nurses in Australia a balance between work and social life was identified as a determinant of resilience (Cameron & Brownie, 2010). Other studies with mixed participant groups have shown that in a seven week intervention focused on increasing resilience through promotion of work-life balance, there has been success in increasing balance and decreasing distress (Liossis, Shochet, Milliar, & Biggs, 2009).

However, in the emergency personnel culture there is a consistent and prominent overlap between these domains. One Assistant Chief of Emergency Medical Services noted that firefighters live, eat, and play with their “family” (Anonymous, personal

communication, November 5, 2009). Even the terminology strongly denotes a close familial bond within the departments. Once again, this can be a source of resource gain through affection, and esteem of others but can also be a risk factor given that firefighters invest deeply in a few resource pools and not broadly among different domains.

***Religion.*** Most careers do not inherently have a religious affiliation. This religious factor, however, is strong in the occupations of emergency medical responders (Smith, 1978) and affects their evaluative resource processing through maintenance of a strong values system. In a study of 162 individuals at three different churches using aggregate measures, church social support was positively correlated with well being in response to life stressors. The authors suggested that this indicated the social support and religious nature of the church might be buffers of life stress (Maton, 2002).

The ethnic heritage of the developing fire departments in its nature contributed to a strong Catholic influence. The Irish immigrants flooding into the country brought with them strong Catholic ties (Byron, 1999; Kenny, 2000). Many fire departments in early years were not staffed or serviced by a psychologist, but instead would have a department priest with whom members could discuss the varieties of their experiences. In modern fire departments there continues to be a designated religious figure that has become more non-denominational, but still fulfills a role that is often perceived as less stigmatizing and “safer” to discuss traumatic incidents and the emotional and behavioral fallout of work life. This thread can be seen even in cutting edge treatment modalities such as the Post-Trauma Retreat developed by Dr. Fay and his colleagues in Inverness, California where a non-denominational religious figure is a member of the multi-disciplinary team treating emergency personnel with extreme cases of PTSD (Cantrell, 2010; Fay et al., 2006).

The strong religious background affects the experience of the modern emergency medical responder in a variety of ways. Finkel, Startwout, and Sosis (2010), through literature review, hypothesized that religion is a significant means by which individuals emotionally bond and acculturate into an in-group. In another synthesis of literature religion was shown to correlate with large group size and prosocial behavior (Norenzayan & Shariff, 2008). Empirical research using the Religious Orientation Scale on social desirability showed that there was correlation between responses of religious beliefs and social desirability (Trimble, 1997).

In emergency medical responders these same religious ties can increase the bonding within the group providing more resources such as esteem of others, status, satisfaction, and self-esteem contribute to the cultural similarities of emergency medical personnel populations as is evidenced by their demographics. The religious figure can act as an impromptu therapist and can provide emotional guidance contributing to the evaluative resource system, increasing evaluated resources such as pride, honor, security, and self-esteem. The religious affiliation also creates a moral framework that the emergency medical responder might feel obligated to abide. From Pargament's theoretical work and review of empirical literature (Pargament & Raiya, 2007) this affiliation potentially has the effect of being both a support through positive religious coping and potentially a risk factor for those who perceive their religious affiliation through the lens of negative religious coping or identify their career and their religion to be one in the same (Pargament, 1997).

**Departmental.** In the field of occupational psychology and sociology the research has differentiated between operational work-related stressors (responding to

incidents) and organizational stressors (e.g., daily work hassles, administrative support, or job satisfaction). Hart, Wearing, and Headey (1995) who studied 527 emergency responders found that experience of organizational stressors had long-term effects on their health outcome and Perceived Quality of Life in comparison to operational stressors.

This conclusion was supported later in the literature by Kop, Euwema, and Schaufeli (1999) who, in a population of Dutch emergency responders given self-report measures, found that organizational stressors were more prevalent than operational stressors and contributed to higher levels of burnout on the Maslach Burnout Inventory.

Following the research on organizational stressors versus operational stressors, even greater resolution in the work hassles (not traumatic incidents) often associated with the term “organizational stressors” can be identified. Brough (2004), using an adapted version of the Police Daily Hassles Scale for use with general emergency responders, found that in 436 emergency medical personnel, in New Zealand operational *hassles* “directly predicted psychological strain” as well as job satisfaction that further indirectly contributed to an increase in psychological strain. This research highlighted the effects of job “hassles” whether organizational or operational as a significant factor in the experience of psychological strain in emergency medical personnel.

