2010

Occupationally Related Stress Exposures and Stress Reactions in the Emergency Medical Services

Elizabeth Anne Donnelly
OCCUPATIONALLY RELATED STRESS EXPOSURES AND STRESS REACTIONS IN THE EMERGENCY MEDICAL SERVICES

By

ELIZABETH A. DONNELLY

A Dissertation submitted to the College of Social Work in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Degree Awarded:
Summer Semester, 2010

Copyright © 2010
Elizabeth Donnelly
All Rights Reserve
The members of the committee approve the dissertation of Elizabeth Donnelly defended on May 18, 2010.

Jim Hinterlong  
Professor Directing Dissertation

R. Jay Turner  
University Representative

Nick Mazza  
Committee Member

Approved:

Jim Hinterlong, Doctoral Program Director, College of Social Work

Nick Mazza, Dean, College of Social Work

The Graduate School has verified and approved the above-named committee members.
This dissertation is dedicated to my mother, Josie Donnelly (1946-2005). Her final adventure inspired me to embark on this journey.

I also wish to dedicate this dissertation to my father, my sister, and my husband, whose support and encouragement were integral to my success.

We are still so very blessed.
ACKNOWLEDGEMENTS

I wish to acknowledge the efforts of Dr. Jim Hinterlong, Dr. R. Jay Turner, and Dr. Nick Mazza in my success. I would have been lost without their support, encouragement, cajoling, mentoring, and cheerleading.

I also wish to acknowledge the contribution of Dr. Darcy Siebert, who was integral to the development of my prospectus.

Finally, I would like to acknowledge those in the EMS community that were so supportive through this process, including Dr. Gregg Margolis at the National Registry of EMTs, my co-workers at Gadsden County EMS, and my friends in the profession who helped with the endless iterations of pilot testing.
# TABLE OF CONTENTS

List of Tables ............................................................................................................................................ viii

List of Figures ........................................................................................................................................... ix

Abstract ................................................................................................................................................... x

1. PROBLEM STATEMENT .......................................................................................................................... 1

   Introduction ............................................................................................................................................. 1

   The History, Purpose, and Structure of the Emergency Medical Services ........................................... 2

   Occupational Stressors in EMS ................................................................................................................. 4

      Chronic Stress ....................................................................................................................................... 4

      Critical Incident Stress ........................................................................................................................... 5

   Potential Consequences of Exposure to Occupational Stress .................................................................... 7

   EMS Research and Theory ......................................................................................................................... 15

      The Stress Process Model ..................................................................................................................... 16

      The Stress Process Model for Stress Exposure and Stress Reactions in EMTs ................................. 19

      Social Support .................................................................................................................................... 21

      Personal Resources ............................................................................................................................... 23

      Coping ................................................................................................................................................. 23

      Locus of control ................................................................................................................................. 24

      Social Characteristics ......................................................................................................................... 25

      Elements of the Stress Process Model Integral to this Research Effort ............................................. 26

   Relevance and Importance to Social Work ............................................................................................... 27

2. REVIEW OF THE LITERATURE ............................................................................................................. 31

   Characteristics of the Population ........................................................................................................... 31

   Current Research in Stress Exposure and Stress Reactions in EMS ....................................................... 33

      Occupationally Related Stress Reactions in EMS ............................................................................. 34

         Evaluation of study design ................................................................................................................ 34

         Qualitative and mixed-method studies ........................................................................................... 36

         Population and sampling strategies ................................................................................................ 37

         Evaluation of data collection ........................................................................................................... 38

         Evaluation of measurement .............................................................................................................. 41

         Evaluation of analyses ..................................................................................................................... 43

      High-risk Alcohol and Other Drug Use ............................................................................................... 45

   Specific Aims: Research Questions and Hypotheses ............................................................................. 48

3. METHODOLOGY .................................................................................................................................. 50

   Research Design ................................................................................................................................... 50

   Measurement ......................................................................................................................................... 50
Measurement and Current Hypotheses ................................................................. 50
High-risk Alcohol Use ............................................................................................ 51
Posttraumatic Stress Disorder and Posttraumatic Stress Symptomatology .............. 53
Occupational Stress in EMS ................................................................................... 54
    Chronic stress. .................................................................................................... 55
    Critical incident stress. ....................................................................................... 56
Demographics .......................................................................................................... 57
Sampling and Power ............................................................................................... 57
Data Collection ....................................................................................................... 59
    General Considerations for Data Collection ....................................................... 59
    Data Collection in this Research Effort ............................................................... 60
Ethical Considerations in this Research ............................................................... 62
    Human Subjects Involvement .......................................................................... 62
    Risks & Protection against Risks ..................................................................... 62

4. RESULTS ............................................................................................................. 64

Data Cleaning and Preparation ........................................................................... 64
Characteristics of the Sample .................................................................................. 66
Hypotheses Testing ................................................................................................. 68
    Hypotheses One and Three .............................................................................. 68
    Hypothesis Two ................................................................................................. 71
    Hypothesis Four ............................................................................................... 72
    Hypothesis Five ............................................................................................... 73
    Hypothesis Six ................................................................................................. 73

5. DISCUSSION ....................................................................................................... 84

Limitations ............................................................................................................. 84
Contributions ......................................................................................................... 86
    Bivariate Hypothesis Testing ............................................................................ 87
    Multivariate Hypotheses .................................................................................. 89
    Support for the Stress Process Model ............................................................. 91
Implications ........................................................................................................... 93
    Implications for EMS ...................................................................................... 93
    Implications for Social Work ........................................................................... 94
Directions for Future Research ............................................................................ 95
Conclusion ............................................................................................................ 97

APPENDICES ........................................................................................................ 99

A. Alcohol Use Disorders Identification Test (AUDIT) ....................................... 98
B. PTSD Checklist – Military (PCL-M) ................................................................. 100
C. Chronic Work Stressors (adapted PSQ) ............................................................... 102
D. Critical Incident Stressors ................................................................................ 105
E. Demographic Data ............................................................................................ 109
LIST OF TABLES

Table 1: 1998 LEADS demographic data ..................................................................................... 31
Table 2: 2006 LEADS demographic data ..................................................................................... 32
Table 3: EMS studies by type and response rate .......................................................................... 39
Table 4: Sample selection process ................................................................................................. 59
Table 5: Demographic characteristics of respondents ................................................................. 61
Table 6: Demographic characteristics of the full sample ............................................................ 67
Table 7: Univariate analysis of composite measures ........................................................................ 68
Table 8: Bivariate correlations ......................................................................................................... 69
Table 9: ANOVA on chronic stress ................................................................................................. 69
Table 10: ANOVA on critical incident stress .................................................................................. 70
Table 11: ANOVA of alcohol use on PTSD .................................................................................. 71
Table 12: ANOVA on years of experience ...................................................................................... 72
Table 13: Mean level of occupational stress by level of training ................................................ 73
Table 14: Unstandardized coefficients from OLS regression of PTSD on stress and alcohol use ................................................................. 75
Table 15: Unstandardized coefficients from OLS regression of alcohol use on stress and posttraumatic stress symptomatology 82
LIST OF FIGURES

Figure 1. Pearlin's stress process model................................................................. 16
Figure 2. The stress process model for EMS .......................................................... 20
Figure 3. Elements of the stress process model tested in this research....................... 27
Figure 4. Interaction of chronic stress with alcohol use in regression of PTSD.............. 78
Figure 5: Interaction of chronic with critical incident stress in regression of PTSD.......... 78
Figure 6: Interactions of critical incident stress and alcohol use with chronic stress, Simultaneous entry in regression of PTSD................................................................. 80
ABSTRACT

This study explored the phenomenon of occupationally related stress exposures and stress reactions in the emergency medical services. While the emergency services are nearly ubiquitous in the United States, very little exploration has been done into the prevalence and sequelae of occupationally related stresses to which emergency medical technicians (EMTs) are exposed as part of their work. This study, based on the Stress Process Model (Pearlin, 1989) explored the impact of both chronic and critical incident stress. Chronic stressors are defined as persistent difficulties (e.g., insufficient salary, conflict with colleagues or supervisors). Critical incident stress relates primarily to the provision of patient care in emergencies and the emotional reactions caused by the exposure to gruesome or tragic circumstances. Posttraumatic stress symptomatology and alcohol use are identified as potential sequelae of exposure to occupational stress. Six hypotheses are presented to elucidate the relationship between the variables and to guide the research process. The overall aim of this study was to improve upon previous research efforts by exploring how different types of occupational stress may relate to different possible stress reactions. By gaining a detailed view into how different types of stress exposures may influence stress reactions in EMTs, more insight was gained into what factors may influence pathological outcomes.

In order to assess the relationship between occupationally related stress exposures and stress reactions, this study used a combination of previously validated measures (PTSD, alcohol use) and stress measures adapted for this research effort. Following the tailored design method (Dillman, 2009), data were collected from a probability sample (N=1633) of nationally registered EMTs and paramedics utilizing an internet-based survey methodology. Data were examined using both bivariate and multivariate analytic approaches.

The findings revealed that in this population, a lower rate of posttraumatic stress symptomatology in this sample than in previous research or in population-based samples. Rates of risky and hazardous alcohol use in this sample were comparable with previous research for the general population. Multivariate findings indicated that chronic stress, critical incident stress, and alcohol use contribute to posttraumatic stress symptomatology. Interactions between chronic stress and alcohol use as well as chronic stress and critical incident stress further improved the explanatory power of the model. Regression of alcohol use on the predictor variables illustrated a
relationship between alcohol use and chronic stress as well as alcohol use and posttraumatic stress symptomatology. Critical incident stress did not retain a significant relationship with alcohol use when controlling for posttraumatic stress symptomatology.

The findings advanced knowledge regarding the relationship between occupational stress exposure and stress reactions in EMTs in several ways. This study placed the phenomenon of occupational stress within a widely utilized theoretical framework, allowing for better understanding of this particular process within the context of a wider body of stress literature. The methodology used in this study (specifically the use of probability sampling) represents a modest improvement from previous studies that have almost exclusively used convenience sampling. Further, this study revealed the differential relationship of chronic and critical incident stress with posttraumatic stress symptomatology and alcohol use in the population, illustrating that both types of stress are influential in stress reactions in EMTs.

This research has important implications for both EMS and social work. This research benefits the emergency medical services at both at the individual and organizational levels. With greater empirical evidence of the impact of occupationally related stress, individuals may be better able to take steps to reduce the impact of occupationally related stress exposures. At an organizational level, these findings may provide data to educators, supervisors, and administrators who may need to address occupationally related stress in the workplace.

This research enhances the social work practice and research. Social work practice benefits by expanding the knowledge base from which evidence-based practices may be developed. This is especially important, as social workers are often called to work with this population. Understanding the relationship between stress exposures and stress reactions may make it possible to develop an evidenced-based intervention that social workers may utilize for individuals who are struggling to manage the stresses of the job. Additionally, in pursuing this work, social work researchers will gain a greater knowledge of how occupational stressors affect EMTs. Any understanding may inform future investigations into occupational stress exposures and stress reactions within the social work profession. While different in many ways, both EMS and social work share risk for exposure to traumatic stressors, and this research may inform parallel efforts to understand the impact of occupationally related stressors on social workers.
CHAPTER 1
PROBLEM STATEMENT

Introduction

In times of medical emergency, the American public often relies on the expertise of emergency medical technicians (EMTs). Despite the nearly ubiquitous nature of EMTs and ambulances, little public awareness exists of the occupationally related hazards associated with the profession. Occupational hazards associated with the profession include car accidents, fires, homicide, suicide, exposure to infectious disease and blood-borne pathogens, extreme temperatures, assaults, back injury, hazardous materials exposure, and sleep deprivation (Maguire, Hunting, Smith, & Levick, 2002). These occupational hazards suggest that EMTs may be at a greater risk of developing stress related disorders (Beaton, Murphy, Pike, & Jarrett, 1995), including posttraumatic stress disorder (PTSD) and other forms of psychological dysfunction (Weiss, Marmar, Metzler, & Ronfeldt, 1995).

Although the prevalence of PTSD in EMTs has been amply documented in the literature (e.g., Carlier, Lamerts, & Gersons, 1997; Clohessy & Ehlers, 1999; Haslam & Mallon, 2003; Regehr, Goldberg, & Hughes, 2002), research about the risk factors for developing PTSD is limited. In addition, despite related research about other kinds of emergency responders (e.g., police officers, firefighters) (Boxer & Wild, 1993; Gershon, Lin, & Li, 2002; Murphy, Beaton, Pike, & Johnson, 1999; Violanti, 2004), possible alcohol misuse in the emergency medical services remains virtually unexamined. This gap in the literature is troubling, as PTSD is classified as an anxiety disorder and anxiety disorders are linked to an increased risk of alcohol and drug misuse (Chilcoat & Breslau, 1998). In fact, PTSD is the only anxiety disorder found to predict alcohol abuse (Lopez, Turner, & Saavedra, 2005).

The first chapter of this dissertation contains an examination of the problem of exposure to occupationally related stressors in the emergency medical services (EMS) as well as the potential factors associated with risk for occupationally related stress reactions and substance use problems. A theoretical model adapted from the stress process model (Pearlin, 1989) is used to illustrate the constructs that are hypothesized to contribute to the development of PTSD and to increase the risk for alcohol abuse in EMTs. The chapter concludes with a discussion of the relevance and importance of the problem of stress exposures and stress reactions to the field of
social work. The second chapter is a critical review of the extant literature on occupationally related stress exposure and stress reactions, including an evaluation of the strengths, weaknesses, and limitations of current research. Overarching research questions and more specific, testable research hypotheses are described. The third chapter contains a discussion of methodological approach taken in this research exploring the relationship between occupational stress exposure and stress reactions in EMS, including discussions of research design, sampling, data collection, and data analysis strategies. Considerations for human subject protections are addressed. In chapter four, the results of the analyses are described. The fifth chapter opens with a discussion of limitations in this research, followed by a description of the contributions of this effort to the knowledge base. Potential implications of this research are discussed for both the fields of EMS and social work. Finally, directions for future research are proposed.

The History, Purpose, and Structure of the Emergency Medical Services

Evidence of organized transport of the ill and injured is documented from as early as 900 A.D. and has much of its history in response to the needs of injured soldiers during military conflict. The first use of emergency medical transport for civilian use in the United States was in 1865 and the first motorized ambulance appeared in 1900 (Barkley, 1978). The emergency medical services (EMS) system that exists in the United States today is the result of legislation based on the recommendations made in the 1966 National Academy of Sciences (NAS) report, “Accidental Death and Disability: The Neglected Disease of Modern Society.” The report discussed the problem of traffic-related fatalities and insufficiency of pre-hospital emergency services in the United States. The recommendations made by the NAS included the creation of standardized training materials for EMTs, implementation of legislation to regulate ambulance services, adoption of state-level legislation on ambulance services, development of local systems for the delivery of emergency services, and pilot studies to determine the efficacy of staffing and service delivery (National Academy of Sciences [NAS], 1966). In the same year, in response to the report, legislation ("Highway Safety Act," 1966), created the U.S. Department of Transportation. This department was charged with enacting the NAS recommendations and continues to be responsible for the development and oversight of EMS today. The EMS system, as it exists today, is defined as,

A component of the health care delivery system, EMS addresses all possible injuries and illnesses, and treats all ages. It is a component of, and is also comprised by, systems
intended to provide care for specific diseases and population segments. Contemporary EMS systems were created to meet the immediate needs of the acutely ill and injured; to provide “stabilization” and transportation. EMS, in general, meets these objectives in relative isolation from other health care and community resources. (National Highway Traffic Safety Administration [NTHSA], 2008)

As illustrated in this definition, delineation exists between the emergency medical services and other types of emergency response. Emergency medical services, for the purposes of this effort, will be the provision of pre-hospital medical intervention and transport of the emergently ill or injured, excluding other types of emergency response such as fire suppression or law enforcement services. While EMS is defined in this effort as exclusively involving pre-hospital medical intervention, it must be noted that practically the provision of emergency services may not be so clearly delineated. In some communities, EMS exists as a stand-alone entity; in other communities, EMS may fall under the umbrella of fire suppression services or law enforcement. In these communities, EMTs may play a dual role, providing multiple services at the same time. So a caveat must be offered that any discussion of occupational stress exposure and stress reactions in EMS may differ for those serving in dual roles.

In addition to the various ways in which emergency medical services may be provided, different levels of training and expertise exist within the EMS system. These distinctions are important, especially within EMS as these levels represent both the level of training and the social hierarchy of the EMS community. Four different levels of emergency responder exist in the United States today; three types fall under the rubric of emergency medical technician (EMT). The different designations reflect the varying levels of training and scopes of practice of the responder. These designations are,

- First Responders: trained to provide basic emergency medical care because they tend to be the first persons to arrive at the scene of an incident.
- EMT-Basic (EMT-B): the first component of the emergency medical technician system. The EMT-B has the skills to assess a patient’s condition and manage respiratory, cardiac, and trauma emergencies at the scene and while transporting patients by ambulance to the hospital under medical direction.
EMT-Intermediate (EMT-I): has advanced training that allows the administration of intravenous fluids, the use of manual defibrillators, and the application of advanced airway techniques and equipment to assist patients with respiratory emergencies.

EMT-Paramedic (EMT-P): provides the most extensive pre-hospital care. In addition to the procedures already described, paramedics may administer drugs orally and intravenously, interpret electrocardiograms (EKGs), perform endotracheal intubations, and use monitors and other complex equipment.


Because emergency responders of all levels of training can be found within the American EMS system, in this document the term EMT will refer to any professional or volunteer provider of emergency medical services, regardless of their level of training or expertise.

Occupational Stressors in EMS

As mentioned briefly before, working in the emergency medical services is not without risk. A number of occupationally related stressors have been identified as significant in EMS (Boudreaux & Mandry, 1996a, 1996b; Sterud, Ekeberg, & Hem, 2006). These occupationally related stressors fall broadly into two conceptual categories, chronic stressors and critical incident stressors. These two types of stress have been identified through theoretical conceptualization as well as in research with emergency medical responders (Bennett, et al., 2005; Boudreaux & Mandry, 1996b) and police officers (Evans & Coman, 1993).

Chronic Stress

Chronic stress, as defined by Pearlin (1989) encompasses “relatively enduring problems, conflicts and threats that many people face in their daily lives” (p. 245). McLean and Link conceptualize chronic stressors as falling into four categories:

- Persistent life difficulties or chronically stressful situations that can be considered as corollaries of life events
- Role strain, including the strain within specific roles as well as the strain of holding multiple roles
- Chronic strains that derive from societal responses to characteristics of a person that include him or her as part of a class of persons, such as racism or sexism
Chronic communitywide strains that may operate at an ecological level, such as the chronic strain of residence in a high crime area or residence near an environmental threat (McLean & Link, 1994, p. 23).

Of the types of stressors identified by McLean and Link, chronic stressors, most closely falling under the category of “persistent life difficulties” have been identified in the scholarly literature as problematic for those working in EMS. These stressors include insufficient salary (Beaton, Murphy, & Pike, 1996; van der Ploeg & Kleber, 2003), an alienated and unsupportive administration (Beaton, et al., 1996; Regehr & Millar, 2007; van der Ploeg & Kleber, 2003; Young & Cooper, 1997), lack of support from or conflict with colleagues (Alexander & Klein, 2001; Beaton, et al., 1996; Beaton, Murphy, Pike, & Corneil, 1997; Bennett, et al., 2005; Clohessy & Ehlers, 1999; Regehr & Millar, 2007; van der Ploeg & Kleber, 2003; Young & Cooper, 1997), and interference with non-work related activities (Beaton, et al., 1996; Beaton, et al., 1997; Bennett, et al., 2005; Clohessy & Ehlers, 1999). In addition, EMTs are at constant risk of exposure to pathogens such as HIV, Hepatitis B, and Hepatitis C (Leiss, et al., 2006; Rischitelli, Harris, McCauley, Gershon, & Guidotti, 2001; Rischitelli, Lasarev, & McCauley, 2005), threats of both verbal and physical violence (Brough, 2005; Suserud, Blomquist, & Johansson, 2002), and injury and death due to vehicle related accidents (Becker, Zaloshnja, Levick, Li, & Miller, 2003; Maguire, et al., 2002). Chronic work stressors may be exacerbated by the fact that many EMTs work 24 hour shifts, and so they must cope with the boredom and tedium of prolonged periods without a call (Beaton, et al., 1995).

The chronic stress conceptualization is useful to the study of stress exposure and stress reactions in EMTs primarily because it is broad enough to encompass many of the stressors that may contribute to stress reactions. While the occupational stressors identified above primarily fall into the category of persistent life difficulties, the construct of chronic stress is broad enough to include other types of stressors that may become important in future research.

**Critical Incident Stress**

The other type of occupationally related stressor is critical incident stress. Critical incident stress is defined as, “any situation faced by emergency service personnel that causes them to experience unusually strong emotional reactions which have the potential to interfere with their ability to function either at the scene or later” (Mitchell, 1983, p. 36). The initial conceptualization of critical incidents included, (1) the serious injury or death of an emergency
team member in the line of duty, (2) the serious injury or death of a civilian resulting from emergency service operations, (3) cases charged with profound emotion such as the death of an infant, (4) cases that attract unusual attention from the news media, (5) a loss of life after a prolonged rescue effort, (6) serious physical or psychological threat to the rescuers, or (7) incidents that surpass the normal coping mechanisms of personnel (Mitchell, 1983, p. 36). The initial conceptualization of critical incident stress is broad enough to encapsulate most critical incidents. It is difficult to quantify or measure “incidents that surpass the normal coping mechanisms of personnel.” Thus, to understand the construct fully, it is appropriate to examine which specific critical incidents are cited most frequently as stressful in the literature.

Since Mitchell’s formulation of critical incident stress, several other stressors have appeared in the literature and may be suitable for consideration as part of the construct. These stressors include dealing with acutely ill or seriously injured people (Alexander & Klein, 2001; Beaton, Murphy, Johnson, Pike, & Corneil, 1998; Brough, 2005; Regehr, Hill, Goldberg, & Hughes, 2003), dealing with psychiatric patients (Bennett, et al., 2005; Clohessy & Ehlers, 1999; van der Ploeg & Kleber, 2003), dealing with family, friends, or those known to the individual (Alexander & Klein, 2001; Beaton, et al., 1998; Bennett, et al., 2005; Clohessy & Ehlers, 1999; Jonsson, Segesten, & Mattsson, 2003) and dealing with dead bodies (Beaton, et al., 1998; Bennett, et al., 2005; Clohessy & Ehlers, 1999). While not an exhaustive list of critical incidents, the stressors listed above are useful for two reasons. First, it is possible to see which critical incidents have already been identified as being potentially stressful by researchers. Secondly, being able to identify specific stressors enriches the conceptualization of critical incident stress by providing a larger number of possible stressors. This breadth is especially useful as it provides a useful starting place in efforts to quantify both the frequency and the stressfulness of the more common critical incidents.

Also important to the conceptualization of critical incidents is the fact that critical incidents may be either a singular event or the cumulative result of series of events (e.g., multiple deaths in a short period). The potential for a critical incident to be the result of cumulative exposure is important as multiple traumatic exposures may increase the risk for negative psychological outcomes. The experience of multiple traumatic exposures are positively correlated with increased levels of posttraumatic stress symptomatology, and cumulative
traumatic experience increases vulnerability to PTSD (Beaton, et al., 1995; Bryant & Harvey, 1996; Ward, Lombard, & Gwebushe, 2006).

The binary conceptualization of stress, encompassing both chronic and critical incident stressors, is useful primarily because it acknowledges that exposures to different types of stressors occur. Critical incident exposures occur primarily in the provision of emergency medical services, wherein EMTs may be exposed, either directly or indirectly, to chaotic, tragic, or gruesome circumstances. These exposures may be of a brief duration. Chronic stressors are considered more pervasive and chronic, encompassing both stressors associated with employment (e.g., conflict with managers or peers) and the constant risk of being involved in a car accident, exposed to infectious disease, or assaulted by a patient. The constructs of chronic and critical incident stress are broad enough that they have the potential to encompass other stressors that may be identified later as problematic for EMTs. The binary conceptualization has demonstrated efficacy in research on other emergency responders (Evans & Coman, 1993). Additionally, the use of the binary conceptualization of stress acknowledges that exposure both types of stress may contribute to stress reactions. The consequences of exposure to occupationally related stressors may as stress reactions. These stress reactions may manifest as psychological dysfunction that may both distress and impair an EMT.

**Potential Consequences of Exposure to Occupational Stress**

Theoretically, exposure to negative stressors may manifest in many different psychological and physiological ways (Mirowsky & Ross, 1989). It follows that exposure to occupational stressors may manifest in a variety of ways among emergency medical technicians. Of the possible stress reactions, posttraumatic stress disorder (PTSD) and posttraumatic stress symptomatology (PTSS) have been identified by the profession anecdotally as problematic for EMTs and have been most frequently studied by scholars. Among EMTs, PTSD has been identified as problematic to a greater extent than other psychological disorders. PTSD may develop whenever an exposure to a traumatic event occurs in which, “the person has 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 and the person’s response involved fear, helplessness or horror” (American Psychiatric Association [APA], 2000, p. 219). In response to that traumatic exposure, a constellation of possible symptoms may develop, generally falling into three categories: persistent re-experiencing of the
event, persistent avoidance of stimuli associated with the traumatic event, and persistent symptoms of increased arousal. To receive a PTSD diagnosis, an individual must present with all three types of symptoms, symptoms must last longer than one month, and the symptoms must cause “clinically significant distress or impairment in social, occupational, or other important areas of functioning” (APA, 2000, p. 220).

Of the diagnostic criteria for PTSD offered by the American Psychiatric Association (APA), perhaps the most important element is that of symptoms causing clinically significant distress. Beyond simply experiencing the symptoms of PTSD, those symptoms must interfere with the day-to-day functioning of the individual. In the case of an EMT, this interference may influence not only the individual and their immediate social circle, but also anyone to which that EMT responds as a professional. PTSD symptomatology, if not identified and treated, might negatively impinge on the care that a patient might receive. The interference of PTSD symptomatology with the provision of emergency medical services is a threat to the public health. The suffering of EMTs and their families is important; the threat to public health also offers a compelling reason to investigate the problem of occupational stress exposure and stress reactions in EMTs.

The first criterion for developing PTSD is exposure to a traumatic event. Little doubt exists that EMTs are exposed to traumatic situations. Rates of exposure to traumatic events have been reported at between 82% (Alexander & Klein, 2001) and 100% (Regehr, Goldberg, Glancy, & Knott, 2002; Regehr, Goldberg, & Hughes, 2002). This rate of exposure is much higher than the general population; only 61% of men and 52% of women in a nationally representative sample reported exposure to at least one traumatic event (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995).

Prevalence of PTSD in EMTs has also been well documented in the literature; rates of PTSD in EMTs have been as high as 22% (Bennett, Williams, Page, Hood, & Woollard, 2004; Bennett, et al., 2005) and over 20% in three other studies. (Clohessy & Ehlers, 1999; Grevin, 1996; Marmar, Weiss, Metzler, Ronfeldt, & Foreman, 1996). Other studies have found lower rates of PTSD, such as 15.2% (Jonsson, et al., 2003), 12% (van der Ploeg & Kleber, 2003), 5.6% (Berger, et al., 2007), and 5% (Lowery & Stokes, 2005).

