Impact of the firefighter academy on recruits' general well-being and distress

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IMPACT OF THE FIREFIGHTER ACADEMY ON
RECRUITS' GENERAL WELL-BEING
AND DISTRESS

by

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Bachelor of Science
South Dakota School of Mines and Technology
1998

A thesis in partial fulfillment
of the requirements for the

Master of Education Degree in Health Promotion
Department of Health Promotion
School of Public Health
Division of Health Sciences

Graduate College
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Impact of the Firefighter Academy on Recruits' General Well-Being and Distress

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ABSTRACT

Impact of the Firefighter Academy on Recruits' General Well-Being and Distress

by

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Coronary heart disease has consistently been shown to be the leading cause of fatalities among professional firefighters. Chronic psychosocial stressors, particularly occupational stress, have been investigated in relation to cardiovascular disease and associated risk factors. Epidemiologic evidence suggests that the elevated occupational prevalence of adverse health outcomes among fire service personnel is due to their work-related stressors. Fire academy instructors have the responsibility of improving the minds and bodies of recruits; therefore, this research evaluated the self-perceived general well-being and distress among firefighter recruits in the southwestern United States. The results were used to assess the need for stress management education during the firefighter academy. Rather than treating firefighters for stress-related health outcomes well into their career, addressing the stress-related risk factors associated with cardiovascular disease during the academy may go a long way in improving the overall health and well-being among fire service personnel.
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CHAPTER 1

INTRODUCTION

This research focused on self-perceived general well-being and distress among firefighter recruits in the southwestern United States (U.S.). This chapter provides a broad overview of the research. It examines the background of the research and the problem statement, and outlines the general aim of the research. The research design and method are then briefly described. Finally, the chapter divisions are delineated.

Prevalence of Coronary Heart Disease among Firefighters

Coronary heart disease (CHD) has consistently been shown to be the leading cause of "on-duty deaths" or fatalities resulting from injury or illness occurring during fire department duties. Between January 1, 1994, and December 31, 2004, 39% of deaths among on-duty firefighters reported to the United States Fire Administration (USFA) were due to CHD. Fire suppression, alarm response, alarm return, and physical training (PT) have been associated with significant increases of risk of death from CHD among firefighters; however, these deaths were 12 to 136 times as likely to occur during fire suppression as during non-emergency duties. Although fire suppression accounts for approximately 1% to 5% of the average firefighter's professional time per year, 32% of CHD-related deaths were associated with the stress, smoke, and sheer physical effort of suppressing a fire (Kales, Soteriades, Christophi, & Christiani, 2007; Kales, Soteriades, Christoudias, & Christiani, 2003).

Firefighting is more likely to precipitate an acute cardiac event in a susceptible person rather than cause the underlying atherosclerosis. Approximately 26% of firefighters who had fatal events related to CHD while on duty had previously received a
diagnosis of CHD, peripheral vascular disease, or cerebrovascular disease (Kales et al., 2003). Whether on-duty CHD deaths are work-related, and which occupational and personal risk factors increase the risk of on-duty CHD death, remains unclear; however, many local workers' compensation statutes presume that if heart disease develops in a firefighter, then a work-related association due to occupational stress is present (Bogucki & Rabinowitz, 2005; Kales et al., 2003).

Stress Defined

The field of physics first defined stress as the distortion produced by an external force placing strain on an object. Both the strength of the force and the ability to withstand it determines the resulting damage to the object (Stinchcomb, 2004). Psychologically, stress is defined as an imbalance between environmental demands and individual resources and occurs when the demands placed on an individual exceed his/her capacity to deal with them (Chernis, 1980). There is no uniform agreement in what stress is; however, Lewis (1994) summarized it in eight concepts: 1) stress is a by-product of any change; 2) there are different types of change that can be experienced, thus there are different types of stress: loosely defined as good stress (eustress) and bad stress (distress); 3) not all stress is harmful; 4) stress is necessary to feel fulfilled, excited, challenged, and ultimately satisfied in life; 5) different individuals have varying degrees of tolerance for different types of stress and may perceive the same event(s) with differing amounts of stress; 6) long-term stress is damaging to one's emotional and physical well-being; 7) some professions have more stress than others and may, therefore, be considered more hazardous; and 8) while individuals have a large amount of control over the impact that stress has in their daily lives, they generally choose not to exercise this control. Stress is viewed as exposure to catastrophic situations (i.e. wars, riots, natural disasters), or traumatic events (i.e. death, accidents, violence). In addition, stress has been recognized as exposure to the normal, but toxic characteristics of everyday life (i.e. noise, crowds, traffic congestion), over a period of
time. Whether catastrophic or commonplace, such disruptions are recognized as stressors, rather than the stress itself (Stinchcomb, 2004).

Stressors may be either physical or psychosocial (emotional). Psychosocial stressors are environmental events in which an individual's perception affects whether or not the stress response is triggered. A physiological response to a stressor, whether physical or psychosocial, results in symptoms such as dry mouth, sweaty palms, and the cessation of digestion. Increases in heart rate, temperature, respiration, and visual activity, may be additional symptoms. In the end, the body moves blood to the skeletal muscles, preparing it to fight or to run. Typically, a stressor situation would include the decision to fight or flee, implementation of that decision, resolution, and a return to a normal baseline until the next stressor occurs; however, today's world does not allow for a return to a baseline because stressors often continue and/or overlap, particularly in the fire service where stress is ongoing, even chronic (Kowalski & Vaught, 2001).

Health and Well-Being Defined

Well-being has been defined by external criteria as some "ideal condition" that differs across cultures. In attempts to expose what leads to the positive evaluation of life or "life satisfaction," researchers have discovered that subjective well-being, or self-described happiness, is a comprehensive assessment of the quality of one's life by an individual's own set of criteria. In this context, happiness is used to denote a dominance of positive affect (e.g. being energetic, excited, and enthused) over negative affect (e.g. anger, disgust, guilt, and depression) (Diener, 1984). According to Danna and Griffin (1999), well-being incorporates the following:

- various life/non-work satisfactions enjoyed by individuals (e.g. satisfaction and/or dissatisfaction with social life, family life, recreation, and spirituality);
- work-/job-related satisfactions (e.g. satisfaction and/or dissatisfaction with pay, promotion opportunities, the job itself, and coworkers); and
- general health, which encompasses the combination of mental/psychological
indicators (e.g. affect, frustration, and anxiety) and physical/physiological indicators (e.g. blood pressure, heart condition, and general physical health).

In a thorough review of the literature regarding work stress and employee health, Ganster and Schaubroeck (1991) concluded that evidence does not strongly support a job stress and health outcomes association; however, the indirect evidence from occupational studies demonstrating differences in health and mortality not easily explained by other factors, as well as within-subject studies pointing toward a causal effect of work experiences on physiological and emotional responses, suggests a work stress effect.

**Stress-Related Health Outcomes**

Over 30% of firefighters experience significant psychological stress, a possible predictor of vulnerability to future illness (Boxer & Wild, 1993; Dutton, Smolensky, Leach, Lorimer, & His, 1978). A broad range of psychological and social characteristics have been investigated in relation to cardiovascular disease (CVD) and associated risk factors; however, chronic psychosocial stressors, particularly occupation- or work-related stress, are one of three domains that dominate much of the literature (Everson-Rose & Lewis, 2005). Stress that is not managed has also been linked to negative states of psychological well-being, including emotions such as anger, guilt, dissatisfaction, agitation, anxiety, depression, hopelessness, and loneliness (Eysenck, 1991; Jerling, 2002). In addition, an overload of stress is associated with loss of motivation, diminished creativity, poor health behaviors, as well as increased disability claims, job turnover rates, absenteeism, lost productivity, and tardiness (Cooper & Cartwright, 1994; Grisby & McKnew, 1988; International Association of Fire Chiefs Foundation, 1991; Kowalski & Vaught, 2001). Signs and symptoms related to stress are of noteworthy concern to the fire service because they hinder job performance, influence length of employment, diminish health status following retirement, and because they
may entail high economic costs on employers and employees alike (Murphy, Bond, Beaton, Murphy, & Johnson, 2002).

Sources of Occupational Stressors in the Fire Service

Firefighting is a challenging and potentially rewarding career; however, many who enter this field are not prepared to withstand the extraordinary and persistent occupational demands associated with the job (Beaton, Murphy, Johnson, Pike, & Corneil, 1999). Firefighting is an especially stressful occupation with many sources of occupational stress, including the following: sleep disruption; concerns about wages, benefits, and possible reductions-in-force (RIF); conflict with co-workers and/or superiors; potential risk for injury and/or death of self; insufficient equipment and resources; concerns about job skills; family conflict issues; past traumatic incidents; boredom; second job stress; and discrimination (Beaton & Murphy, 1993; Beaton, Murphy, Pike, & Jarrett, 1995; Boxer & Wild, 1993; Murphy, Beaton, Pike, & Johnson, 1999; Murphy et al., 2002). Epidemiologic evidence suggests that the elevated occupational prevalence of adverse health outcomes among fire service personnel is due to their job-related stressors (Beaton & Murphy, 1995; Beaton et al., 1995; International Association of Fire Fighters [IAFF], 2000). As rookies in the fire service profession, firefighters may not be able to deny the affective impact of the job when faced with occupational stress; however, they often lack adaptive or protective strategies. Maladaptive coping responses may facilitate harmful changes in health behavior, such as substance abuse, more sedentary lifestyles, accident proneness, violence, and poor compliance with medical regimens (Kawachi et al., 1994; Lobstein, Mosbacher, & Ismail, 1983; Quick, Horn, & Quick, 1986; Wortman, Sheedy, Gluhoski, & Kessler, 1992).

Fire Service Recruit Training

Certain traits or aptitudes make a good firefighter; therefore, many fire departments
use psychological testing, interviews, and other tools to screen applicants. Traits common to firefighters and other emergency responders are control orientation, attention to detail, traditionalism, strong role identification, action orientation, risk-taking behavior, dedication, family orientation, high expectations, and rescue orientation. The combination of these qualities produce precisely what the public needs in a firefighter; however, traits such as control orientation and high expectations that help firefighters succeed can also lead to difficulties in relationships with both coworkers and family. Thus, firefighters need to be aware of the behaviors associated with these traits to avoid professional and personal consequences such as isolation and persistent negativity (McEvoy, 2004).

Fire academies are designed to prepare firefighter recruits for a long, safe, and successful career in the fire service, and follow the National Fire Protection Association (NFPA) 1001 Standard for Entry Level Firefighter guidelines for knowledge and skills. During the 14- to 16-week firefighter academy, recruits participate in a combination of classroom and hands-on training sessions. Classroom sessions are comprised of lectures in subjects such as fire science, safety, fire extinguishing systems, basic emergency medical services (EMS) procedures, and fire service hydraulics. Hands-on training includes, but is not limited to hose lays, search and rescue, ladders, extrication, self-contained breathing apparatus (SCBA) donning and doffing, power tools, high rise operations, rapid intervention teamwork, hazardous materials, and swift water rescue (Clark County Fire Department [CCFD], 2005; Long Beach Fire Department [LBFD] Training Center, n.d.; New Mexico Public Regulation Commission, 2006; North Las Vegas Fire Department [NLVFD], n.d.).