The difference in operational stressors and organizational stressors is again highlighted when looking at evaluated resources in COR theory. Evaluated resources are a higher-level resource, raw resources that pass through a value system that is associated most closely with the organization structure and group values the individual operates in. As discussed, emergency medical responders have a long history of cultural values



associated with pride, honor, achievement, physical strength, and resilience. These values shape their evaluative process and the resource investment associated with operational work-related stressors that tax resources such as physical health and time. These raw resources pass through the evaluative system and bear on the individual as mastery, pride, status, honor, and self-esteem. Through risk of some resources, as Hobfoll discusses, an individual can gain higher level evaluated resources. However, organizational operational hassles are not associated with the same gain of evaluative resources. Instead they can be viewed as a loss of raw resources such as time, energy, and esteem of others without the offset gain because the task is not valued by the culture. For example, a baseball player who excels at knitting will not be valued as much as one that excels at hitting. And, if every player on a team was required to knit at some point, this would be considered a hassle that diminished resources such as time without a gain of evaluative resources such as mastery or self-esteem. Hobfoll would describe this as lack of resource gain following investment of resources. For emergency medical personnel a work hassle might be “excessive paperwork” or “hoax calls” (Brough, 2004) that do not directly relate to the job of saving lives but are a necessary part of the overall work.

***Training.*** Training with its obvious face validity, has also emerged as an important domain of action in the field of emergency medical responder psychology. It provides net raw and evaluative resource gain of knowledge, job advancement, mastery, and self-esteem. Akerboom and Maes (2006) conducted research on health care workers using the Organizational Risk Factors Questionnaire (ORFQ), a scale that consists of six subscales, two of which were “Job skills” and “Communication/Training.” They found that Communication/Training had predictive value with regard to job satisfaction. This

connection demonstrates the interaction of training on an individual's experience of satisfaction. The same study showed that Job Skills (having sufficient knowledge resources about their job tasks) predicted psychological distress, further supporting the thesis that lack of training might lead to an overall feeling of chronic low levels of dissatisfaction and stress. Another study with firefighters in Germany showed that trauma education could reduce the potential for vicarious traumatization (Bell, Kulkarni, & Dalton, 2003) by inoculating the individuals with appropriate knowledge.

Organizational hassles, job satisfaction, and training can be further linked to feelings of evaluative resources such as self-efficacy. In studies on self-efficacy (Heinrichs et al., 2005; Jex & Bliese, 1999) there has been indication that individuals with high levels of job strain and low levels of self-efficacy have higher levels of overall stress. These contributing factors might lead to an increase in psychic load and further strain on the individual's system resources.

## **Group**

In COR theory groups as they pertain to an individual are complex to discuss because an individual might be a part of many different groups: family, the shift at work, friends, etc. Each of these groups has the potential to affect the individual's level of resources. There is research specifically on social support groups (work groups, family groups) and how they can affect the individual emergency responders overall levels of stress (Regehr, 2005; Watson, 2003). In military groups the lack of social support from officers was related to feelings of loneliness and higher levels of combat stress (Solomon, Mikulincer, & Hobfoll, 1986).

Family can be a strong protective factor but also can be a strain on individual resources. The incidents that emergency medical personnel experience at work are not always contained in the work environment. Interesting research by Regehr (2005) showed that the way an “emergency services officer” copes with a traumatic incident at work has an affect on his or her relationships at home. She noted that emotional numbing is a common coping strategy in emergency medical personnel and that this might affect the ability of experiencing emotions with a spouse. This study and others also highlighted the occupational stressors of shift-work on the family unit (Costa, 1996; Grosswald, 2002). With one third to one fourth of paramedics reporting trauma symptoms in the high to severe range (Regehr et al., 2002), the amount of trauma they bring home has the potential for extreme effects on the family units. Spitzer and Neely (1992) found that in a group of emergency services personnel there were elevated levels of divorce and domestic violence when compared to the general population.

In a mixed population study of 172 emergency service, welfare and hospital personnel in Australia Robinson and Mitchell (1993) found that 40% indicated on self-report measures that their experiences of critical incidents “significantly impacted their families” in a negative way. Another example of impact of spousal trauma was found in Bosnia, where PTSD symptoms in refugees was inversely related to marital functioning (Spasojevic, Heffer, & Snyder, 2000). Southworth (1990) also suggested that the characteristics that might be beneficial in an emergency environment , such as, taking control, springing to action, remaining emotionally detached, making quick and decisive decisions, and questioning everything, might be inconsistent with a spousal relationship.