The rates of PTSD symptomatology in EMTs are similar to firefighters, where prevalence estimates range between 8% (Del Ben, Scotti, Chen, & Fortson, 2006) and 22% (Corneil,
Beaton, Murphy, Johnson, & Pike, 1999). PTSD prevalence rates for police officers are somewhat lower, falling between 7% (Carlier, et al., 1997) and 13% (Robinson, Sigman, & Wilson, 1997). It appears from a simple “eye-ball” comparison of prevalence rates that for law enforcement personnel, levels of PTSD are lower. It is difficult to assess why this might be the case, several possible explanations may exist. First, any difference in prevalence rates between types of responders is not statistically significant, and the apparent discrepancy is simply an artifact of researchers’ sampling and measurement choices. A second possibility is that some basic differences exist between the nature of police work and firefighting or EMS. These differences might be between the types of people who self-select into the different professions, the structure of the work (e.g., 8 vs. 24-hour shifts), the use of pre-employment psychological screening in many law enforcement agencies, or the rate and malignancy of the stressors to which each is exposed. Further research may elucidate what differences might exist between the professions and what, if any, difference exists in the rates of PTSD.

The rate of PTSD among all types of emergency responders, including EMTs, is much higher than the general population. In samples that are nationally representative, prevalence rates of PTSD were found to range between 6.8% (Kessler, et al., 2005) and 7.8% (Kessler, et al., 1995). These differences are most easily attributable to the difference in rates of traumatic exposure; the public has fewer traumatic exposures, and so fewer opportunities for PTSD to develop.

The use of PTSD as a construct is useful because it is a widely accepted construct, it has been previously identified as problematic in EMS, and has diagnostic criteria that allows for the identification of pathology. The existence of diagnostic criteria creates a threshold, and if that threshold is exceeded, a diagnosis of PTSD can be made. Being able to identify distressed EMTs is important, and diagnosis of PTSD is one way to accomplish that end. Yet relying exclusively on diagnosable PTSD fails to capture the continuum of stress reactions that may possibly result from exposure to occupationally related stressors.

As noted by Mirowsky and Ross (1989), relying on diagnosis alone as a form of measurement is problematic, as diagnosis creates a false dichotomy between the presence and absence of illness. Reflecting that concern, researchers have not dealt exclusively with PTSD diagnoses, but rather have reported posttraumatic stress symptomatology (PTSS). For the purposes of this effort, the term posttraumatic stress symptomatology refers to a constellation of
PTSD symptoms that may be experienced by an EMT but do not meet the APA diagnostic criteria for PTSD. The wide variety of measures utilized and the different conceptualizations of symptomatology among studies make comparisons difficult. Examples of PTSS prevalence findings within studies of EMTs include 30% with “high” posttraumatic stress symptoms (Alexander & Klein, 2001), 25.5% of “severe” PTSD symptoms, (Regehr, Goldberg, & Hughes, 2002) and 20.2% “severe or high distress” (Regehr, et al., 2003), and 15% with “partial” PTSD (Berger, et al., 2007). Posttraumatic stress symptomatology has also been documented in other emergency responders; prevalence rates for PTSS for law enforcement range between 16% (Maia, et al., 2007) and 34% of (Carlier, et al., 1997) and between 22% and 26% for firefighters (Murphy, et al., 1999).

Regardless of way that symptoms are measured, posttraumatic stress symptomatology requires consideration independent of diagnosable PTSD. Sub-threshold PTSD has been found to cause levels of social and occupational impairment equivalent to that caused by PTSD (Zlotnick, Franklin, & Zimmerman, 2002). EMTs may not meet diagnostic criteria for PTSD. Research demonstrates that between fifteen and thirty percent of EMTs may be experiencing some sort of PTSD symptomatology. It is useful to consider PTSD not as something that is either present or absent, but rather existing on a continuum of severity. If levels of impairment between PTSD and sub-threshold PTSD are comparable, impairment due to sub-threshold symptomatology may be equally important as full PTSD as far as possible consequences. Sub-threshold symptomatology may be threat to the health of the EMT as well as a threat to the well-being of the public, as symptoms may interfere with the provision of emergency medical services.

In addition to increased vulnerability to PTSD and PTSS in reaction to occupationally related stress exposure, the possibility exists that a significant amount of drug and alcohol use occurs amongst EMTs because of the significant levels of posttraumatic stress symptomatology identified amongst EMTs. Posttraumatic stress symptomatology has been causally linked to an increased risk for alcohol abuse in young adults (Chilcoat & Breslau, 1998; Lopez, et al., 2005) and so it would follow that occupationally related stress reactions like PTSD will increase the risk for alcohol use in EMTs.

Despite the identified risk factors for high-risk drug and alcohol use, a dearth of information exists concerning the occurrence of high-risk alcohol and other drug use in EMTs. Only four studies have been identified that address this very important issue. A brief discussion
of the findings follows below, with a more in-depth critique in Chapter 2. Regehr (2002) found that 1.2% of EMTs indicated problems with alcohol use prior to traumatic exposure and 11.6% reported problems after exposure. A similar number of respondents (1.2%) reported drug problems prior to traumatic exposure; that percentage did not increase after exposure to a traumatic incident. Unfortunately, the authors do not comment about why alcohol use might increase after traumatic exposure while drug use does not increase, nor do they do any statistical analysis to determine what, if any, statistical significance may be associated with the change in alcohol use.

A second study involved South African ambulance personnel and examined critical incident exposure, psychiatric disorder, and substance abuse in six types of emergency responders (public/private and volunteer ambulance personnel, firefighters, police officers, sea rescue, and defense force). Findings included 22.5% of public and private ambulance personnel and 12% of volunteer ambulance personnel reporting problem drinking. According to the authors, these levels of alcohol use, while high, were not significantly related to critical incident exposure in this population, nor were they different from other types of responders included in the study (police, sea rescue, firefighters). The study did find that critical incident exposure was significantly related to PTSD symptomatology (Ward, et al., 2006).

The third study investigated the relationship between occupationally related stress and alcohol use, as well as burnout and basic personality characteristics in a sample of Norwegian police and ambulance personnel. In this population, 18.8 percent of men and 10.7 percent of female ambulance personnel were found to be at risk for hazardous drinking. The authors did not find a relationship between occupational stress and alcohol use in their sample. They note that a more occupationally specific instrument might have produced different results. The final study asked EMTs about number of drinks consumed on days when drinking (Pirallo, Levine, & Dickison, 2005), and had non-significant findings compared to a national sample. Given the lack of research addressing alcohol use by EMTs, it is necessary to look at parallel literature dealing with other emergency responders (police, firefighters) to see if patterns of problematic alcohol use are found in those populations.

Among police officers, traumatic exposures have been linked with an increase the risk of PTSD symptoms which subsequently increase the risk of alcohol use and suicidal ideation (Violanti, Marshall, & Howe, 1983; Violanti, 2004; Violanti, Marshall, & Howe, 1985).
Similarly, police officers’ perceived work stress has been shown to increase risk for maladaptive coping behaviors like excessive drinking and alcohol abuse (Gershon, et al., 2002). Prevalence rates of alcohol use in police are high. One study found 48% of male and 40% of female officers consumed alcohol excessively, including both continuous hazardous or harmful consumption and binge drinking. (Richmond, Wodak, Kehoe, & Heather, 1998). A large-scale study (N=4193) found that 32% of Australian police officers, (33% of men, 24% of women) were in the “at-risk for hazardous alcohol consumption” range and 3% had scores indicating a risk of alcohol dependence. The authors note that while frequency of alcohol consumption among police officers is lower than in the general population, police drank higher quantities of alcohol when they did drink; 34% of officers reported occasional binge drinking. Another study of Australian police found that 32% of female officers and 16% of male officers were classified as binge drinkers (McNeill & Wilson, 1993). Davey, Obst, & Sheehan further found that a lower percentage of the police population (9%) abstained from alcohol than the general population (24% abstained) and 26% of officers reported consuming alcohol on duty (2000). Further study by the same investigators found that among another sample of officers (N =749), over 37% reported drinking rates that would place them at risk for harmful consequences. Additionally, 23% reported being affected by coworkers’ drinking in the last year, 44% reported a co-worker drank before the shift, 20% during the shift, and 36% after the shift. Finally, 14% stated that drinking outside of work hours had affected their professional performance in the last year (Davey, Obst, & Sheehan, 2001). A review of police literature made several important assertions about drinking in the context of police work, specifically that,

- Police subculture may be contribute to alcohol and drug use as officers themselves have indicated that police tend to use drinking for socializing and stress reduction
- Drinking with colleagues may be used to test an officer's loyalty and masculinity
- Alcohol and drug consumption among officers is indirectly related to the job stress factors
- Alcohol is the most convenient and socially acceptably coping alternative for police officers (Dietrich & Smith, 1986).

These assertions about the relationship between the police culture and alcohol use are important because it indicates that not only are police at risk of alcohol abuse due to occupational
stress, but the culture models and encourages drinking behavior as an acceptable coping mechanism. Specifically, that “the nature of the work leads to drinking after work with colleagues as a means of relaxing, unwinding, and debriefing” (Al-Humaid, el-Guebaly, & Lussier, 2007, p. 109). Stress and social influence have been identified as the primary factors influencing alcohol consumption by the police (Davey, et al., 2001). Further evidence that alcohol is an integral part of the police subculture is evidenced by the increased rates of drinking in police recruits. A longitudinal study of police recruits (N =177) found that 6% were at risk for alcohol dependency when assessed on their first day at the academy. This risk increased to 13% after 6 months and to 16% after 12 months in law enforcement. Younger recruits were found to be at higher risk; gender made no difference in the risk (Obst, Davey, & Sheehan, 2001). The observations about the permissive nature of the police culture towards alcohol consumption are especially important, as the dynamics that occur in one branch of emergency response may also occur amongst EMTs. Indeed, anecdotal evidence suggests that alcohol consumption within a social context is prevalent among EMTs.

Two studies of alcohol use by police, conducted by the same researchers (Davey, et al., 2000; Davey, et al., 2001) are especially useful as methodological models for research into alcohol use in EMTs. First, the relatively large sample used by the researchers (N=749 and N =4193) increases the power of the study. The sampling frames consisted of all the officers in two divisions (Davey et al., 2001) and of the entire population of officers in a state police service (Davey et al., 2000). Using recommended strategies for maximizing response rate, researchers obtained return rates of 55% and 67% respectively. The use of an entire population as a sampling frame is a strength, as it means that every individual will have the chance to participate in the study, and unless differences between responders and non-responders exist, it is highly probable that the data will accurately reflect the health of the population. To test their hypotheses, the researchers selected an instrument, the Alcohol Use Disorders Identification Test (AUDIT) (Saunders, Aaslans, Amundsen, & Grant, 1993). The AUDIT has proved to be valid and reliable across multiple studies (Bradley, Bush, McDonell, Malone, & Fihn, 1998; Bradley, McDonell, et al., 1998; Daeppen, Yersin, Landry, Pecoud, & Decrey, 2000). Further, these studies include a comparative analysis of police consumption rates to the general population to provide context for the prevalence rates. The methodological choices made by these researchers, especially including the use of large samples and psychometrically strong measurement instruments, provide a model
for future EMS research by demonstrating how alcohol use has been effectively investigated in other emergency responders.

In addition to the research on alcohol use in police officers, several studies in the fire service have identified problematic rates of alcohol use. Boxer and Wild (1993) reported 29% of their sample \((N = 145)\) had possible or probable problems with alcohol use. North et al. observed that alcohol abuse was endemic in a population of Oklahoma City firefighters, although consumption rates did not increase significantly after the bombing of 1995 (North et al., 2002). In a longitudinal study \((N = 188)\), the relationship between alcohol abuse, stress levels, and posttraumatic stress symptomatology in firefighters was assessed over two years (Murphy et al., 1999). Alcohol problem drinking “caseness,” as indicated by positive score on one or more subscale of the Health Screening Survey (Fleming & Barry, 1991), was reported to be 36.2% at time 1 and 29.1% at time 2 among firefighters. Self reported drinking problems in the same population were 10.3% at time 1 and 8.1% at time 2 and number of drinks consumed weekly was 5.85 at time 1 and 5.84 at time 2. Although the levels of all three alcohol-related variables appear to have decreased over time, no significance was noted in the changes. No changes were noted in posttraumatic stress symptomatology levels, although other symptoms of stress did increase over time. The strongest predictors of scores on job stressors, stress and posttraumatic stress symptomatology, and alcohol use were the previous scores. Self reported drinking problems at time 2 were predicted by job stressors, traumatic symptomatology, number of drinks per week, and alcohol caseness at time 1. Alcohol caseness and number of drinks per week at time 2 was predicted by job stressors, and self reported drinking problems at time 1 (Murphy et al., 1999).

This longitudinal study in firefighters has several strengths that warrant mention. First, the researchers retained 100% of their sample from time 1 to time 2, avoiding the problem of attrition so often found in longitudinal surveys and increasing the strength and veracity of the findings. Second, the longitudinal design makes it possible to assess the impact of stress exposure and stress reactions over time as well as assess their relationship to alcohol use. Rather than relying exclusively on correlation to establish significance, it is possible to establish a temporal order and discover which variables may show a capacity to predict other variables. This study is also useful as it buttresses some of the relationships that are proposed in this effort. It is posited that both chronic and critical incident stress may contribute to stress reactions in EMTs; in this study population, job stressors and stress symptomatology were predictive of
posttraumatic symptomatology and alcohol abuse. Further, it is posited that posttraumatic symptomatology may contribute to alcohol and other drug use in EMTs, and in firefighters, traumatic symptomatology was found to be predictive of self-reported drinking problems. The relationships illustrated by this study of firefighters provide evidence that supports the hypotheses that a significant relationship exists between stress exposure, stress reactions, and alcohol use. If this relationship exists within a firefighting community, it increases the possibility the same relationship exists in EMTs.

Given the empirical evidence regarding risk for stress related reactions associated with occupational stress exposure for those in EMS, it is important to discuss a research agenda that addresses risk and protective factors that may exist within both the individual and the environment. This agenda is rooted in theory, as theory can guide the development of research questions as well as provide a model for the influences that may be important in mitigating or exacerbating occupationally related stress reactions.

EMS Research and Theory

Theory provides a framework that can guide research as well as provide an overarching hypothesis as to how constructs may interact within a holistic model. Theory allows for abstractions and conceptualizations broader than any one empirical research study could encompass. Theory is a critical part of any research effort; theoretical frameworks can provide logical links between different phenomena, both within one study and between studies. One of the fundamental goals of research is to articulate a theoretical basis that can guide the development of a research question, the selection of an appropriate study design and measurement tools, and a discussion of outcomes that logically ties back into the initial theoretical propositions.

One major weakness of the extant studies examining occupationally related stress exposures and stress reactions in EMTs is the lack of an articulated theoretical basis. Few of the articles examining occupationally related stressors and stress reactions in EMTs included some mention of the theoretical basis for their work. Some discuss fully articulated theories (Beaton, et al., 1996; Jonsson, et al., 2003) while others discuss theoretical concepts such as ego defense mechanisms (Grevin, 1996) and social support (Beaton, et al., 1997) without citing a specific theoretical source. This is not to argue that the past research lacks a theoretical basis, just that the authors have not explicated that basis nor have they articulated how they grounded their work in
established theory. This failure to articulate a theoretical basis for research efforts has caused problems in linking specific research efforts into a larger body of knowledge. These problems in EMS research design are discussed in detail in Chapter 2. Moving forward, researchers should strive to articulate the theoretical framework for their studies.

The process of developing the theoretical underpinnings for the research proposed in this effort evolved over time. This author has a considerable amount of lived experience as an EMT, and those experiences have played an integral part in informing the process. Certain constructs, like the construct of cohesion (discussed briefly below), were thought to be important because of the author’s observations in the behavior of peers towards each other and towards other emergency responders. These observed relationships appeared to involve a loyalty that transcended personal differences, an “us against them” mentality that seemed to serve both a protective function against stress exposure as well as establishing the group identity. In addition to drawing on lived experience, the author reviewed the extant literature to discover which constructs had been identified as influential in previous stress reaction research. Through this process, the author identified constructs such as coping and locus of control (Folkman, 1984; Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986; Lazarus, 1993). Reviewing this seminal research informed the development of a theory about stress reactions in EMTs. While in the process of identifying constructs as possibly important in illustrating the process of stress reactions in EMTs, the author became aware of an existing model that encapsulated many of the influential constructs. This model was Pearlin’s (1989) stress process model.

**The Stress Process Model**

Stress is defined as, “a state of arousal resulting either from the presence of socio-environmental demands that tax the ordinary adaptive capacity of the individual or from the absence of the means to attain sought-after ends” (Aneshensel, 1992, p. 16). This definition of stress reflects a sociological view of stress, wherein the focus is not just on the sequelae of stress (e.g., psychological dysfunction), but on the social factors which influence how stress is distributed. For example, social factors like socioeconomic status (SES) have been identified as risk factors for disease because of higher levels of stress, fewer access to resources, as well as influencing risk factors and disease outcomes (Link & Phelan, 1995). These diseases may be physical or mental; the social environment has also been linked to mental health issues (Mirowsky & Ross, 1989; Switzer, Dew, & Bromet, 1999). Beyond SES, the social environment
includes systems of stratification that may influence stress based on ethnicity, race, gender, and age. The type and number of stress exposures depend on the interrelationship between social stratification, social institutions (which dictate social roles), and interpersonal relationships (Pearlin, 1989, 2010). Because of this interrelationship of factors, the social environment may influence stress reactions. In 1989, Pearlin developed the stress process model, which reflected the sociological view as stress as a socially influenced process. Pearlin noted that the type of stressor might be influential in whether or not a stress reaction occurs; two types of stressors that may influence a stress reaction were life events and chronic strains (Pearlin, 1989). Life events refer to an exploration of the relationship between an event and a stress response. Pearlin argued that the construct was problematic, as it assumed that all change was bad and that a life event might actually just be a marker for an ongoing state or condition. Pearlin (1989) stated, “to the extent that events are surrogate indicators of noneventful, ongoing circumstances, empirical relationships between events and health may be explained more accurately by the continuing circumstances in which the event is embedded” (p.244). Therefore, in addition to life events, chronic strains must be considered part of the stress process. The conceptualization of chronic strain involved different types of role strain (Pearlin, 1989). An individual may become overloaded due to the demands of a role, there may be interpersonal conflict in a role set (e.g., husband/wife), conflict may exist for an individual between roles, stress may result from a sense of being captive in a role or finally, the restructuring of a role may cause a stress reaction. Aside from role strain, ambient strain (e.g., from a violent neighborhood) may also be considered as a chronic strain (Pearlin, 1989). Having identified social characteristics and types of stress exposure he felt were influential, further development of the theoretical model with the introduction of mediating characteristics. A visual representation of the complete model can be seen in Figure 1.
In addition to the stress exposure, both social and personal resources might influence the relationship between stress exposure and stress reaction. Within the sphere of personal resources, the functions of coping, managing the meaning of a stress exposure and mitigating a stress reaction are the same, even if the types of coping used may change depending on the situation. Thus the construct of coping as a function, rather than the type of coping is included as a mediator between stress exposure and general health outcomes (Pearlin, 1989). In a similar way to personal resources, social resources, including social support and social networks mediate the relationship between stress exposure and health outcomes. Social support refers to the resources on which a person may draw; social networks refer to the structure of social attachments (e.g., formal vs. informal, family vs. friends). Combining social support, social networks, as well as consideration of the interactional nature of both capture the overall construct of social resources (Pearlin, 1989, 2010).
The outcome variable in the model involved health outcomes, both physical and emotional. Pearlin posited that stress reactions may develop both emotionally and physically, and may be measured in several ways. Outcomes may be assessed according to a medical model, emphasizing the identification and diagnosis of disorder. Alternately, outcomes may be assessed by rating subjective levels of distress. Pearlin encourages avoiding the former method, but rather relying on self-report to assess for outcomes, as well as assessing for multiple types of outcomes (Pearlin, 1989). It is possible that a stress reaction may manifest in different ways, and so assessing for different types of outcomes may capture that variance in reaction.

In evaluating the stress process model developed by Pearlin, it is useful to the study of stress exposure and stress reaction in EMTs. First, it presents a holistic picture of the stress process, incorporating both moderating and mediating characteristics. The constructs identified in earlier research were already specified in the model (e.g., coping) or could be fit well within the model (cohesion fell under social resources). Since its development, the stress process model has been widely cited, 744 times in Google Scholar as of April 26, 2009. In addition to the breadth with which the work has been cited, it has been successfully used as the theoretical basis in several large scale studies (e.g., Turner & Avison, 2003; Turner & Lloyd, 1999) to illustrate the relationship between stress exposure and stress reactions.

The Stress Process Model for Stress Exposure and Stress Reactions in EMTs

To ground any future research into occupationally related stress exposure and stress reactions in EMTs, the stress process model (Pearlin, 1989), has been adapted to present the most cohesive and holistic picture possible of all elements previously identified in the literature. The adapted model considers pre-existing moderating variables such as demographic characteristics, the degree of stress exposure and stress reaction, and the outcome of high-risk alcohol and other drug use. The model includes mediators, such as individual characteristics (personal resources) and the social environment (social support, cohesion). All of these elements interact in a dynamic way, creating a model that captures, to the best extent possible, all the factors which may influence the health of those who work in the emergency medical services.

In this adapted stress process model, a number of different constructs are discussed within the context of their relationship to each other as either mediating variables or moderating variables. For the purposes of this effort, a moderating variable is be defined as a “variable that affects the direction and/or strength of the relation between an independent or predictor variable
and a dependent or criterion variable” (Baron & Kenny, 1986, p. 1174). Moderation can also occur when a variable interacts with the association between the independent variable and the dependent variable. The “association with the outcome variable is stronger or weaker at different levels of the moderator variable” (Bennett, 2000, p. 416). Mediating variables “can be said to function as a mediator to the extent that it accounts for the relation between the predictor and the criterion. Mediators explain how external physical events take on internal psychological significance” (Baron & Kenny, 1986, p. 1176).

Figure 2. The Stress Process Model for EMS

As discussed earlier in this chapter, the extant research points to the possibility of an elevated risk for high-risk alcohol and other drug use EMTs because of the high rate of occupationally related stress exposure and the identified stress reactions such as PTSD. As seen in Figure 2, this construct becomes outcome variable in this stress process model. The vast majority of the studies discussed in this effort deal primarily with alcohol consumption. Despite a dearth of evidence extant in the literature, the stress process model posits that drug use may also occur in reaction to occupationally related stress exposures. It remains in the model.
primarily due to anecdotal evidence that EMTs may abuse the narcotics they have access to as part of their professional duties as well as empirical research within other professions. Evidence of drug use has been documented in other medical professionals with access to controlled substances, physicians (McAuliffe et al, 1986), and nurses (Trinkoff & Storr, 1998).

Posttraumatic stress disorder and posttraumatic stress symptomatology mediate the relationship between occupational stress exposure and the outcome variable of high-risk alcohol and other drug use in the stress process model. Previous EMS research has identified the existence of posttraumatic stress disorder and posttraumatic stress symptomatology in the EMS population. In Pearlin’s original model, all health-related consequences were grouped together, in this adapted model, PTSD is considered separately from alcohol and drug use because research indicates that posttraumatic symptomatology may predict alcohol abuse (Lopez, et al., 2005).

Exposure to occupational stressors, including both chronic and critical incident stressors, influences, both directly and indirectly, the constructs of PTSD/PTSS and high-risk alcohol and other drug use. In the model, occupational exposures are directly to PTSD/PTSS as well as to alcohol and other drug use. In addition to the direct linkages, occupational exposures are mediated by both the social environment (social support/cohesion) as well as personal resources (coping/mastery). These mediating constructs of social support and personal resources are critical to the model as they acknowledge the idiosyncratic environment of EMS as well as the individual coping style of the EMT.

Social Support

While the constructs of social support and personal resources are considered an important part of the overall stress process model, they will not be assessed in the research being proposed in this effort, and so will not be discussed at length. The construct of social support has been substantively linked to psychological health and distress (Langford, Bowsher, Maloney, & Lillis, 1997). Social support may be drawn from multiple sources, including from a husband, wife, or partner, from friends, from relatives, and from coworkers (Turner & Marino, 1994). Social support has been shown to be protective against psychological distress in several studies of EMTs (Brewin, Andrews, & Valentine, 2000; Brown & Grover, 1998; Hyman, 2004), and work support in particular has been found to be protective against distress (Corneil, et al., 1999).
In addition to social support, the construct of cohesion addresses important influences within the EMS profession. This community has at times been referred to as having a paramilitary structure (Greene, Kane, Christ, Lynch, & Corrigan, 2006). Sprung from military research, the construct of cohesion incorporates the dynamics of social support and a paramilitary environment. The definition of cohesion is, “a unit or group state varying in the extent to which the mechanisms of social control maintain a structured pattern of positive social relationships (bonds) between unit members, individually and collectively, necessary to achieve the unit or group’s purpose” (Siebold & Kelly, 1988, p. 1). Griffith and Vaitkus (1999) conceive of cohesion as multidimensional and posit four different types of cohesion, horizontal-instrumental, horizontal-affective, vertical-instrumental, and vertical affective. Horizontal bonding refers to bonding among peers, vertical bonding refers to bonding between leaders and subordinates. Instrumental bonding is focused on task support while affective bonding is emotional support (Griffith & Vaitkus, 1999).

Three aspects of cohesion resonate with the social structure of the emergency medical services. The concept of cohesion comes primarily from the military literature; this reflects both the paramilitary nature of the field and the chronic exposure to trauma that both soldiers and EMTs experience. The multidimensional nature of cohesion addresses not only peer interactions, but also the supervisory, emotional and task-focused aspects of the work. Including these elements of cohesion are especially salient as organizational stressors may be just as stressful as traumatic exposures. Finally, this construct posits that cohesion is protective from stress. “The extent stress is identified by members as a group problem; the more group members are more willing to sacrifice themselves for the survival of the group, especially when threatened by conflict with another group” (Griffith & Vaitkus, 1999, p. 41). Elements of the EMS culture reinforce that sense of group cohesion. Mechanisms such as the use of “gallows humor” are inherent in the EMS community, and serve to define it as a group (Fullerton, McCarroll, Ursano, & Wright, 1992; Moran & Massam, 1997).

In the stress process model, social support and cohesion mediate the relationship between demographic characteristics and stressors, PTSD/PTSS, and high-risk alcohol and other drug use. Additionally, social support mediates the relationship between stressors, PTSD/PTSS, and high-risk alcohol and other drug use. In addition to mediation, social support is hypothesized to moderate the relationship between stressors and PTSD/PTSS, as well as the relationship between
PTSD/PTSS and high-risk alcohol and other drug use. The constructs of social support and cohesion address the social realm in which the EMT exists and hypothesizes both a mediating and moderating influence on the other constructs within the model. The other construct with similar theoretical linkages to social support deals not with the external environment, but personal resources. The general construct of personal resources describes the internal functions that appraise and manage stressful situations.