Firefighter recruits are taught vital tools and information that will help them preserve the lives and property of others, as well as their own life as an on-duty firefighter. During the academy, recruits must be able to quickly and efficiently transition between PT, lecture, skills evolutions, EMS, and public interaction. Because the fire academy is designed to prepare and expose recruits to all aspects of fire service
operations and activities, they are intentionally placed in stress-inducing situations to help them better understand the rigors of firefighting and how to mentally and emotionally handle work-related stressors (CCFD, 2005; LBFD Training Center, n.d.; New Mexico Public Regulation Comission, 2006; NLVFD, n.d.). Recruits participate in a daily cardiovascular and strength training program designed to prepare them for the physical demands of the profession; however, there is no evidence of formal stress management training during the academy. Although recruits are exposed to many of the same types of stressors that they will encounter in the fire service, these stressors are “controlled” by the instructors; therefore, the firefighter academy may be a prime environment for the implementation of a stress management education program.

Problem Statement

Research involving stress among firefighters, with the exception of critical incident stress, and its undesirable health outcomes was not initiated until 1985 (Murphy et al., 1999). Since then, much of the research regarding stress in the fire service has involved professional firefighter populations. Further research is needed to explore the firefighter academy experience to better assess whether this environment is conducive to providing a stress management education program. Fire academy instructors have the responsibility of improving the minds and bodies of recruits; therefore, this research investigated the self-perceived general well-being and distress experienced by recruits during a professional firefighter academy, and examined the following hypotheses:

- The academy has an effect on the self-perceived general well-being and distress of firefighter recruits.

- Firefighter recruits report feelings of distress during the academy.

From the above-mentioned problem statement, the aim of this research was to evaluate the self-perceived general well-being and distress among firefighter recruits in the southwestern U.S., and to use the results to assess the need for stress management education during the firefighter academy.
Professional Significance

Stress affects the health and well-being of firefighters and is acknowledged as one of the most serious occupational health hazards facing the fire service (International Association of Fire Chiefs Foundation, 1991). Stress, however, cannot be avoided absolutely as it is essential for maintaining vitality and optimal functioning. Therefore, rather than being treated for stress-related health outcomes well into their fire service career, firefighters would benefit from learning what stress is and its effect on health and well-being, as well as from being taught stress management modalities that can be employed to buffer the effects of the stressful situations they will encounter as part of their work. Addressing the stress-related risk factors associated with CVD during the firefighter academy may go a long way in improving the overall health and well-being among fire service personnel.

Overview of the Methodology

This research made use of existing data collected from 40 firefighter recruits in the southwestern U.S. during three academies over an 18-month period who, as part of their job requirements, completed several performance assessments, including the General Well-Being Schedule (GWB). The GWB is a self-administered questionnaire developed by H. J. Dupuy (1978, as cited in McDowell, 2006) that offers a brief, but broad-ranging, indicator of subjective feelings of psychological well-being and distress. It is an educational/informational screening strategy used in community settings that is designed to assess how individuals feel about their inner personal state rather than about external conditions (McDowell, 2006). Statistical Package for the Social Sciences (SPSS) software was utilized to analyze the secondary data. One-way repeated measures of analysis of variance (ANOVA) was used to determine if a significant difference existed between at least two of the three mean GWB sub-scale and total scores (pre-academy, mid-academy, and end-of-academy) among the firefighter recruits. When a significant
difference in scores across the time occasions was revealed, pairwise comparisons were performed to assess which of the time occasions differed from one another.

Chapter Summary

This introductory chapter has provided a broad overview of the research, as well as its background. The problem statement and aim of the research have been outlined and the research design and method have been briefly described. A detailed literature review intended to provide support for the focus of this research will be discussed in Chapter 2. Chapter 3 will describe, in full, the methodology of this research, as well as the data. The data analyses will be discussed in Chapter 4, and Chapter 5 will provide the interpretation of the findings, as well as the conclusions, recommendations, and limitations of this research.
CHAPTER 2

REVIEW OF RELATED LITERATURE

The job of firefighter ranks second as most stressful only to being the President of the U.S. (Krantz, 2002). Numerous studies have examined potential occupational stressors, stress responses, and lifestyle practices among professional firefighters, as well as their relationship to CVD. This chapter consists of a review of the related literature to provide the theoretical and empirical background of this research. It will commence with a discussion of the prevalence rates of CVD, particularly CHD, among U.S. firefighters, as well as their duty-specific risks of morbidity and mortality from CVD. Thereafter, the chapter will be divided in four sections: the first section will focus on evidence supporting the hypothesis that psychosocial factors are related to morbidity and mortality due to CVD; the second section will focus on the description of stressors inherent to firefighting; the third section will focus on stress-related mental and physical health outcomes among firefighters; and the fourth section will focus on lifestyle behaviors among firefighters. This chapter will conclude with a review of the content of the chapter, bringing together the key conclusions of all of the empirical research analyzed.

Prevalence of CVD among Firefighters and their Duty-Related Risks

Although firefighters are an exceptionally healthy sub-sample of the U.S. population at the beginning of their careers, cardiovascular events, largely due to CHD, are the leading nature of injuries and account for nearly half of the total deaths among on-duty firefighters. In 1977, the number of sudden cardiac deaths was over 70, but fell by approximately 25% by 1990. Since then, the number of CHD-related deaths has
fluctuated between 40 and 50, down nearly one-third from the 1970s. The number of
dead from CHD in 2006 was at the lowest level in 30 years; however, cardiovascular
events still accounted for the largest percentage of on-duty firefighter fatalities (Fahy,

CHD accounts for 45% of deaths among firefighters on-duty, compared to 22% of
deaths among police officers and detectives on-duty, 11% of deaths among other EMS
workers, and 15% among occupational fatalities overall (Fahy, 2005; Maguire, Hunting,
Smith, & Levick, 2002; USFA, 2002). It has been demonstrated that most on-duty CHD
fatalities in the fire service are likely to be work-precipitated and occur in firefighters
with underlying CHD (Kales et al., 2003). Among the 34 victims of cardiovascular events
in 2006, 15 were reported to have had prior heart problems, including prior heart
attacks, bypass surgery and angioplasty/stent placement; 11 had severe arteriosclerotic
heart disease, according to post-mortem medical documentation; 2 had diabetes; and 3
were hypertensive. Post-mortem information or other details on the victims' medical
histories have been made available for 713 of the 1,177 CHD victims over the past 25
years. Of the 713 victims, 603 (84.6%) had suffered prior heart attacks, severe
arteriosclerotic heart disease, had undergone bypass surgery or angioplasty/stent
placement, or were diabetic. Some CHD victims had more than one condition (Fahy et
al., 2007).

The following research examined CHD morbidity and mortality among firefighters
and employed similar methodological parameters. A well-documented cohort of 310
Massachusetts professional firefighters who underwent baseline medical surveillance in
1996/1997, and whose vital status and continued professional activity were re-
documented in 1998, served as a control group for each study. Furthermore,
hypertension, smoking, high cholesterol, and diabetes mellitus were defined as CHD
risk factors for all groups, and a previous abnormal exercise of radionuclide stress test,
a history of coronary artery bypass grafting, angioplasty, myocardial infarction (MI),
angina, carotid stenosis, or peripheral vascular disease defined preexisting evidence of
arterial occlusive disease. Finally, information from fiscal year 2002 data from the Cambridge, Massachusetts, Fire Department serving a population of approximately 100,000 people was used to estimate the relative proportions of firefighters’ time spend in different duties.

Kales et al. (2003) carried out an internal, case-control study, selecting as cases 52 male firefighters whose CHD deaths were investigated by the National Institute of Occupational Safety and Health Administration (NIOSH), to reveal job-related precipitants and underlying risk factors. In addition to the above-mentioned cohort of Cambridge professional firefighters, another control population was selected for this study – 51 male firefighters who died of on-duty trauma.

Results demonstrated that the 52 firefighters included as CHD cases died as a result of ischemic heart disease (IHD), including autopsies in 36 cases (69%), and pre-morbid evidence of arterial occlusive disease in 6 additional cases (12%). In the remaining 10 cases (19%), risk factors and symptomology supported CHD as the most likely cause of death. Although 35 cases (67%) were professional firefighters, with the remainder serving as volunteer firefighters, no significant differences were found in the prevalence of CHD risk factors between career and volunteer CHD decedents (Kales et al., 2003).

CHD deaths peak between 6:00 am and noon in the general population; however, 77% of on-duty CHD fatalities occurred between noon and midnight. This circadian pattern continued even when only professional firefighters working 24-hour shifts or only volunteer firefighters were considered with 73% and 70%, respectively, of on-duty CHD deaths occurring between noon and midnight. Likewise, similar distributions of the final job activity engaged in prior to CHD death was found for both professionals and volunteers. When compared to non-emergency duties, significantly increased risks of CHD death were found during fire suppression, training, and alarm response. Smoking, hypertension, and prior arterial-occlusive disease, all recognized and largely
modifiable risk factors, were found to be strong predictors for on-duty CHD death (Kales et al., 2003).

Over 40 states in the U.S. have enacted presumptive disability laws that assume that any CVD contracted by firefighters is job-related for purposes of worker's compensation and disability retirement, unless proven otherwise (IAFF, 2007). Holder, Stallings, Peeples, Burress, and Kales (2006) studied Massachusetts firefighters retiring with presumptive or other cardiovascular-related disability awards from January 1, 1997, to December 31, 2004, to describe the medical basis of the retirements, and compare the following: underlying cardiovascular risk factors between those retiring due to CHD and those retiring due to other cardiovascular diagnosis; firefighters whose retirements were associated with discrete on-duty events with retirees whose CVD manifested off-duty; and the retirees' prevalence of cardiovascular risk factors with those of professionally active Massachusetts firefighters.

Of the 362 cases identified as cardiovascular-related disability awards with medical files in Massachusetts, CHD accounted for 77% of all heart presumptive retirements. Of the 48 cases with a preexisting diagnosis of arterial occlusive disease, 38 (79%) had preexisting CHD alone, and 4 (8%) had CHD in addition to peripheral vascular disease or cerebrovascular disease. Significant increases in risk were found during fire suppression and alarm response when compared with non-emergency duties. Age was the strongest predictor of CHD retirement; however, current smoking, diabetes, and prior arterial occlusive disease were also independent predictors. Although the majority of CHD retirements among Massachusetts firefighters most likely resulted from an excess of personal cardiovascular risk factors among older firefighters, and over half were unrelated to specific on-duty events, the overall findings suggested that certain firefighting activities increase the risk of a cardiovascular event in susceptible firefighters (Holder et al., 2006).

Kales et al. (2007) conducted a study of all deaths that occurred among on-duty firefighters in the U.S. between January 1, 1994, and December 31, 2004, excluding the
deaths that occurred during the first 48 hours after the September 11, 2001, terrorist attack. The authors used the findings from this study to confirm the findings in their 2003 case-control study, which provided preliminary evidence that coronary events may be triggered by specific firefighter duties. Deaths were classified into categories according to the specific duty performed during the onset of symptoms or immediately preceding death: fire suppression; alarm response; alarm return; PT; EMS, rescues, and other non-fire emergencies; and non-emergency duties. In addition to the average estimated proportion of time that firefighters spend in each category, two supplementary sets of estimates were utilized, one representing a level of emergency activity higher than that of the Cambridge Fire Department, and the other representing a lower level of emergency activity.