With social support being a strong mediator of PTSD and a source of raw resources for the individual, the ability for the family unit to function in a positive manner can be seen as vitally important (Regehr, Hemsworth, & Hill, 2001; Weiss, Marmar, Metzler, & Ronfeldt, 1995). Whether emergency workers brings traumatic experiences home, creating a scenario of vicarious trauma in the family, or they use emotional numbing to distance from the experiences at work, there is a common heightened level of family discord involved. The level of discord experienced within emergency medical workers' primary social support then might have a direct relationship on their ability to cope with experienced or vicarious trauma by depleting the raw resources of love and affection, and consequently lead to higher levels of PTSD symptoms overall. To compensate, the workers might put more weight on their social support network at work, another group the individual participates in. Given the close and familial nature of the work environment unique to this career, the individuals then can distance further from their family network and become more enmeshed with their work environment, further blurring the important balance between life and work. As discussed previously, this narrowing of resource pools leaves the individual at risk for traumatic resource loss when there is an event that affects the group or organizational level resources.

Other groups such as friends and biological family members offer similar sources of raw resources but can be impacted in similar ways. The coping skills useful in blocking out traumatic incidents can be harmful to the social structures the individual lives in. Because of this, the number of groups the individual relies on can dwindle and the subsequent resource pools the individual uses are limited. This is particularly

impactful when there is an event of individual ability loss, mentally or physically, which keeps the individual from continuing in the work group environment. Research has been done on the difficulty of a firefighter reintegrating with the normal workforce. Beyond the firefighter's occupation fulfilling a strong self-identity role, the skills are not generalizable to many other careers (Regehr & Bober, 2005). This causes a loss of an ability to gain more resources through social means when an individual is injured or removed from duty.

### **Organism**

The individual level is where most of the research into PTSD has focused; individual risk and protective factors. Some of these factors can be attributed to a larger group or community level resource gain or loss, or they can be attributed in some cases to biological factors that act on the cellular/organ level. However, there are left several domains that affect the individual directly.

Recent research has indicated the importance of the individual's appraisal of personal safety during the event (Byrne, Lerias, & Sullivan, 2006). These appraisals are closely tied to value systems and evaluative processes consistent with COR theory. When individuals experience an event, their value system is important in identifying what is interpreted as a loss of resources in that system. Lazarus and Folkman (1984) explored this factor and coined the term cognitive appraisal theory. Their research and more recent research by Tomaka, Blascovich, Kibler, and Ernst (1997) explored how an individual's cognitive appraisal of a situation that depletes the individual's resource could either be perceived as a threat or a challenge depending on the individual's cognitive frame. The appraised loss of resources and the failure to replenish these resources are important in

the prediction of trauma reactions as noted by Hobfoll (1989). Furthermore, PTSD as defined by the DSM-IV TR implies evaluated danger to self or others: but when addressing chronic stress and the dose effect it is important to consider the individual's history of perceived threat. Individuals that experienced PTSD symptoms in reaction to a specific trauma were found to show significantly more PTSD symptoms after a subsequent trauma than those that had no history of PTSD symptoms (Brunet, Boyer, Weiss, & Marmar, 2001). This indicates two things: that these individuals had a propensity for resource loss and that these individuals experienced an evaluated (appraised) resource loss without replenishment of the resource.

While this additive effect has been replicated in many studies, there has also been research that indicates a more complex set of predictors that also have a comparable impact on the outcome post a traumatic incidents in emergency medical responders and firefighters (Regehr et al., 2001; Warren et al., 2003). One of these other factors is an individual's personality. Personality or temperament characteristics have a profound effect on how one evaluates raw environmental resources as well as how one is perceived by others in our environment. In a study of 43 professional firefighters assessed after basic training, and at intervals up to 2 years, personality characteristics accounted for 42% of variance in posttraumatic stress symptoms (Heinrichs et al., 2005). In another study of 527 police officers personality dimensions significantly predicted Perceived Quality of Life (Hart et al., 1995). Literature shows that personality characteristics can have an integral affect not only on how trauma affects emergency medical personnel, but also on how the individuals are perceived within their family and the culture of firefighters and ambulance officers. In the study done by Regher et al. (2001) with a

group of 164 firefighters, relational capacity, a subcomponent of personality, had a negative affect on social support, and social support had a negative affect on level of distress. This result showed the framework by which personality factors have an affect on how the individuals are supported in their social network and subsequently how they are able to cope with traumatic incidents.