**Personal Resources**

**Coping.** The model of stress and coping and control laid out by Folkman (1984) posits that stress is mediated by cognitive appraisal and coping. Stress is not an event but rather an interaction between the person and the environment. Through a process of primary and secondary appraisals, a potentially stressful situation is evaluated and a coping method selected. Appraisal is defined as “the process of evaluating salient dimensions of the stressor event such as threat potential, meaningfulness, predictability and controllability” (Fairbank, Hansen, & Fitterling, 1991, p. 274). In primary appraisal, the individual evaluates the situation and if it is evaluated as stressful, it is considered either as “harm/loss, threat, or challenge” (Folkman, 1984). If something is assessed as having the potential for harm/loss or threat, negative emotions attached to it, whereas something considered a challenge has positive emotions (Folkman, 1984). The primary appraisal is pivotal in deciding which emotions will be attached to the stressful event; depending on personality, some will associate increased stress with a decrease in mood, some will associate increased stress with an increased good mood (DeLongis, Folkman, & Lazarus, 1988; Smith, Haynes, Lazarus, & Pope, 1993)

Once a primary appraisal is complete, a secondary appraisal occurs. In this secondary appraisal, an assessment of the level of control over the situation happens. Perceived controllability dictates what coping mechanisms may be utilized (Folkman, 1984). Coping, as defined by Folkman, has “two major functions: the regulation of emotions or distress (emotion-focused coping) and the management of the problem that is causing the distress (problem-focused coping)” (1984, p. 844). Emotion-focused coping is used more often when a low perceived likelihood of change is perceived and problem-focused coping is used in situations that are viewed as possibly changeable (Folkman, 1984). The methods of coping selected have a significant impact on emotion (Folkman & Lazarus, 1988). If either appraisal or control does not fit the situation, the result will not match expectations and lead to maladaptive outcomes
PTSD has been associated with emotion-focused coping (Fairbank, et al., 1991; LeBlanc, Regehr, Jelley, & Barath, 2008) and those with an emotion-focused problem solving style and external locus of control were found to be more likely to develop PTSD than those with a problem-solving coping style and an internal locus of control (Solomon, Mikulincer, & Avitzur, 1988).

**Locus of control.** A separate yet related aspect of the secondary appraisal involves an individual’s sense of control. Several different aspects of control can influence situation appraisal. First, the general beliefs about control can influence the perception of a situation. Second, cognitive assessments evaluate how much control one has over a specific set of circumstances. Locus of control is a concept developed by Rotter (1966, 1975) and refers to an individual’s belief that events are influenced predominately by internal or external factors. The concept was included in the model laid out by Folkman (1984). Locus of control mediates both the control appraisal and general beliefs about how controllable a situation may be. An internal locus of control refers to a belief that events can be influenced by one’s behavior, whereas an external locus of control reflects a belief that events are not influenced by one's efforts, but rather by “luck, chance, fate, or powerful others” (Folkman, 1984, p. 841). An internal locus of control is considered to be beneficial in some situations, as it has demonstrated associations with problem focused coping and adaptive coping (Peacock & Wong, 1996).

The interaction between appraisal, coping and control is at the heart of Folkman’s theory. If a situation is perceived as potentially changeable, there may be a higher sense of control and more of a focus on problem-solving coping (attempting to change the situation). If a situation is appraised as uncontrollable, there will be less of a sense of control and more emotion-focused coping (accepting the situation and assigning meaning to it). Folkman asserts that in this model, threat and challenge function as mediators. The key is to have cognitive appraisals and a sense of control that accurately reflects the situation. If either appraisal or control does not fit the situation, the result will not match expectations and lead to maladaptive outcomes (Folkman, 1984).

The formulations of coping and locus of control discussed above are useful to a discussion of stress responses in EMTs, as it provides a framework for coping and problem solving that is interactive. An EMT will already have a set of coping skills in place when he or she enters service, and these skills will significantly affect his or her ability to cope with the
stresses associated with the occupation. The model is dynamic; it allows the environment to influence the EMT. To succeed, the EMT will evaluate and adapt their coping mechanisms to try to achieve a dynamic balance with the occupational environment. The idea of threat and challenge appraisal is also useful. EMTs who evaluate situations as a challenge will have positive emotions, reinforcing their sense of proficiency and excitement in the field. EMTs who view situations as a threat will experience negative emotions and may be at risk for developing occupationally related stress reactions. Similarly, an EMT with an internal locus of control may prove more resilient to stress exposure compared a responder with an external locus of control. Finally, the construct allows for maladaptive outcomes, not based on fixed individual characteristics but on the ability to achieve a balance between what the expected outcomes are and what the outcome actually is. Some situations may be uncontrollable and dangerous. In that particular context, a challenge appraisal and problem-solving approach, usually considered protective, would be maladaptive.

Now that the construct of personal resources, including coping and locus of control, has been explicated, it is necessary to discuss the final construct in this adapted stress process model. The moderating characteristics of age, socio-economic status, ethnicity, and gender are in Pearlin’s model, and with a few adaptations are discussed under the umbrella term of social characteristics.

**Social Characteristics**

Pearlin (1989) asserted that stressful experiences are rooted in the social structures surrounding the individual, specifically those structures based on socio-economic factors such as class, ethnicity, gender and age. Following Pearlin’s logic as well as convention, the demographic elements of the stress process model for EMTs include some commonly measured constructs (gender, age, ethnicity, marital status) as well as several which are novel to this model.

The three new elements added to the stress process model are levels of training and years of experience, and hours of work. The reason to consider levels of training important are two-fold, the distinction between levels of training appears in the literature and the distinction is highly relevant to those in the field. The training and expertise of those within EMS is not uniform, various levels of training separate responders into different categories of EMT, each with specific competencies and skill sets. Years of experience in the profession was also
considered important for inclusion as several studies have found the variable to be important in predicting stress responses (Bennett, et al., 2005; Jonsson, et al., 2003; Regehr, Goldberg, & Hughes, 2002). A possibility exists that when this model is tested, age and years of experience will be collinear. When this phenomenon has been observed in the past and investigators chose to eliminate age as a variable (Weiss, et al., 1995). The final new demographic characteristic is hours of work. EMTs work long hours. Seventy two percent of EMTs in a recent study (N=1,379) reported working at least some overtime in the past seven days (Studnek & Fernandez, 2008). These long hours, in addition to years of experience and level of training, may increase vulnerability to stress reactions.

In this formulation of the stress process model, social characteristics have a moderating capacity on stress exposure, social support, and personal coping resources. These characteristics exist prior to the individual entering the field of EMS, and will influence all other elements of the stress process model. Prior research has already established the significant influence of social characteristics on the exposure to stressors (Turner, 2003; Turner & Lloyd, 2004), in perceived social support (Turner & Marino, 1994) and in personal coping resources (Aneshensel, 1992).

Many relationships illustrated in the stress process model may inform future research efforts. The literature has already established that a disturbingly high prevalence of PTSD and posttraumatic stress symptomatology exists among those in the emergency medical services. The etiologies of stress reactions and the factors that may mitigate or exacerbate risk factors have yet to be elucidated to the same extent. This stress process model will guide future research, both contributing to the extant literature and illuminating areas that are currently uninvestigated.

**Elements of the Stress Process Model Integral to this Research Effort**

The entire stress process model is broad enough to inform multiple research efforts. For this initial research into the stress process in EMTs, only the direct relationships between stress exposure and stress outcomes will be tested. This is not to argue that the mediating influences of social support and personal resources are not an integral part of the model. In the interests of proposing a manageable effort, they will not be part of this project. A visual representation of these relationships tested in this effort is in Figure 3.
A more detailed discussion of the extant research on stress reactions in EMS can be found in Chapter 2. Let it briefly be stated that the extant research on the relationship between stress exposure and stress reactions in EMTs is problematic, and the research on stress exposure and high-risk alcohol use in EMTs is virtually non-existent. The elements in Figure 3 were selected because of the need to clarify in early research efforts if these hypothesized relationships exist before it is possible to investigate any possible mediating influences.

Relevance and Importance to Social Work

Several reasons exist why the problem of occupational stress exposure and stress reactions in EMS is both a relevant and appropriate issue for social workers to address. First, it is consistent with the National Association of Social Workers’ [NASW] Code of Ethics (1999). Second, the social work profession has a long history in the field of mental health, and that history equips social workers with the theoretical perspective and expertise to intervene in contemporary mental health concerns. The stress process model echoes theories already in use in the social work field. Finally, as helping professionals, social workers are continually striving to understand the issues that lead to impairment within the social work profession. The body of knowledge about social work stress and impairment continues to develop, so parallel work with other helping professionals like EMTs can inform and improve these intervention and research efforts.

Three of the core values in the NASW Code of Ethics (1999) are the values of service, of dignity and worth of the person, and of the importance of human relationships. As social workers value service in their own work, so must they value and support the service of others. If EMTs
place themselves in harm’s way in the service of others, it falls to the profession of social work to ameliorate to the best of our abilities the harm that service may cause them. The value of dignity and worth of the person charges the social workers to enhance their client’s capacity. A traumatized EMT may be prevented by posttraumatic stress symptoms from operating at their full capacity. The efforts of social work may help mitigate harm that may occur due to posttraumatic stress symptomatology and encourage healing through identification of symptomatology and treatment. Finally and perhaps most importantly, is the emphasis of social work on the great influence human relationships. Social workers “seek to strengthen relationships among people in a purposeful effort to promote, restore, maintain, and enhance the well-being of individuals, families, social groups, organizations, and communities” (National Association of Social Workers [NASW], 1999). If an individual is suffering, so will their families, co-workers, and friends. In fact, research has already identified the negative impact of occupational stress exposure on the families of EMTs (Regehr, 2005).

In addition to the resonance of the NASW Code of Ethics (1999) to the problem of occupationally related stress reactions in EMS, the profession of social work has a long history of working with mental and chemical health issues. As far back as the mid 19th century, advocacy efforts by Dorothea Dix resulted in the establishment of hospitals and lobbying of the federal government to improve the environment and treatment of the mentally ill (Trattner, 1999). As social work developed as a profession, social workers were actively involved in advocating for the mentally ill, as part of the mental hygiene movement of the early 20th century (Moniz & Gorin, 2003) and in the deinstitutionalization movement of the latter half of the century (Kirst-Ashman, 2007). Contemporary social workers continue to be active in mental health issues, both in advocating for laws like the Mental Health Parity Bill (NASW, 2007) and as practitioners. Social workers have a long history of advocating for the improvement of the treatment of the mentally ill; that advocacy has taken the form of legislative lobbying, innovation and improvement in treatment, and educating the larger public about mental illness. As the result of occupational stress exposure is the possible development of mental health issues, including possible alcohol or drug abuse, and social workers have an established expertise in this area, it is entirely appropriate that social workers be involved in efforts to ameliorate any problems faced by emergency medical personnel.
The history and expertise that social workers have in dealing with mental illness make intervention with EMTs who are suffering from PTSD because of their occupational exposure to stress is entirely appropriate. Social workers will be able to work with the individual EMT in a therapeutic way, educate friends, family members, and co-workers about the risks of occupationally related stress exposure, and advocate on a larger scale for institutional changes that may mitigate future negative outcomes. Additionally, social workers can draw on the mental health knowledge base to inform future research efforts, using the body of knowledge accumulated in past research efforts in mental health to develop the most rigorous and relevant research possible. As this research moves forward, social workers can use the newly acquired insights to inform research and intervention in other populations, not only in other emergency responders (police, firefighters), but in other groups exposed to frequent occupationally related stressors (e.g., disaster workers, military personnel).

In addition to the clinical expertise developed by social workers, the stress process model echoes in many ways crisis theory, a theoretical approach that has been identified as useful in social work practice (Falck, 1978; Mackey, 1968). Crisis theory (Caplan, 1961) posits four phases of a crisis reaction. In the first phase, a crisis is recognized, and normal coping mechanisms are utilized to try to overcome the problem. In the second phase, an increase in distress is experienced as normal coping mechanisms fail to work. In the third phase, the increased distress causes the individual to employ new and creative problem solving strategies. In the final phase, if the crisis is not resolved, the individual will experience negative mental heath outcomes due to the inability to overcome the crisis. Not all crises may end negatively; successful resolution of a crisis may potentially promote growth and positive change (Caplan, 1961). The stress process model echoes these principals insofar as it recognizes the stress exposure, which is consistent with the first phase. The second phase of crisis theory is reflected in the hypothesized link between stress exposure and stress reaction, wherein the stress exposure/crisis causes elevated levels of distress. In the third phase, the individual employs problem-solving strategies to try to resolve the crisis, a dynamic included in the theoretical linkages between stress exposure, coping, and stress reactions in the stress process model. Finally, the potentially negative health outcomes are reflected in the hypothesized development of PTSD and high-risk alcohol and other drug use. The consistency of the theoretical
underpinnings of this research and previous social work efforts strengthen the relationship between social work and future research efforts into stress reactions in EMTs.

Finally, social workers, like EMTs, are exposed to a host of occupational stressors. Recent social work investigations into that exposure are contributing to a developing body of knowledge on stress reactions in the helping professions (Siebert, 2003, 2005, 2006). This research is not exclusively the purview of social work (e.g., Einav, et al., 2008; Trinkoff, 1998; Trinkoff, Zhou, Storr, & Soeken, 2000), but the profession is contributing to the growth of the knowledge base in several ways. Social workers are participating in research, developing a deeper understanding of how, when, and where professionals may have negative reactions to occupationally related stress exposures. It is imperative that social workers continue to explore the relationship between stress exposures and stress reactions, both for the health of their own profession, and for the health of other helping professions. Research into stress exposures and stress reactions in EMTs may both compliment and enhance that research by helping to identify possible relationships between relevant constructs and assess the degree to which the experiences of social workers may differ or be the same as EMTs.

The work of exploring occupational stress exposures and stress reaction is social work because social work has a history of and expertise in advocacy, education, and intervention at multiple levels to draw on, as well as bodies of knowledge in both mental health and professional impairment. This is social work because EMTs and the people surrounding them will benefit from a deeper knowledge of the risks associated with the professions. A greater understanding of the influences surrounding stress reactions will alleviate suffering in individuals and their families, as well as aid in development of evidence-based empirically validated interventions to prevent and mitigate negative reactions to occupationally related stress exposure. Finally, this is social work because all of these objectives are consistent with goals of the profession of social work, as stated in the NASW Code of Ethics.
This chapter will begin with a brief discussion of the demographic characteristics of EMTs, followed by a critique of the extant literature relevant to stress exposure and stress reactions in EMTs. This critique structures research relevant to each of the constructs in the stress process model together, so that the research involving stress exposure and stress reactions, alcohol and other drug use are considered in aggregate. Finally research questions and hypotheses, drawn from the theoretical and empirical literature, will be posited as a guide for formulating future research efforts.

**Characteristics of the Population**

Describing the demographic characteristics of emergency medical responders is challenging because the regulation of emergency medical services occurs at the state level, making national statistics scarce. The best data source is the National Registry of EMTs (NREMT), a non-profit organization founded in 1971. The NREMT develops curriculum and testing standards and encourages reciprocity between state based regulatory agencies. Forty-four states use the NREMT as the primary source for competency testing and certification. In 2007, NREMT had 196,392 EMT-Basics, 15,477 EMT-Intermediates, and 62,940 EMT-Paramedics registered (National Registry of EMTs [NREMT], 2007). Further demographic details in data are found in the NREMT sponsored Longitudinal Emergency Medical Technician Attribute and Demographic Study (LEADS). While dated and incomplete (EMT-Intermediates are not included), Table 1 illustrates demographic data collected in 1998 (Brown, Dickison, Misselbeck, & Levine, 2002).

<table>
<thead>
<tr>
<th></th>
<th>EMT-Basic</th>
<th>EMT-Paramedic</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>880</td>
<td>910</td>
</tr>
<tr>
<td>Gender (male)</td>
<td>71.2%</td>
<td>69%</td>
</tr>
<tr>
<td>Average age</td>
<td>34.9</td>
<td>35.1</td>
</tr>
</tbody>
</table>

Table 1: 1998 LEADS Demographic Data
Table 1: 1998 LEADS Demographic Data (continued)

<table>
<thead>
<tr>
<th></th>
<th>EMT-Basic</th>
<th>EMT-Paramedic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=880</td>
<td>n=910</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>90.2%</td>
<td>92.3%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>3.5%</td>
<td>2.8%</td>
</tr>
<tr>
<td>Native American</td>
<td>2.8%</td>
<td>1.5%</td>
</tr>
<tr>
<td>African American</td>
<td>2.7%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Asian/Hawaiian/Pacific Islander</td>
<td>1.4%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>56.3%</td>
<td>61.6%</td>
</tr>
<tr>
<td>Single</td>
<td>28%</td>
<td>20.9%</td>
</tr>
<tr>
<td>Divorced/Separated/Widowed</td>
<td>11.3%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Unmarried couple</td>
<td>4.3%</td>
<td>4.9%</td>
</tr>
</tbody>
</table>

Updated demographic data from 2006 shows that while the profession is becoming more ethnically diverse, gender ratios and average age of responders remains similar (NREMT, 2006).

Table 2: 2006 LEADS Demographic Data

<table>
<thead>
<tr>
<th></th>
<th>EMT-Basic</th>
<th>EMT-Paramedic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (male)</td>
<td>64.8%</td>
<td>73%</td>
</tr>
<tr>
<td>Average age</td>
<td>36.5</td>
<td>35.1</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>76%</td>
<td>77.7%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>10.8%</td>
<td>10.6%</td>
</tr>
<tr>
<td>Native American</td>
<td>&lt;1.0%</td>
<td>1.3%</td>
</tr>
</tbody>
</table>
Table 2: 2006 LEADS Demographic Data (continued)

<table>
<thead>
<tr>
<th></th>
<th>EMT-Basic</th>
<th>EMT-Paramedic</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td>8.4%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Asian/Hawaiian/Pacific Islander</td>
<td>2.4%</td>
<td>2.7%</td>
</tr>
</tbody>
</table>

While the demographic data for the EMT population are sparse, it is useful to discuss what data are available as it provides the best possible estimate about the demographic characteristics of the population. Knowing the characteristics of a population are important for reasons relating to methodological issues in research. While methodology is discussed in depth in Chapter 3, it may be briefly noted that having demographic data available is critical when assembling a sampling frame prior to data collection and testing the representativeness of the sample to the entire population of EMTs after data collection. Knowing the characteristics of a population is only one step in the process of designing rigorous research. A thorough and critical review of the extant literature can also improve future efforts by providing examples of both the successes and failures of previous research.

**Current Research in Stress Exposure and Stress Reactions in EMS**

As discussed earlier, extant literature has examined the phenomenon of occupationally related stress exposure and stress reactions in EMS. This literature is of variable quality and rigor. To avoid mistakes of the past, as well as learn what strategies have succeeded, the quality of the studies explicitly examining occupationally related stress exposure and stress reactions were evaluated for quality in design, sampling strategies, measurement, and analytic techniques. The goal of this evaluation is both a scholarly critique and to inform future research efforts in this area. This critique will be structured to follow the stress process model; articles addressing each of the constructs in the model will be considered together.

To identify appropriate scholarly articles, the following search terms were utilized: emergency medical technician (EMT), emergency medical service (EMS), paramedic, paramedical personnel, first responder, stress, stressor, occupation, occupational hazard, occupational risk, injury, trauma, PTSD, morbidity, mortality, assault, alcohol, alcoholism, drug abuse, chemical dependence, measurement, measures, evaluation, and outcome. Databases that were utilized in this search include Medline (PubMed), PsychInfo, Cambridge Scientific
Abstracts (CSA), Articles First/WorldCat and Google Scholar. To be included, studies had to meet several criteria. First, the study must have EMTs as their subjects. Studies that dealt with firefighters, police officers, and other emergency responders were not included. Studies where there was no clear delineation of occupational status were not included. Articles that include firefighters and other emergency responders were included if EMTs were considered and analyzed as a discrete group.

**Occupationally Related Stress Reactions in EMS**

Evaluating the empirical literature dealing with occupationally related stress reactions involves two related streams of literature, research efforts examining the type and frequency of stress exposures as well as those examining the types and severity of stress reactions in EMTs. Because of the importance this literature in informing the structure of future research efforts, the articles have been evaluated within the context of the different elements of research design. Studies that serve as either notably strong or weak examples an element of research methodology are highlighted as part of the overall critique.

**Evaluation of study design.** In 1996, Boudreaux and Mandry conducted a systematic research synthesis of the studies of EMS stress. On the topic of study design, the authors wrote, another major limitation concerns the proliferation of retrospective, cross-sectional, self-report designs. Although these studies represent an important initial step in the exploration of EMT stress, such designs are susceptible to confounding factors such as recall inaccuracy or bias, response bias, and experimenter demand. In addition, such designs do not account for changes over time or individual differences that may be crucial to understanding EMT stress. (1996b, p. 300)

As far as study design in EMS research, it would seem that the problems identified by Boudreaux and Mandry have persisted over the past thirteen years with few exceptions. The vast majority of studies reviewed used a non-experimental, cross-sectional design. The best overall example is a study looking at PTSD in Swedish ambulance personnel (Jonsson, et al., 2003). In this study, the authors wanted to assess for prevalence rates of PTSD as well as the relationship between posttraumatic symptomatology and another theoretical construct of interest, sense of coherence (Antonovsky, 1987). The construct of “sense of coherence” posits that a difference exists in rates of illness after a traumatic event, and that difference is related to a capacity to endure because of a “dynamic feeling of confidence” (Jonsson, et al., 2003, p. 80). Researchers
found a 15.2% prevalence rate for PTSD and another 12.1% with a “strong” but sub-clinical reaction and note that lifetime prevalence of PTSD in their community is 1%. The authors also found a strong statistical relationship ($p \geq 0.001$) between PTSD symptomatology and a low “sense of coherence” score, a finding that may support the hypothesized relationship between personal resources and PTSD in the stress process model.

This study is the strongest example of cross-sectional research for several reasons. First, the authors articulated a theoretical context and rationale for their research, providing the reader with an explanation of their thinking and how the empirical evidence collected may relate back to the theoretical underpinnings of the research. Secondly, all personnel in one ambulance service made up the sampling frame, the sample was large ($N=362$), allowing for significant power for analysis and a respectable response rate of 72.4 percent. The authors chose to use the Impact of Event Scale (IES) (Horowitz, Wilner, & Alvarez, 1979), a measure which has been validated in multiple populations, is cited in 3268 studies as of April 27, 2009 according to Google Scholar, and used frequently in EMS research. The only problem with this article is that the authors do not articulate the evidence of the psychometric strength of their selected measures. The authors use appropriate statistical methods for their analyses and conclude with a thoughtful discussion of their results in relationship to the theoretical rationale for the study and implications for future research. This study is without obvious flaws; it had a large sample, good response rate, used previously validated measures, acceptable analyses and discussion, making it a good example of cross-sectional research in occupational stress exposure and stress reactions in EMTs.

Only two of studies reviewed did not utilize a non-experimental, cross-sectional design. One was longitudinal (van der Ploeg & Kleber, 2003), another utilized a quasi-experimental design, comparing three different populations of emergency responders (Marmar, et al., 1996). These two studies offer evidence that designs other than cross-sectional designs can be used successfully in EMS. The longitudinal study conducted by van der Ploeg and Kleber (2003) measured acute stressors, chronic stressors, and health symptoms including PTSD, burnout, and fatigue in EMTs ($N=132$) twice at a one-year interval, assessing the relationship between the types of stressors and health outcomes. This study found that while exposure to acutely stressful events was significantly associated to PTSD, it was not predictive of health symptoms one year later. Rather, perception of work as emotionally stressful and chronic stressors like poor social
support from co-workers and supervisors as well as poor communication and previous symptomatology predicted PTSD. The authors note that health symptoms appear to be stable over time, and so may be caused not only by the acute stress of being exposed to a critical incident, but to chronic stress as well.

The quasi-experimental study done by Marmar et al. (1996) compared three groups of first responders (N=493), to assess what the impact of exposure to a major disaster might be. The groups included those who had responded an interstate collapse due to a major earthquake (n=198), those in the same geographic area that had not responded to the disaster (n=140) and a control group of responders from another city (n=101). This quasi-experiment used a post-test only design with multiple cohort controls. The groups not involved in the freeway collapse reported on another incident that was distressing to them. This study found that despite exposure to the trauma of the earthquake and higher reported distress levels at the time of the incident, current symptom levels were consistent across all three groups. The authors speculated that “the dramatic nature of the control incidents reflects the difficulties faced by emergency services personnel in the line of routine work, let alone at times of larger scale disasters” (Marmar, et al., 1996, p. 79).

The strength of these two studies lies not only in their design, but also in the explanatory power of the research because of the design choices. In the case of van der Ploeg and Kleber (2003), the longitudinal design was able to illustrate that both acute and chronic stressors contributed to negative health outcomes. In the case of Marmar et al. (1996), the use of control groups was essential to demonstrate that in at least one instance, response to a freeway collapse did not contribute to posttraumatic symptomatology any more than other critical incident stressors. The use of these experimental designs provides more compelling evidence than a cross sectional study, as symptomatology is assessed over time and in comparison to other groups. While it is encouraging to know that more rigorous research designs have been used in EMS research, it could be argued that two studies do not demonstrate a concerted effort by the research community to conduct more rigorous research in the field.

**Qualitative and mixed-method studies.** When discussing research design, it must be noted that a several qualitative and mixed-method (a combination of qualitative and quantitative methods) studies can be found in the literature (Freedman, 2004; Gallagher & McGilloway, 2008; Patterson, Probst, Leith, Corwin, & Powell, 2005; Regehr, 2005; Regehr, Goldberg, &
Hughes, 2002). These studies enrich the body of literature on stress exposure and stress reactions in EMTs by adding the strength of a narrative personal experience to the relationships already observed in the empirical literature. In the mixed-method studies, the themes described in the qualitative elements are used to enhance quantitative findings. For example, Regehr et al. (2002) uses the narratives offered by EMTs about exposure to critical events as a way to create a more compelling narrative about why rates of traumatic symptomatology are high. To the extent possible, the quantitative portions of the mixed mode studies have been included in the critique. The methodology involved in qualitative research is substantially different from quantitative research, and an adequate description of that methodology would exceed the scope of this effort.

**Population and sampling strategies.** Several issues have emerged regarding the population in general and the specific sampling techniques that have been utilized in past EMS research. First, the literature is dominated by foreign studies. Of the eighteen identified empirical articles examining stress reactions, only five were generated by researchers in the United States (Beaton, et al., 1998; Beaton, et al., 1996; Beaton, et al., 1997; Grevin, 1996; Marmar, et al., 1996). The rest of the articles originated in the United Kingdom (Alexander & Klein, 2001; Bennett, et al., 2005; Clohessy & Ehlers, 1999; Young & Cooper, 1997), the Netherlands (van der Ploeg & Kleber, 2003), Australia (Brough, 2005; Lowery & Stokes, 2005), Sweden (Jonsson, et al., 2003; Suserud, et al., 2002), Norway (Sterud, Erlend, Ekeberg, & Lau, 2007), Brazil (Berger, et al., 2007) and Canada (Regehr, Goldberg, & Hughes, 2002; Regehr, et al., 2003). Given the diversity of nationalities represented, it is difficult to state with certainty that the different levels of EMT that exist in the United States have equivalence in other nations. Indeed, while some studies specifically use the language “EMT” and “paramedic,” other authors refer to their subjects as ambulance personnel or ambulance service employees. While concern exists about the language used to describe the occupation, it remains clear that the primary occupational activity is responding medically to the seriously ill or injured.