Of the 1,144 firefighter deaths reported to the U.S. Fire Administration between 1994 and 2004, 449 deaths were classified as due to CHD (39%). In regards to the classifications of specific duties at the time of death, 144 (32%) occurred during fire suppression, 138 (31%) occurred during alarm response or return, and the remaining 167 (37%) occurred during other duties. Fire suppression was associated with the most significantly elevated ratios of observed to expected deaths because although 32% of CHD-related deaths occurred during this duty, fire suppression duties accounted for as little as 1% to 5% of the average firefighter's professional time per year. Increased risk of death from CHD was consistently observed for several emergency duties when compared with non-emergency duties. Fire suppression represented the most marked increase in risk by a factor of 12 to 136 times. Likewise, risk was increased by a factor of 2.8 to 14.1 during alarm response, 2.2 to 10.5 during alarm return, and 2.9 to 6.6 during PT. Risk of CHD generally increased with age for each type of duty; however, the results for job status (professional vs. volunteer firefighter) were mixed (Kales et al., 2007).
Psychosocial Factors and CVD Risk

Psychological stressors are one of many biologically reasonable explanations for the high rate of cardiovascular morbidity and mortality among firefighters. Most individuals who develop CVD have at least one classic cardiovascular risk factor (e.g. smoking, hypertension, hypercholesterolemia, or diabetes); however, these risk factors do not fully account for or explain the excess burden of CVD in the general population. The literature relating psychosocial characteristics to CVD is extensive. Everson-Rose and Lewis (2005) outlined and reviewed the literature regarding three important psychosocial domains that have been significantly associated with increased risk of cardiovascular morbidity and mortality: negative emotional states, including depression, anger and hostility, and anxiety; chronic and acute psychosocial stressors; and social ties, social support, and social conflict. The authors also discussed key pathophysiological mechanisms and pathways likely to function in a synergistic and integrative way to promote atherogenesis and related clinical manifestations.

Negative Emotional States

Anda et al. (1993) used four items from the General Health Questionnaire (GHQ) (Vieweg & Hedlund, 1983) to measure depressed affect, and reported that it was significantly associated with a 50% to 60% increased risk of fatal and non-fatal IHD after adjusting for traditional coronary risk factors over 12 years of follow-up of more than 2,800 initially healthy men and women for the National Health Examination Follow-up Survey (NHEFS). In another sample of 1,551 adults drawn from the general population who were initially free of heart disease, a diagnosis of major depression and a history of dysphoria were significantly related to a 4.5-fold and 2.7-fold, respectively, increased risk of self-reported MI (Pratt et al., 1996). Ferketich, Schwartzbaum, Frid, and Moeschberger (2000) found that depressive symptoms, measured by the Center of Epidemiological Studies Depression (CES-D) Scale (Sayetta, 1975), predicted greater than 70% excess risk of incident CHD in women and men, and 2.34-fold greater CHD
mortality in men in adjusted analyses after nearly 10 years of follow-up in the first National Health and Nutrition Examination Survey (NHANES-I).

The quality of the literature investigating hostility and anger in relation to risk of CVD morbidity and mortality is mixed; however, a meta-analytic review of 45 studies by Miller, Smith, Turner, Guijarro, and Hallet (1996) concluded that hostility is an independent risk factor for CHD and all-caused mortality. Men at high risk for CVD who scored high on a behavioral rating of hostility were more likely to die from CVD in the prevailing 16 years than were men who were low in hostility, after adjustment for coronary risk factors, in a case-control study from the Multiple Risk Factor Intervention Trial (Matthews, Gump, Harris, Haney, & Barefoot, 2004). Williams, Nieto, Sanford, and Tyroler (2001) found that anger predicted incident CHD and incident stroke, after adjusting for age, sex, and race/ethnicity, in the Atherosclerosis Risk in Communities (ARIC) study.

Anxiety disorders have also been associated with greater mortality, particularly sudden cardiac death, and greater cardiovascular morbidity. Among men, high levels of anxiety had nearly four times greater risk of fatal CHD over 10 years than low levels of anxiety after adjusting for traditional CVD risk factors (Haines, Imeson, & Meade, 1987). Similarly, Kawachi et al. (1994) found that, in a sample of nearly 34,000 male health professionals initially free of disease, phobic anxiety predicted 2.45-fold greater risk of fatal CHD. Compared with men with no symptoms of anxiety in the Normative Age Study, men with at least two self-reported anxiety symptoms had increased risk of cardiac death, although only a small number of events occurred (Kawachi, Sparrow, Vokonas, & Weiss, 1994). In 1997, Kubzansky et al. performed a separate analysis from the Normative Age Study and found that men who reported high levels of worrying had a more than 2-fold increased risk of nonfatal MI after 20 years of follow-up.

Psychosocial Stressors

Early observations made by Cannon and Selye motivated much of the research on the effects of stress on health. Cannon (1935) identified a set of physiological responses
to threat or challenge called the fight-or-flight response, and Selye (1956) first recognized that severe, prolonged stress could lead to tissue damage and disease. Their critical theoretical and empirical observations helped clarify the physiologic pathways by which psychosocial factors may increase risk of CVD (Everson-Rose & Lewis, 2005).

Firefighters’ elevated risk for CVD is likely related to their exposure to occupational or work-related stressors, which have been the focus of numerous epidemiological studies of stress and CVD, particularly the high-demand/low-control nature of firefighting (Murphy et al., 1999). The job strain model suggests that high job demands combined with low job control have a particularly harmful effect on cardiovascular health. Positive associations between overall job strain and CVD morbidity and mortality, with the low control aspect of the job strain model having the most consistent negative effects, have been found in a number of large-scale, prospective studies (Karasek, Baker, Marxer, Ahlbom, & Theorell, 1981; Kuper & Marmot, 2003).

Siegrist (1996) and Siegrist et al. (2004) presented an effort-reward imbalance model suggesting that high efforts (e.g. high demands and/or high involvement) in the presence of low rewards (e.g. low pay, low esteem, few career opportunities, and/or job insecurity) may have a hazardous influence on cardiovascular health. Bosma, Peter, Siegrist, and Marmot (1998) found that, in a sample of 6,895 men and 3,413 women from the Whitehall II cohort, effort-reward imbalance and aspects of job strain independently predicted cardiovascular outcome, conferring a 1.56- to 2.38-fold greater risk of developing CVD over 5 years of follow-up. Thus, researchers have combined information from both the job strain and effort-reward imbalance models to improve the predictability of cardiovascular health outcomes. Subsequently, significant associations have been found between a more generalized measure of work stress and CVD mortality (Matthews & Gump, 2002).

Also associated with increased sudden cardiac death are severe acute stressors, such as an earthquake or terrorist attack. In 1995, Kark, Goldman, and Epstein, noted a 58% increase in total population mortality, largely attributable to out-of-hospital
deaths due to CVD, following the 1991 Iraqi missile attack on Israel. Similarly, Leor and Kloner (1996) observed a distinct increase from an average of 4.6 sudden cardiac deaths during the week preceding the 1994 Northridge, California, earthquake to 24 sudden cardiac deaths on the day of the earthquake, according to county coroner records from the week before, the day of, and the week following the earthquake.

The relationship between chronic, non-occupational daily life stressors and the onset or exacerbation of CVD has not been examined as extensively as occupational/work-related stressors or acute psychosocial stressors. In a sample of more than 73,000 initially healthy Japanese men and women, Iso et al. (2002) found that, when compared to women with low stress levels, women who reported high levels of nonspecific daily stress had a 1.6- to 2-fold higher age-adjusted risk of death from CVD after 8 years of follow-up. Results for men were less evident, with no observed associations made between daily life stress and other CVD endpoints; however, men with moderate daily stress had higher rates of MI compared to their low-stress equivalents.

Social Ties, Social Support, and Social Conflict

Associations between social ties and CVD have been consistently found in epidemiological studies. On average, socially isolated individuals (i.e. living alone or being unmarried and/or having little social contact with relatives, friends, and other social groups) have higher rates of CVD mortality (Brummett et al., 2001; Kaplan et al., 1988). In a study of 32,624 initially healthy men, Kawachi et al. (1996) found that, when compared with socially integrated men, socially isolated men experienced a nearly two-fold greater risk of CVD mortality over 4 years. After 10 years of follow-up, further analyses of the same cohort revealed similar associations – socially isolated man had a two-fold greater risk of fatal CHD, when compared to non-isolated men (Eng, Rimm, Fitzmaurice, & Kawachi, 2002).

Emotionally supportive relationships, described as high levels of caring, sympathy, understanding, and esteem support, have been shown to be cardio-protective; however,
low degrees of emotional support have been associated with a number of negative cardiovascular health effects (Orth-Gomer, Rosengren, & Wilhelmsen, 1993; Uchino, Cacioppo, & Kiecolt-Glaser, 1996). Orth-Gomer et al. (1993) found that, in a sample of 736 initially healthy men, low levels of emotional support from close friends were associated with a significant 3.1-fold increased risk of incident MI and CHD mortality over 6 years of follow-up after controlling for other potential risk factors. Fewer studies have prospectively examined social conflict with the respect to CVD; however, while social networks and social support are generally positive and health-enhancing, social conflict may be associated with poorer health outcomes (Finch, Okun, Barrera, Zautra, & Reich, 1989; Fiore, Becker, & Coppel, 1983).

Pathophysiological Mechanisms

The relationship between psychosocial factors and CVD is highly complex and multi-factorial. Numerous important and potentially interrelated physiological mechanisms may underlie the observed associations between negative emotions, stress, and social factors, and CVD morbidity and mortality. Four critical mechanisms by which psychosocial factors may influence cardiovascular function and promote atherogenesis include: 1) activation of the hypothalamic-pituitary-adrenal (HPA) axis and autonomic nervous system (ANS); 2) serotonergic dysfunction; 3) secretion of proinflammatory cytokines; and 4) platelet activation. CVD development and progression may be indirectly influenced by psychosocial factors in non-physiological pathways. Individuals who are anxious, depressed, angry, hostile, or who have more stressful lives are more socially isolated, have poor behavioral risk profiles or less healthy lifestyles, including higher rates of smoking, more sedentary lifestyles, excess consumption of alcohol, and exhibit poor compliance with medical regimens (Anda et al., 1990; Kawachi et al., 1994; Lobstein et al., 1983).

The HPA axis and/or the ANS are activated in response to fear, anxiety, depression, anger, and stress (McEwen, 1997; Musselman, Evans, & Nemeroff, 1998; Ritchie & Nemeroff, 1991). Chronic dysregulation of the HPA axis can result in hormonal and
neuroendocrine alterations, including hypercortisolemia or excess glucocorticoid secretion (Seeman, Singer, Rowe, Horowitz, & McEwan, 1997). If sustained over time, even small increases in glucocorticoids can contribute to hypertension, insulin resistance, visceral obesity, coagulation changes, and increased lipid levels, all of which are antecedents to CVD (Chrousos & Gold, 1998; Musselman et al., 1998).

Serotonin is important in the regulation of mood, emotions, and behavior. Most of the circulating serotonin, which has known vasoactive properties and is involved in thrombogenesis, platelet activation, and hypertension, is in the blood and is contained in the platelets (Guicheney, Baudouin-Legros, Valtier, & Meyer, 1987; Saxena & Villalon, 1990). According to McEwen and Mendelson (1993), chronic stress can produce alterations in serotonin levels and function.

Ross (1993) proposed that the likely primary event in atherogenesis is inflammatory processes such as injury to the arterial endothelium, which can result from traditional coronary risk factors, including smoking, high cholesterol, diabetes, and hypertension. Psychosocial factors can adversely affect these inflammatory processes, particularly through the action of proinflammatory cytokines, which can induce behavioral and psychological expressions of stress, including negative emotional states. A classic stress response resulting in elevated circulating glucocorticoids is initiated by the pro-inflammatory cytokines IL-1 and IL-6 stimulating the HPA axis (Berkenbosch, Oers, Rey, Tilders, & Besedovsky, 1987; Sapolsky, Rivier, Yamamoto, Plotsky, & Vale, 1987).