Mitchell and Everly (1999), while developing Critical Incident Stress Debriefing (CISD) created, through personal observation and interviews, a list of some common personality traits associated with emergency service personnel:

- Obsessive compulsive (do it right every time)
- Controller (of self, scene, home)
- Action oriented
- Easily bored (adrenaline junky)
- High need for stimulation (adrenaline junky)
- Risk taker (with survival skills)
- Highly dedicated
- Strong need to be needed
- Difficulty saying no
- Rescue personality
- Family oriented (but will drop everything to respond to a call)
- Driven by internal motivation
- Generally high tolerance of stress and ambiguity

Marmar et al. (1996) studied emergency services personnel after the 1989 Loma Prieta earthquake in the San Francisco Bay Area. Their study found that characteristics of

low adjustment, low identity, and low ambition – all evaluated resources, on the Hogan Personality Inventory – were associated with peritraumatic dissociation and indirectly with greater levels of psychological distress after a traumatic incident (Ozer, Best, Lipsey, & Weiss, 2003). Other studies have shown that a common predictor of post incident distress is a history of psychiatric disturbances other than the present trauma reported (Bryant & Harvey, 1995; Byrne et al., 2006). While this does not inherently mean a direct relationship between personality traits and psychiatric distress, it might be that chronic personality disorders affect an individual's ability to gain raw resources, or block the ability to translate them into evaluated resources, and can account for some of the reaction to a traumatic incident as suggested by (Jeavons, 2000; McFarlane, 1998)

Coping strategies can be reframed as individuals' ability to redevelop raw resources and evaluated resources in their system. Research indicates that coping and resilience have a strong relationship with an individual developing PTSD symptoms. Various studies have shown that an important post-incident variable associated with the development of symptoms of PTSD is an individual's coping strategies for dealing with the adverse consequences of trauma (Ehlers & Clark, 2000; van der Kolk et al., 1996). Marmar et al. (1996) found a positive association of greater perceived threat and use of avoidant coping strategies such as alcohol and drug use. This research showed high negative coping strategies in emergency medical personnel. This is not surprising considering their history of low reporting and low levels of help seeking behavior (Greene et al., 2006). The emergency medical worker's propensity to self-medicate can be seen as a further risk factor for developing more symptoms of PTSD.



## **Organ/Cell**

These two levels in Miller's systems theory have been combined into what the research generally defines as "biological factors." These factors include resource processing on the level of ATP and other biological processes. Stress acutely affects the body's storage, processing, and use of raw resources. Resources such as food, which normally pass through an evaluative system at the biological level, are affected by the individual's fight or flight response in relation to a critical incident. In gross terms, during a fight or flight response, the body moves from processing raw resources to mobilization of stored resources for quick retrieval for biological processes, often associated with increased muscle, respiratory, and cardiac functioning (Sapolsky, 2000). When an individual experiences chronic levels of stress, the body spends more time and resources than it is processing for storage. Because of this there can be a strain on the system of resources at the biological level that can affect the individual's immune function, leaving the individual more susceptible to disease, which might ultimately affect job function and resources processing at the individual, group, and organization level. In a study of 11 firefighters following live-fire exercises, there was an immediate increase in immune function as measured by white blood cell activity (Smith, Petruzzello, Chludzinski, Reed, & Woods, 2005). In multiple reviews on psychoneuroimmunology this chronic activation of the immune system, often experienced by emergency medical personnel, in coordination with stress and subsequent glucocorticoid secretion has been identified as one of the factors of immunosuppression in reaction to stressful event (Cohen & Herbert, 1996; Dhabhar, 2011; Sapolsky, 2000; van der Kolk et al., 1996).

This individual experience of stress has been shown to impact the larger organization as well. In studies of human services workers in Denmark (Borritz et al., 2010), in a population of 258 nurses in Hong Kong (Siu, 2002), and a population of 79,070 American workers from 250 companies (Jacobson et al., 1996) using different measures, psychological distress predicted both short, and long-term absenteeism. This biological effect on immune functioning that affects sickness and absenteeism either directly or indirectly, affects the functioning of the organization as well.

The biological factor incorporates two major domains. The first of these domains includes predisposing factors that might either lead an individual into the field of emergency medical responding or put an individual at risk for developing PTSD after a critical incident. The second major domain is that of biological change after trauma that might precipitate PTSD in subsequent critical incidents and explain the dose effect in physiological terms. This second factor is particularly salient in the emergency medical field as emergency medical responders are consistently exposed to critical incidents.

**Genetic predisposition.** Research focuses on the actions primarily of the hippocampus. Studies have shown that individuals who develop PTSD after a traumatic event are seen to have decreased hippocampal volume when compared to sample populations (Bonne et al., 2001). The “genetic hypothesis” is based on monozygotic twin studies. The results suggested that individuals with smaller hippocampal volumes at birth were more prone to developing PTSD (Gilbertson et al., 2002). The importance of the hippocampus during trauma appears to be its relationship to memory formation and emotional reactivity in the amygdale as well as its actions in the hypothalamic pituitary adrenal axis. This system is one’s source of physiological arousal (resource mobilization)

in reaction to extreme environmental stress and plays an integral role in the development of PTSD.