It is unclear as to why so little research into stress exposure and stress reactions in EMS originates in the United States. The dearth of studies may be related to inadequate access to funding; three of the five American studies were supported by the same federal grant. Beyond federal funding, other EMS related research grants available through professional organizations are relatively small ($2500-5000) (Journal of Emergency Medical Services [JEMS], 2008; National Association of EMTs [NAEMT], 2008), making them unappealing to researchers.
Another possibility is that there may be a lack of support from professional organizations and regulatory bodies for this work. The lack of support from those in EMS may be related to a reluctance to “air the dirty laundry” by examining the mental and chemical health of their EMTs, making access difficult for researchers.

Beyond the geographic origins of the research, concerns exist about the way researchers obtained their samples. The majority of studies used purposive sampling. The studies reviewed used a number of different purposive approaches for gathering their sample (generally the entire population of EMS workers at a selected service site). While purposive sampling is an effective way to identify research subjects, the recommendation for the best possible sampling techniques continues to be probability sampling (Shadish, Cook, & Campbell, 2002), as probability samples may generate data that can be generalized to an entire population. The fact that one study (van der Ploeg & Kleber, 2003) was able to use probability sampling techniques, not with individuals, but within ambulance services from the entire population of services in the Netherlands, demonstrates that it is possible to move closer towards that sampling ideal.

Often, access to a study population is one of challenges of research. In EMS, where the paramilitary structure engenders a suspiciousness of outsiders, access is potentially problematic. The predominance of the use of purposive sampling in EMS research may be because researchers use the samples to which they have access. This access may be easier to obtain when particular EMS services are willing to cooperate with research efforts. The use of discrete EMS services provides a sample, but not one that could be considered representative of all EMTs. Creating a representative sample may not have been the goal. In the articles reviewed for this effort, it appears that the use of purposive sampling techniques was adequate to test the hypotheses posited by the researchers; hypotheses related to either symptomatology prevalence or correlation between stressors and stress reactions. While the use of purposive sampling appears to have met the needs of past research efforts, future research efforts should focus on improving the quality of the samples by using probability sampling.

**Evaluation of data collection.** In addition to variation in sampling methodology, methods utilized for data collection took several different paths. Seven studies gathered data through surveys delivered through the postal service. Five studies used an intermediary (agency contact, internal mail service), three studies did not discuss how they obtained their sample, and three studies approached their subjects directly. All the studies utilized some form of self-report
instrument for data collection. Sample sizes ranged from over 2000 to as few as 42. Survey response rates vary, generally falling in the 50-70% range, with the highest response rate at 92% and the lowest at 24%. Four studies did not discuss the rate of response. None of the studies reviewed included a discussion of the characteristics of non-responders or follow-up with non-responders.

This variation in survey administration methodology may have influenced response rates. Current recommendations by the Institute for Education Sciences for response rates for longitudinal surveys are at least 70%, with following waves at least 90% response rate. For cross-sectional surveys, response rates should be at least 85% at every wave (Institute of Education Sciences, 2007). While these recommendations are rigorous and provide a target response rate for researchers, actual response rates vary widely. A meta-analysis of over 1000 surveys found an average response rate when data were collected from individuals of 53% with a standard deviation of 20% (Baruch & Holtom, 2008). Response rates may be artificially skewed upwards, as many surveys with low response rates may not be published. In the studies reviewed for this effort, only two studies had a response rate over 80% (Berger, et al., 2007; Suserud, et al., 2002). As seen in Table 3, it would appear that with some exceptions response rates appear to be within the 50-70% on a reasonably consistent basis.

Table 3: EMS Studies by Type and Response Rate

<table>
<thead>
<tr>
<th>Type of study</th>
<th>n</th>
<th>(response rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Alexander &amp; Klein, 2001)</td>
<td>110</td>
<td>(69%)</td>
</tr>
<tr>
<td>(Beaton, et al., 1996)</td>
<td>2050</td>
<td>(50%)</td>
</tr>
<tr>
<td>(Beaton, et al., 1997)</td>
<td>2050</td>
<td>(50%)</td>
</tr>
<tr>
<td>(Beaton, et al., 1998)</td>
<td>173</td>
<td>N/R</td>
</tr>
<tr>
<td>(Bennett, et al., 2005)</td>
<td>617</td>
<td>(60%)</td>
</tr>
</tbody>
</table>
Table 3: EMS Studies by Type and Response Rate (continued)

<table>
<thead>
<tr>
<th>Study Reference</th>
<th>Type of Sample</th>
<th>Sample Methodology</th>
<th>Sample Size (n)</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Berger, et al., 2007)</td>
<td>Purposive</td>
<td>Cross-sectional</td>
<td>234</td>
<td>(88%)</td>
</tr>
<tr>
<td>(Brough, 2005)</td>
<td>Purposive</td>
<td>Cross-sectional</td>
<td>119</td>
<td>(24%)</td>
</tr>
<tr>
<td>(Clohessy &amp; Ehlers, 1999)</td>
<td>Purposive</td>
<td>Cross-sectional</td>
<td>56</td>
<td>(57%)</td>
</tr>
<tr>
<td>(Grevin, 1996)</td>
<td>Purposive</td>
<td>Cross-sectional</td>
<td>225</td>
<td>N/R</td>
</tr>
<tr>
<td>(Jonsson, et al., 2003)</td>
<td>Purposive</td>
<td>Cross-sectional</td>
<td>362</td>
<td>(72%)</td>
</tr>
<tr>
<td>(Lowery &amp; Stokes, 2005)</td>
<td>Purposive</td>
<td>Cross-sectional</td>
<td>42</td>
<td>(57%)</td>
</tr>
<tr>
<td>(Marmar, et al., 1996)</td>
<td>Purposive</td>
<td>Quasi-experimental</td>
<td>439</td>
<td>N/R</td>
</tr>
<tr>
<td>(Regehr, Goldberg, &amp; Hughes, 2002)</td>
<td>Purposive</td>
<td>Cross-sectional</td>
<td>86</td>
<td>N/R</td>
</tr>
<tr>
<td>(Regehr, et al., 2003)</td>
<td>Purposive</td>
<td>Cross-sectional</td>
<td>264</td>
<td>N/R</td>
</tr>
<tr>
<td>(Sterud, et al., 2007)</td>
<td>Purposive</td>
<td>Cross-sectional</td>
<td>1286</td>
<td>(41%)</td>
</tr>
<tr>
<td>(Suserud, et al., 2002)</td>
<td>Purposive</td>
<td>Cross-sectional</td>
<td>61</td>
<td>(92%)</td>
</tr>
<tr>
<td>(van der Ploeg &amp; Kleber, 2003)</td>
<td>Probability</td>
<td>Longitudinal</td>
<td>221</td>
<td>(56%)</td>
</tr>
<tr>
<td>(Ward, et al., 2006)</td>
<td>Purposive</td>
<td>Cross-sectional</td>
<td>1099</td>
<td>28%</td>
</tr>
<tr>
<td>(Young &amp; Cooper, 1997)</td>
<td>Purposive</td>
<td>Cross-sectional</td>
<td>427</td>
<td>27%</td>
</tr>
</tbody>
</table>
When considering data collection techniques, it is important to consider not only the response rate, but also the impact of the data collection technique on the responses themselves. As an example, Suserud et al. (2002) had an impressive response rate of 92%, by far the best of the studied reviewed. Yet in describing their methodology, they discussed appointing a “contact person” from within the service. This contact person had a list of who had responded to the survey and who had not, approaching non-responders twice with reminders. This methodology, while resulting in a high rate of response, is problematic primarily because the use of a “contact person” known to the subjects places a significant amount of social pressure on the individual to respond. Especially in situations that may potentially involve sensitive questions, the subject may respond to the survey because of pressure from their peer rather than a sincere desire to participate in the research. This social pressure may skew results and invalidate any data collected.

Other studies provide a better model for data collection. Bennett et al. (2005) used anonymous mailed surveys with follow up contacts to achieve a response rate of 60%. Alexander and Klein (2001) used extensive pre-survey promotion to raise awareness about the research through personal visits to the stations, posted notices, and soliciting the support of union officials to obtain a response rate of 69%. Both the use of anonymous mailed surveys with follow up contacts and pre-survey contact are consistent with current recommendations for optimizing survey research while preventing the introduction of bias (Dillman, 2007; Edwards, et al., 2007). The Suserud et al. (2002) study is instructive insofar as it illustrates that a high response rate is only useful if the techniques used to obtain it did not introduce bias unnecessarily. It is preferable to use data collection methods that preserve anonymity and reduce bias, even if the result is a slightly lower response rate. Even with a lower response rate, the result will be data that reflects more accurately the health of the population.

Evaluation of measurement. In the selection of measurement instruments, three major issues present themselves. The first issue involves the panoply of measures utilized in the studies, the second involves the variable use of standardized measures, and the third involves the control of bias.
The measures utilized to assess symptomatology in these studies varied widely; in assessing stress reactions in EMTs, only three of the thirty measures used appear in multiple research efforts. The Impact of Events Scale (IES) (Horowitz, et al., 1979) was used in six studies (Alexander & Klein, 2001; Berger, et al., 2007; Jonsson, et al., 2003; Marmar, et al., 1996; Regehr, Goldberg, & Hughes, 2002; Regehr, et al., 2003). The Beck Depression Inventory (BDI) (Beck, Steer, & Garbin, 1988) was used in two studies (Regehr, Goldberg, & Hughes, 2002; Regehr, et al., 2003), and the General Health Questionnaire (GHQ) (Goldberg & Hillier, 1979) was used twice (Alexander & Klein, 2001; Clohessy & Ehlers, 1999). Some of the replication in measurement use is due to multiple publications by the same researchers.

The vast array of measurement tools utilized in these studies and the disparate descriptions of the findings make it difficult to ascertain in more than a basic way what commonalities may exist. Different measures may assess the same construct (e.g., PTSD) differently and so even though the construct is the same, the findings may be different. For example, as discussed in Chapter 1, posttraumatic stress symptomatology is described differently in four studies, as “high” (Alexander & Klein, 2001), as “severe” (Regehr, Goldberg, & Hughes, 2002), as “severe or high” (Regehr, et al., 2003), and as “partial PTSD” (Berger, et al., 2007). This lack of clarity makes it difficult to state with any degree of certainty how comparable the results may be. It is possible to observe that symptoms falling under the general umbrella of PTSD are occurring at varying rates, but the lack of consistency in measurement makes any further conclusions about the mental health of EMTs problematic.

In addition to the problems associated with the use of different measures, the degree to which researchers utilized standardized measures was variable. Standardized measures are those that have proved to be both valid and reliable in previous studies. A number of criteria may be used to assess if a measure is considered valid. The convention of research is to offer Cronbach’s coefficient alpha scores (Cronbach, 1951). In fact, the coefficient alpha score only offers evidence of reliability, not validity. A discussion of the problematic nature of the coefficient alpha as exclusive evidence of validity can be found in Chapter 3. As an example, of studies looking explicitly at PTSD symptomatology, nine reported a coefficient alpha score. Only four studies reported alphas from their own data and one reported alphas both from their data and from the initial scale validation (Lowery & Stokes, 2005), the rest relied on the original psychometric research for the alpha coefficient. Four studies did not report coefficient alphas at
This is problematic, as no guarantees exist that because an instrument had an acceptable alpha in the initial validation, it will be working as reliably in the current study population. Without reporting the coefficient alpha for each study population, it is difficult to assert that the measure is reliably capturing what the researchers are hoping to measure in the target population. While an optimal discussion of measures would include consideration of multiple elements of validity, the Lowery and Stokes (2005) article is the best example in this research stream because of the inclusion of evidence of both initial scale reliability and reliability in the study population.

A final measurement concern lies in the vulnerability to biases. Surveys are retrospective, and vulnerable to recall bias (Coughlin, 1990). Surveys rely on self-report, which can lead to potential problems with social desirability bias (Nederhof, 1984; Paulhus, 1991). None of the studies examined included a discussion of controls for either recall bias or social desirability bias.

**Evaluation of analyses.** In considering analysis, it is important to note that the level of sophistication in analytic technique varied substantially among the studies. Studies ranged from using only bivariate statistics like t-tests (Jonsson, et al., 2003) to more sophisticated techniques like path analysis (Lowery & Stokes, 2005) and multiple analysis of variance (MANOVA) (van der Ploeg & Kleber, 2003).

In analysis, several types of validity need to be of concern to researchers. Statistical conclusion validity, (Shadish, et al., 2002) is especially important in analysis. Several aspects of statistical conclusion validity are relevant to this effort. To guard against Type I error, alpha (α), also known as the p-value, is generally set at 0.5 and against Type II error, beta (β), is set at 0.2. It appears that in this arena, consistent attention is shown. All of the studies reported either p-values or the corresponding t-value for their dependent variables as evidence of significant findings. A statistically significant finding may be an artifact of the data, so it is incumbent on a researcher to not only demonstrate significant difference, but the strength of the association between variables.

The approaches to analysis diverge widely at this point. Some studies chose to report correlation coefficients (r, $R^2$). Correlation coefficients can be used to demonstrate the strength of association between variables as well as the total variance explained by the model (Chen & Krauss, 2003). Some variety of correlation coefficient is reported in five studies (Alexander &
Klein, 2001; Bennett, et al., 2005; Clohessy & Ehlers, 1999; Lowery & Stokes, 2005; van der Ploeg & Kleber, 2003). Other studies used forms of regression (Bennett, et al., 2005; Clohessy & Ehlers, 1999; Grevin, 1996), analysis of variance (ANOVA) (Marmar, et al., 1996; van der Ploeg & Kleber, 2003) or path analysis (Lowery & Stokes, 2005) to assess for the relative strength of their findings.

As the sophistication of the studies varies, so does the complexity of the analytic techniques. Generally, the analytic techniques selected by the researchers fit the needs of the study with three exceptions. Lowery & Stokes used path analysis to try to ascertain the relationship between PTSD and trauma-related symptomatology with three predictor variables. The model estimated 10 parameters. The entire sample size was $N=42$. This is quite problematic, as it is recommended that 10 times as many cases as parameters and 5 times or less is insufficient for significance testing of model effects (Kline, 1998). According to these recommendations, to test the parameters adequately, the researchers would need an absolute minimum of 50 cases. The inadequate number of cases makes any analytic conclusions reached problematical. A second analytic problem exists in the Suserud et al. (2002) study, where the authors reported their findings in mean scores and percentages, with no discussion of the presence or absence of statistical significance in their findings. The authors present basic prevalence rates, but the lack of any sophisticated analyses makes answering the “so what?” question difficult. A final, more minor error was made in the use of a chi-square analysis on a continuous variable (Alexander & Klein, 2001). With these three exceptions, analysis appears to be a relative strength in this literature. One particular strength was a decision to include a discussion of the rationale for analytic approach (Marmar, et al., 1996). The articulation of why researchers chose particular tests eliminates any guesswork by a reader and contributes to an overall goal of transparency in research.

Beyond the statistics used to analyze data is consideration of power. A detailed description of power can be found in Chapter 3, but for purposes of contextualizing a critique, power is the ability to detect effect changes in a population. The power of an analysis depends a great deal on the size of the sample, and sample sizes varied dramatically. Two publications resulting from one research effort (Beaton, et al., 1996; Beaton, et al., 1997) had a sampling frame of over 4000 individuals and a final $N$ of over 2000. Other studies (Clohessy & Ehlers, 1999; Lowery & Stokes, 2005; Suserud, et al., 2002) had under 100 participants. For these three
studies, the low N would make statistical power questionable. The problems with the Lowery & Stokes (2005) and Suserud et al (2002) articles have already been discussed above. The Clohessy & Ehlers (1999) study relied on correlation to test relationships between variables, and so the appropriate statistic to indicate effect size is r. The authors did report r-values along with p values, although they did not comment on the size of the effects they detected. Commenting on the effect size would be beneficial, as it cannot be assumed that a reader will understand the meaning of an r statistic without some explication by the author.

A final analytic concern is the possible violation of assumptions for parametric statistical tests. None of these studies discussed the assumptions behind their chosen statistical tests for statistical significance. This may be neither reasonable nor desirable, especially considering the space limitations so often found in journals, yet the violation of statistical assumptions is a threat to validity and hence warrants mention.

**High-risk Alcohol and Other Drug Use**

As noted in Chapter 1, a dearth of research exists pertaining to what the prevalence of high-risk alcohol and other drug use in the emergency medical services may be. Thus far, only four studies (Pirallo, et al., 2005; Regehr, Goldberg, & Hughes, 2002; Sterud, et al., 2007; Ward, et al., 2006) have been identified that examine the issue at all, and all studies have significant weaknesses. Regehr et al (2002) used a convenience sample (N=86) Canadian paramedics and asked respondents if they had problems with alcohol or drug use before and after occupational traumatic exposure, finding 1.2% of respondents reported problems with alcohol prior to exposure, and 11.6% reported problems after exposure. No changes were noted in problematic drug use prior to and after traumatic exposure in that population. The authors do not posit any reasons for the findings, nor is there any statistical testing to assess if the difference in alcohol use before and after traumatic exposure is significant. A possible explanation for the difference in alcohol abuse vs. drug use may be in the accessibility of alcohol and the social nature of drinking. As discussed in Chapter 1, a strong norm of drinking either at work or after a shift and a culture of acceptance of drinking alcohol has been identified among police officers, and anecdotal evidence suggests this is also true for EMTs. If a cultural tendency exists towards alcohol use in response to stressful events, it is reasonable to assume that levels of alcohol consumption would increase after exposure to a traumatic event. The failure to observe changes in drug use may be the result of the relatively small size of the sample and comparatively lower
rates of drug abuse vs. alcohol abuse. In the United States, 8.5% of the general population are at risk for alcohol abuse or dependence, whereas, only 2% are at risk for drug abuse (Grant, Stinson, et al., 2004). Given the relatively lower risk for drug abuse, the sample may have been small enough to fail to detect any changes drug use as a response to traumatic exposure.

Ward, Lombard, & Gwebushe (2006) surveyed six different types of emergency responders (public/private and volunteer ambulance personnel, firefighters, police officers, sea rescue and defense personnel) and among all six groups had a 30% response rate ($N = 1099$). They assessed exposure to critical incidents, general psychopathology, and alcohol use using the CAGE questionnaire (Ewing, 1984). The CAGE questionnaire is widely used, and has demonstrated acceptable reliability and validity, yet it is not without its limitations and has not performed equally in all populations (Dhalla & Kopec, 2007; Maisto & Saitz, 2003). The authors reported 22.5% of public and private personnel reported problem drinking, as well as 8% of volunteer ambulance personnel. No significant relationship existed between the rates of problematic drinking and either the level of critical incident exposure or general levels psychopathology. Additionally, the levels of problematic drinking reported by the ambulance personnel were not significantly different from the other emergency responders or from the population as a whole. In the general, in the population of South Africa, using the CAGE questionnaire, 27.6% of men report problem drinking and 9.9% of women (World Health Organization [WHO], 2004). In fact, the low reported rate of problem drinking among volunteer ambulance personnel may not be related at all to prevalence rates, but to problems the researchers had with low sampling rates in that subset of their overall sample.

Sterud et al (2007) surveyed the entire population of ambulance personnel in Norway, assessing occupational stress with the Job Stress Survey (Vagg & Spielberger, 1998) and alcohol use using the AUDIT (Saunders, et al., 1993). Using supervisors to distribute surveys, they ended up with a 41 percent response rate ($n = 1096$). In Norwegian ambulance personnel, 18.8 percent of men and 10.7 percent of women were found to be at risk for hazardous drinking. While the authors did not find that general job related stress was related to alcohol use, they note, “this does not rule out the possibility that more specific job stressors related to ambulance and police work might be associated with more alcohol related problems and consumption” (Sterud, et al., 2007, p. 903). The authors also note that no normative data about alcohol use in the general Norwegian population is available for comparison with their findings.
Finally, the Pirrallo, Levine, & Dickison (2005) studied EMTs in the United States, achieving a 36% response rate ($N=361$). To assess for problems with alcohol consumption, researchers used questions “modeled after” the CDC Behavioral Risk Factor Surveillance System questionnaire (National Center for Chronic Disease Prevention and Health Promotion, 2002), asking about average number of drinks consumed per day. EMTs reported drinking 1.77 alcoholic drinks per day, and the general population consumed 1.75 drinks per day. The differences in alcohol consumption in EMTs compared to a nationally representative sample of the general population were non-significant.

These four studies are all problematic due to issues with sampling and measurement. The use of convenience sampling by Regehr et al. makes generalizing to a larger population impossible as does the low response rate reported by the other two studies. Low response rates make it difficult to assert significant differences between responders and non-responders. Additionally, the use of non-standardized measures by Regehr et al. and Pirrallo et al. make it difficult to compare findings to other research in a rigorous way. The use of the CAGE questionnaire by Ward et al. and the use of the AUDIT by Sterud et al. are useful, as they have been widely used. Their findings offer perhaps the best the most reliable evidence of problems with alcohol consumption among emergency medical responders. However the Ward et al. study occurred in South Africa and the Sterud et al. study was conducted in Norway, so there may be social and cultural differences, including the high rate of alcohol use endemic in the South African population, that make generalizing to the population of emergency medical responders in the United States problematic.

Because the literature on alcohol and drug use in EMTs is so scarce and problematic, it is necessary to look to parallel literature for models of well-done research. As noted in Chapter 1, strong studies in both the police and fire literature that may serve as models for future research with EMTs. In police, the cross-sectional Australian studies (Davey, et al., 2000; Davey, et al., 2001) used large $N$s, had a respectable response rate, and used previously validated measures to produce rigorous investigations into rates of alcohol consumption. Given the success with which the Alcohol Use Disorders Identification Test (AUDIT) (Saunders, et al., 1993) was used in this population, the fact that it is only ten questions long, and that it more successfully identified heavy drinking than the CAGE questionnaire (Bradley, Bush, et al., 1998), it is a good tool for this research. For different reasons, the longitudinal research into alcohol use in firefighters may
also be useful in informing future research into alcohol use in EMTs (e.g., Murphy, et al., 1999). The longitudinal design allowed researchers to assess what factors may have a predictive relationship to subsequent stress reactions. Similar research would be valuable in EMTs, as it may be possible to establish a temporal relationship between the elements of the stress process model.

Given the current state of research into occupational stress exposure and stress reactions in EMS, it is critical to assess where future research efforts should be focused. Using the stress process model as a theoretical base, hypotheses are described that explicate the relationships between alcohol use, posttraumatic stress symptomatology, occupational stress exposure, and the demographic characteristics of the EMT.

Specific Aims: Research Questions and Hypotheses

Of the gaps in the extant literature, the lack of information on high-risk alcohol and drug use and abuse is perhaps the most troubling. Given the extent to which society relies on EMTs to respond to crises, it is surprising that so few efforts have been made to investigate the extent to which those EMTs may or may not be impaired. This and future research efforts must elucidate this issue as well as investigate to what relationship alcohol abuse has with occupationally related stress exposure and stress reactions. The research question for this research is, “what relationship do the elements in the stress process model have to occupational stress exposure, stress reactions, and high-risk alcohol and other drug use in EMTs?” Reflecting the larger research question, as well as the relationships identified as important for this research effort in Chapter 1, Figure 3, hypotheses tested in this research effort are,

(H1) There will be a positive association between levels of occupationally related stress and high-risk alcohol use in EMTs
(H2) There will be a positive association between posttraumatic stress symptomatology and high-risk alcohol use in EMTs
(H3) There will be a positive association between levels of occupationally related stress and posttraumatic stress symptomatology in EMTs

This is not a homogenous population, and factors independent of occupation influences may influence stress exposure, stress reactions, and alcohol use. Because of the number of demographic characteristics available in the stress process model, multitudes of different
possible hypotheses exist. Two specific hypotheses are tested in this research, reflecting relationships that have already been identified as potentially problematic in the literature.

(H4) There will be a positive association between years of experience (cumulative adversity) and levels of occupationally related stress.

(H5) There will be a negative association between level of training (EMT-B vs. EMT-P) and levels of occupationally related stress.

Finally, a hypothesis for the entire model is,

(H6) Posttraumatic stress symptomatology will mediate the relationship between occupationally related stress exposure and high-risk alcohol use; higher levels of occupationally related stress exposure will be related to higher levels of high-risk alcohol use. Higher levels of posttraumatic stress symptomatology will also be related to high-risk alcohol use. Higher levels of posttraumatic stress symptomatology will mitigate the relationship between occupationally related stress exposure and high-risk alcohol use.

Now that the extant literature has been critically reviewed, and the research question and initial research hypotheses have been identified, it is appropriate to consider the methodological concerns that are important in the process of moving from theory into research design.
CHAPTER 3
METHODOLOGY

This chapter will contain a discussion of the research methodologies used in this study of occupationally related stress exposures and stress reactions in EMS. These methodological concerns include elements of research design such as study design, measurement instrument selection, sampling and power, data collection, and human subjects considerations.

Research Design

This research uses a survey methodology, which is considered a non-experimental design (Johnson, 2001). Survey research was the best possible design in this effort, as it allowed for large-scale quantitative data collection at one point in time. The use of survey research in the social sciences has generated a wealth of literature (Edwards, et al., 2002; Edwards, et al., 2007; Nakash, Hutton, Jørstad-Stein, Gates, & Lamb, 2006). Surveys have been shown to produce acceptable response rates in other health professionals (Choi, Pack, & Purdham, 1990; Kellerman & Herold, 2001; Puleo, et al., 2002; Shiono & Klebanoff, 1991; Siebert, 2005; Summers & Price, 1997). Additionally, previous studies that compare methods of collecting sensitive data find self-administered questionnaires superior to other kinds of self-report (Darke, 1998; Harrison, 1995; Secades-Villa & Fernández-Hermida, 2003; Turner, Lessler, & Gfroerer, 1992) and found methods that minimize personal contact are most likely to produce accurate and complete results (Edwards, et al., 2002; Trinkoff & Storr, 1997). Study design only provides the bones of a study, giving shape and structure to the effort. To explore the relationships illustrated in the stress process model, the constructs therein must be measured. Therefore, the selection of instruments is a critical step in the process of research development.

Measurement

Measurement and Current Hypotheses

The goal of this research was to test the paths hypothesized in the model, and so the selection of appropriate measures was critical to the success of this effort. The hypotheses posit connections between four different constructs, demographic characteristics (level of training, years of experience), occupational stress exposure, posttraumatic stress symptomatology, and high-risk alcohol and other drug use. The selection of measures for each of these constructs was challenging for different reasons. In some cases, multiple previously validated measures were
available. In other cases, nothing immediately appropriate existed. These issues will be discussed in depth within the context of measure selection for these constructs.