Enhanced platelet response to psychological stress is a critical mechanism whereby psychosocial stress may trigger acute ischemic events and contribute to the development and progression of CVD (Markovitz & Matthews, 1991). Platelets contribute to hemostasis, thrombosis, and the development of atherosclerosis and acute coronary syndromes (Lefkovits, Plow, & Topol, 1995). Depression, hostility, and anger expression have been positively associated with increased platelet activation and exaggerated platelet reactivity (Markovitz, Matthews, Kiss, & Smitherman, 1996; Musselman et al., 2000; Wenneberg & Schneider, 1997).
Occupational Stressors among Firefighters

Much of the early research suggesting that firefighters are subjected to extraordinary, duty-related demands, and are at risk to succumb to various physical and mental stress-related disorders, focused specifically on traumatic events or critical incidents, usually involving injured, mutilated, or dead and dying victims; however, the stress experienced by firefighters is complicated and multi-faceted (Beaton & Murphy, 1993). Thus, more recent studies have investigated both acute and chronic occupational stressors in relation to firefighter morbidity and mortality.

Generic occupational stress questionnaires, such as the Occupational Stress Inventory (Osipow & Spokane, 1983), do not capture the variety or the relatively unique, job-related stressors that are commonly encountered by fire service personnel; therefore, Beaton and Murphy (1993) developed and validated the Sources of Occupational Stress (SOOS) instrument, a multi-factorial paper and pencil, self-report measure integrating critical incident, organizational conflict, and role theory conceptualizations to assess the sources of occupational stress in both professional firefighter/paramedics (FF/PM) and firefighter/emergency medical technicians (FF/EMT). The SOOS instrument identified 57 occupational stressors inherent and/or related to employment as a professional FF/PM and/or FF/EMT, and included items to assess carry-over stress from family problems and/or from a second job, as well as to address poor health habits such as poor diet and lack of exercise. Respondents identified if a particular stressor had occurred within their past 10 shifts and, if it had, rated the degree to which they felt “bothered” (i.e. frustrated, annoyed, irritated) by the source of job-related stress on a 0 (slightly bothered) to 100 (extremely bothered) Visual Analog Scale (VAS) (Beaton and Murphy, 1993; Gift, 1989).

The SOOS was one of many survey measures mailed to over 4,000 professional FF/PMs and FF/EMTs in Washington State in late 1989. A modified Dillman (1978) set of procedures and criteria was utilized to conduct the mail survey, which also included
a follow-up reminder postcard. A total of 2,042 (51%) surveys were completed anonymously and mailed back to the investigators. Missing entries and statistical-software limitations eliminated certain data sets from the entire sample. Of the respondents, 253 (13%) were FF/PMs and 1,730 (87%) were FF/EMTs. The FF/PM respondent sample reported that approximately 85% of their "runs" or calls were medical emergencies during their past 10 shifts, and that the remaining 15% of their runs involved fire suppression. Approximately 60% of the runs made during their past 10 shifts by the FF/EMT respondent sample were to provide EMS (Beaton and Murphy, 1993).

Beaton and Murphy (1993) also assessed job satisfaction and morale using two separate scales; one asked for the FF/PM's and FF/EMT's current overall job satisfaction ratings on a 0 (not satisfied at all with job) to 100 (completely satisfied with job) VAS to identify an individual respondent's sense of job pleasure/displeasure, and the other asked for their current work-related morale ratings on a 0 (extremely low morale/demoralized) to 100 (extremely high morale) VAS to reflect a more general mental condition of enthusiasm, or lack of enthusiasm, shared by an employee group or department. Because social desirability (SD) has been shown to account for up to 50% of the variance of self-report measures of health (Carstensen & Core, 1983), respondents were also asked to complete the Edward's Social Desirability Scale, a 39-item, true-false measure of SD test-taking bias.

Scores from the Edward's Social Desirability Scale indicated that survey respondent replies on the SOOS were not corrupted by a SD response bias. Overall, the internal consistency reliability of the SOOS instrument was .95 (n = 2,050), suggesting that the instrument measured a unitary phenomenon, presumably occupational stress. Fourteen SOOS items were identified as distinctly independent and coherent clusters of items: 1) sleep disturbance; 2) concerns about wages, benefits, and/or RIF; 3) management and/or labor conflicts; 4) personal safety apprehension; 5) substandard equipment; 6) concerns regarding job skills; 7) family and/or financial strain; 8) past
incidents; 9) coworker conflict; 10) poor health habits; 11) conveying tragedy to others; 12) boredom and/or tedium; 13) stress related to a second job; and 14) discrimination.

The majority of the SOOS factors related directly to inherent duties, tasks, and responsibilities of professional fire service personnel, such as sleep disturbance, apprehensions regarding personal safety, and conveying tragedy. Only two differences were uncovered between the FF/PM and FF/EMT groups' responses: personal safety was ranked third on the FF/PM group list, whereas it was ranked fourth on the FF/EMT list; and second job stress, which was ranked twelfth on the FF/PM list, ranked thirteenth on the FF/EMT list (Beaton and Murphy, 1993).

Among both groups, leadership and organizational sources of stress were the most predictive of job satisfaction/dissatisfaction and work-related morale. In addition, feelings of reported discrimination and harassment were significantly correlated with low job satisfaction and poor work morale. Some differences were found in how occupational stressors predicted their respective job satisfaction and work morale ratings between the FF/PM and FF/EMT groups. Personal safety apprehensions correlated with low work morale for the FF/PM, but not for the FF/EMT group. Additionally, complaints regarding boredom and dislike of day-to-day duties, and the degree to which one was bothered by past critical incidents, correlated with job dissatisfaction and low morale for the FF/EMT, but not for the FF/PM group.

Firefighters must respond to potentially life-threatening emergencies from a state of sleep. A major factor accounting for sleep problems are the variable, unpredictable, and unavoidable sleep disturbances largely associated with emergency calls and false alarms during the 24-hour shifts that most U.S. firefighters work (Beaton et al., 1995). Some investigators have suggested that firefighters experience repetitive adrenaline surges related to their emergency duties. Moreover, shift-related increases in 17-ketogenic steroids and adrenaline excretions have been reported in both firefighters and paramedics (Dutton et al., 1978; Kalimo, Lehtonen, Daleva, & Kuorinka, 1980).

On any given shift, U.S. firefighters may spend only 2 hours responding to
incidents, leaving 22 hours to alternately cope with the boredom and tedium associated with anticipating the next alarm (Mitchell & Bray, 1990). This time at the station can stimulate organizational and leadership stressors including personality conflicts with coworkers and management/labor conflict. Such social conflicts are intensified by the rigid, paramilitary administrative structures of many fire departments that can make some forms of communication difficult, as well as the heavy emphasis on teamwork and reliance upon one another in life-threatening emergency situations (Beaton, Murphy, Pike, & Corneil, 1997; Beaton et al., 1995; Murphy et al., 1999).

Fire departments occasionally face RIFs because of budget cuts; therefore, concerns regarding wages, benefits, and job security are high-ranking job-related stressors among professional firefighters. Perceived and actual race and gender-based harassment, and even “reverse” discrimination, have been other stressors presented for both firefighters and paramedics following affirmative-action programs. Also, carryover second-job stress is a concern because approximately 25% to 50% of professional fire service personnel are employed part-time at second jobs due, in part, to extended periods of off-duty time and/or their modest incomes (Beaton et al., 1995; Murphy et al., 1999).

Firefighters have become increasingly involved in life-threatening medical emergencies. While responses to fire suppression incidents have leveled off, fire-based EMS have increased dramatically for most urban firefighters, accounting for 60% to 80% of the responses on most shifts in some urban areas of the country. Time pressure, accurate decision making, potential of injury and/or death to self and others, witnessing deaths and injuries, and conveying news of a tragic death or injury to surviving family and friends characterize some of the highly demanding job skills and work performance required in both EMS tasks and fire suppression (Beaton et al., 1995; Murphy et al., 1999; Murphy et al., 2002).

Fire service personnel must seemingly rely upon coworkers, family members, and friends for social support to cope with the dangerous and stressful occupational
demands inherent in their careers. Due to their long shifts and occupational cultural norms, firefighters spend long hours at the firehouse eating, sleeping, and playing together. Moreover, the type of work shift patterns assigned often provide several days at a time to spend at home. Because firefighters do not have regular work schedules, social and recreational activities tend to occur in the company of other firefighters and family members with similar schedules, which leads to greater on- and off-duty social support interdependence among coworkers and closer interaction between family and work social support compared to other occupational groups (Beaton et al., 1997).

Beaton et al. (1997) examined the satisfaction with social support reported by FF/PMs, the impact of coworker relations and relations with family and friends upon their health outcomes, and the similarities and differences in perceived social support and network conflict between professional firefighters and paramedics. Interrelationships among social support, relationship conflict, work stressors, job satisfaction, and self-reported health outcomes were also determined. Using the same methodology and sample of 4,000 professional FF/PMs and FF/EMTs in Washington State, this study yielded an identical FF/PM respondent sample as in the above-mentioned Beaton and Murphy (1993) study.

Four separate 0 to 100 modified VAS were used to assess the respondents' perceived satisfaction with their social relations, as well as their subjective conflict experiences with family relations and friends at home and, separately, their perceived satisfaction with social support and network conflict with their coworkers. Satisfaction with social support both at work and at home were measured with the following adjective VAS anchors: 0 = completely dissatisfied, 50 = somewhat satisfied, and 100 = completely satisfied. Network degrees of conflict both at work and at home were measured with the following adjective VAS anchors: 0 = little or no conflict, 50 = some conflict, and 100 = frequent, intense conflict. Two separate VAS, as described in the Beaton and Murphy (1993) study, were used to assess job satisfaction and morale. Other instruments included the SOOS to assess the psychosocial stressors to which respondents were
commonly exposed to (Beaton and Murphy, 1993); the Symptoms of Stress (SOS) self-report inventory to measure the FF/PM respondents' somatic, behavioral, and psychological stress symptomology (Thompson, 1989, as cited in Beaton et al., 1997); and the Edward's Social Desirability Scale to determine the SD test-taking bias (Beaton et al., 1997).

Scores from the Edward's Social Desirability Scale indicated that social network ratings were not correlated with this measure of SD test-taking bias. Perceived social support and network conflict were found to be direct stressors affecting the perceived occupational stress in the FF/PM respondent sample. Although job stress accounted for less than 5% of the variance of the measure of occupational stressors, it was more strongly tied to ratings of social satisfaction and perceived conflict at work, which accounted for three times more variance than home satisfaction and conflict ratings. Consequently, although social support at home was rated significantly more satisfactory by the FF/PM respondents, their non-work-related support and conflict ratings were not as strongly associated with job and health outcome measures (Beaton et al., 1997).

In terms of relationships to job satisfaction and work morale, social satisfaction and conflict at work were more strongly correlated, accounting for approximately seven times more variance than equivalent at-home measures. Although perceived conflict at work was associated with occupational stressors, the FF/PM respondents' perceptions of social support at work were most strongly correlated with perceptions of occupational stressor levels. Reports of more frequent and/or numerous stress symptoms were associated with lower social support ratings and higher conflict ratings, with social support at work appearing to be more significantly and inversely correlated with the stress symptomology of the FF/PM respondents (Beaton et al., 1997).

Stress-Related Health Outcomes among Firefighters

Psychosocial stressors affect both mental and physical health. Stress-related
disorders have been documented to occur at elevated prevalence rates in emergency
service workers (Beaton et al., 1995). Physiological, cognitive, psychological, and
behavioral manifestations of an acute or chronic nature may interfere with job
performance, impact the length of employment, impair health status following
retirement, and may impose high economic costs of employers and employees alike;
therefore, these stress-related signs and symptoms are outcomes of considerable
concern (Murphy et al., 1999).