There is also research that indicates that, in addition to hippocampal volume, there might be other physiological markers that are predictive of heightened reactivity to trauma. Guthrie and Bryant (2005) found that by measuring skin-conductance and startle response of firefighters pre-trauma and post-trauma, both were significantly predictive of elevated trauma reactivity. This research further supports the genetic theory that there might be biological differences in individuals that are risk factors for developing PTSD.

Beyond the simple genetic factors there is also a more complex social influence as well. In emergency medical fields there is a long cultural heritage passed down, especially in the firefighting profession. It is considered an honor and in many ways an expectation, to follow in a parent's footsteps (Greene et al., 2006). An anecdotal example would be a retired deputy fire chief who reported that even while he had a poor relationship with his middle son and was absent a great deal of his early childhood because of his dedication to firefighting, his son had grown up to become a firefighter as well. Because of this self-selection to the field and strong ethnic ties, there might be a concentration of genetic markers within the population.

**Biological changes.** The other major theory is that instead of, or in addition to, hippocampal volume being a risk-factor for the development of PTSD, it might be the physical damage caused to the brain as a result of extreme stress through hippocampal neurotoxicity. This neurotoxicity impacts the evaluative resource processing system of the biological system. The neurotoxic theory posits that the hippocampus is vital in the inhibitory feedback system in the HPA axis. However, when the trauma is severe or

recurrent, then the levels of glucocorticoids released into the bloodstream can have a neurotoxic effect on the hippocampus (Sapolsky, 2000). This affect then in turn diminishes the capabilities of the hippocampus to regulate the HPA and results in a “run away system” (Miller, 1995).

The neurotoxic hypothesis is supported by a large body of research (Bremner, 1999; Bremner, Randall, Vermetten, & Staib, 1997; Stein, Koverola, Hanna, & Torchia, 1997; Villarreal & King, 2004). However, the research must be viewed with caution as predominantly it has been conducted after an individual has experienced trauma. Because of the lack of pre-post testing, most of the researchers suggest that the damage is either a predisposing factor or a result of neurotoxicity and cannot be clearly delimited.

## **Chapter 4. Discussion**

### **Conclusion**

This dissertation has provided the theoretical scaffolding for future research. It has focused on the layers of living systems as they relate to the individual's experience of resource gain or loss and therefore the individual's response to traumatic incidents. This theoretical perspective takes the focus off of individual clinical treatment and pathology and explores how the individual reacts in the specific ecological effects of a world in turmoil. Measures such as the Incident Event Scale (IES) evaluate the experience of trauma: other PTSD measures try to concretize the individual's experience of specific symptoms: and the Conservation of Resources – Evaluation (COR-E) measures individual resource gain and loss (Hobfoll, Lilly, & Jackson, 1992). However, each of these functions must not be examined in a vacuum. Instead these measures must be brought together into a cohesive multi-system evaluation of the individual's complex cultural response to traumatic experiences.

Once these measures are used in concert, future research can employ them to explore in greater detail the multifaceted way in which an individual emergency medical responder experiences resource loss and trauma and how that loss has a reciprocal relationship on the system. This dissertation has identified many different levels where the systems designed to increase productivity and systemic functioning often times malfunction and complicate traumatic experiences, thus contributing to ongoing mental health struggles for the individuals in the system. A culture of pain and silent trauma belies that of the heroic work and stoicism of the professional medical responder field.

Like the war veterans that return home after war with psychological wounds, we need to be able to identify and alleviate the resource loss of those individuals that are the walking wounded, before they are struck down by severe symptoms of traumatic stress that can cripple even their support network developed to cope with the incidents.

Using the model of resource loss and living systems the junctures have been identified where at each level the society, community, organization, and group can be a level of unconventional and innovative clinical intervention. Moving beyond the traditional role of the individual therapist, innovative health care can move toward a model of the professional as an advocate for clinical health across multiple levels of the system, facilitating a more robust and potentially efficacious treatment model. The American Psychological Association (American Psychological Association, 2010a) and the American Counseling Association (Lewis, Toporek, & Ratts, 2010) both endorse this broader influence of therapists in social advocacy and a greater involvement with professional roles beyond that of individual therapy. Evidence-based policy-making (Bogenschneider & Corbett, 2010) has become a new genre in which psychologists can influence social justice issues at the societal level (McKnight, Sechrest, & McKnight, 2005). Instead of only treating symptoms at the individual level, this shifts the focus and the direction of treatment to a public health model, with the idea of conserving resources for those at risk of traumatic experiences.