**High-risk Alcohol Use**

Before it is possible to measure high-risk alcohol and other drug use, a distinction must be made between the terms dependence, abuse, and use. According to the DSM IV-TR, to be considered substance dependent, a maladaptive pattern of use leading to clinically significant distress must be demonstrated (APA, 2000). Additionally, three of the following must exist: tolerance, withdrawal, consumption to avoid withdrawal, an inability to stop taking the substance despite efforts to quit, spending significant amounts of time in activities necessary to obtain the substance, reduction in social/occupational/recreational activities because of use, and/or continued use despite negative physical or psychological consequences (APA, 2000). Substance abuse may be diagnosed if the individual fails to fulfill social obligations because of substance use, uses in situations that may be considered hazardous (e.g., driving while intoxicated), legal problems related to substance abuse, or continued use despite negative physical or psychological consequences (APA, 2000). Throughout this effort, alcohol use has not been referred to as abuse or dependence. The reason for this distinction is that one of the goals of this research was to assess levels of alcohol use and not to diagnose substance abuse or dependence. Individuals may be using alcohol at levels that do not meet the criteria for abuse or dependence, but may still have the potential to impair their professional performance. Therefore, the measure selected to assess alcohol and drug use must be sensitive enough to capture sub-clinical levels of substance use. The distinction between assessing level of use versus diagnosis of alcohol abuse or dependence is reflected in the types of extant measures available. Connors and Volk (2003) distinguish alcohol use measures as either screening instruments or assessment instruments. In this effort, a screening instrument was be utilized, as the goal of this research is to assess “high-risk” alcohol use. A screening instrument is considered the best choice because the goal is to assess risky behavior, not to obtain a diagnosis. The importance of assessing risky behavior like binge drinking lies in the connection between the alcohol consumption and risky behavior such as driving under the influence (Duncan, 1997; Midanik, Tam, Greenfield, & Caetamo, 1996).

The National Institutes for Alcohol Abuse and Alcoholism have identified fourteen instruments that serve primarily as screening instruments (Connors & Volk, 2003). When compared to other instruments, the AUDIT was judged to be the best screening tool available.
The AUDIT has ten items in three subscales (hazardous alcohol use, dependence symptoms, and harmful alcohol use). The stated goal of this research is to assess high-risk alcohol use; the AUDIT offers the greatest range of information on both the frequency and consequences of alcohol use. Finally, the AUDIT has one question that assesses binge drinking at a conservative level, asking about the frequency with which the respondent drinks six or more drinks at one time. This is considered a conservative measure of binge drinking, as the current recommendations for measuring binge drinking are five or more drinks for men and four or more drinks for women in one sitting (NIAAA, 2004).

The AUDIT has been used in research with both ambulance personnel and police officers (Davey, et al., 2000; Davey, et al., 2001; Sterud, et al., 2007; Violanti, 2004). Additionally, the AUDIT has been used to assess the relationship of alcohol use to posttraumatic symptomatology in a number of different studies, including in police officers (Violanti, 2004), military peacekeepers (Yarvis, Bordnick, Spivey, & Pedlar, 2005), volunteer disaster workers (Simons, Gaher, Jacobs, Meyer, & Johnson-Jimenez, 2005), and veterans (Lehman & Cheung, 2002). The literature does not offer the same depth of association when using the AUDIT to assess the relationship of alcohol use to occupational stress levels. Violanti (2004) found a relationship between alcohol use and occupationally related traumatic exposures (critical incidents) in police, and Davey et al. (2000) found a relationship between police responding to alcohol related calls and subsequent alcohol use. Sterud et al. (2007) did not find a relationship between occupational stress and alcohol use in ambulance personnel, however the instrument used to assess occupational stress was not occupation specific and may not have accurately captured the sources of stress particular to EMS. From these articles, it may be argued that the literature offers sufficient evidence that the AUDIT has successfully been used to assess the relationship between high-risk alcohol use and the other constructs in the model.

The AUDIT (seen in Appendix A) consists of ten items, three questions on drinking frequency, three questions on alcohol dependence, and four questions on problems caused by alcohol. Total score indicates relative risk of hazardous drinking and is created by summing responses; scores can vary from zero to forty. A score of eight or more indicates a hazardous level of alcohol problems, and a score of fifteen or greater indicate harmful consumption. The AUDIT has been widely used in research, producing ample evidence of its psychometric
strengths. A recent review of the literature found that eighteen studies used the AUDIT since 2002 and reported a median coefficient reliability of 0.83 (range .75 to .97) (Reinert & Allen, 2007). It has also demonstrated acceptable test/retest reliability and strong criterion validity (sensitivity and specificity) across demographic variables such as race and gender (Reinert & Allen, 2007).

**Posttraumatic Stress Disorder and Posttraumatic Stress Symptomatology**

As discussed in Chapter 1, evidence exists that posttraumatic stress disorder (PTSD) and posttraumatic stress symptomatology (PTSS) are prevalent in EMS. A number of measures have been developed to assess for PTSD. The PTSD checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993) was chosen in this effort for three reasons. First, one of the goals of this effort was to address both diagnosable PTSD and posttraumatic stress symptomatology, so the instrument needed be able to reliably produce both a continuous measure of symptomatology as well as a cut-off that may indicate potential pathology. A second important criterion was that the instrument needed to include the specific elements of the diagnostic requirements for PTSD. The third requirement for a measure is that of parsimony; due to concerns about response burden, a short instrument was preferable to a longer instrument. Finally, EMTs are exposed to multiple traumas. While it is possible that one traumatic exposure will trigger a posttraumatic stress reaction, it is also possible that the stress reaction will be the result of multiple exposures over time. The structure of an instrument (if rooted in one traumatic event) may fail to acknowledge the truth of multiple stress exposures, and so an instrument was selected that is not restricted to one trauma.

The PTSD Checklist (PCL) is a 17-item scale that is scored using a 5-item Likert format, ranging from one (not at all) to five (extremely). Three versions of the PCL were developed; the PCL-M focuses on military experiences, the PCL-C is focused on civilian experiences, and the PCL-S focuses on specific experiences. The PCL measures symptoms across multiple symptom clusters, including criterions B, C, and D. Measurement can be either continuous or used as diagnostic of PTSD (Weathers, et al., 1993).

The PCL-M was first validated on veterans of the Vietnam War (N=123) and was later validated on veterans of the Persian Gulf War (N=1006). In the first study, test-retest reliability was .96, alpha coefficients were .93 for “B” symptoms, .92 for “C” symptoms, and .92 for “D” symptoms. Overall alpha for the measure was .97. Inter-scale correlations ranged from .62-.87.
In the second study, alpha coefficients were .90 for “B” symptoms, .89 for “C” symptoms, and .91 for “D” symptoms. Overall alpha for the measure was .96. Inter-scale correlations fell between .52 and .80 (Weathers, et al., 1993). In addition to these demonstrating reliability, the PCL has demonstrated convergent validity with the Mississippi Scale for Combat related PTSD (Keane, Caddell, & Taylor, 1988) and the Impact of Events Scale (Horowitz, et al., 1979). The PCL-C and the PCL-S have also been evaluated and found to be strong psychometrically (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Smith, Redd, DuHamel, Vickberg, & Ricketts, 1999). While the PCL-M has not been used to assess posttraumatic stress symptomatology in EMTs, it has been used successfully to assess PTSD symptomatology in military personnel (Sutker, Davis, Uddo, & Ditta, 1995; Sutker, Uddo, Brailey, Allain, & Errera, 1994; Thompson, et al., 2004) and to test the relationship between alcohol use and PTSD in peacekeepers (Asmundson, Stein, & Mccreary, 2002).

While the language of the PCL-M was slightly adapted to be appropriate for this population, it is the best possible choice for assessing PTSD and posttraumatic stress symptomatology in EMS. The PCL-M facilitated the testing of the hypotheses relating to posttraumatic stress symptomatology in several ways. First, the PCL-M collected data in a continuous way, so that both clinically significant and sub-clinical symptomatology could be identified. Collecting continuous data allowed for analyses that considered the impact of alcohol use as well as occupational stress exposure on a continuum of symptom severity. The PCL-M also offered cut-off points so that as desired, the data may be considered dichotomously. To make the PCL-M appropriate for this research effort, the language was altered slightly. Questions 1-8, initially asked respondents about a stressful military experience. For this effort, respondents were asked about a stressful work experience. The PCL-M is found in Appendix B.

**Occupational Stress in EMS**

A number of different approaches exist to measures stress, including assessing the interaction of the individual and the environment, a psychological approach (e.g., stress appraisal), and a biological perspective (e.g., measuring physiological reactions to stress) (Derevenco, Popescu, & Delio, 2000). A number of measures exist that assess general levels of occupational stress (e.g., Fields, 2002). Frequently used examples of these measures include the Work Environment Scale (Moos, 1981), the Occupational Stress Inventory (Osipow & Spokane, 1987), and the Occupational Stress Indicator (Cooper, Sloan, & Williams, 1988). It would have
been appropriate to select one of these measures if the goal of this research is to assess general levels of occupational stress. However, the stress process model posits two types of stress, chronic work stress and critical incident stress. Given that these two types of stress may be influential in stress responses in EMS, it was necessary to select different measures to assess each type of stress individually. While numerous extant measures assess general occupational stress, far fewer measures exist when it comes to assessing chronic and critical incident stress in an environment as specific as EMS. To reflect the idiosyncratic environment of EMS stress, measures were selected from the parallel research literature on police stress reactions.

**Chronic stress.** In Chapter 1, chronic stress is defined as persistent life difficulties or chronically stressful situations that can be considered as corollaries of life events (McLean & Link, 1994). Because the extant stress measures used in the EMS literature were not sufficient for the needs of this research, the literature on police stress measurement proved a useful source of other potential measures. After reviewing the literature on police stress measurement, the two-part Police Stress Questionnaire (PSQ; McCreary & Thompson, 2006) was selected. The PSQ has two facets, examining operational and organizational aspects of police work, and was validated on two samples ($N=197, 188$) police officers in Ontario, Canada. Each scale has 20 items on a 7-point Likert scale, and is scored through simple summing of responses. The PSQ has demonstrated acceptable reliability ($\alpha > .90$) in both validation samples. In addition to reliability, inter-item correlations ranged between .40 and .60 in both samples. Convergent validity was demonstrated with a number of previously validated scales, including the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermetstein, 1983), a shortened version of the Daily Hassles Scale and a measure of negative life events (McCreary & Sadava, 1998) in the first sample. In the second sample, the PSQ correlated with the Job Satisfaction Survey (JSS; Spector, 1997) and the Job-related Affective Well-being Scale (Van Katwyk, Fox, Spector, & Kelloway, 2000).

To adapt the PSQ scales for this study several changes were made, as seen in Appendix C. The language in items 18 and 22 were altered slightly to fit the EMS population; the original text is in red. One item was removed that asked about exposure to traumatic events as traumatic exposure will be dealt with separately in this study.

The PSQ was a good candidate for adaptation for this research effort for several reasons. First, it has demonstrated psychometric strength in multiple samples. Secondly, it addresses in a
more focused way, some of the idiosyncratic aspects of chronic stress in emergency services work. Thirdly, it incorporates both environmental interaction and stress perception, as it names specific stressors and then asks respondents how much stress each stressor has caused in the past six months. The PSQ adequately captures chronic stress, however chronic stress only constitutes half of the hypothesized sources of stress in EMS. The other type of stress, critical incident stress, was assessed using a separate instrument.

Critical incident stress. In contrast to the other measures selected for this effort, no validated measure of critical incident stress is extant in the scholarly literature. One unpublished scale, the Critical Incident History Questionnaire (CIHQ; Weiss, et al., 2001) is currently being used in research on police, however no published work is extant discussing the psychometric attributes of the instrument (T. Metzler, personal communication, Wednesday, July 18, 2007). The CIHQ, in its original form, is a 34-item measure that asks respondents to report both the number of times they have been exposed to the stressor and how difficult it would be in their opinion to cope with each type of incident. Frequency of exposure is assessed by having respondents write in a number if it falls between one and nine, or indicate by checking a box if they have experienced the event 10-20 times, 21-50 times, or 51+ times. The stress measure is assessed on a 5 point Likert scale, ranging from 0= not at all difficult to 4= extremely difficult.

The CIHQ was included in the pilot study of North Carolina professional discussed above, and was adapted to suit EMS in several ways. First, the language was changed so that it is consistent with EMS terminology. Secondly, items that did not directly apply to EMS were removed from the inventories; items were added that reflect the extant data about stressors in EMS. For example, while no item initially existed in the CIHQ asking about responding to a call involving friends and family, the literature has identified that as a significant stressor, especially in rural areas (Alexander & Klein, 2001; Beaton, et al., 1998; Bennett, et al., 2005; Clohessy & Ehlers, 1999; Jonsson, et al., 2003). So an added item asked about that particular stressor. The CIHQ scoring was adapted in several ways. First, the respondents were given a time frame, and asked to report how many times they were exposed to each stressor in the past six months. Secondly, the respondents reported how stressful they found it the last time it happened. The Likert scale was expanded to 7 points, and a “N/A” option was added.

Following the pilot study, the CIHQ was further adapted for this effort. By assessing the number of times an event was endorsed and the perceived stressfulness of the event, it was
possible to evaluate which stressors occurred most frequently. Two items, asking about the EMT a mistake causing the injury or death of a co-worker or bystander were not endorsed at all and were removed from the inventory; the questions were replaced with an item asking about a mistake causing the injury or death of a patient. Other items were combined (e.g., threatened with a gun and threatened with another weapon became threatened with a gun or other weapon). After careful consideration, the decision was made to return to the original formulation asking about the number of times an event occurred. That is, rather than asking the EMT to identify the number of times an event happened, respondents will write in a number if it falls between one and nine, or indicate by checking a box if they have experienced the event 10-20 times, 21-50 times, or 51+ times. The limited response options, while creating categorical rather than continuous data, were thought to more accurately capture frequency of stressful exposures, as recall over an extended period might be limited. Finally, the response options asking about the perceived stressfulness of the event was changed to remain consistent with the response options on the PSQ. That is, stressfulness is assessed on a 7-point Likert scale; levels of stress are reported for the past six months. The current CIHQ, seen in Appendix D, is the result of multiple iterations of evaluation, testing, and revision.

**Demographics**

The final element of measurement is the collection of demographic data. Respondents were asked about age, race/ethnicity, gender, martial status, urbanicity of service area, level of training, and years of experience. Respondents were asked to report their age and years of service as a continuous number. Gender was as either male or female, level of certification was asked as EMT-B, EMT-I or EMT-P. Martial status is never married, married for the first time, married with previous marriages, divorced or separated, or widowed. Average hours of work was be formatted in intervals (less than 10 hours, 10-20 hours, 20-40 hours, 40-60 hours, 60-80 hours, 80-100 hours, 100+ hours). Socioeconomic status was formatted in intervals, with categories ranging from less than $19,999 to $100,000+. Ethnicity was grouped by American Indian/Alaskan Native, Black or African American, Native Hawaiian/Pacific Islander, White, Hispanic/Latino, or more than one race. Questions that are not a part of this dissertation proposal will ask about the urbanicity of service area, number of positions held, business of their primary service, and type of service at which the respondent is employed.

**Sampling and Power**
As discussed in Chapter 2, one of the identified weaknesses of the extant literature is an over-reliance on purposive samples. To avoid replicating this limitation in previous research, a probability sample was utilized. For this research, individuals with an email address registered with the National Registry of EMTs were included in the sampling frame. While it is not possible to eliminate sampling error, the use of probability sampling reduced error by improving the probability that those in the overall population of nationally registered EMTs had an equal chance to be placed in the sampling frame and selected for participation in the survey. The goal of using probability sampling was to create a sampling frame that, if response rates were high enough, could create a data set representative of the larger population of EMTs. Data collected from a representative sample of EMTs may be generalizable and accurately reflect the health of the entire EMS community.

Participants were selected from the mailings lists of the National Registry of EMTs (NREMT). The NREMT is the optimal choice for obtaining a sample for several reasons. EMS certification is managed at the state level, so no national list of EMS providers exists. The NREMT was created to encourage reciprocity between the states, the NREMT testing is an element of the certification procedure in 46 states, and so the NREMT holds certification information for a vast majority of the EMTs in the United States. The NREMT has currently registered over 200,000 paramedics, EMTs, and first responders. Because of NREMT involvement in a majority of states and the large number of individuals represented, the NREMT is the best possible resource for drawing a probability sample of EMTs.

The process of determining a sample size for this research involved both considerations for the power of the analytic strategies and compensating for methodological challenges. Given how critical power can be to the success of the analytic strategy, attempting to obtain a sample size that had sufficient power was critical. To determine the required sample size, \( \alpha \) was set at .05, \( \beta \) set at .95, and sample sizes were calculated to detect small, medium, and large effects. Analyses indicated that to detect subtle differences, the sample needed to be \( N \geq 1500 \).

Once a sample size large enough to detect small effects was established, it was necessary to consider how many individuals must be included in the sampling frame to achieve the required number of responses. Although a meta-analysis of over 1000 survey studies found an average response rate when data were collected from individuals of 53% but one standard deviation from the average response rate included studies with response rates between 20%
higher or lower than the average (Baruch & Holtom, 2008). The data regarding response rates to internet based surveys is somewhat more scarce. Two meta-analyses of online surveys identified response rates at about 30 percent (Cook, Heath, & Thompson, 2000; Sheehan, 2001), however they also found a large standard deviation in response rates. Therefore, this study estimated roughly a 20 percent response rate, consistent with the investigator’s previous internet-based research with EMTs, in which a 22 percent usable response rate was returned (Donnelly, Siebert, & Siebert, 2009). Given the estimated response rate and including consideration of possible degradation of the lists, a final sampling frame of 12,500 was established, 500 for a small pilot study and 12,000 for the main study. Responding to the sample request, the NREMT randomly selected participants based on the following criteria:

- Currently registered EMT-Basics or Paramedics
- Valid USA address only
- Willing to have their name used by non-NREMT sources
- Not primarily affiliated with the military
- No blank email addresses

The effects of those criteria are as follows:

<table>
<thead>
<tr>
<th></th>
<th>EMT-B</th>
<th>EMT-P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently registered</td>
<td>186,138</td>
<td>63,535</td>
</tr>
<tr>
<td>Met search criteria</td>
<td>87,731</td>
<td>22,735</td>
</tr>
<tr>
<td>Registrants in data set</td>
<td>6,250</td>
<td>6,250</td>
</tr>
</tbody>
</table>

Once the sample had been selected, it was possible to begin the process of data collection.

**Data Collection**

**General Considerations for Data Collection**

One of the goals in data collection process is to maximize response rate. The greater the response rate, the more representative the sample and a larger overall N will allow greater power
to detect small effect sizes. To maximize response rates, these data were in a way that has proved successful in past research. Specifically, data were collected using the tailored design method, developed by Dillman (2009).

The tailored design method has been used in both mail and internet surveys, and has produced response rates as high as 70 percent (Gore-Felton, Koopman, Bridges, Thoresen, & Spiegel, 2002; Hughes, et al., 1992; McAuliffe, et al., 1991; Siebert, 2005; Trinkoff, 1998). The tailored design method includes recommendations for how to structure a survey as well as how and how frequently to contact respondents. The evidence for the efficacy of these recommendations has been supported in multiple in mail-based surveys. The recommendations are consistent with the findings of a Cochran collaboration review of mail surveys, wherein the odds of response were significantly improved if the survey administration included pre-notification, follow-up contact, shorter questionnaires, mentioning an obligation to respond, university sponsorship, personalized questionnaires, and assurance of confidentiality (Edwards, et al., 2007).

While this approach has proved effective in mail-based surveys, it is less certain if the techniques work in web-based surveys. One meta-analysis of web-based surveys found that the factors that increased response rates were similar to mail-based surveys, and included number of contacts, the use of personalized contacts, and pre-contacting those in the sampling frame (Cook, et al., 2000). Given this evidence, the tailored design approach appeared to be a useful way to collect data for this effort.

**Data Collection in this Research Effort**

Given that the tailored design method has proven successful in so many previous efforts, the recommendations were operationalized in the letters included as Appendix F. Each letter had an insertion point for the name of the respondent and clear instructions for accessing the survey. Individuals received one pre-contact notice and four invitations to participate in the study, for five total contacts. While Dillman notes, “the optimal timing sequence for web surveys has not, we believe, been determined yet” (2009, p. 279), he suggests that the timing may be faster than in mail based surveys. In this study, respondents were contacted every five days; frequently enough to remind them of the study, but not so frequently that respondents will feel harassed by the contacts. Evidence suggests that sending emails early in the morning has shown more success than emails sent later in the day (Dillman, 2009), so all emails were sent early in the morning.
This study was conducted in two waves. A pilot study was conducted primarily to assess if the survey instrument was functioning appropriately. The pilot study, with a sampling frame of 500 ended on 11/19/2009. Of the participants, 33 email addresses were non-functional and 11 individuals declined to participate. The final pilot sample was \( n=90 \) (19\% response rate). The main study, with a sampling frame of 12,000 participants ended on 1/8/2010. Of the participants, 1107 email addresses were non-functional and 418 individuals declined to participate. The final sample was \( n=1633 \) (15\% response rate). Respondent characteristics are shown in Table 5.

Table 5: Demographic Characteristics of Respondents

<table>
<thead>
<tr>
<th></th>
<th>( N )</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1208</td>
<td>74%</td>
</tr>
<tr>
<td>Female</td>
<td>418</td>
<td>25.6%</td>
</tr>
<tr>
<td>Missing</td>
<td>7</td>
<td>.4%</td>
</tr>
<tr>
<td>Total</td>
<td>1633</td>
<td></td>
</tr>
<tr>
<td><strong>Martial status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married first time</td>
<td>646</td>
<td>39.6%</td>
</tr>
<tr>
<td>Married with previous marriages</td>
<td>235</td>
<td>14.4%</td>
</tr>
<tr>
<td>Widowed</td>
<td>2</td>
<td>.1%</td>
</tr>
<tr>
<td>Divorced/Separated</td>
<td>164</td>
<td>(10%)</td>
</tr>
<tr>
<td>Not married, living with partner</td>
<td>173</td>
<td>10.6%</td>
</tr>
<tr>
<td>Never married</td>
<td>412</td>
<td>25.2%</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>(.1%)</td>
</tr>
<tr>
<td>Total</td>
<td>1633</td>
<td></td>
</tr>
<tr>
<td><strong>Level of certification</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMT-B</td>
<td>486</td>
<td>29.8%</td>
</tr>
<tr>
<td>EMT-I</td>
<td>31</td>
<td>(1.9%)</td>
</tr>
<tr>
<td>EMT-P</td>
<td>1115</td>
<td>68.3%</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>.1%</td>
</tr>
</tbody>
</table>
Table 5: Demographic Characteristics of Respondents (continued)

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>N</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indian/Alaskan Native</td>
<td>21</td>
<td>1.3%</td>
</tr>
<tr>
<td>Native Hawaiian or Pacific Islander</td>
<td>12</td>
<td>.7%</td>
</tr>
<tr>
<td>White</td>
<td>1406</td>
<td>86.1%</td>
</tr>
<tr>
<td>African American</td>
<td>17</td>
<td>1%</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>88</td>
<td>5.4%</td>
</tr>
<tr>
<td>Asian</td>
<td>24</td>
<td>1.5%</td>
</tr>
<tr>
<td>More than one race</td>
<td>56</td>
<td>3.4%</td>
</tr>
<tr>
<td>Missing</td>
<td>9</td>
<td>.6%</td>
</tr>
<tr>
<td>Total</td>
<td>1633</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years)</td>
<td>1623</td>
<td>34.67</td>
<td>10.19</td>
</tr>
<tr>
<td>Length of service (in years)</td>
<td>1630</td>
<td>9</td>
<td>7.81</td>
</tr>
<tr>
<td>Hours worked weekly</td>
<td>1627</td>
<td>4.08</td>
<td>1.29</td>
</tr>
<tr>
<td>Income</td>
<td>1613</td>
<td>4.49</td>
<td>2.37</td>
</tr>
</tbody>
</table>

**Ethical Considerations in this Research**

**Human Subjects Involvement**

The Florida State University IRB reviewed and approved this study. The IRB letter (HSC No. 2009.2862) is included as Appendix H. The IRB provided external review and support for the methodology and plan for the protection of human subjects. This research was considered exempt, insofar as the research is considered to have minimal risk to the respondents and it falls into one of the categories identified as acceptable for exempt research, research on individual or group characteristics that employs a survey methodology (Department of Health and Human Services, 2005).

**Risks & Protection against Risks**
Risks for the respondents were minimal; they were asked primarily to provide information about stress levels and stress responses. If respondents felt discomfort at revealing sensitive information, they could decline to answer questions or end their involvement in the study at any time. While risks associated with this research were considered minimal, several potential areas of concern existed. In taking the survey, respondents may have had an increased awareness of their stress levels and stress exposures in EMS. This increased awareness may potentially either negatively influence the respondent’s sense of their stress level and increase stress related symptomatology or positively influence the respondent by alerting them to stress triggers and encouraging steps for stress mitigation. To address this increased awareness, a page was at the end of the survey. This page stated, “In this survey you were asked questions about your stress levels. If you want further information about stress management, please click on the following link.” Participants were guided to a link for stress management resources (http://www.nlm.nih.gov/medlineplus/stress.html). Additionally, since respondents were asked about alcohol use, a link will be made available discussing alcohol use and abuse (http://www.niaaa.nih.gov/FAQs/General-English/). A further statement was added about seeking further advice from a physician or other health care provider. In this way, those who might have been negatively influenced by participating in the survey will have access to resources to educate themselves about both stress management and alcohol use.

If subjects had questions or concerns about confidentiality, they were given an email address especially created for the study (ems@csw.fsu.edu), along with the email address and telephone number for the Florida State University Institutional Review Board. The principal investigator answered all emails directed to the study.

Additionally, once collected, the data was managed so that no human subjects can be identified. Identifying information was stripped from the data prior to analyses, so analyses could not be linked to individual responses. These steps minimized to the extent possible the disclosure of the human subjects' responses outside the research that could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.
CHAPTER 4
RESULTS

In this chapter, the analytic process will be discussed, starting with the process of data cleaning, followed by characteristics of the sample and univariate statistics. The hypotheses set forth earlier in this effort will be examined, first on a bivariate level and then with OLS regression in multivariate analysis.

Data Cleaning and Preparation

Prior to beginning analyses, the data were examined to ensure no data entry errors exist and to look for possible patterns in missingness in the data. The computerized format of survey administration limited the number of response options, minimizing outliers in the data set. However, missing data were identified within the data set. At the end of the data collection process, the total number of responses downloaded were \( n=1686 \). Of those responses, \( n=37 \) declined to participate at the stage of asking for informed consent, reducing the number of responses to \( n=1649 \).

In order to assess for missingness in these data, dichotomized variables (1= missing, 0= not missing) were created for all the variables in the data set. Missing responses for each construct were examined using frequency count. Most variables did not have significant proportions of missing data (fewer than 15 missing responses). Two exceptions were in the questions regarding number of critical incident exposures, twenty-five individuals did not answer, “How many times were you trapped in a life-threatening situation?” and in the AUDIT, fifty-six individuals did not answer, “How many drinks containing alcohol do you have on a typical day when you are drinking?” There did not appear to be a reason related to the formatting or administration of the survey for the higher rate of non-response, and so it must simply be considered a characteristic of the sample. The missing data flag variables were summed and a composite variable was created that indicated the total number of missing responses for the chronic stress scale, critical incident exposure scale, PTSD and alcohol use scales. These composite missing variables were then used to create a total number of missing items for each respondent; which could range between zero and ninety-seven. Critical incident stress and alcohol use were not included due to the high level of appropriate missingness in these scales (respondents who indicated they had not been exposed to a stressor or did not drink alcohol did
not answer subsequent questions on that scale). Since intervention is recommended if at least 85 percent of the survey is not completed (Hertel, 1976), respondents with more than fifteen missing responses were dropped ($n=16$) resulting in a final sample size of 1633.