Approximately 6.8% of U.S. firefighter job-related injury retirements reported in
2000 were due to mental stress (IAFF, 2000). An unknown fraction of this distress is
traumatic stress. Firefighters are repetitively and cumulatively exposed to duty-related
trauma or critical incidents (Beaton et al., 1995; Hytten & Hasle, 1989; Murphy et al.,
1999). As a result, they are at risk for experiencing secondary traumatic stress, or
stress associated with helping, or wanting to help, a victim of trauma. Secondary stress
symptomology is manifested by trauma symptoms, such as intrusion, avoidance, and
hypervigilance (Beaton & Murphy, 1995).

In an effort to identify naturally occurring stress-symptom factors, or “stress
pathways,” among firefighters, Beaton et al. (1995) empirically delineated the relative
frequency-intensity of the self-reported somatic, behavioral, and psychological stress
pathways using the same methodology and sample of professional FF/PMs as in the
Beaton and Murphy (1993) study, assuming that the nature and extent of their
symptoms of stress reflected the FF/PMs exposure to the numerous and potent
occupational stressors identified earlier in this chapter. The SOS self-report inventory
(Thompson & Leckie, 1991, as cited in Beaton et al., 1995) was used to compare the
somatic, behavioral, and psychological stress symptomology of FF/PM respondents to a
non-random convenience comparison sample of males (n = 97) recruited from the
Seattle metropolitan area. Respondents were asked to rate the frequency with which
they may have experienced a particular stress symptom during the past week on a 0-
(never) to 4- (frequently) point scale. Based upon prior research showing that the SOS
inventory has adequate interim and test-retest reliabilities, it appeared to have adequate sensitivity and specificity to measure FF/PM symptoms of stress. Respondents were also asked to complete the Edward's Social Desirability Scale to determine SD test-taking bias (Beaton et al., 1995).

SD test-taking bias accounted for less than 10% of the SOS's total and the subscales' variances for the FF/PM sample. Symptoms of stress among the FF/PM sample and male comparison group included: apprehension and/or dread; head, neck, and facial tension; anger; gastrointestinal symptoms; general anxiety; sleep difficulties; cardiopulmonary symptoms; cutaneous and/or peripheral symptoms; agitated depression; throat and mouth symptoms; headiness; upper respiratory symptoms; intrusive thoughts and/or hopelessness; extremity tension; itchiness and/or rashes; hunger; exaggerated startle reflexes; nervous habits; and indigestion and/or asthma. The inherently dangerous nature of FF/PM work and their repeated exposure to critical incidents were described as being related to items of subjective apprehension and dread, which explained more than 25% of the SOS inventory's variance and highlighted the centrality of occupational stress symptomology among the FF/PM respondents.

Numerous SOS factors that surfaced, including gastrointestinal symptoms, head, neck, and facial tension, and cardiopulmonary symptoms were associated to somatic, psycho-physiologic-stress symptomology. Other SOS factors, including anger, agitated depression, anxiety, and nervous habits were related to psychological and behavioral difficulties. The FF/PM sample scored higher on 18 of the 19 SOS factor scales when compared to the convenience sample; however, only 5 scales were statistically significantly elevated in the FF/PM sample: 1) apprehension and/or dread; 2) intrusive thoughts and feelings; 3) gastrointestinal symptoms; 4) sleep difficulties; and 5) throat and/or mouth symptoms. When combined, these significantly higher SOS factor scales suggested that symptoms of anxiety, agitation, and irritability were more problematic among the FF/PM when compared to the non-random male community sample (Beaton et al., 1995).
Cluster analysis based on SOS factor scores yielded three distinct FF/PM profiles identified as Cluster 1, Cluster 2, and Cluster 3. Cluster 1 was considered the group of FF/PMs at highest risk. This group consisted of 156 participants, or approximately 8% of the sample, and reported higher levels of stress symptomology on nearly every factor scale relative to Clusters 2 and 3, as well as the convenience comparison sample. Moreover, compared with the other FF/PM cluster groups and the convenience sample, Cluster 1 reported a mismatched number and intensity of somatic stress symptoms including head, neck, and facial tension; gastrointestinal distress; and cardiopulmonary complaints. In terms of their stress-factor scores, Cluster 2, comprising over 80% of the FF/PM sample, was statistically indistinguishable from the male convenience sample. Cluster 3, made up of approximately 9% of the FF/PM sample, was also considered to be at high risk. This group showed elevations primarily on psychological-emotional stress pathways including apprehension and/or dread, anger, generalized anxiety, and agitated depression when compared to the convenience sample. The at-risk FF/PM groups, Clusters 1 and 3, representing the minority (only 15% to 20%) of the survey respondents, were found to be comparable to available community norms; however, the duties and responsibilities of fire service personnel are on no account normative (Beaton et al., 1995).

Lifestyle Behaviors among Firefighters

Individual lifestyle behaviors have a powerful influence on the burden of illness. Cigarette smoking, excessive alcohol consumption, and diet and exercise to control obesity were factors in over 50% of premature deaths before age 75 in Canada (Wigle, Semenciw, McCann, & Davies, 1990). Engaging in positive health behaviors, such as not smoking, moderate use of alcohol, regular physical exercise, and maintaining desirable weight in relation to height are additive and cumulative. In other words, the greater number of personal health habits practiced, the greater the probability of an
individual living a longer, healthier life (Berkman & Breslow, 1983, as cited in Murphy et al., 2002).

Exercise

Exercise, including physical activity and physical fitness, has been one of many possible moderators studied that buffer the effects of stress. In 1999, Carmack, Boudreaux, Amaral-Melendez, Brantley, and de Moor examined leisure physical activity and aerobic fitness as potential buffers of the association between minor stress on physical and psychological symptoms in a sample of 135 college students. Measures included: the Weekly Stress Inventory (WSI) (Brantley, Jones, Boudreaux, & Catz, 1997) to assess minor stressful events or daily hassles that might have occurred over the past week; the Life Experience Survey (LES) (Sarason, Johnson, & Siegel, 1978) to assess major life events occurring over the past 12 months; the Profile of Mood States (POMS) (McNair, Lorr, & Droppelman, 1992) to measure affective states occurring over the past week; the Modified Wahler Physical Symptoms Inventory (WPSI) (Wahler, 1983) to measure physical complaints and symptoms; estimated maximal oxygen consumed (VO2max), or the greatest rate of oxygen utilization attainable during strenuous activity, using Bruce protocol to provide an index of cardio-respiratory fitness; the Physical Activity Questionnaire (Kriska et al., 1990) to assess historical, past year, and past week leisure and occupational activity; and the GHQ (Vieweg & Hedlund, 1983) to measure psychological distress.

Information was obtained regarding the unique contributions of both aerobic fitness and leisure physical activity to the stress-buffering effects of exercise. Results suggested that amount of leisure physical activity, rather than level of aerobic fitness, may be the mechanism by which exercise exerts its buffering effects against physical symptoms and anxiety in response to stress. Moreover, the mental health benefits, or the protective effects against stress, may increase with higher levels of participation in leisure physical activity. Individuals engaging in low physical activity while under periods of high stress reported 37% more physical symptoms than those engaging in
high physical activity. Conversely, individuals under periods of high stress engaging in low physical activity reported anxiety that was 21% higher than individuals engaging in high physical activity (Carmack et al., 1999).

**Alcohol Consumption**

In 1986, Boxer and Wild (1993) conducted a study in partnership with the Cincinnati, Ohio, Fire Department and Cincinnati firefighters Union 48, to document potential occupational stressors, assess psychological distress and problems with alcohol use, and determine whether a relationship exists between these measures and self-reported stressors. Based on a review of the department's annual report, eight firehouses were chosen to represent a spectrum of levels of work activity, and 145 of the 147 male firefighters in these houses agreed to participate.

The study utilized a 317-item questionnaire comprised of several validated instruments. A list of 72 potential workplace stressors was developed from a review of the literature, feedback from a similar questionnaire completed by 41 firefighters and firefighting officers who attended an IAFF symposium in Houston, Texas, in 1985, and interviews with 10 Cincinnati firefighters. The 90-item Symptom Check List (SCL 90-R) (Derogatis, 1983) included nine primary symptom dimensions: 1) somatization; 2) obsessive-compulsive; 3) interpersonal sensitivity; 4) depression; 5) anxiety; 6) hostility; 7) phobic anxiety; 8) paranoid ideation; and 9) psychoticism. A form of the Global Severity Index (GSI) (Vieweg & Hedlund, 1983) consisting of 12 items assessed the mental health of the firefighter subjects. The CES-D Scale (Sayetta, 1975) measured feelings of guilt, worthlessness, helplessness and hopelessness, loss of appetite, sleep disturbance, and psychomotor retardation. The Michigan Alcoholism Screening Test (MAST) (Hedlund & Vieweg, 1984, as cited in Boxer & Wild, 1993) was used to screen for alcoholism. And the personality and environmental domains of the Derogatis Stress Profile (DSP) (Derogatis, 1987) measured potential stress-inducing events in the home, work, and health environments, as well as personality characteristics of reaction to
time-induced pressure, driven behavior, attitude posture (achievement orientation),
relaxation potential, and role definition (Boxer & Wild, 1993).

Among the 145 male firefighter respondents, the highest ranked stressor was
hearing that children are in a burning building, followed by: being concerned about
possible exposure to unknown toxic substances and persons who have AIDS, hepatitis,
tuberculosis, or other infectious diseases; believing that "reverse" discrimination exists
towards non-minority groups; being disturbed by the tone or intensity of alarms; as well
as feelings of responsibility for other people's lives, lack of support from city
government, that the public has the wrong idea of what firefighting work involves, that
there is insufficient manpower to deal with the workload, and being over-utilized for
EMS runs for non-emergency purposes. Results from this study suggested that 33% of
the firefighters surveyed were experiencing at least mild depression, 41% exhibited high
distress, 39% had a high level of emotional distress, and 29% had scores on the MAST
suggestive of possible or probable current problems with alcohol use. No relationship
was found between measures of psychological distress, alcohol use, and objectively
measured workloads. In general, the firefighters scored poorly on all measures of
mental health in comparison with the results of other published studies utilizing the
same instruments in community or occupational studies (Boxer & Wild, 1993).

Murphy et al. (1999) conducted a dual-site longitudinal prospective study to
replicate and extend the investigation conducted by Boxer and Wild (1993). The specific
aims were to monitor and measure change in self-reported occupational stressors,
emotional trauma, symptoms of stress, and alcohol consumption in urban firefighters.
Surveys completed by the 188 study participants at both baseline and at the 2-year
follow-up included: the SOOS instrument (Beaton & Murphy, 1993); four VAS, as
described in the Beaton et al. (1997) study, to measure satisfaction with social support,
as well as the network degree at conflict, both at home and at work; the SOS (Beaton,
Egan, Kogan, & Morrison, 1991) to measure stress responses of the fire service
personnel; the 15-item Impact of Event Scale (IES) (Horowitz, Wilner, & Alvarez, 1979)
to measure post-trauma symptoms and caseness criteria for post-traumatic stress disorder (PTSD); and 19 items from the Health Screening Survey (HSS) (Fleming & Barry, 1991) to measure quantity and frequency of alcohol consumption.