### **Limitations**

This synthesis of research holds some significant limitations. Instead of being a concise and detailed empirical account of all factors related to stress in emergency medical personnel, it has been a theoretical exploration and synthesis of disparate but

related concepts in a theoretical integration. Instead of providing answers, this synthesis identifies fields of thought that need further exploration with this population.

One of the limitations of this dissertation was the lack of extensive research on the emergency medical responders from the United States. Instead research was found in European countries where public employees are more often studied due to differing laws, regulations, and socialized medicine. Because data was used in reference from other cultures, the inherent cultural identifying characteristics of Irish Immigrants and Catholic roots in the United States holds less impact.

Dixon-woods et al. (2005) also identified several limitations of this type of study. They noted that this type of interpretive analysis focuses on theoretical concepts and does not focus on differentiating the literature sources as qualitative or quantitative. It also does not differentiate or weight the differing methodologies of the studies. Each of these specifics is often left up to more quantitative synthesis that focuses on data and not explicitly on concepts. The limitations discussed lead to the discussion of future interventions and studies possible. Behind the higher order theoretical synthesis is a collection of empirical studies that could support or refute the conceptual assertions.

## **Implications**

Clinical interventions in this model take on a multifaceted character informed by American Psychological Association (APA) and American Counseling Association (ACA) that have suggested societal level advocacy and evidence-based policy-making. In addition to individual treatment models, a broader intervention strategy is suggested.

In order for psychologists to intervene effectively with this population it is important to envision a more diverse role for psychologists in advocacy and influencing social policy. This dissertation has focused on the broader organizational and systems variables that affect the individual's experience of stress, taking into account resource deprivation and evaluative processes. These complex interactions inform multiple domains in the field of psychology. There are individual clinical implications, potential educational implications, and social advocacy and public policy implications. Each of these will be discussed while maintaining the general theme of conservation of resources and biological systems theory.

**Clinical implications.** Systemic resource maintenance can at first not appear to have a direct effect on the individual therapist and the techniques used in individual clinical interventions. However, each level of the system affects the individual, and interventions at each of these levels, especially with the understanding of the interplay of resources within the system, can improve the health of the individual. Once a therapist understands and feels comfortable with the concepts associated with COR theory and systemic resources, the therapist can consider the individual's cognitive appraisals, history of trauma, and systems resources.

In an attempt to inform therapeutic processes, Hobfoll et al. (1992) developed the COR-E, a measure of resource loss. Their research suggested that not only would COR theory and the COR-E identify areas of resource loss, it could also direct the steps taken by the interveners through measuring cognitive, personal, and property loss, taking stock of available resources, and consultation with community leaders to prioritize the resource



needs. These studies used mostly physical health models and Hobfoll suggested they be expanded for use with traumatic stress as well.

Cognitive appraisal theory expands upon the COR theory concept of evaluated resources and considers not only the raw resource but also the individual's cognitive appraisal of that resource in the evaluative process. Lazarus and Folkman (1984) note that an individual appraises threat in a situation "when the situation is goal relevant and environmental demands are perceived as taxing or exceeding resources or ability to cope." This focus on the perception of resource deprivation can be where the effects of individual cognitive interventions can influence how an individual experiences stress. Through use of cognitive reframing a situation that is at first perceived as taxing resources and therefore considered a threat appraisal, might be reevaluated as a challenge appraisal in which an individual's personal resources are perceived as sufficient to meet the situational demands (Lazarus, 1991).

This cognitive approach to evaluation of resources can also have a historic variable. When individuals have a significant trauma history their cognitive frame might be that they are resilient and can overcome difficult and traumatic situations, or it might be that they are weak or incapable. In this way, the cognitive evaluations of the individual's ability and character come into effect when evaluating resources past and present and can be directly addressed in individual therapy practice.

Psychologists can also effectively be involved in addressing the biological level outlined earlier. This includes playing a role in issues such as medication management (psychotropic and otherwise) and nutrition that can have an affect on the individual's raw

resources and evaluative processes. Through education and management of nutrition the individual can reduce stress load and improve overall health by increasing available raw resources (Sapolsky, 2000). Active involvement in the individual's medication management might also help in the domain of resource management. Some medications have side effects that can include drowsiness, lowered motivation, lowered impulse control, and greater distractibility to name a few. These side effects might have the action of reducing the individual's ability to access resources or to process raw resources into evaluative resources. For example an individual who experiences distractibility or difficulty focusing might find their work ability diminished which could be evaluated as a decrease in the evaluated resource of esteem or mastery. Again, psychological advocacy of policies at the societal level that help support nutrition and physical health would also improve the individual's resource levels.