As part of the pre-analytic phase, reverse scored items were recoded followed by the computation of composite variables for chronic stress, critical incident stress, posttraumatic stress symptomatology, alcohol use, and perceived stress. While overall missingness was not judged to be problematic for the chronic stress measure, the high number of variables ($n=39$) and the use of listwise deletion in creating the composite variable reduced the total number of respondents significantly. The decision was made to represent the missing data using mean replacement, as it was judged that mean replacement would bias the results less than the high rate of respondent attrition. Prior to mean replacement, the chronic stress variable had a sample size of 1093 with a mean score of 92.9 ($SD\ 42.7$). With mean replacement, the chronic stress variable had a sample size of 1633 with a mean of 93.6 ($SD\ 40.4$).

In order to create composite critical incident stress variable, level of critical incident stress was coded as zero (no stress at all) for respondents who reported never having been exposed to a stressor. In the composite alcohol use scale, respondents who reported never drinking alcohol were coded to zero for the rest of the AUDIT scale. The overall reliability of the previously validated scales was assessed using Cronbach’s alpha (Cronbach, 1951). In this sample, the posttraumatic stress symptomatology scale $\alpha = .93$ and for the AUDIT, $\alpha = .80$.

In order to facilitate ANOVA analyses, the stress variables were divided into three equal groups, or tertiles, creating three categories, “lowest tertile,” “middle tertile,” and “highest tertile.” Respondents were evenly distributed into the three categories. For chronic stress, scores below 74 were “low,” scores between 74 and 112 were coded “middle” and anything over 112 was considered “high.” For critical incident stress, scores below 13 were “low,” scores between 13 and 34 were coded “middle” and anything over 35 was considered “high.” Composite variables were also created for the alcohol and posttraumatic stress measures using the cutpoints established in the literature. Respondents with an AUDIT score greater than eight were categorized as “risky” drinkers and those with scores over fifteen were categorized as “hazardous/harmful drinkers.” Posttraumatic stress symptomatology was dichotomized per the recommendations of the authors of the scale; those with a score above thirty-seven being
categorized as “symptomatic” and those with scores below thirty-seven were characterized as “non-symptomatic” (Weathers, et al., 1993).

For the purposes of analyses, several demographic variables were recoded dichotomously. Specifically, married respondents (married for the first time, married with previous marriages) were collapsed into a “married” variable and coded “1”, whereas respondents who reported their status as single, living with a partner, divorced or separated, and widowed were recoded as “non-married” and coded as “2.” While the sampling frame was only supposed to contain EMT-Bs and EMT-Ps, thirty-one individuals identified themselves as certified at the EMT-I level. These individuals were collapsed into the EMT-P category. The rationale for this decision was that the higher level of training and responsibility associated with EMT-I more closely resemble the characteristics of EMT-Ps. EMT-Bs were coded as “1” and EMT-I/EMT-Ps were coded as “2.” Finally, because of the overwhelming proportion of individuals that were Caucasian in this sample, all other respondents were collapsed into a “non-white” category. White participants were coded as “1” and non-white participants were coded as “2.”

Characteristics of the Sample

The demographic characteristics of the sample with the collapsed variables are contained in Table 6.
Table 6: Demographic characteristics of the full sample.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Age mean (SD)</th>
<th>Hours worked mean (SD)</th>
<th>Income mean (SD)</th>
<th>Length of service mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1208</td>
<td>34.41 (10.08)</td>
<td>4.21 (1.24)</td>
<td>5.70 (9.65)</td>
<td>9.50 (8.15)</td>
</tr>
<tr>
<td>Female</td>
<td>418</td>
<td>35.37 (10.43)</td>
<td>3.73 (1.36)</td>
<td>5.31 (12.41)</td>
<td>7.55 (6.56)</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>1626</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>p&lt;.10</td>
<td>p&lt;.001</td>
<td>p=N/S</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>881</td>
<td>38.02 (9.81)</td>
<td>4.07 (1.28)</td>
<td>6.07 (11.20)</td>
<td>10.62 (8.31)</td>
</tr>
<tr>
<td>Non-married</td>
<td>751</td>
<td>30.74 (9.18)</td>
<td>4.10 (1.30)</td>
<td>5.03 (9.38)</td>
<td>7.12 (6.73)</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>1632</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>p&lt;.001</td>
<td>p=N/S</td>
<td>p&lt;.05</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td><strong>Level of training</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMT-B</td>
<td>486</td>
<td>35.08 (11.93)</td>
<td>3.39 (1.47)</td>
<td>5.35 (15.67)</td>
<td>6.00 (6.85)</td>
</tr>
<tr>
<td>EMT-P/-I</td>
<td>1146</td>
<td>34.50 (9.36)</td>
<td>4.37 (1.08)</td>
<td>5.77 (7.61)</td>
<td>10.28 (7.86)</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>1632</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>p=N/S</td>
<td>p&lt;.001</td>
<td>p=N/S</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>1406</td>
<td>34.95 (10.37)</td>
<td>4.08 (1.30)</td>
<td>5.62 (10.60)</td>
<td>9.33 (7.96)</td>
</tr>
<tr>
<td>Non-white</td>
<td>218</td>
<td>32.57 (8.55)</td>
<td>4.09 (1.21)</td>
<td>5.01 (6.84)</td>
<td>6.76 (6.16)</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>1624</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>p&lt;.001</td>
<td>p=N/S</td>
<td>p=N/S</td>
<td>p&lt;.001</td>
</tr>
</tbody>
</table>
As discussed in Chapter 2, several characteristics of the sample are consistent with what is known about the general population of EMTs (NREMT, 2006). Specifically, the sample is predominately male, Caucasian, with a mean age in the mid-thirties. Although the sampling frame was split evenly between EMT-B and EMT-P, a larger proportion than expected of individuals certified at the EMT-P level responded to the survey. When examined in a bivariate way, gender differences were found in hours worked \((p<.001)\) and length of service \((p<.001)\). Differences by marital status (married vs. unmarried) were found in mean age \((p<.001)\), income \((p<.05)\), and length of service in EMS \((p<.001)\). EMT-Ps reported working more hours \((p<.001)\) and a longer tenure in EMS \((p<.001)\). Other significant differences were noted between white and non-white respondents in age \((p<.001)\), and length of service \((p<.001)\).

In addition to the demographic characteristics, the univariate characteristics of the composite measures (stress, PTSD, alcohol use) are presented in Table 7: Univariate analysis of composite measures.

<table>
<thead>
<tr>
<th></th>
<th>(N)</th>
<th>(\text{Mean})</th>
<th>(\text{(SD)})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic stress</td>
<td>1633</td>
<td>93.6</td>
<td>(40.41)</td>
</tr>
<tr>
<td>Critical incident stress</td>
<td>1633</td>
<td>28.8</td>
<td>(25.52)</td>
</tr>
<tr>
<td>Posttraumatic stress symptomatology (PCL-M)</td>
<td>1568</td>
<td>11.9</td>
<td>(10.58)</td>
</tr>
<tr>
<td>PTSD (&gt;37)</td>
<td>57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol use (AUDIT)</td>
<td>1533</td>
<td>4.3</td>
<td>(4.3)</td>
</tr>
<tr>
<td>Harmful or hazardous use (&gt;8)</td>
<td>194</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possible alcohol dependence (&gt;15)</td>
<td>58</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hypotheses Testing**

Six hypotheses were developed for this research effort. Two hypotheses addressed the bivariate relationship between occupational stress exposure and the two outcome variables, posttraumatic stress symptomatology and alcohol use.

**Hypotheses One and Three**
(H1) There will be a positive association between levels of occupationally related stress and high-risk alcohol use in EMTs

(H3) There will be a positive association between levels of occupationally related stress and posttraumatic stress symptomatology in EMTs

To test these hypotheses, the correlation between the variables was estimated (as seen in Table 8), to test the degree to which a positive association may exist.

Table 8: Bivariate correlations

<table>
<thead>
<tr>
<th></th>
<th>Chronic stress</th>
<th>CI stress</th>
<th>PTSD</th>
<th>Alcohol use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic stress</td>
<td>1</td>
<td>0.427**</td>
<td>.513**</td>
<td>0.041</td>
</tr>
<tr>
<td>CI stress</td>
<td>1</td>
<td>.386**</td>
<td>.079**</td>
<td></td>
</tr>
<tr>
<td>PTSD</td>
<td>1</td>
<td></td>
<td>.187**</td>
<td></td>
</tr>
<tr>
<td>Alcohol use</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

** p <.01

As illustrated in Table 8, all of the variables were significantly positively associated with each other (p<.01), with one exception; these data did not show a significant bivariate association between chronic stress and alcohol use. The relationship between the three levels of chronic and critical incident stress were tested using ANOVA. Table 9 illustrates the relationship of the outcome variables to chronic stress, and Table 10 illustrates the relationship between the outcome variables and critical incident stress.

Table 9: ANOVA on chronic stress

<table>
<thead>
<tr>
<th></th>
<th>PTSD</th>
<th>Alcohol use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>mean</td>
</tr>
<tr>
<td>Lowest tertile</td>
<td>526</td>
<td>6.31</td>
</tr>
<tr>
<td>Middle tertile</td>
<td>527</td>
<td>11.22</td>
</tr>
<tr>
<td>Highest tertile</td>
<td>515</td>
<td>18.38</td>
</tr>
</tbody>
</table>
Table 9: ANOVA on chronic stress (continued)

<table>
<thead>
<tr>
<th></th>
<th>PTSD</th>
<th>Alcohol use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n mean</td>
<td>(SD)</td>
</tr>
<tr>
<td>Total</td>
<td>1568 11.92 (10.58)</td>
<td>1533 4.29 (4.30)</td>
</tr>
</tbody>
</table>

F (2, 1565) = 218.57, p<.001  F (2, 1530) = 2.48, p=.084

The relationships found in the correlation analysis were shown in the ANOVA, with higher levels of chronic stress are significantly associated (p<.001) with posttraumatic symptomatology but not significantly associated with alcohol use. Post hoc analyses revealed that significant differences existed between all three groups in regards to PTSD (p<.001), and no significant differences existed between groups for alcohol use.

Because the language of the original hypothesis posited high-risk alcohol use, a dichotomized variable was created; individuals who had scores greater than eight were coded as “risky” drinkers as recommended by the AUDIT and those who had scores less than were coded “not at risk” drinkers. Non-risky drinkers (n=1066) had a mean chronic stress score of 92.64 (SD 40.14) and risky drinkers (n=252) had a mean chronic stress score of 98.60 (SD 40.46). The difference was significant $t= -2.12$ (df=1316, p=.05).

Table 10: ANOVA on critical incident stress

<table>
<thead>
<tr>
<th></th>
<th>PTSD</th>
<th>Alcohol use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n mean</td>
<td>(SD)</td>
</tr>
<tr>
<td>Lowest tertile</td>
<td>536 7.54 (7.76)</td>
<td>524 3.98 (4.10)</td>
</tr>
<tr>
<td>Middle tertile</td>
<td>507 11.56 (9.41)</td>
<td>491 4.19 (4.00)</td>
</tr>
<tr>
<td>Highest tertile</td>
<td>525 16.75 (12.03)</td>
<td>518 4.72 (4.73)</td>
</tr>
<tr>
<td>Total</td>
<td>1568 11.92 (10.58)</td>
<td>1533 4.29 (4.30)</td>
</tr>
</tbody>
</table>

F (2, 1565) = 115.67, p<.001  F (2, 1530) = 4.12, p<.05
Critical incident stress had a significant relationship with both posttraumatic symptomatology \( (p<.001) \) and alcohol use \( (p<.05) \). Post-hoc analyses revealed significant differences \( (p<.001) \) between all groups for PTSD. However, for alcohol use, the only significant difference was between the lowest tertile and the highest tertile \( (p<.05) \). Further investigation was done to assess the relationship of critical incident stress to high-risk alcohol use. For critical incident stress, non-risky drinkers \( (n=1066) \) had a mean score of 28.11 \( (SD \ 25.40) \) and risky drinkers \( (n=252) \) had a mean score of 31.82 \( (SD \ 26.18) \). A t-test was then conducted on chronic stress, and a significant difference was found at \( t= -2.07 \ (df=1316, \ p=.05) \).

After examining the correlation and ANOVA analyses, it would appear that the first hypothesis is partially supported. A significant relationship was found between critical incident stress and alcohol use \( (p<.05) \) but no relationship was found between high, middle, and low levels of chronic stress and alcohol use. While no significant relationship was found between low, middle, and high levels of chronic stress and alcohol use, a significant relationship \( (p<.05) \) was found between chronic stress levels in non-risky and risky alcohol drinkers. The third hypothesis is supported, insofar as the data demonstrate significant relationships chronic stress and PTSD \( (p<.001) \), critical incident stress and PTSD \( (p<.001) \).

**Hypothesis Two**

To test the second hypothesis, there will be a positive association between posttraumatic stress symptomatology and high-risk alcohol use in EMTs, PTSD scores were collapsed into “highest,” “middle,” and “lowest” tertiles of symptomatology and tested against alcohol use using ANOVA.

<table>
<thead>
<tr>
<th>Tertile</th>
<th>( n )</th>
<th>( mean )</th>
<th>( (SD) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest tertile</td>
<td>495</td>
<td>3.49</td>
<td>(3.49)</td>
</tr>
<tr>
<td>Middle tertile</td>
<td>471</td>
<td>4.08</td>
<td>(3.65)</td>
</tr>
<tr>
<td>Highest tertile</td>
<td>509</td>
<td>5.26</td>
<td>(5.33)</td>
</tr>
<tr>
<td>Total</td>
<td>1475</td>
<td>4.29</td>
<td>(4.32)</td>
</tr>
</tbody>
</table>

\( F (2,1472)= 22.47, \ p<.001 \)
In this ANOVA analysis, posttraumatic stress symptomatology was significantly related to alcohol use ($p<.001$). Post-hoc analyses revealed a significant difference between the highest tertile and the other two tertiles ($p<.001$), but no difference between the lowest and middle tertiles. A t-test was conducted comparing levels of posttraumatic symptomatology in non-risky and risky drinkers. Non-risky drinkers ($n=1023$) had a mean PTSD score of 10.9 ($SD$ 9.80) and risky drinkers ($n=244$) had a mean PTSD score of 16.02 ($SD$ 11.83). A t-test was then conducted on chronic stress, and a significant difference was found at $t=-7.02$ ($df=1265$, $p=.001$).

**Hypothesis Four.**

The fourth hypothesis, *there will be a positive association between years of experience (cumulative adversity) and levels of occupationally related stress*, was tested using correlations and then ANOVA. Years of experience in EMS was positively correlated with both chronic stress $r = .066$ ($p<.01$) and with critical incident stress $r = .155$ ($p<.01$). Table 12 contains the results of the ANOVA.

<table>
<thead>
<tr>
<th></th>
<th>$n$</th>
<th>mean $(SD)$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chronic stress</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest tertile</td>
<td>545</td>
<td>8.68 $(7.97)$</td>
</tr>
<tr>
<td>Middle tertile</td>
<td>542</td>
<td>8.42 $(7.21)$</td>
</tr>
<tr>
<td>Highest tertile</td>
<td>543</td>
<td>9.92 $(8.17)$</td>
</tr>
<tr>
<td>Total</td>
<td>1630</td>
<td>9.01 $(7.82)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$F(2,1627)= 5.69, p&lt;.01$</td>
</tr>
<tr>
<td><strong>Critical incident stress</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest tertile</td>
<td>555</td>
<td>8.01 $(7.88)$</td>
</tr>
<tr>
<td>Middle tertile</td>
<td>520</td>
<td>8.41 $(7.33)$</td>
</tr>
<tr>
<td>Highest tertile</td>
<td>555</td>
<td>10.56 $(7.82)$</td>
</tr>
<tr>
<td>Total</td>
<td>1630</td>
<td>9.01 $(7.82)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$F(2,1627)= 17.27, p&lt;.001$</td>
</tr>
</tbody>
</table>
Statistically significant results were found in both correlation and ANOVA analyses, with chronic stress ($p<.01$) and critical incident stress ($p<.001$) being related to years of experience. For chronic stress, post-hoc analyses indicated differences between the highest tertile and the other two tertiles ($p<.01$) but no differences between the lowest and middle tertiles. With critical incident stress, the same relationship was observed. The highest tertile was different from the middle tertile ($p<.001$) and lowest tertile ($p<.001$), but no difference was found between the lowest and middle tertiles.

**Hypothesis Five**

The last bivariate relationship tested in these analyses is found in hypothesis five, *there will be a negative association between level of training (EMT-B vs. EMT-P) and levels of occupationally related stress*. These relationships were assessed using a t-test; significant differences were found for both types of occupational stress. The mean level of chronic and critical incident stress by level of training is illustrated in Table 13:

<table>
<thead>
<tr>
<th></th>
<th>Chronic stress</th>
<th>Critical incident stress</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ($SD$)</td>
<td>Mean ($SD$)</td>
</tr>
<tr>
<td>EMT-B</td>
<td>85.66 (40.70)</td>
<td>19.91 (20.28)</td>
</tr>
<tr>
<td>EMT-I &amp; EMT-P</td>
<td>97.02 (39.82)</td>
<td>32.63 (26.55)</td>
</tr>
<tr>
<td>Total</td>
<td>93.6 (40.41)</td>
<td>28.8 (25.52)</td>
</tr>
</tbody>
</table>

Analysis indicates that levels of both chronic and critical incident stress are significantly higher $t=-10.52 (df=1182, p=.001)$ for paramedics than they are for EMT-Basics. Since the initial hypothesis the opposite relationship, the fifth hypothesis is not supported.

**Hypothesis Six**

The final hypothesis seeks to examine all elements of the model and assess the degree to which they may be related to one another.
(H6) Posttraumatic stress symptomatology will mediate the relationship between occupationally related stress exposure and high-risk alcohol use; higher levels of occupationally related stress exposure will be related to higher levels of high-risk alcohol use. Higher levels of posttraumatic stress symptomatology will also be related to high-risk alcohol use. Higher levels of posttraumatic stress symptomatology will mitigate the relationship between occupationally related stress exposure and high-risk alcohol use.

In order to test these relationships, a series of OLS regression analyses were conducted. The final hypothesis was considered in two parts, with PTSD and alcohol use being treated as the dependent variable. PTSD was regressed on the demographic characteristics, chronic and critical incident stress, and then a separate set of analyses considered the influence of demographic characteristics, chronic stress, critical incident stress, and posttraumatic stress symptomatology on alcohol use. The results of the regression of posttraumatic stress symptomatology on the predictor variables are presented in Table 14:
<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>SE</td>
<td>p</td>
<td>b</td>
<td>SE</td>
</tr>
<tr>
<td>(Constant)</td>
<td>-5.908</td>
<td>2.205</td>
<td>.007</td>
<td>-2.801</td>
<td>1.950</td>
</tr>
<tr>
<td>Length of service</td>
<td>.136</td>
<td>.048</td>
<td>.005</td>
<td>.061</td>
<td>.042</td>
</tr>
<tr>
<td>Age</td>
<td>-.046</td>
<td>.035</td>
<td>.198</td>
<td>-.025</td>
<td>.031</td>
</tr>
<tr>
<td>Gender</td>
<td>-.350</td>
<td>.644</td>
<td>.587</td>
<td>-.952</td>
<td>.566</td>
</tr>
<tr>
<td>Hours worked</td>
<td>1.850</td>
<td>.257</td>
<td>.000</td>
<td>.787</td>
<td>.231</td>
</tr>
<tr>
<td>Income</td>
<td>-.514</td>
<td>.156</td>
<td>.001</td>
<td>-.244</td>
<td>.138</td>
</tr>
<tr>
<td>Level of training</td>
<td>1.441</td>
<td>.692</td>
<td>.038</td>
<td>.605</td>
<td>.609</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>-.318</td>
<td>.816</td>
<td>.697</td>
<td>-.478</td>
<td>.716</td>
</tr>
<tr>
<td>Martial status</td>
<td>-1.115</td>
<td>.594</td>
<td>.061</td>
<td>-.487</td>
<td>.522</td>
</tr>
<tr>
<td>Chronic stress</td>
<td>.129</td>
<td>.006</td>
<td>.000</td>
<td>.111</td>
<td>.006</td>
</tr>
<tr>
<td>Critical incident</td>
<td>.149</td>
<td>.010</td>
<td>.000</td>
<td>.081</td>
<td>.010</td>
</tr>
<tr>
<td>stress</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>.054</td>
<td></td>
<td></td>
<td>.279</td>
<td></td>
</tr>
<tr>
<td>Change in $R^2$ (vs. model 1)</td>
<td>.224***</td>
<td>.114***</td>
<td>.242***</td>
<td>.022**</td>
<td></td>
</tr>
</tbody>
</table>

*p<.05, **p<.01, *** p<.001
Table 14: Unstandardized coefficients from OLS regression of PTSD on stress and alcohol use (continued)

<table>
<thead>
<tr>
<th></th>
<th>Model 6</th>
<th></th>
<th></th>
<th>Model 7</th>
<th></th>
<th></th>
<th>Model 8</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>SE</td>
<td>p</td>
<td>b</td>
<td>SE</td>
<td>p</td>
<td>b</td>
<td>SE</td>
<td>p</td>
</tr>
<tr>
<td>(Constant)</td>
<td>10.583</td>
<td>1.897</td>
<td>.000</td>
<td>-1.720</td>
<td>1.914</td>
<td>.369</td>
<td>-1.764</td>
<td>1.906</td>
<td>.355</td>
</tr>
<tr>
<td>Length of service</td>
<td>.040</td>
<td>.041</td>
<td>.335</td>
<td>.044</td>
<td>.041</td>
<td>.280</td>
<td>.041</td>
<td>.041</td>
<td>.315</td>
</tr>
<tr>
<td>Age</td>
<td>.004</td>
<td>.030</td>
<td>.887</td>
<td>.001</td>
<td>.030</td>
<td>.974</td>
<td>.003</td>
<td>.030</td>
<td>.912</td>
</tr>
<tr>
<td>Gender</td>
<td>-.162</td>
<td>.552</td>
<td>.769</td>
<td>-.054</td>
<td>.554</td>
<td>.923</td>
<td>-.106</td>
<td>.552</td>
<td>.848</td>
</tr>
<tr>
<td>Hours worked</td>
<td>.527</td>
<td>.224</td>
<td>.019</td>
<td>.555</td>
<td>.225</td>
<td>.014</td>
<td>.546</td>
<td>.224</td>
<td>.015</td>
</tr>
<tr>
<td>Income</td>
<td>-.239</td>
<td>.132</td>
<td>.071</td>
<td>-.237</td>
<td>.133</td>
<td>.075</td>
<td>-.232</td>
<td>.132</td>
<td>.079</td>
</tr>
<tr>
<td>Level of training</td>
<td>.078</td>
<td>.588</td>
<td>.895</td>
<td>.103</td>
<td>.590</td>
<td>.862</td>
<td>.087</td>
<td>.588</td>
<td>.882</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>-.246</td>
<td>.689</td>
<td>.721</td>
<td>-.310</td>
<td>.691</td>
<td>.654</td>
<td>-.224</td>
<td>.688</td>
<td>.745</td>
</tr>
<tr>
<td>Martial status</td>
<td>.192</td>
<td>.516</td>
<td>.710</td>
<td>.253</td>
<td>.518</td>
<td>.626</td>
<td>.240</td>
<td>.515</td>
<td>.641</td>
</tr>
<tr>
<td>Chronic stress</td>
<td>.111</td>
<td>.006</td>
<td>.000</td>
<td>.112</td>
<td>.007</td>
<td>.000</td>
<td>.112</td>
<td>.007</td>
<td>.000</td>
</tr>
<tr>
<td>Critical incident stress</td>
<td>.073</td>
<td>.010</td>
<td>.000</td>
<td>.063</td>
<td>.011</td>
<td>.000</td>
<td>.063</td>
<td>.011</td>
<td>.000</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>.367</td>
<td>.056</td>
<td>.000</td>
<td>.384</td>
<td>.056</td>
<td>.000</td>
<td>.366</td>
<td>.056</td>
<td>.000</td>
</tr>
<tr>
<td>Chronic stress x alcohol use</td>
<td>.005</td>
<td>.001</td>
<td>.000</td>
<td>.005</td>
<td>.001</td>
<td>.000</td>
<td>.005</td>
<td>.001</td>
<td>.000</td>
</tr>
<tr>
<td>Chronic stress x CI stress</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>.325</td>
<td></td>
<td></td>
<td>.320</td>
<td></td>
<td></td>
<td>.326</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in R² (vs. model 5)</td>
<td>.007***</td>
<td></td>
<td></td>
<td>.002*</td>
<td></td>
<td></td>
<td>.009***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p<.05, **p<.01, *** p<.001
In Model 1, the demographic variables were entered. Length of service ($p < .01$), hours worked ($p < .001$), and income ($p < .01$) evidenced a significant relationship with PTSD. Once chronic stress was introduced in Model 2, most of the demographic factors were no longer significant with the exception of hours worked, which retains its significance as a predictor throughout the analyses. In Model 2, chronic stress is also a significant predictor of PTSD ($p < .001$). In Model 3, critical incident stress is a significant predictor ($p < .001$) and in Model 4, both chronic and critical incident stress remain significant predictors of PTSD when entered simultaneously. In Model 5, alcohol use becomes a significant predictor of PTSD ($p < .001$). The inclusion of chronic stress, critical incident stress, and alcohol use improves the explanatory power of the model substantially from an adjusted $R^2$ in Model 1 of .051 to .318 in Model 5.

Given the strong relationships between the stress and alcohol variables with PTSD and previous empirical evidence demonstrating the importance of stress on health related outcomes, the decision was made to test the interactions of the two types of stress and alcohol use. Interactions are defined as “the relationships among variables differ depending on different values of the variables” (Byrne, 2003). While the interaction of critical incident stress and alcohol use was not significant (not shown), the joint inclusion of chronic stress and alcohol use in Model 6 was significant ($p < .001$), increasing the adjusted $R^2$ of the model to .325 ($\Delta R^2 = .007, p < .001$). The interaction term of chronic and critical incident stress introduced in Model 7 was also significant ($p < .05$), adding slightly to the overall explanatory power of the model by increasing adjusted $R^2$ to .320 ($\Delta R^2 = .002, p < .05$). Joint inclusion of both interaction terms in Model 8 increased the adjusted $R^2$ to .326 ($\Delta R^2 = .009, p < .001$).