Significant changes were noted for only 5 of the 19 (26%) occupational stressors measured at baseline and at the 2-year follow-up assessment. Decreases in perceived work stressors over time were observed in terms of fewer job skill concerns and fewer concerns about RIF and benefits. Increases in perceived work stressors over time were noted for 14 of 19 (74%) of the occupational stressors; however, only 3 reached statistical significance, specifically financial concerns and less social support at work and at home. PTSD caseness did not change significantly in the participants between the baseline and 2-year follow-up assessments, with 20% of the firefighter sample meeting DSM-IV criteria for PTSD (American Psychiatric Association, 2000) at both time occasions; however, several symptoms of stress increased and reported problems with alcohol decreased. Not only was the incidence of stress-related disorders high at baseline, it was higher on many SOS scales than community norms and did not wane over the 2-year surveillance period (Beaton & Murphy, 1993; Beaton et al., 1995). The prevalence of alcohol caseness decreased significantly from baseline to the 2-year measurement assessment; however, it was around 30% at follow-up, roughly the same rate reported by Boxer and Wild (1993). Overall, significant correlations were documented among work stressors, symptoms of stress, and alcohol problems in the firefighters who participated in this study (Murphy et al., 1999).

According to Wilson, Holman, and Hammock (1996), the workplace is a critical social environment that impacts health behaviors by its norms, policies, and job characteristics. Murphy et al. (2002) utilized an ecological model to develop lifestyle risk factor profiles in a sample of professional firefighters and to test the influence of both individual and occupational risk and protective factors on health outcomes based on these profiles. Ecological models are based in ecological theory, which is similar to system theories describing the interdependence of the diverse levels and divisions.
presented within systems, and suggest that systems can work together to generate equilibrium or homeostasis (McDonald, Poertner, & Pierpont, 1999). In identifying health risk and protective factors, ecological models consider both personal (e.g. the individual’s knowledge and beliefs about health) and environmental (e.g. the influence of systems) factors (Breslow, 1996; Jaffe, 1995; Salazar & Beaton, 2000). This study made use of lifestyle behaviors including exercise, alcohol consumption, and smoking to conceptualize the individual component of the ecological model, as well as both work stressors and job satisfaction to conceptualize the organizational component of the ecological model.

A sample of 441 male firefighters from two departments completed several measures, including: the HSS (Fleming & Barry, 1991) to assess diet, exercise, smoking, and alcohol consumption; the SOOS (Beaton & Murphy, 1993) to assess occupational stressors; a job satisfaction VAS (Beaton & Murphy, 1993), and the SOS (Beaton et al., 1991) to assess emotional and physical health outcomes. “Lifestyle strengths” were defined as not smoking, drinking 14 or fewer drinks per week, and exercising 5 to 6 times per week for at least 20 minutes; “lifestyle risks” were defined as smoking 10 or more cigarettes per day, meeting CAGE (Mayfield, McLeod, & Hall, 1974) screening criteria for alcohol abuse or dependence, and not exercising vigorously at all during leisure time during the past 3 months; and “lifestyle concerns” were defined as not meeting the criteria for either the “risks” or “strengths” categories (Murphy et al., 2002).

For the prior 3-month period, 13% of firefighters smoked, with approximately one-third smoking 1 to 9 cigarettes a day and smaller percentages smoking more than 10 cigarettes per day. Approximately 90% of firefighters exercised during leisure time, with 41% exercising 3 to 4 days per week, which was a promising finding, especially in the perspective of the study by Carmack et al. (1999) which showed that participation in leisure physical activity is a valuable buffering mechanism between stress and illness. Among the sample, 78% consumed alcohol, with 47% consuming 1 to 2 drinks on 1 to 2
days per week, which may have represented an underreporting of their actual consumption when compared to the study by Boxer and Wild (1993), which suggested a somewhat higher prevalence rate of drinking, and some alcohol abuse or dependence, among firefighters. Generally, 14% of the male firefighter sample met criteria for “lifestyle strengths,” 53% met criteria for “lifestyle concerns,” and 33% met criteria for “lifestyle risks.” Statistically significant relationships were found among the health symptom outcome variables and job stressors, job satisfaction, and lifestyle composite factors, accounting for 46% of the variance of firefighters’ scores on the SOS outcome measure.

Chapter Summary

This chapter has discussed the prevalence rates of CVD, including CHD, among U.S. firefighters, as well as their duty-specific risks of morbidity and mortality from CVD; psychosocial factors related to morbidity and mortality due to CVD; occupational stressors inherent to firefighting; stress-related mental and physical health outcomes among firefighters; and lifestyle behaviors among firefighters. Most on-duty CHD fatalities have been found to be work-precipitated and to occur in firefighters with underlying CHD (Kales et al., 2003). Specific physically-demanding duties have been associated with significant increases in risk of death from CHD among firefighters, particularly fire suppression, but also alarm response, alarm return, and PT; however, researchers have also found a significantly high prevalence of classic and largely modifiable risk factors among firefighters succumbing to on-duty CHD (Kales et al., 2007; Holder et al., 2006).

In their review of the literature relating psychosocial factors to CVD morbidity and mortality, Everson-Rose and Lewis (2005) concluded that, although not unequivocal, the accumulating data has suggested that the psychological domains of negative emotional state, chronic and acute psychosocial stressors, especially job stress, and three related social factors – social ties, social support, and social conflict – are
associated with increased risk of CVD morbidity and mortality. Furthermore, these psychosocial characteristics have direct pathophysiological effects, which are multifactorial and act in an integrative and synergistic manner to promote atherogenesis and its clinical manifestations.

In addition to stress symptoms related to critical incidents, firefighters report many other distinct somatic, emotional, and behavioral stress pathways related to occupational stressors, such as sleep disturbances, tedium, conflict with coworkers and administration, concerns regarding wages, benefits, and job security, second job stress, and the demanding job skills and work performance required in both EMS tasks and fire suppression (Beaton & Murphy, 1993; Beaton et al., 1995; Murphy et al., 1999; Murphy et al., 2002). Firefighters with low social support and/or high relational conflict, especially at work, may be at greater risk in terms of adverse health outcomes (Beaton et al., 1997).

Firefighters engage in both health risk and protective behaviors. Lifestyle practices, such as exercise, can positively influence health symptom outcomes, and are known to reduce stress and promote health. Thus, there is a strong consensus among the researchers presented in this chapter that individual firefighters, fire departments, unions, workers compensation, and pension authorities need to work together to implement health promotion and stress management education interventions to reduce stress by increasing employee awareness of the importance of exercise, not smoking, moderate alcohol consumption, and other lifestyle factors such as diet, weight control, and assessment of stress-related health conditions, particularly CVD (Holder et al., 2006; Kales et al., 2003; Murphy et al., 1999; Murphy et al., 2002). The methodology of this research, as well as the data, will be described in Chapter 3.
CHAPTER 3

METHODOLOGY

This chapter encompasses the empirical study undertaken to evaluate self-perceived general well-being and distress among firefighter recruits in the southwestern U.S. These results will be used to assess the need for stress management education during the firefighter academy. This chapter focuses on the analyses and demographic characteristics of the sample, as well as the description of the measuring instruments. The measurements include a demographic questionnaire and a subjective psychological well-being and distress questionnaire. The collection of data is described, focusing on the administration of the psychological well-being and distress questionnaire. The reduction and statistical processing of the data are also described. This chapter is concluded with a summary.

Description of the Sample

The sample consisted of 40 male firefighter recruits in the southwestern U.S. who, as part of their job requirements, completed several performance assessments throughout the academy. This cohort of recruits was comprised of members of three consecutive academies of a similar number over a period of 18 months. The demographic characteristics of the sample, as obtained from the demographic questionnaire, are indicated in Table 1 and Table 2.

The age of the firefighter recruits ranged from 21 to 41 years with a mean age of 27.60 years. The majority (40.0%) of the participants were in the age category of 20 to 25 years and only one recruit (2.5%) was in the age category of 41 to 45 years. The
Table 1  Age Characteristics of the Sample

<table>
<thead>
<tr>
<th>Age</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 – 25</td>
<td>16</td>
<td>40.00</td>
</tr>
<tr>
<td>26 – 30</td>
<td>14</td>
<td>35.00</td>
</tr>
<tr>
<td>31 – 35</td>
<td>9</td>
<td>22.50</td>
</tr>
<tr>
<td>36 – 40</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>41 – 45</td>
<td>1</td>
<td>2.50</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2  Marital Status Characteristics of the Sample

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>19</td>
<td>47.50</td>
</tr>
<tr>
<td>Single</td>
<td>21</td>
<td>52.50</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

The majority of the recruits were single (52.5%) at the time of the assessments.

The General Well-Being Schedule

This study assessed one dependent variable: subjective feelings of psychological well-being. The GWB is a self-administered questionnaire that offers a brief, but broad-ranging indicator of self-perceived feelings of general well-being and distress (see Appendix). It is an educational/informational screening strategy used in community settings that is designed to assess how individuals feel about their inner personal state rather than about external conditions (McDowell, 2006). It was developed by H. J. Dupuy (1978, as cited in McDowell, 2006) for the NHANES-I. The usual set of questions referred to as the GWB includes 18 positive and negative questions for six dimensions: 1) anxiety; 2) depression; 3) general health; 4) positive well-being; 5) self-control; and 6) vitality (Brook et al., 1979, as cited in McDowell, 2006). A time frame of “during the past month” is used for each question (McDowell, 2006).

The first 14 questions use six-point response scales representing intensity or
frequency and the ordinal qualities of these response items were checked empirically. The remaining four questions utilize a 0 to 10 rating scale described by adjectives at each end. In scoring responses, the polarity of items 1, 3, 6, 7, 9, 11, 15, and 16 is reversed; therefore, a lower score represents more severe distress. Each selected response on the GWB is assigned a numerical value range. Table 3 describes how the sub-scores for each of the above-mentioned six dimensions are formed. The sub-scores of the six dimensions are added together to obtain an overall, or total, GWB score ranging from 0 to 110. Dupuy (1978, as cited in McDowell, 2006) proposed cutting points to represent three levels of distress: 1) scores of 73 to 110 points point toward "positive well-being" (74.1% of the population, during any one month, falls into this category); 2) scores of 61 to 72 points point toward "moderate distress" (16.3% of the population, during any one month, falls into this category); and 3) scores of 0 to 60 points point toward "severe distress" (9.6% of the population, during any one month, falls into this category).

The test-retest reliability coefficients of the GWB range from .68 to .85. Three-month test-retest reliability coefficients of .68 and .85 were reported for "two different groups" (Monk, 1981, p. 183, as cited in McDowell, 2006). After three months, Fazio (1977) reported a retest coefficient of .85 for 195 college students. And a retest coefficient of .69 was obtained for 98 college graduates (Edwards, Yarvis, Mueller, Zingale, & Wagman, 1978). Several studies have reported internal consistency coefficients of the GWB over .90 (Dupuy, 1978, as cited in McDowell, 2006; Fazio, 1977; Himmelfarb & Murrell, 1983, as cited in McDowell, 2006; Taylor et al., 2003). Correlations among the sub-scores ranging from .16 to .72 were reported by Fazio (1977).