The cultural variables also play an integral role in the conduct of individual therapy sessions. As discussed in biological systems theory, an individual's culture and family of origin shape their appraisals of resources and their evaluation of raw resources. Again cultural differences may change the frame in which individuals cognitively appraise their ability to handle or overcome challenges to their resources. In this way an individual's resilience is integral to their experience of resource loss in the face of stress.

**Educational/training implications.** Just as with any cultural group, it is particularly important to consider the heritage, values, and cultural variables inherent in the field of emergency medical responders as they affect the individual's evaluative process. The position of medic or firefighter holds clinically relevant cultural meaning; they have a specific value system, strong social bonds, ethnic ties, and personal identity

associated with their profession. Thus, as with any cultural group different from that of the clinician, it is important to study, explore, and consult if necessary on the pertinent factors that affect the emergency medical responder. Specific trainings should be more broadly available for individuals who might act as EAP counselors serving state or municipal fire departments.

At the community and organizational level, psychoeducation can provide information on symptoms of traumatized emergency medical responders. One deputy chief reported that a captain at a firehouse would be responsible for identifying signs of trauma in his firefighters and referring those firefighters for possible treatment. However, there was no structured training on signs and symptoms of stress and trauma for these officers (Anonymous firefighter, personal communication, May 11, 2009).

At the community level, Monnier and Hobfoll's research (2000), based on COR theory, suggested public health opportunities for interventions through direct community member education. Resources such as community pride and cohesion were identified as two of the factors that could be increased through psychoeducation specifically.

**Research implications.** Applying the conservation of resources and biological systems theories has provided a unique view of the framework of domains that affect the individual emergency medical responder. However, much of this research pulls from multiple disparate research groups in multiple countries, or generalizes from general population responses to traumatic incidents. The crux of this theoretical work has been to highlight areas that could provide particular insight into emergency medical responder responses to trauma and identify areas that require further targeted research. At each level

in the living systems model the theory posited in this dissertation could be expanded upon with new research. This dissertation has outlined where the research is lacking and gives direction to myriad new research possibilities at each of the levels within the system.

*Supranational.* At this level, research could be conducted correlating stress levels and stress claims in emergency medical responders with international affairs. Economic variables of recession as well as war could be explored as they relate to trends in the population. Questions such as, “Are emergency medical responders economically insulated from supranational variables?” or “Do stress levels track with political and macroeconomic changes?” could provide insight into the effects of supranational factors on individual resources. A small subset of the emergency medical responder population also acts as active duty national guard that can be deployed. Do these supranational factors then affect the group and organization in staffing and potential resource loss?

*Society.* At the society level, longitudinal levels of stress could be evaluated with regards to societal laws and policy. For example, after 9/11 was there an increase throughout the system of emergency medical responders in stress claims and stress leave, or was the effect strictly limited to those that took part in the evacuations and cleanup? Further studies on how factors such as terrorist threat levels affects individual emergency medical responder levels of stress could elucidate ways in which societal interventions can ultimately reduce individual resources. Also, do economic variables such as recession and macroeconomic variables such as the mortgage crisis relate to levels of PTSD symptoms in the population? Is there a relationship between political control (Democrat or Republican) of the decider position in the society and emergency medical responder resource levels?

**Community.** At the community level, studies that explore how layoffs and budget reductions relate to dose effects and levels of PTSD symptoms in the population could provide further detail of the individual's resources. Resiliency factors could also be studied to determine if perceived community support related to levels of PTSD symptoms. Some communities maintain close ties with emergency medical responders, especially firefighters, while others do not. Is there a difference between state-based Cal Fire units that might not have a connection with a community and community based municipal fire units that often operate as a strong community member?

**Organization.** At this level there are a host of studies that could more thoroughly explore levels of training, support, organizational funding, hierarchical structure, and work hassles as they relate to stress, perceived resource gain or loss, and PTSD symptoms. Do individuals in the organization that hold different hierarchical positions have different stress loads and resource strains? At the organizational level there could also be a greater differentiation between emergency medical responder types, such as separating ambulance personnel and fire personnel. Organizational funding might play a role as the economic variables affect the functioning of the organization and the members of the organization. Is the organization a public one, like most municipal and state funded fire departments, or a private company or corporation like many ambulance companies such as American Medical Response? The differences might play a role in layoffs, funding, benefits, and support provided for the emergency medical responder personnel.

**Group.** The group level provides for information on how individuals relate on a daily basis. Further research could explore how different ranked officers on a shift support the resources of others. Is there an equal share of work or do newer staff

members bear a greater burden? Beyond rank, level of medical training could also provide further detail as to what types of trauma and how these types of trauma, are impactful to an individual. Is there a difference between the driver and the paramedic that treats the patient more closely?