To explore further explore the interactions included in Models 6-8, the interactions were graphed by high, moderate, and low tertiles of chronic stress. Mean scores for the tertiles of chronic stress were used in these analyses (please refer to page 66). Tertiles of alcohol use were created using the mean alcohol use score plus/minus one standard deviation. These mean scores were entered into the regression equation separately, yielding three different regression lines. For example, to create the regression line for the interaction of high chronic stress and high alcohol use, the beta weights for the demographic variables were multiplied by their mean values. For the dichotomized values, the coding for the most frequent response was used (e.g., male, married, paramedic). These multiplied values were then summed with the constant for the regression line to create one value to produce a predicted level of PTSD (26.39). The mean
values of highest tertile of chronic stress were multiplied by the mean levels of alcohol use and multiplied by the beta weight for the interaction term, creating three values (6.37, 3.45, and 0.52). These three values were added to the summed value (26.39) to create the three points on the “highest tertile chronic stress” regression line found in Figure 4. The interaction between chronic stress and alcohol use is found in Figure 4:

![Figure 4: Interaction of chronic stress with alcohol use in regression of PTSD.](image)

As seen in Figure 4, in the interaction of chronic stress with alcohol use ($b=.005$, $SE=.001$, $p<.001$), the relationship between alcohol use and PTSD appears to be conditioned by the level of chronic stress. Those with high levels of alcohol use exhibit variability in posttraumatic stress symptomatology, whereas those with low levels of alcohol use do not exhibit similar variability. High levels of alcohol consumption and high chronic stress predict higher levels of posttraumatic symptomatology than those with low levels of chronic stress. Amongst those with low alcohol use, chronic stress does not appear to have the same influence.
on posttraumatic stress symptomatology, as the scores are all within four tenths of a point of each other. The interaction (Model 7) of chronic stress with critical incident stress is found in Figure 5.

![Figure 5: Interaction of chronic with critical incident stress in regression of PTSD.](image)

As in the interaction of chronic stress with alcohol use, chronic stress appears to condition the relationship between critical incident stress and posttraumatic stress symptomatology. There is variability in posttraumatic stress symptomatology amongst those with high levels of critical incident stress that is not observed in those with low levels of critical incident stress. For those with high levels of chronic and critical incident stress, there are higher reported rates of posttraumatic stress symptomatology than for those with lower rates of chronic stress. Posttraumatic stress symptomatology scores are similar, for those with low critical incident stress, regardless of the reported levels of chronic stress. Finally, to assess the degree to which the observed interactions varied when both entered into the model, both interactions
were graphed using the beta weights found in Model 8. The resulting relationships are found in Figure 6.

![Figure 6: Interactions of critical incident stress and alcohol use with chronic stress, Simultaneous entry in regression of PTSD.](image)

When considering both interactions in Model 8, the basic relationship of chronic stress with both critical incident stress and alcohol use appears to remain intact. Among those in the high tertiles of critical incident stress and alcohol use, more variability is found in posttraumatic stress symptomatology than in the lower tertiles. This variability appears to be conditioned by chronic stress, as those with high levels of chronic stress and high levels of alcohol use or critical incident stress report greater levels of posttraumatic stress symptomatology than those with low levels of chronic stress.
A second series of OLS regressions assessed the relationship of demographics, chronic and critical incident stresses, and posttraumatic symptomatology on alcohol use. The results are presented in Table 15.
Table 15: Unstandardized coefficients from OLS regression of alcohol use on stress and posttraumatic stress symptomatology

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
<th>Model 3</th>
<th></th>
<th>Model 4</th>
<th></th>
<th>Model 5</th>
<th></th>
<th>Model 6</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>SE</td>
<td>p</td>
<td></td>
<td>b</td>
<td>SE</td>
<td>p</td>
<td></td>
<td>b</td>
<td>SE</td>
<td>p</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>8.371</td>
<td>.878</td>
<td>.000</td>
<td></td>
<td>8.405</td>
<td>.886</td>
<td>.000</td>
<td></td>
<td>8.575</td>
<td>.862</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Length of service</td>
<td>-.030</td>
<td>.019</td>
<td>.118</td>
<td></td>
<td>-.030</td>
<td>.019</td>
<td>.000</td>
<td></td>
<td>-.035</td>
<td>.019</td>
<td>.073</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.050</td>
<td>.014</td>
<td>.098</td>
<td></td>
<td>-.032</td>
<td>.014</td>
<td>.003</td>
<td></td>
<td>-.041</td>
<td>.014</td>
<td>.030</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>1.600</td>
<td>.257</td>
<td>.000</td>
<td></td>
<td>1.604</td>
<td>.257</td>
<td>.000</td>
<td></td>
<td>1.523</td>
<td>.251</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Hours worked</td>
<td>.151</td>
<td>.102</td>
<td>.139</td>
<td></td>
<td>.144</td>
<td>.105</td>
<td>.000</td>
<td></td>
<td>.103</td>
<td>.102</td>
<td>.029</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>.079</td>
<td>.062</td>
<td>.194</td>
<td></td>
<td>.081</td>
<td>.062</td>
<td>.061</td>
<td></td>
<td>.088</td>
<td>.061</td>
<td>.149</td>
<td></td>
</tr>
<tr>
<td>Level of certification</td>
<td>.231</td>
<td>.276</td>
<td>.403</td>
<td></td>
<td>.225</td>
<td>.276</td>
<td>.416</td>
<td></td>
<td>.197</td>
<td>.271</td>
<td>.468</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td>-.506</td>
<td>.325</td>
<td>.507</td>
<td></td>
<td>.325</td>
<td>.119</td>
<td>.583</td>
<td></td>
<td>.314</td>
<td>.063</td>
<td>.514</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>-.042</td>
<td>.237</td>
<td>.000</td>
<td></td>
<td>-.038</td>
<td>.237</td>
<td>.000</td>
<td></td>
<td>-.1979</td>
<td>.231</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Chronic stress</td>
<td>.001</td>
<td>.003</td>
<td>.761</td>
<td></td>
<td>.002</td>
<td>.003</td>
<td>.610</td>
<td></td>
<td>.002</td>
<td>.003</td>
<td>.610</td>
<td></td>
</tr>
<tr>
<td>CI stress</td>
<td>.009</td>
<td>.004</td>
<td>.042</td>
<td></td>
<td>.010</td>
<td>.005</td>
<td>.036</td>
<td></td>
<td>.009</td>
<td>.004</td>
<td>.043</td>
<td></td>
</tr>
<tr>
<td>PTSD</td>
<td>.066</td>
<td>.010</td>
<td>.000</td>
<td></td>
<td>.082</td>
<td>.012</td>
<td>.000</td>
<td></td>
<td>.066</td>
<td>.010</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Adjusted R^2</td>
<td>.111</td>
<td>.110</td>
<td>.113</td>
<td></td>
<td>.112</td>
<td>.112</td>
<td>.137</td>
<td></td>
<td>.142</td>
<td>.142</td>
<td>.142</td>
<td></td>
</tr>
<tr>
<td>Change in R^2 (vs. model 1)</td>
<td></td>
<td></td>
<td>.000</td>
<td></td>
<td>.002*</td>
<td>.003</td>
<td>.026***</td>
<td></td>
<td>.030***</td>
<td></td>
<td>.030***</td>
<td></td>
</tr>
</tbody>
</table>

* p<.05, **p<.01, *** p<.001
When the demographic variables are entered in Model 1, there are significant adjusted mean differences in alcohol use by gender, age, and marital status \((p<.01)\) and an adjusted \(R^2\) of .113. These demographic variables retain their significant relationship to alcohol use in subsequent models. In Model 2, the addition of chronic stress does not contribute significantly to explaining the variance in alcohol use, but in Model 3, critical incident stress is significant \((R^2 = .113, p<.05)\). These observed relationships continue in Model 4, when both stress variables are entered together. Model 5 introduces posttraumatic symptomatology \((p<.001)\) and increases the \(R^2\) to .137. In Model 6, we observe an apparent suppression effect. A suppressor is “a variable, which increases the predictive validity of another variable (or set of variables) by its inclusion in a regression equation” (Conger, 1974, p. 36). Suppression appears to occur insofar as when PTSD is included with both stress variables, chronic stress becomes significantly associated with alcohol use \((p<.01)\) and critical incident stress becomes non-significant. The final model \(R^2\) is .142.
CHAPTER 5
DISCUSSION

This study adds to the understanding of the relationship between occupationally-related stress exposures and stress reactions in EMTs and paramedics. Specifically, this study examines the differential relationships of chronic and critical incident stress on posttraumatic stress symptomatology and alcohol use. Previous studies have reported higher estimates of posttraumatic stress symptomatology in emergency medical responders than population estimates. This study expands on those findings by attempting to identify potential stressors that may influence the levels of pathology in this population. In this chapter, limitations of the study are discussed, followed by a discussion of the contributions and implications of the study. Finally, possible directions for future research are presented.

Limitations

The methodology for this research effort includes a number of limitations attributable to the study design, including sampling and data collection methods. Non-experimental designs lack many of the elements of randomized experiments, relying on theory and hypotheses rather than design control to assess for relationships between variables (Shadish, Cook, & Campbell, 2002). Relationships between variables may only be correlated, so no causal argument can be made. Because of the non-experimental design of this study, the only possible conclusions involve evidence of a relationship between variables. No causal conclusions can be reached.

Another limitation exists within the sampling approach taken in this study. While the use of probability sampling is a modest improvement over past efforts that used convenience samples, the sampling frame does not include every individual who is working as an EMT in the United States. Because the NREMT certifies individuals in 46 states, individuals practicing in the states of Delaware, Massachusetts, North Carolina, Wyoming, and New York were not included in the sampling frame. It is possible that individuals within those states voluntarily chose to re-register after their initial two-year certification period with the NREMT, however an unknown percentage of the population will not. While this is a limitation of the study, the NREMT offers the best sampling frame possible, and so was the best choice for this study.

A limitation is also found in non-response bias. As discussed in the sampling section of Chapter 3, this research was designed expecting a low response rate. The use of probability
sampling was intended to generate a sample population that reflected more accurately the characteristics of the general population, increasing the potential for generalizability of the results. The fifteen percent response rate to this survey is lower than desirable, as some unknown differences may exist between individuals who choose to respond to the study and those who do not respond. While the methodology selected has demonstrated efficacy in mail-based surveys, methodology recommendations for internet-based surveys do not have as extensive a history or are as developed as mail-based surveys, some limitation in the certainty of the efficacy of these contacts must be acknowledged. One way to address this issue involves study replication, wherein findings may or may not be reproduced in different sample populations. If findings are consistent across multiple studies, the chances increase that they apply to the population as a whole. Future research efforts may be able to reproduce the findings of this research effort, ameliorating concerns about external validity of the current study. While the low response rate was less than desirable, the survey methodology did succeed insofar as it produced the required number of responses as projected in the power analysis.

As with all research in which individuals are asked to report on their own experiences and feelings, several potential biases may be introduced. Specifically, social desirability bias (Nederhof, 1984; Paulhus, 1991), wherein individuals report what they think they ought to say rather than what is actually true. This may be particularly problematic in EMTs, as often very little social permission exists to express distress over a gruesome or traumatic patient encounter. If the social environment has taught individuals that it is not acceptable to have reactions to occupationally related stress exposures, individuals may be less willing to admit that they indeed are having reactions, creating a tendency to underreport symptomatology and alcohol use. Unfortunately, due to the length of the survey, including a measure to assess the degree to which social desirability influences responses was not feasible.

Another type of bias that is introduced in self-report surveys deals with recall bias (Coughlin, 1990), wherein respondents do not answer questions accurately because too long a period of time has passed, and they do not recall the answers accurately. Because of problems with recall bias, every effort was made to keep the time frame consistent across the different measures to reduce the burden of attending to different time frames on respondents. Additionally, the recall period was relatively recent, as respondents were asked about stress levels in the last six months. This focus on recent events may have failed to differentiate long-
term accumulated stress or trauma from recent stress. However, the time frame is consistent with recommendations of six months to one year (Turner & Wheaton, 1995), was consistent with how the instruments had previously been used in other research, and focusing on recent stress levels was judged to the best way to minimize the threat posed by recall bias.

A final limitation of this research lies in the analytic process. The decision was made to collapse the stress variable into tertiles for the purpose of ANOVA. Since these instruments are not validated scales, the argument was made that creating tertiles allowed for a gross estimation of group differences. However, in collapsing a continuous measure into categories, some of the variance was lost. For example, the ANOVA analysis based on these groups did not detect differences in alcohol use by levels of chronic stress, but in regression, continuously measured chronic stress was a significant predictor of alcohol use. The use of ANOVA analyses may have introduced a Type II error; retaining the continuous measure allowed for more sensitive analysis of the relationship between chronic stress and alcohol use. Despite the limitations of this study, significant findings contribute to the overall understanding of occupationally related stress exposures and stress reactions in EMTs.

**Contributions**

This study contributes to the literature in several ways. First, it provides descriptive data on levels of posttraumatic stress symptomatology and alcohol use in American EMTs and paramedics. The latter represents data that have never been collected before in this population. Testing among the theoretical linkages as specified by the stress process model revealed a differential relationship of different types of stress exposure and stress reactions. Finally, the efficacy of the stress process model in this population is discussed within the context of the findings.

In the first chapter of this effort, extant studies of posttraumatic stress disorder found rates ranging from 22% (Bennett, et al., 2004; Bennett, et al., 2005) to 5% (Lowery & Stokes, 2005). Population estimates of PTSD range between 6.8% (Kessler, et al., 2005) and 7.8% (Kessler, et al., 1995). This study had 57 (3.5%) of respondents reporting scores on the PCL-M that would indicate they may have PTSD. This finding is substantially lower than earlier studies in EMTs and those estimating PTSD in the general population. Why would EMTs, who have regular exposure to traumatic stressors, report less pathology than the overall population? There are several possible explanations for these findings. The first possibility is that social desirability
bias caused respondents to underreport their symptoms. As noted earlier, the occupational culture in EMS discourages reporting distress, and so respondents may have minimized their reporting. A second possibility involves the low response rate. Some unobserved difference may exist in levels of pathology between responders and non-responders. A third possibility may involve a present state bias, wherein those who were more vulnerable to stress reactions may have moved out of the profession, creating a population that has more overall resiliency to traumatic stress than the general population. These options are not mutually exclusive; it is possible that all three options have influenced the findings.

The second outcome variable, alcohol use, yielded estimates of alcohol abuse and dependence that are close to population estimates. In this study, 80.7% \((n=1318)\) of the sample reported drinking alcohol, 11.9% \((n=194)\) reported risky or abusive consumption, and 3.6% \((n=58)\) had scores that indicated possible alcohol dependence. In population estimates, 82.2% reported consuming alcohol (Johnson, O’Malley, & Bachman, 2002), 12.9% reported abusive alcohol use, and 5.8% reported alcohol dependence (Chen, et al., 2006). The results of this study appear to be roughly comparable to population estimates of alcohol use. Therefore, despite evidence in studies of other types of first responders, it cannot be asserted that rates of risky alcohol use or dependence are higher in this population of EMTs and paramedics than in the overall population. However, the multivariate findings indicated that alcohol use is related to occupational stressors. Future research may be able to elucidate if and how alcohol use in this population may be used as a mechanism to manage occupational stress.

**Bivariate Hypothesis Testing**

The first hypothesis posited a positive association between levels of occupationally related stress and high-risk alcohol use in EMTs. Bivariate testing did not find a significant relationship between alcohol use and tertiles of chronic stress, and the only significant difference in alcohol use by critical incidents stress was between the lowest and highest tertiles. The bivariate analysis indicates a weak relationship between critical incident stress and alcohol use, and no relationship between chronic stress and alcohol use. However, regression analyses reveal a strong positive relationship between alcohol use and chronic stress, and no relationship between critical incident stress and alcohol use when controlling for posttraumatic symptomatology. It appears that the creation of tertiles may have attenuated the relationship between chronic stress and alcohol use.
The second hypothesis hypothesized a positive association between posttraumatic stress symptomatology and high-risk alcohol use in EMTs. Results found that those in the highest tertile had significantly higher rates of alcohol use than those in the lowest and middle tertiles. This is consistent with the extant literature (e.g., Lopez, et al., 2005; Sabourin & Stewart, 2007) that links posttraumatic stress symptomatology to alcohol use. Additional regression analyses indicate that there is a positive linear association between alcohol use and posttraumatic stress symptomatology in this population. Similar to the first hypothesis, no relationship was found between alcohol use in the lowest and middle tertiles. This may suggest that there is less variability in alcohol use amongst those with lower or moderate levels of posttraumatic stress symptomatology or that variability was lost in the creation of tertile groups.

The third hypothesis posited a positive association between levels of occupationally related stress and posttraumatic stress symptomatology in EMTs. Bivariate analyses revealed significant differences among all tertiles in posttraumatic stress symptomatology in both chronic and critical incident stress. These findings are consistent with extant literature that has linked chronic stress exposure and traumatic exposure (critical incident exposure) to posttraumatic stress symptomatology in EMTs and in the general population (Lloyd & Turner, 2003; Marmar, et al., 1996; Turner & Lloyd, 1995; Turner & Lloyd, 2004; van der Ploeg & Kleber, 2003).

The fourth hypothesis considered a positive association between years of experience and levels of occupationally related stress. In these analyses, years of experience were related to higher levels of stress, insofar as those in the highest tertile of stress had more years of experience than those in the middle and lowest tertile. It is unsurprising that those who had the highest levels of chronic and critical incident stress had more years of experience, than those with lower levels of stress. The longer someone is in the field, the greater the chance of exposure to stressors and the greater the chance of developing a stress reaction. This is consistent with the idea of cumulative adversity (Alonzo, 2000; Lloyd & Turner, 2003; Turner & Lloyd, 1995; Turner & Lloyd, 2004), where the overall numbers of traumatic exposures over time are related to the development of pathological stress reactions like PTSD. However, the observed difference in mean years of experience between the lower and middle tertiles was not significant. Why would those with higher levels of stress have significantly more years of experience than those with moderate or low levels of stress? It is illogical to assume there is some “threshold” in length of service that may place an individual at higher risk of high levels of occupationally related
stress. Rather, given the nature of the analyses, it is probable that collapsing the stress variables disguised any significant differences between the levels stress and years of experience. Further, it must be acknowledged that while the differences in chronic and critical incident stress were significant, the relatively weak correlation and similarity in mean levels of stress among the tertiles suggest that the observed relationship is not strong.

The fifth hypotheses posited a negative association between level of training (EMT-B vs. EMT-P) and levels of occupationally related stress. Analyses revealed an opposite relationship, as EMT-Ps had higher levels of both chronic and critical incident stress than EMT-Bs. Several reasons may exist for these findings. As EMT-Ps have a higher level of training, they may be more likely to be working full-time in the profession. Full-time employment means more hours “on the road” and a higher likelihood of stress exposure. A second possibility for the higher levels of stress may lie in the structure of EMS services. Emergency medical services delivery happens many different ways. Some trucks have multiple EMT-Ps; however, on a truck staffed by both an EMT-P and EMT-B, the EMT-P bears most of the responsibility for managing critically ill or injured patients. That responsibility may contribute to a greater sense of accountability in the EMT-P for the patient outcome, and perhaps a greater level of stress.

**Multivariate Hypotheses**

The final hypothesis considered the overall efficacy of the model. In the first set of regression analyses, posttraumatic stress symptomatology was significantly associated with both types of stress as well as alcohol use. The relationship found in the bivariate analyses persisted even after controlling for demographic factors. Although alcohol use was not hypothesized to be a predictor of posttraumatic stress symptomatology, the results indicate a significant relationship. Several reasons may be posited for this finding. Individuals consuming alcohol may be more likely to place themselves in hazardous or traumatic circumstances, not because of their occupational environment but because of impaired decision-making (e.g., Field, Claassen, & O'Keefe, 2001; Spain, et al., 1997; Swahn, Simon, Hammig, & Guerrero, 2004) and increase the chances of developing PTSD. Alcohol use may heighten susceptibility by increasing anxiety, stress or guilt associated with heavy drinking or cause physiological reactions (e.g., high levels of ingestion, withdrawal) that leave the individual in a hyper-aroused state and more vulnerable to PTSD (Pihl & Stewart, 1991; Stewart, 1996). Another possibility may be that individuals reporting higher rates of alcohol use have a history of previous trauma. Individuals exhibiting
high rates of alcohol use may have been subjected to trauma outside of their occupation (e.g., rape, child abuse) causing higher rates of alcohol use. As previous traumatic history was not included in this study, it becomes a potential confounding variable. All three possibilities are plausible explanations for why alcohol abuse is a significant predictor of posttraumatic stress symptomatology in EMTs.

Additional findings in the regression of PTSD revealed significant interactions between chronic and critical incident stress and chronic stress and alcohol use. While the introduction of both interaction terms did not increase the explained variance of the model substantially, results were significant. Graphing of the interaction terms suggested that chronic stress appears to influence both critical incident stress and alcohol use. Individuals with high levels of chronic stress report higher levels of critical incident stress and alcohol use, whereas individuals with low levels of chronic stress report about the same levels of critical incident stress and alcohol use as those with low levels of alcohol use and critical incident stress. This suggests that stress exposures may have a synergistic effect and may act together to increase the risk of a stress reaction. It must also be noted that the effect, while significant, was not large. Further research may better illustrate the significance of the interaction of chronic and critical incident stress.

In the analyses conducted on alcohol use, after regressing alcohol on the predictor variables, the final model did not have as much explanatory power as the regression analyses of posttraumatic stress symptomatology. The higher proportion of unexplained variance is may be explained as the result of the theoretical model guiding this research. Alcohol use was included because of evidence of alcohol abuse problems in other types of emergency responders. The primary empirical evidence indicated that in the general population, posttraumatic stress symptomatology and not stress exposure predicted alcohol use. While evidence indicated that PTSD might influence alcohol use; there was less evidence that stress exposure would be a strong influence. Given the lack of empirical evidence to support the connection between stress exposure and alcohol use, it is logical that the connection would not be strong in this population and that stress exposure would explain less of the overall variance in alcohol use. Future studies focused more directly on alcohol use may include predictors that result in a model with greater explanatory power. Despite the low explained variance in these analyses, significant relationships were detected with both chronic stress and posttraumatic stress symptomatology. While alcohol abuse had a significant relationship with chronic stress in this sample, after
controlling for posttraumatic stress symptomatology, no significant relationship was found between critical incident stress and alcohol abuse. While some evidence exists to tie traumatic exposure to alcohol abuse in the literature (e.g., Stewart, 1996), it would appear that in this sample, traumatic exposure overlaps with posttraumatic stress symptomatology in a significant way. Individuals may be exposed to traumatic stress, but it is the subsequent stress reaction that creates a higher risk for alcohol use. This is consistent with findings in firefighters (McFarlane, 1998), where it was just traumatic exposure, but the subsequent PTSD that predicted increased alcohol use. If this relationship between PTSD and alcohol use continues to appear in future research efforts, it may provide an important clue for how to train individuals entering the profession. Given the nature of the work necessarily will expose responders to gruesome and tragic circumstances, training on how to cope with that exposure may mitigate the potential for a stress reaction.

Support for the Stress Process Model

Pearlin’s (1989) stress process model posits that stress reactions are not only dictated by stress exposure, but also influenced by the social environment in which people function; the social environment includes ethnicity, socio-economic status, race, gender, and age, level of social support, and coping resources. In addition to considering the context of the stress exposure, Pearlin posited that the type of stressor might be influential in whether or not a stress reaction occurs. The efficacy of the stress process model has been demonstrated several ways in this research effort. First, this research illustrates the varying influence of demographic characteristics and the type of stressors on the outcome variables. For example, when regressing on PTSD only the number of hours worked remained significant after controlling for stress levels and alcohol use, whereas for alcohol use, age, gender, and martial status were significant predictors. Additionally, the multiple significant associations between stress exposures and stress reactions revealed in the analytic process lend support for the hypothesized relationships illustrated in the model.

In these analyses, different aspects of the social environment proved to be differentially influential on stress reactions. In predicting posttraumatic symptomatology, the only demographic characteristic that retained significance in the final model was “hours worked.” This finding is logical insofar as the more hours an individual works, the potential to be exposed to potentially stressful events would increase. Additionally, given the nature of the work, an
individual may become exhausted (e.g., working 24-hour shifts with disrupted sleep cycles) and have less time to relax and decompress. However, it must be noted that this variable retained significance even when chronic and critical incident stress was controlled, so it is possible that “hours worked” contributed to posttraumatic stress symptomatology in a way that was not captured by the stress measures used in this research. When considering alcohol use, age, gender, and marital status retained their significance in the final model. This is consistent with what is known about alcohol use in the empirical literature. Specifically, men tend to drink more heavily than women (Nolen-Hoeksema, 2004; Nolen-Hoeksema & Hilt, 2006; Schulte, Ramo, & Brown, 2009), younger people tend to consume more alcohol (Grant, Dawson, et al., 2004; Grant, Stinson, & Harford, 2001), and married individuals tend to drink less than unmarried individuals (Curran, Muthén, & Harford, 1998; Harford, Hanna, & Faden, 2004; Miller-Tutzauer, Leonard, & Windle, 1991; Power, Rodgers, & Hope, 1999).

In this research, the variable influences of different types of stress exposures were demonstrated in both outcome variables. When examining posttraumatic stress symptomatology, chronic stress, critical incident stress, and alcohol use all had independent, statistically significant relationships with the outcome variable, indicating that each stressor contributed uniquely to posttraumatic symptomatology as well as interacting with each other. These findings indicate that each type of stressor has an independent influence on level of posttraumatic stress symptomatology as well as interacting with each other to further influence symptomatology.

The importance of considering the differential influence of different kinds of stressors is also demonstrated in analyses of alcohol use. These findings show that while chronic stress does have a significant relationship with alcohol use, critical incident stress does not when controlling for level of posttraumatic symptomatology. Ascertaining the variable influences of the different types of stress reactions may prove valuable insofar as it illustrates the need to consider the stressors separately in the stress process model.

These analyses support most of the hypothesized relationships in the model. In the model initially adapted from Pearlin’s model for this research, both chronic and critical incident stress contributed to both posttraumatic stress symptomatology and high-risk alcohol use. Not all of these hypothesized relationships were observed in this population. While regression revealed a direct relationship of both types of stress to posttraumatic stress symptomatology, there was no support for the linkage between critical incident stress and alcohol use when controlling for
posttraumatic symptomatology. In other words, critical incident stress indirectly affects alcohol use through posttraumatic stress symptomatology and its interaction with chronic stress, but has no direct effect as originally hypothesized.

**Implications**

**Implications for EMS**

This research can benefit the overall population of EMS professionals, both at the individual and organizational levels. With greater empirical evidence of the impact of occupationally related stress, individuals may be better able to take steps to reduce the impact of occupationally related stress exposures. The findings may benefit EMTs and paramedics by providing useful information about occupationally related stress reactions. With greater awareness of the risks associated with the profession, individuals will be better equipped to handle stressors and seek help when it is needed. Additionally, a greater awareness may lead to less stigmatizing beliefs about stress reactions, increasing the permissibility of discussing these issues openly amongst colleagues.

At an organizational level, these findings may provide data to educators, supervisors, and administrators who may need to address occupationally related stress in the workplace. Educators can incorporate these findings into their courses, which would disseminate the findings to individual EMTs and paramedics. While there is a reasonable level of awareness of critical incident stress in the EMS community, the impact of chronic stress is not as widely identified as a concern. With these findings, emergency services may be able to create better institutional protections for their employees and enact policies to address some of the chronic stressors that are so influential in increasing the risk for higher levels of posttraumatic stress symptomatology and higher levels of alcohol use.