The GWB shows good correlational validity with interviewer’s ratings of depression, as well as other depression and anxiety scales. The GWB total score correlated .47 with an interviewer’s rating of depression, .66 with Zung’s Self-Rating Depression Scale, and
<table>
<thead>
<tr>
<th>Sub-Scale Label</th>
<th>Question Numbers</th>
<th>Range of Sub-Scores</th>
<th>Low Score</th>
<th>High Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>2, 5, 8, 16</td>
<td>0 to 25</td>
<td>Extremely bothered by nervousness; very tense; anxious; worried; upset; felt under heavy pressure.</td>
<td>Not bothered by nerves; low tension; not anxious; relaxed; little or no stress or strain.</td>
</tr>
<tr>
<td>Depression</td>
<td>4, 12, 18</td>
<td>0 to 20</td>
<td>Intensely or often felt depressed, down-hearted and blue, or hopeless.</td>
<td>Never or rarely felt depressed, down-hearted or blue, or hopeless.</td>
</tr>
<tr>
<td>Positive Well-Being</td>
<td>1, 6, 11</td>
<td>0 to 15</td>
<td>Low spirits; unhappy; never or seldom felt life interesting or cheerful.</td>
<td>In excellent spirits; happy with life; daily life interesting; felt cheerful.</td>
</tr>
<tr>
<td>Self-Control</td>
<td>3, 7, 13</td>
<td>0 to 15</td>
<td>Very concerned or disturbed about losing self-control; seldom felt emotionally stable.</td>
<td>In definite control of behavior, thoughts, emotions, and feelings; emotionally stable.</td>
</tr>
<tr>
<td>Vitality</td>
<td>9, 14, 17</td>
<td>0 to 20</td>
<td>Low in energy; seldom waking fresh, rested; sluggish; tired; worn-out.</td>
<td>Full of energy, pep; waking fresh, rested; felt active, vigorous; never felt tired or worn-out.</td>
</tr>
<tr>
<td>General Health</td>
<td>10, 15</td>
<td>0 to 15</td>
<td>Often bothered by illness, bodily disorders; needed help in caring for self; worried or fearful about health.</td>
<td>Rarely, if ever, bothered by illness; healthy enough to do things; not fearful or worried about health.</td>
</tr>
</tbody>
</table>
with the Personal Feelings Inventory – Depression. The average correlation of the
GWB and six independent depression scales was .69 and the average correlation was
.64 with three anxiety scales (Fazio, 1977). Correlations of .70 with a ten-item
depression score, .58 with the Lubin Depression Adjective Checklist, and .80 with
Zung's Self-Rating Depression Scale, were obtained by Simpkins and Burke (1974, as
cited in McDowell, 2006). Correlations between the GWB subscales and reports of
stress at home and at work have been reported in the range from .17 to .59 (Brook et
al., 1979, as cited in McDowell, 2006). The GWB demonstrated evidence of concurrent
and construct validity when examined in association with measures of self-concept,
depression, and several health behaviors (Taylor et al., 2003). The available GWB
reliability and validity tests show good results. Its internal consistency is higher than
for other scales and there is wide evidence of agreement with other purpose-built
depression and anxiety scales (McDowell, 2006).

Description of the Data

The research made use of existing data collected from approximately 64 firefighter
recruits in the southwestern U.S. during three firefighter academies over an 18-month
period. The GWB questionnaire was administered to the recruits three times: 1) during
the first week of the academy (pre-academy); 2) around the mid-point of the academy
(mid-academy); and 3) during the last week of the academy (end-of-academy). At each
administration, the firefighter recruits were given verbal instructions regarding the
completion of the GWB and were assured of the confidentiality of the results. The
recruits then completed the questionnaire, which took approximately 10 minutes. After
the questionnaires were collected by the administrator, sub-scores for the six
dimensions of the GWB, as well as a total GWB score, were determined. In addition, a
Basic Wellness and Fitness Profile questionnaire containing minimal demographic
information was completed by the firefighter recruits at the pre-academy assessment.
Statistical Processing of the Data

Of the 64 firefighter recruits who completed the GWB questionnaire, 16 failed to complete the entire firefighter academy, which reduced the number of possible data sets to 48. In addition, the two recruits who scored the highest and lowest pre-academy total GWB scores were excluded from the data set to minimize sources of testing bias. The data was further reduced by excluding three more recruits due to missing demographic information. Moreover, only male recruits were included in the analysis due to the small number of female recruits (n = 3). Once reduced, the number of completed data sets used in the analyses was 40. SPSS software was utilized to analyze the secondary data. One-way repeated measures of ANOVA was used to determine if a significant difference existed between at least two of the three mean GWB sub-scale and total scores (pre-academy, mid-academy, and end-of-academy) among the recruits. An alpha level of .05 was set to evaluate the recruits’ scores on the GWB questionnaire. When a significant difference in scores across the time occasions was revealed, pairwise comparisons were performed to assess which of the time occasions differed from one another, with each test conducted at an alpha level of .016.

Chapter Summary

This chapter has explained the methods used in this study of the impact of a professional firefighter academy on the self-perceived general well-being and distress among firefighter recruits. The description of the sample population focused on age and marital status. The dependent variable measure included the GWB questionnaire. A description of the data collection procedures was also provided. Finally, the quantitative procedures and statistical techniques were presented as the statistical processing of the data. The next chapter presents the findings of this research that were obtained using these methods.
CHAPTER 4

FINDINGS OF THE STUDY

This chapter presents the findings of this research, described in terms of the specific aim of the research, namely: to evaluate self-perceived general well-being and distress among firefighter recruits in the southwestern U.S. The descriptive statistics are analyzed by looking at the mean sub-scale and total scores of the GWB questionnaire. The chapter is concluded with a summary of the findings.

Self-Perceived General Well-Being and Distress

Anxiety Sub-Scale Scores

One-way repeated measures of ANOVA was conducted on the sum of the 4 questions from the GWB that comprise the questionnaire's anxiety sub-scale. The anxiety sub-scale scores for the firefighter recruits were significantly different across the time occasions (pre-academy, mid-academy, and end-of-academy), Greenhouse-Geisser adjusted $F(1.57, 61.29) = 12.91, p < .001$, partial $\eta^2 = .25$. Pairwise comparisons were performed to assess which of the time occasions differed from one another, with each test conducted at an alpha level of .016. Possible anxiety sub-scale scores range from 0, signifying extreme feelings of anxiety, to 25, signifying slight or no feelings of anxiety. The data analysis indicated that the recruits’ end-of-academy anxiety sub-scale scores ($M = 16.28, SD = 5.15$) were significantly higher when compared to their mid-academy scores ($M = 12.60, SD = 4.39$), $t(39) = -5.93, p < .001$, as well as their pre-academy scores ($M = 12.50, SD = 4.98$), $t(39) = -3.72, p < .001$. There was not a significant difference between the recruits' pre-academy and mid-academy anxiety sub-scale scores, $t(39) = -.12, p = .908$. The results of these analyses are illustrated in Figure 1.
Repeated measures ANOVA, performed on the sum of the 3 questions from the GWB that comprise the questionnaire's depression sub-scale, revealed that the depression sub-scale scores for the firefighter recruits were significantly different across the time occasions, $F(2, 78) = 3.62, p = .031$, partial $\eta^2 = .09$. Pairwise comparisons were performed to assess which of the time occasions differed from one another, with each test conducted at an alpha level of .016. Possible depression sub-scale scores range from 0, signifying intense feelings of depression, to 20, signifying infrequent or no feelings of depression. The data analysis indicated that the recruits' end-of-academy depression sub-scale scores ($M = 16.78, SD = 2.74$) were significantly higher when compared to their mid-academy scores ($M = 15.43, SD = 2.87$), $t(39) = -3.18, p = .003$. There was not a significant difference between the recruits' pre-academy ($M = 16.35, SD = 2.18$) and mid-academy depression sub-scale scores, $t(39) = 1.70, p = .097$, or between their pre-academy and end-of-academy depression sub-scale scores, $t(39) = -.76, p = .452$. The results of these analyses are illustrated in Figure 2.
Repeated measures ANOVA was conducted on the sum of the 3 questions from the GWB that comprise the questionnaire's positive well-being sub-scale. The positive well-being sub-scale scores for the firefighter recruits were significantly different across the time occasions, $F(2, 78) = 6.50, p = .003$, partial $\eta^2 = 0.14$. Pairwise comparisons were performed to assess which of the time occasions differed from one another, with each test conducted at an alpha level of .016. Possible positive well-being sub-scale scores range from 0, signifying feelings of unhappiness or little satisfaction with daily life, to 15, signifying feelings of happiness or high satisfaction with daily life. The data analysis indicated that the recruits' end-of-academy positive well-being sub-scale scores ($M = 11.93, SD = 2.27$) were significantly higher when compared to their mid-academy scores ($M = 10.40, SD = 1.96$), $t(39) = -4.22, p < .001$. There was not a significant difference between the recruits' pre-academy ($M = 11.33, SD = 2.14$) and mid-academy positive well-being sub-scale scores, $t(39) = 2.17, p = .036$, or between their pre-academy and

Figure 2. Mean depression sub-scale scores of the GWB questionnaire.
end-of-academy positive well-being sub-scale scores, t(39) = -1.24, p = .221. The results of these analyses are illustrated in Figure 3.

![Figure 3](image-url)

Figure 3. Mean positive well-being sub-scale scores of the GWB questionnaire.

**Self-Control Sub-Scale Scores**

Repeated measures ANOVA, performed on the sum of the 3 questions from the GWB questionnaire's self-control sub-scale, revealed that the self-control sub-scale scores for the firefighter recruits were significantly different across the time occasions, F(2, 78) = 3.30, p = .042, partial η² = .08. Pairwise comparisons were performed to assess which of the time occasions differed from one another, with each test conducted at an alpha level of .016. Possible self-control sub-scale scores range from 0, signifying feelings of emotional instability, to 15, signifying feelings of emotional stability. The data analysis indicated that the recruits' end-of-academy self-control sub-scale scores (M = 13.63, SD = 2.10) were significantly higher when compared to their mid-academy scores (M = 12.83, SD = 1.81), t(39) = -2.67, p = .011. There was not a significant difference between the recruits' pre-academy (M = 13.40, SD = 1.45) and mid-academy self-control sub-scale scores, t(39) = 1.99, p = .053, or between their pre-
academy and end-of-academy self-control sub-scale scores, $t(39) = -.61, p = .546$. The results of these analyses are illustrated in Figure 4.

![Figure 4. Mean self-control sub-scale scores of the GWB questionnaire.](image)

**Vitality Sub-Scale Scores**

Repeated measures ANOVA was conducted on the sum of the 3 questions from the GWB that comprise the questionnaire’s vitality sub-scale. The vitality sub-scale scores for the firefighter recruits were significantly different across the time occasions, Greenhouse-Geisser adjusted $F(1.61, 62.65) = 8.60, p = .001$, partial $\eta^2 = .18$. Pairwise comparisons were performed to assess which of the time occasions differed from one another, with each test conducted at an alpha level of .016. Possible vitality sub-scale scores range from 0, signifying feelings of being worn-out and little to no energy, to 20, signifying feelings of being rested and full of energy. The data analysis indicated that the recruits' mid-academy vitality sub-scale scores ($M = 10.13, SD = 2.75$) were significantly lower when compared to their pre-academy scores ($M = 12.15, SD = 3.36$), $t(39) = 3.08, p = .004$, and that the recruits' end-of-academy vitality sub-scale scores ($M = 12.85, SD = 3.76$) were significantly higher than their mid-academy scores, $t(39) = -$
5.11, \( p < .001 \). There was not a significant difference between the recruits' pre-academy and end-of-academy vitality sub-scale scores, \( t(39) = -.85, p = .401 \). The results of these analyses are illustrated in Figure 5.