**Individual.** Individual protective and risk factors have been the focus of much of the research. However, the relationship between these factors and an individual's perception of resource gain or loss could provide greater support for the theoretical perspective posited in this dissertation: that an individual's resources are related to their experience of stress. Broader use of the COR-E resource loss scale developed by Hobfoll et al. (1992) across different variables could provide detail about individual perceived loss during a multitude of events across all levels. By discussing resources, this might also de-pathologize the exploration of stress and trauma in the population. As Fay et al. (2006) discussed in the development of ERES, when the problem can be placed outside the individual as one within the system it can be more easily discussed and treated. Similarly studies of the value systems of individual emergency medical responders will provide greater detail in to how their evaluative process translates raw resources into higher level evaluated resources.

**Biological.** The biological system is rife with research possibilities. Studies that explore the effects of the HPA-axis on brain structures will continue to need further clarifying research to determine the direction of the action, either genetic or biological sequelae. Studies of individual biological systems in situ could also provide greater detail as to what portion of the individual's daily work life provides the greatest level of biological strain. Some studies and anecdotal information have suggested that "work

hassles” and organizational strain might provide a greater stress for the firefighter than traumatic incidents. Other biological strains such as the relation between personality types and the experience of stress might provide further detail on the individual’s evaluative process as it relates to Hobfoll’s conservation of resource theory.

**Advocacy/policy implications.** The U.S. Department of Health and Human Services (2000) identified the top 10 major public health concerns. Of them, the sixth highest was “Mental Health.” Hobfoll recently identified that an important use of the COR ecological psychology model could be with public health at the societal level in a preventative role. Hobfoll and Schumm (2009) noted that COR theory informs interventions at multiple levels and focuses on resource loss cycles as well as resource gain cycles. They highlighted the importance of including preventative resource gain cycles in order to develop a store of resources that can buffer an individual from future traumatic loss. Through their research they identified some, such as self-efficacy, positive thinking, and empowerment, and suggested these be the focus of future public health efforts. Through increasing resources, pre-trauma the resource impact of the traumatic event will fundamentally be offset.

In a similar multi-level way, after 9/11 a group of counselors in the Counseling Services Unit (CSU) of the EAP of the FDNY developed a community based program that provided services across the wide social support network of the fire department (Greene et al., 2006). This new model is consistent with the notion of exploring models of health care beyond the traditional roles of the therapist in one-on-one or group-treatment. This model showed again that through use of community psychoeducation services provided to the emotional supporters of the emergency medical responders, and

through the use of firehouse clinicians, a multi-modal approach could address the resource loss of the individual at multiple levels. This approach addresses the levels of organism, group, organization, and community. This however, still left out the harder to quantify societal and supranational levels.

Psychologists moving beyond the role of the treating clinician can impact the resource loss of those in the emergency medical responder roles. This global professional role of the psychologist is also supported in work on social advocacy and preventative interventions (Kenny, Horne, Orpinas, & Reese, 2009). The political advocacy efforts of the APA's Government Relations Office and other psychological non-profit groups are consistent with the systemic perspectives advanced in this dissertation. The APA Government Relations Office role of a psychologist reads: "Strengthening psychology's role in the promotion of human welfare through the utilization of relevant psychological research and theory when public policy is formulated to address public interest issues" (American Psychological Association, 2010b).

When an advocacy group can change the way in which laws are written, based on scientific evidence, in order to provide resources to those emergency medical responder victims of traumatic incidents, the scope of impact is potentially much greater than that of the individual practicing clinician.

It is encouraged that the model for traumatic stress reach beyond that of the therapy office and look toward other roles the clinician can fulfill for their patient. Psychologists can act as consultants on international policy within the decider of the society (the government) as rights advocates at the community and organizational levels, or they can be a consultant for the organization in the development of new training



modules for the identification of resource loss and stress within the hierarchy of the emergency medical services to provide more accurate identification of problematic stress or potential stress responses in the individual. This theoretical framework moves beyond the confines of the traditional psychologist role and identifies interventions and research opportunities for a more comprehensive intervention strategy for addressing stress with emergency medical responders.

This model for unconventional psychological analysis of systems of trauma broadens our understanding of a singular event's impact on an individual. Taking the focus away from the individual pathology, trauma symptoms can be seen as symptoms of a broader problem affecting the emergency responder population as a whole — which in turn has a reciprocal affect on the surrounding community. This synthesis can also be generalized to other groups and coherently supports the ongoing push for psychologists to explore professional roles beyond the individual therapy model thus highlighting the need for a greater understanding of wrap-around models and ecological influences throughout the study of psychology.

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