Additionally, these findings may help EMS researchers focus future research efforts on areas of potential vulnerability. Future efforts may lead to a greater understanding of how and why an individual may be vulnerable to occupationally related stress reactions. A greater understanding of the mechanisms leading to a stress reaction may in turn lead to better interventions to mitigate and ameliorate stress reactions. For example, currently the only intervention that is widely used to manage work related stress in EMS is critical incident stress debriefing (CISD; Everly, Flannery, & Mitchell, 2000; Mitchell, 1983). However the research on the efficacy of CISD is problematic at best (Regehr, 2001; Smith & Roberts, 2003), and a great
deal of potential exists for improvement. Understanding the relationship between stress exposures and stress reactions may make it possible to develop an evidenced-based intervention for individuals who are struggling to manage the stresses of the job.

**Implications for Social Work**

As discussed in Chapter 2, this is an area of investigation that is germane to both social work practitioners and researchers. This research enhances the social work profession in a number of ways, pertaining to ethics, intervention, and research. First, this research represents an operationalization of the NASW Code of Ethics (NASW, 1999), insofar as it is based on the values of service, the dignity and worth of the person, and the importance of human relationships. This research is rooted not only in theory, but also in the values that prioritize the social work value of mitigating suffering and improving the health and well-being of individuals.

Beyond the social work values inherent in this research, social work practice will benefit by expanding the knowledge base from which evidence-based practices may be developed. Because of the potential benefits both to EMTs and to the field of social work, social work researchers should continue to move purposefully in exploring this area, including operationalizing findings in practice settings. In pursing this research, social workers will gain evidence-based information about the interrelationship of stress exposures and stress reactions in EMS that has the potential to enhance their work with a traditionally difficult to reach client base (Miller, 1995). This is important because there is a high probability that social workers will be called upon to work with this group of emergency responders. That involvement may come in a formal setting, such as an employment assistance program (EAP) or in informal settings where social workers may be asked to work with emergency responders in dealing with mass casualty incidents, disaster responses, or other crisis response situations.

In addition to practice implications, this investigation enhances the field of social work research in several ways. First, this is an under-explored area that is not currently identified with any one field. Continuing investigation by social work researchers will place the problem of occupationally related stress exposures in EMS within the field of social work. Social work has already established a history of research and publication in this area. Indeed, some of the best research extant in the literature was done by a social work scholar (e.g., Regehr, 2005; Regehr, Goldberg, & Hughes, 2002; Regehr, et al., 2003). By continuing to pursue research in this area, social workers will gain a greater knowledge of how occupational stressors affect EMTs. A base
of knowledge about occupational stress in EMS will contribute to a greater overall understanding of stress in the emergency services and the overall body of knowledge about the stress process. Continuing this research also has the potential to improve the field of social work. Any understanding developed in this research may be used to inform future investigations into occupational stress exposures and stress reactions within the social work profession. While different in many ways, both EMS and social work share risk for exposure to traumatic stressors, and this research may inform parallel efforts to understand the impact of occupationally related stressors on social workers.

**Directions for Future Research**

This study was descriptive and exploratory, so it may serve as a basis for future research efforts in a number of ways. Three potential directions are discussed. First, future research informed by this effort may expand to include different outcome variables or elements of the stress process model. Improvements are possible in the methodological elements of this study through the development of better instruments and data collection procedures. Finally, future research may improve with the inclusion of the collaborative efforts of other EMS and social work researchers.

Future research efforts may explore the relationship between stress exposures and stress outcomes in a more multidimensional way. In this study, the only outcome measures that were assessed were posttraumatic stress symptomatology and alcohol use. Future research efforts may look at other psychological outcomes like burnout, depression, anxiety, and drug use or biological indicators such as hormone levels or cardiovascular reactivity. Studies of police officers (e.g., Anderson, Litzenberger, & Plecas, 2002; LeBlanc, Regehr, Jelley, & Barath, 2008; Tang & Hammontree, 1992) and firefighters (Guidotti, 1992; Kuorinka & Korhonen, 1981) have found evidence of an association between physical reactions and work-related stress, making it an appropriate area of exploration in EMS personnel. Additionally, future research may attempt to replicate some unexpected findings. For example, the prevalence rate of PTSD in this population is significantly lower than previous research has indicated and is lower than the general population. Replication efforts regarding this finding would provide further evidence that the level of posttraumatic stress symptomatology is lower than in the general population.

In addition to replication and exploring other outcome measures, future research efforts may include other elements of the stress process model, specifically testing the mediating
influences of social support and personal resources. This study makes some important first steps in exploring the relationship between occupationally related stress exposures and stress reactions, however previous research has already established the environment and the coping capacity of the individual may significantly influence stress reactions. In testing these mediating influences, it will be possible to take a strengths-based perspective (Saleebey, 2008), testing not only for deficits, but also for resources and protective mechanisms that may mitigate stress reactions.

As discussed in the limitations section of this chapter, one of the weaknesses of this study lies in its cross sectional nature. Future research may explore the relationship between occupationally related stress exposures and stress reactions using a longitudinal research design. By utilizing a longitudinal model, participants may be followed from the inception of their career in EMS. In this way, it may be possible to track how different personal characteristics, rates of chronic and critical incident stress exposure, and levels of social support may influence stress reactions. A longitudinal design may make it possible to discover what (if any) personality types are best suited for this type of work, what types of coping and social support may be protective against stress reactions, or if and how the individual changes to accommodate the nature of the work and the professional culture of EMS. Additionally, this research found a difference in stress levels between those with different levels of training (EMT-B vs. EMT-P). A longitudinal design would be able to track levels of stress over time to see if and how those stress levels vary by level of training, and how those stress levels manifest as stress responses.

In addition to the different ways in which the issue of occupationally related stress exposures and stress reactions may be studied, methodological improvements may be made in future studies. Specifically, the chronic and critical incident stress measures in this study have not been previously validated. Indeed, a review of the literature has failed to find any scholarly work that has attempted to operationalized and measure the concept of critical incident stress. There is a need to refine, improve, and validate measures of occupational stress in EMS. Qualitative data was collected in addition to the twenty-nine critical incident stressors, so that future research may better capture the elements of critical incident stress.

In addition to the possible future improvements in measurement, the use of online data collection may be improved. While established methods were used to try to maximize response rates, the actual rate of response was still low. Empirically verified methodology for how to maximize response rates in an online setting is still sparse, and so future research efforts may
include an effort to experiment with the online methodology to try to improve responses. Approaches that could be used include the inclusion of a non-responders survey to see why participants did not respond, the use of multiple means of communication (e.g., mail and internet based contacts), experimenting with the timing of the contact intervals, and varying the length of the survey instrument.

Finally, in addition to changes in design and methodology, future research efforts will be collaborative, insofar as other researchers may be identified and partnerships developed. This investigator is aware of a small but growing body of literature that has been created by committed scholars who are undertaking scholarly research with the aim of improving the emergency medical services, both for providers and patients. Through collaborative efforts and incorporating their agendas into the future efforts of this investigator, the rigor and depth of EMS research has the potential to be improved. Not only will collaborative efforts enrich the field of EMS research, it will be consistent with the tradition of interdisciplinary collaboration in the social work profession.

**Conclusion**

This study represents the first effort in a research trajectory that aims to explore the interaction of occupationally related stressors and stress reactions in the emergency medical services. The goals of this agenda involve both expanding the scholarly social work literature and improving the occupational health of individuals who, like social workers, have chosen a life of service. Current findings indicate that while levels of posttraumatic stress symptomatology and high-risk alcohol use are consistent with the national average, significant associations exist between occupationally related stress and these stress reactions. These results support continued investigation and exploration into the relationship of occupationally related stress and stress reactions, including mediating and moderating characteristics, with the goal of improving occupational health, intervention efforts, and the overall base of knowledge about the stress process.
Because alcohol use can affect your health, it is important that we ask some questions about your use of alcohol. Your answers will remain confidential, so please be honest.

<table>
<thead>
<tr>
<th>Questions</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How often do you have a drink containing alcohol</td>
<td>Never</td>
<td>Monthly or less</td>
<td>2 to 4 times a month</td>
<td>2 to 3 times a week</td>
<td>4 or more times a week</td>
</tr>
<tr>
<td>2. How many drinks containing alcohol do you have on a typical day?</td>
<td>1 or 2</td>
<td>3 or 4</td>
<td>5 or 6</td>
<td>7, 8, or 9</td>
<td>10 or more</td>
</tr>
<tr>
<td>3. How often do you have six or more drinks on one occasion?</td>
<td>Never</td>
<td>Less than monthly</td>
<td>Monthly</td>
<td>Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>4. How often during the last year have you found that you were not able to stop drinking once you had started?</td>
<td>Never</td>
<td>Less than monthly</td>
<td>Monthly</td>
<td>Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>5. How often during the last year have you failed to do what was normally expected from you because of drinking?</td>
<td>Never</td>
<td>Less than monthly</td>
<td>Monthly</td>
<td>Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>6. How often during the last year have you been unable to remember what happened the night before because you had been drinking?</td>
<td>Never</td>
<td>Less than monthly</td>
<td>Monthly</td>
<td>Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>Question</td>
<td>Choice 1</td>
<td>Choice 2</td>
<td>Choice 3</td>
<td>Choice 4</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>----------</td>
<td>---------------------------</td>
<td>---------------------------</td>
<td>---------------------------</td>
<td></td>
</tr>
<tr>
<td>7. How often during the last year have you needed an alcoholic drink first thing in the morning to get yourself going after a night of heavy drinking?</td>
<td>Never</td>
<td>Less than monthly</td>
<td>Monthly</td>
<td>Daily or almost daily</td>
<td></td>
</tr>
<tr>
<td>8. How often during the last year have you had a feeling of guilt or remorse after drinking?</td>
<td>Never</td>
<td>Less than monthly</td>
<td>Monthly</td>
<td>Daily or almost daily</td>
<td></td>
</tr>
<tr>
<td>Have you or someone else been injured as a result of your drinking?</td>
<td>No</td>
<td>Yes, but not in the last year</td>
<td>Yes, during the last year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Has a relative, friend, doctor, or another health professional expressed concern about your drinking or suggested you cut down?</td>
<td>No</td>
<td>Yes, but not in the last year</td>
<td>Yes, during the last year</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B
PTSD CHECKLIST – MILITARY (PCL-M)

Instructions: Below is a list of problems and complaints that veterans sometimes have as a response to stressful work experiences. Please read each one carefully, and then circle one of the numbers to the right to indicate how much you have been bothered by that problem in the past month.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>A little bit</th>
<th>Moderately</th>
<th>Quite a bit</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Repeated, disturbing memories, thoughts, or images of a stressful work experience?</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Repeated, disturbing dreams of a stressful work experience?</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Suddenly acting or feeling as if a stressful work experience were happening again (as if you were reliving it)?</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Feeling very upset when something reminded you of a stressful work experience?</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Having physical reactions (e.g., heart pounding, trouble breathing, sweating) when something reminded you of a stressful work experience?</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Avoiding thinking about or talking about a stressful work experience or avoiding having feelings related to it?</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Avoiding activities or situations because they reminded you of a stressful work experience?</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Trouble remembering important parts of a stressful work experience?</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Loss of interest in activities that you used to enjoy?</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>10. Feeling <em>distant or cut off</em> from other people? &amp; 1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Feeling <em>emotionally numb</em> or being unable to have loving feelings for those close to you? &amp; 1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Feeling as if your <em>future</em> somehow will be <em>cut short</em>? &amp; 1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Trouble <em>falling or staying asleep</em>? &amp; 1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Feeling <em>irritable</em> or having <em>angry outbursts</em>? &amp; 1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Having <em>difficulty concentrating</em>? &amp; 1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Being “<em>superalert</em>” or watchful or on guard? &amp; 1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Feeling <em>jumpy</em> or easily startled? &amp; 1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**APPENDIX C**

**CHRONIC WORK STRESSORS (adapted PSQ)**

Below is a list of items that describe different aspects of being an EMT or paramedic. Please indicate how much stress each has caused you over the past six months.

<table>
<thead>
<tr>
<th>Item</th>
<th>No stress at all</th>
<th>Moderate stress</th>
<th>A lot of stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dealing with co-workers</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Feeling like different rules apply to different people (e.g., favoritism)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Feeling like you always have to prove yourself to the organization</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Excessive administrative duties</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Constant changes in policy/legislation</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Staff shortages</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Bureaucratic red tape</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Too much computer work</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Lack of training on new equipment</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Perceived pressure to volunteer free time</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Dealing with supervisors</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Inconsistent leadership style</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Lack of resources</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Unequal sharing of work responsibilities</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. If you are sick or injured, your co-workers seem to look down on you</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Leaders over-emphasize the negatives (e.g., supervisor evaluations, public complaints)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Internal investigations</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Dealing with hospital staff</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. The need to be accountable for doing your job</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Inadequate equipment</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Shift work</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Working at night</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Overtime demands</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Risk of being injured on the job</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Work related activities on days off (e.g., court, community events)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. Managing your social life outside of work</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>27. Not enough time available to spend with friends and family</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>28. Paperwork</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>29. Eating healthy at work</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>30. Finding time to stay in good physical condition</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>31. Fatigue</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>32. Occupation-related health issues (e.g., back pain)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>33. Lack of understanding from your friends and family about your work</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>34. Making friends outside of the job</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>35. Upholding a “higher image” in public</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>36. Negative comments from the public</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>37. Limitations to your social life (e.g., who your friends are, where you socialize)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>38. Feeling like you are always on the job</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>39. Friends/family feel the effects of the stigma associated with your job</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
APPENDIX D
CRITICAL INCIDENT STRESSORS

<table>
<thead>
<tr>
<th>Please indicate how many times you have experienced each incident in the line of duty</th>
<th>If this happened, how much stress has it caused you in the last six months?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No stress at all</td>
</tr>
<tr>
<td>In the line of duty, I was….</td>
<td></td>
</tr>
<tr>
<td>1. Seriously injured</td>
<td>0-9</td>
</tr>
<tr>
<td>2. Present when a fellow EMT/Paramedic was seriously injured</td>
<td>0-9</td>
</tr>
<tr>
<td>3. Present when a fellow EMT/Paramedic was killed</td>
<td>0-9</td>
</tr>
<tr>
<td>4. Seriously beaten</td>
<td>0-9</td>
</tr>
<tr>
<td>5. Taken hostage</td>
<td>0-9</td>
</tr>
<tr>
<td>6. Received serious threats towards loved ones as retaliation for your work in EMS</td>
<td>0-9</td>
</tr>
<tr>
<td>7. Threatened with a gun or other weapon</td>
<td>0-9</td>
</tr>
<tr>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8</td>
<td>Trapped in a potentially life threatening situation</td>
</tr>
<tr>
<td>9</td>
<td>Exposed to serious risk of AIDS or other life-threatening diseases</td>
</tr>
<tr>
<td>10</td>
<td>Exposed to a life-threatening toxic substance</td>
</tr>
<tr>
<td>11</td>
<td>Made a mistake that lead to the serious injury or death of a patient</td>
</tr>
<tr>
<td>12</td>
<td>Was in a serious car accident</td>
</tr>
<tr>
<td>13</td>
<td>Saw someone dying</td>
</tr>
<tr>
<td>14</td>
<td>Encountered the body of someone recently dead</td>
</tr>
<tr>
<td>15</td>
<td>Encountered a decaying corpse</td>
</tr>
<tr>
<td>16</td>
<td>Encountered a mutilated body or human remains</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>0-9</td>
<td>10-20</td>
<td>21-50</td>
<td>51+</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>0-9</td>
<td>10-20</td>
<td>21-50</td>
<td>51+</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>0-9</td>
<td>10-20</td>
<td>21-50</td>
<td>51+</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>0-9</td>
<td>10-20</td>
<td>21-50</td>
<td>51+</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>0-9</td>
<td>10-20</td>
<td>21-50</td>
<td>51+</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>0-9</td>
<td>10-20</td>
<td>21-50</td>
<td>51+</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>0-9</td>
<td>10-20</td>
<td>21-50</td>
<td>51+</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>0-9</td>
<td>10-20</td>
<td>21-50</td>
<td>51+</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>16</td>
<td>0-9</td>
<td>10-20</td>
<td>21-50</td>
<td>51+</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Question</td>
<td>Frequency Range</td>
<td>Count</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>-------------</td>
<td>-----</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Made a death notification</td>
<td>0-9 10-20 21-50 51+</td>
<td>1 2 3 4 5 6 7 N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Encountered a child who had been sexually assaulted.</td>
<td>0-9 10-20 21-50 51+</td>
<td>1 2 3 4 5 6 7 N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Encountered an adult who had been sexually assaulted.</td>
<td>0-9 10-20 21-50 51+</td>
<td>1 2 3 4 5 6 7 N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Encountered a SIDS death</td>
<td>0-9 10-20 21-50 51+</td>
<td>1 2 3 4 5 6 7 N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Encountered a child who had been badly beaten</td>
<td>0-9 10-20 21-50 51+</td>
<td>1 2 3 4 5 6 7 N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Encountered an adult who had been badly beaten</td>
<td>0-9 10-20 21-50 51+</td>
<td>1 2 3 4 5 6 7 N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Encountered a child who was severely neglected or in dire need of medical attention because of neglect</td>
<td>0-9 10-20 21-50 51+</td>
<td>1 2 3 4 5 6 7 N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Saw animals that had been severely neglected, intentionally injured, or killed</td>
<td>0-9 10-20 21-50 51+</td>
<td>1 2 3 4 5 6 7 N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Had to respond to a large-scale disaster</td>
<td>0-9 10-20 21-50 51+</td>
<td>1 2 3 4 5 6 7 N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
26. Had your life endangered in a large-scale disaster

| 0-9 | 10-20 | 21-50 | 51+ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |

27. Responded to an aggressive crowd or riot

| 0-9 | 10-20 | 21-50 | 51+ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |

28. Responded to a scene involving family, friends, or others known to the crew

| 0-9 | 10-20 | 21-50 | 51+ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | N/A |
Just a few more questions….

How old are you? ________ years

How many years have you been in EMS? ________ years

Are you:

□ Male
□ Female

What is your current marital status?

□ Married first time
□ Married with previous marriage(s)
□ Widowed
□ Divorced or separated
□ Never married

At what level are you certified?

□ EMT-P
□ EMT-B

Do the consumers of your services primarily live in a….

□ A city
□ A suburb
□ A small town or rural area?

How many hours do you typically work in a week?

□ less than 10 hours
□ 60-80 hours
□ 10-20 hours
□ 80-100 hours
□ 20-40 hours
□ 100+ hours
□ 40-60 hours
How many jobs do you currently hold?  _________ jobs

In your primary job, how busy is your service?

☐ Not at all busy  ☐ Occasionally busy
☐ Moderately busy  ☐ Frequently busy
☐ Very busy

In your primary job, what sort of service do you work for?

☐ Fire based  ☐ 3rd Service
☐ Private (for profit)  ☐ Private (non-profit)
☐ Volunteer  ☐ Other

Are you:

☐ American Indian or Alaskan Native  ☐ Native Hawaiian or Other Pacific Islander
☐ Black or African American  ☐ White
☐ More than one race  ☐ Hispanic or Latino

What is your net personal income per year?

☐ less than $19,999  ☐ $60,000-69,999
☐ $20,000-29,999  ☐ $70,000-79,999
☐ $30,000-39,999  ☐ $80,000-89,999
☐ $40,000-49,999  ☐ $90,000-99,999
☐ $50,000-59,000  ☐ $100,000+
APPENDIX F
LETTER OF SUPPORT FROM THE NATIONAL REGISTRY OF EMTs

October 7, 2008

To Whom It May Concern:

The National Registry of EMTs is committed to supporting research in EMS. We have agreed to provide the systematic probability sample of EMTs and Paramedics for the research into occupationally related stress exposures and stress reactions in EMS proposed by Ms. Donnelly.

If you have any questions or concerns, please feel free to contact me at greggm@nremt.org or 614-885-1384.

Respectfully,

Gregg S. Mangona, Ph.D., NREMT-P
Associate Director
Pre-contact letter:

Subject: Help us understand stress and health in EMS!

Dear [insert participant name here],

For those of us who work in EMS, we know that being an EMT or paramedic can be stressful. The stress may be from a tough call, co-worker conflict, low pay, or long hours. We know the work is stressful, but we know less about how chronic and critical incident stress influences us on a day-to-day basis.

Within the next few days, you will be receiving an e-mail requesting your participation in a survey of EMTs and paramedics throughout the United States. The e-mail will contain a link to a survey that can be completed online. The purpose of this study is to find out what aspects of EMS work are the most stressful, and how we react to that stress.

We are writing to you in advance because we have found that many people like to know ahead of time that they will be contacted. The study is an important one and your participation will be greatly appreciated!

Thank you for your time and consideration.

Sincerely,

Elizabeth Donnelly, NREMT-B
Principal Investigator
EMS Stress and Health Study
Florida State University
College of Social Work
(850) 644-2710
ems@csw.fsu.edu

Jim Hinterlong, PhD
Major Professor
Florida State University
College of Social Work
(850) 644-3577
jhinterlong@fsu.edu
First Survey Contact

Subject: Study on stress and health in EMS

Dear [insert participant name here],

I have been an EMT for over ten years. In those years, I have been impressed with the dedication and strength of my co-workers in the face of a great deal of adversity. Stress may come from both critical incidents and the day-to-day conflicts that arise between co-workers or supervisors. Very few would argue that working in EMS can be stressful. Unfortunately, very little is known about how that stress affects us.

I am writing to request your participation in a survey being conducted of EMTs and paramedics throughout the United States. As a nationally registered EMT/paramedic, you have been randomly selected to participate in our survey, which will ask you what aspects of EMS work are the most stressful, and how you react to that stress.

Completion of the survey will take approximately 15 minutes (individual times may vary). Please go to the following secure website, which will take you directly to the survey:

[provide link here]

You can help your profession by taking a few minutes to share what is the most stressful for you about being in EMS.

If you have any questions or comments about this survey, or wish to know the results when I have compiled them, please feel free to contact me at ems@csw.fsu.edu.

Sincerely,

Elizabeth Donnelly, NREMT-B
Principal Investigator
EMS Stress and Health Study
Florida State University
College of Social Work
(850) 644-2710
ems@csw.fsu.edu

Jim Hinterlong, PhD
Major Professor
Florida State University
College of Social Work
(850) 644-3577
jhinterlong@fsu.edu
This part of the consent appeared on the first page of the survey, prior to participants being asked any questions.

Welcome to the Emergency Medical Services Stress and Health Survey!

As a nationally registered EMT/paramedic, you have been randomly selected to participate in our survey. The purpose of this study is to find out what aspects of EMS work are the most stressful, and how EMTs and paramedics react to that stress.

Your answers will be held confidentially to the extent allowed by law and will be released only as summaries in which no individual’s answers can be identified.

You may experience minimal risks, including possible stress or anxiety, from participating in this study. You may also benefit from enhanced awareness of types and levels of stress you face in your work as an EMT or paramedic.

Once you complete and submit the survey through the online procedure, your e-mail address will be separated from your responses and never connected to your answers in any way.

This survey is voluntary and you will not be penalized for nonparticipation.

This research has been approved by Florida State University’s Institutional Review Board (IRB). If you have questions about the IRB, they can be reached at 850-644-7900 or e-mail jth5898@fsu.edu

Do you wish to participate in the EMS Stress and Health Study?

- Yes
- No
Questions regarding this study may be directed to

Elizabeth Donnelly, NREMT-B
Principal Investigator
EMS Stress and Health Study
Florida State University
College of Social Work
(850) 644-2710
ems@csw.fsu.edu

Jim Hinterlong, PhD
Major Professor
Florida State University
College of Social Work
(850) 644-3577
jhinterlong@fsu.edu
Second Survey Contact

Subject: Following up on the study of stress and health in EMS

Dear [insert participant name here],

Recently, a request to participate in an online survey of EMTs and paramedics was sent to you. If you have already completed the survey, please accept my sincere thanks. If not, please do so today. We are especially grateful for your help because only you can help me understand what aspects of EMS work are the most stressful and how people react to that stress. The survey can be accessed at:

[provide link]

I hope to hear from you soon!

Sincerely,

Elizabeth Donnelly, NREMT-B
Principal Investigator
EMS Stress and Health Study
Florida State University
College of Social Work
(850) 644-2710
ems@csw.fsu.edu

Jim Hinterlong, PhD
Major Professor
Florida State University
College of Social Work
(850) 644-3577
Third Contact Letter

Subject: Reminder about the EMS Stress and Health study

Dear [insert participant name here],

About a week ago, I requested your participation in a survey we are conducting of EMTs and paramedics regarding the stress of working in EMS.

[provide link here]

Thus far, we have not yet received your response. Based on the responses I have already received, we believe that the results will shed a great deal of light on how working in EMS affects us.

I am writing to you again because of the importance your participation in this survey has in helping us to get accurate results. It is only by hearing from nearly everyone selected to participate in our survey that we can ensure that our results are truly representative of those we invited to participate.

I want to remind you that the results of this survey will be confidential and your name and e-mail address will not be connected with the results, which will only be presented in summarized form. Protecting the confidentiality of people’s answers is important to me, as well as to the University.

I hope that you will respond to the survey soon!

Sincerely,

Elizabeth Donnelly, NREMT-B
Principal Investigator
Fourth Contact Letter

Subject: Last chance to participate in the EMS Stress and Health Study!

Dear [insert participant name here],

The study is drawing to a close! This is the last time I will request your participation in our study on occupational stress in EMS.

I am making this final attempt because I am concerned that the responses of people who have not yet filled out the survey may be different from those who already responded. Hearing from everyone in the sample will ensure that the results are as accurate as possible. The survey can be accessed at:

[provide link]

The only way I can understand how stressful working in EMS may or may not be is if you take the time to tell me. I hope to hear from you soon!

Sincerely,

Elizabeth Donnelly, NREMT-B
Principal Investigator
EMS Stress and Health Study
Florida State University
College of Social Work
(850) 644-2710
ems@csw.fsu.edu

Jim Hinterlong, PhD
Major Professor
Florida State University
College of Social Work
(850) 644-3577
jhinterlong@fsu.edu
APPENDIX H
HUMAN SUBJECTS APPROVAL

Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 9/9/2009

To: Elizabeth Donnelly

Address: 110 N. Lipona Road #15, Tallahassee, FL 32304
Dept.: SOCIAL WORK

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
Occupational Stress Exposure and Stress Reactions in the Emergency Medical Services

The application that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Expedited per 45 CFR § 46.110(7) and has been approved by an expedited review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.
If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 9/8/2010 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chair of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Jim Hinterlong, PhD, Advisor
HSC No. 2009.2862
REFERENCES


Davey, J. D., Obst, P. L., & Sheehan, M. C. (2001). It goes with the job: Officers' insights into the impact of stress and culture on alcohol consumption within the policing occupation *Drugs: Education, Prevention & Policy, 8*, 141-149.


In the summer of 1997, Elizabeth Donnelly completed a Bachelors degree in Theater and History from the University of Minnesota. In 2003, she was awarded Masters Degrees in Social Work and Public Health by the University of Minnesota. Ms. Donnelly is a Licensed Independent Clinical Social Worker (LICSW) in the State of Minnesota and worked as an emergency medical technician-basic (EMT-B) since 1999. She enrolled in the doctoral program at the Florida State University in the fall of 2006. Ms. Donnelly’s research interests include the impact of occupationally related stress exposure on emergency responders, including EMTs and paramedics.