![Figure 5. Mean vitality sub-scale scores of the GWB questionnaire.](image)

**General Health Sub-Scale Scores**

Repeated measures ANOVA, performed on the sum of the 2 questions from the GWB that comprise the questionnaire's general health sub-scale, revealed that the general health sub-scale scores for the firefighter recruits were significantly different across the time occasions, \( F(2, 78) = 4.96, p = .009 \), partial \( \eta^2 = .11 \). Pairwise comparisons were performed to assess which of the time occasions differed from one another, with each test conducted at an alpha level of .016. Possible general health sub-scale scores range from 0, signifying feelings of worry regarding personal health, to 15, signifying infrequent or no feelings of worry regarding personal health. The data analysis indicated that the recruits' end-of-academy general health sub-scale scores (\( M = 11.45, SD = 3.14 \)) were significantly higher when compared to their mid-academy scores (\( M = 10.08, SD = 3.38 \)), \( t(39) = -2.64, p = .012 \), as well as their pre-academy scores (\( M = 9.88, SD = 4.8 \))
3.66), \( t(39) = -2.58, p = .014 \). There was not a significant difference between the recruits' pre-academy and mid-academy general health sub-scale scores, \( t(39) = -.40, p = .689 \).

The results of these analyses are illustrated in Figure 6.

![Graph](image)

**Figure 6.** Mean general health sub-scale scores of the GWB questionnaire.

**Total GWB Scores**

The total scores of the GWB questionnaire revealed that at the beginning of the firefighter academy, 55.0% of the sample scored between 73 to 110 points, pointing toward self-perceived feelings of positive well-being, 32.5% scored between 61 to 72 points, pointing toward self-perceived feelings of moderate distress, and 12.5% scored between 0 to 60 points, pointing toward self-perceived feelings of severe distress. At the mid-point of the firefighter academy, 52.5% of the sample fell into the category of positive well-being, 22.5% fell into the category of moderate distress, and 25.0% fell into the category of severe distress. Finally, at the end of the firefighter academy, 80.0% of the sample pointed toward self-perceived feelings of positive well-being, 12.5% pointed toward self-perceived feelings of moderate distress, and 7.5% pointed toward self-perceived feelings of severe distress.
Repeated measures ANOVA was conducted on the sum of the 6 sub-scales from the GWB questionnaire to gain an overall evaluation of self-perceived general well-being and distress among firefighter recruits. The total GWB scores for the firefighter recruits were significantly different across the time occasions, Greenhouse-Geisser adjusted $F(1.58, 61.56) = 10.14, p < .001$, partial $\eta^2 = .21$. Pairwise comparisons were performed to assess which of the time occasions differed from one another, with each test conducted at an alpha level of .016. The data analysis indicated that the recruits' end-of-academy total GWB scores ($M = 82.90$, $SD = 15.48$) were significantly higher when compared to their mid-academy scores ($M = 71.45$, $SD = 12.89$), $t(39) = -5.92, p < .001$. There was not a significant difference between the recruits' pre-academy ($M = 75.60$, $SD = 13.61$) and mid-academy total GWB scores, $t(39) = 1.63, p = .111$, or between their pre-academy and end-of-academy total GWB scores, $t(39) = -2.35, p = .024$. The results of these analyses are illustrated in Figure 7.

![Figure 7. Mean total scores of the GWB questionnaire.](image)

**Figure 7.** Mean total scores of the GWB questionnaire.

**Chapter Summary**

Several findings resulted from the statistical analyses in this research. First, the
firefighter academy did have an impact on how the recruits scored on the GWB questionnaire on all six sub-scales, as well as on their total GWB score. Second, the recruits’ mean scores on all six sub-scales, as well as their mean total GWB score, were significantly higher at the end of the academy than at mid-academy. Third, the recruits’ end-of-academy mean scores on the anxiety and general health sub-scales of the GWB questionnaire were significantly higher when compared to their pre-academy scores. Fourth, the recruits’ mid-academy mean scores were significantly lower when compared to their pre-academy scores on only one sub-scale – vitality. Fifth, the firefighter academy did not have an impact on the recruits’ mid-academy scores when compared to their pre-academy scores on five subscales – anxiety, depression, positive well-being, self-control, and general health – or on their total GWB score. Finally, the firefighter academy did not have an impact on the recruits’ end-of-academy scores when compared to their pre-academy scores on four subscales – depression, positive well-being, self-control, and vitality – or on their total GWB score. The interpretation of the findings, as well as the conclusions, recommendations, and limitations of this research, will be discussed in Chapter 5.
DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

This chapter focuses on the interpretation of the findings, as well as the conclusions, recommendations, and limitations of this research. The discussion of the findings and conclusions are structured in terms of the aim of the research, which was to evaluate self-perceived general well-being and distress among firefighter recruits in the southwestern U.S. The recommendations relate to the importance of implementing a stress management education program during the firefighter academy, which would increase firefighters' awareness about stress, its health consequences, and stress management modalities early in their firefighting career.

Review of the Problem Statement

Research involving stress among firefighters, with the exception of critical incident stress, and its undesirable health outcomes was not initiated until 1985 (Murphy et al., 1999). Since then, much of the research regarding stress in the fire service has involved professional firefighter populations. Further research is needed to explore the firefighter academy experience to better assess whether this environment is conducive to providing a stress management education program. Fire academy instructors have the responsibility of improving the minds and bodies of recruits; therefore, this research investigated the self-perceived general well-being and distress experienced by firefighter recruits during a professional firefighter academy, and examined the following hypotheses:

- The academy has an effect on the self-perceived general well-being and distress of firefighter recruits.
• Firefighter recruits report feelings of distress during the academy.

From the above-mentioned problem statement, the aim of this research was to evaluate the self-perceived general well-being and distress among firefighter recruits in the southwestern U.S., and to use the results to assess the need for stress management education during the firefighter academy.

Review of the Methodology

The research made use of existing data collected from 40 firefighter recruits in the southwestern U.S. during three academies over an 18-month period who, as part of their job requirements, completed several performance assessments, including the GWB questionnaire. SPSS software was utilized to analyze the secondary data. One-way repeated measures of ANOVA was used to determine if a significant difference existed between at least two of the three mean GWB sub-scale and total scores (pre-academy, mid-academy, and end-of-academy) among the firefighter recruits. When a significant difference in scores across the time occasions was revealed, pairwise comparisons were performed to assess which of the time occasions differed from one another.

Interpretation of the Findings and Conclusions

Anxiety

The firefighter recruits' reported self-perceived feelings of anxiety were significantly lower at the end of the academy when compared to during the first week, as well as at the mid-point of the academy. No significant difference was found in the recruits' reported self-perceived feelings of anxiety between the first week of the academy and at mid-academy. During the first week of the academy, as well as at the mid-point, the firefighter recruits' had mid-range mean anxiety sub-scale scores. Thus, they reported moderate feelings of nervousness, tension, worry, and/or strain. At the end of the academy, these feelings had lessened for recruits. The conclusion can be drawn that the
firefighter academy had an effect on the self-perceived feelings of anxiety of firefighter recruits.

In relation to previous research, stress symptoms of anxiety, agitation, and irritability have been found to be more problematic among professional firefighters when compared to a non-random male community sample (Beaton et al., 1995). In terms of health consequences, anxiety disorders have been associated with greater mortality, particularly sudden cardiac death, and greater cardiovascular morbidity (Haines et al., 1987; Kawachi et al., 1994; Kawachi et al., 1994; Kubzansky et al., 1997).

Depression

The firefighter recruits' pre-academy mean depression sub-score was above average, indicating less intense feelings of depression, down-heartedness, and/or hopelessness. At the mid-point of the academy, recruits reported more intense feelings of depression than during the first week; however, this difference was not found to be significant. Likewise, no significant difference was found between the firefighter recruits' reported self-perceived feelings of depression at the end of the academy when compared to during the first week; however, they had a significantly higher mean depression sub-scale score at the end of the academy when compared to at mid-academy. Thus, recruits reported a reduced amount of depressed feelings at the end of the academy. The conclusion can be drawn that the firefighter academy had an effect on the self-perceived feelings of depression of firefighter recruits.

In relation to previous research, agitated depression, a symptom of stress factor, is common among professional firefighters and has been related to psychological and behavioral difficulties (Beaton et al., 1995). Studies conducted by Anda et al. (1993), Pratt et al. (1996), and Ferketich et al. (2000) have shown that depressive symptoms are associated with increased risk of fatal and non-fatal IHD, self-reported MI, and incident CHD in the general population.
Positive Well-Being

The firefighter recruits' pre-academy above-average mean positive well-being score indicates that, in general, they felt happier and more satisfied with their daily life. At the mid-point of the academy, recruits reported less happiness and/or satisfaction with their daily life than during the first week; however, this difference was not found to be significant. Similarly, no significant difference was found between the firefighter recruits' reported self-perceived feelings of positive well-being at the end of the academy when compared to during the first week. The recruits, however, had a significantly higher mean positive well-being sub-scale score at the end of the academy when compared to at mid-academy, indicating improved happiness and satisfaction with daily life. The conclusion can be drawn that the firefighter academy had an effect on the self-perceived feelings of positive well-being of firefighter recruits.

In relation to previous research, Helliwell and Putnam (2004) found that social capital, as measured by the strength of family, neighborhood, religious, and community ties, is strongly linked to subjective well-being. Marriage and family, ties to friends and neighbors, workplace ties, civic engagement (both independently and collectively), trustworthiness, and trust were found to be independently and robustly related to happiness and life satisfaction, both directly and through their impact on health outcomes.

Self-Control

The firefighter recruits' had an above-average mean self-control score during the first week of the academy, indicating that they were, for the most part, in control of their own behavior, thoughts, emotions, and feelings. At the mid-point of the academy, recruits reported less self-control than during the first week; however, this difference was not found to be significant. Likewise, no significant difference was found between the firefighter recruits' reported self-perceived feelings of self-control at the end of the academy when compared to during the first week; however, they had a significantly higher mean self-control sub-scale score at the end of the academy when compared to
at mid-academy. Thus, recruits reported more control over their own behavior, thoughts, emotions, and feelings at the end of the academy. The conclusion can be drawn that the firefighter academy had an effect on the self-perceived feelings of self-control of firefighter recruits. In relation to previous research, a study conducted by Beaton et al. (1995) found intrusive thoughts and feelings, a symptom of stress, to be one of only five scales that were significantly elevated among professional firefighters when compared to a non-random convenience sample of males.

Vitality

Vitality was the only sub-scale in which the firefighter recruits' mean score was significantly lower at the mid-point of the academy when compared to during the first week, as well as at the end of the academy, indicating that they reported notably lower mid-academy energy levels, most likely due to not attaining enough rest. At the end of the academy, recruits reported higher energy levels than during the first week; however, this difference was not found to be significant. The conclusion can be drawn that the firefighter academy had an effect on the self-perceived feelings of vitality of firefighter recruits. In relation to previous research, sleep difficulties have been identified as a primary source of occupational stress, as well as a symptom of stress, among professional firefighters, largely due to the variable, unpredictable, and unavoidable sleep disturbances associated with emergency calls and false alarms during the 24-hour shifts that most U.S. firefighters work (Beaton & Murphy, 1993; Beaton et al., 1995).

General Health

The firefighter recruits' reported feelings of worry regarding their general health were significantly lower at the end of the academy when compared to during the first week, as well as at the mid-point of the academy. No significant difference was found in their reported self-perceived feelings of general health between the first week of the academy and at mid-academy. During the first week of the academy, as well as at the mid-point, the recruits had mid-range mean general health sub-scale scores. Thus, they reported
feeling moderately bothered by illness and/or bodily disorders. At the end of the academy, however, worries about personal health had eased among the firefighter recruits. The conclusion can be drawn that the firefighter academy had an effect on the self-perceived feelings of general health of firefighter recruits.

In relation to previous research, several symptoms of stress related to general health have been found among professional firefighters, including: head, neck, and facial tension; gastrointestinal symptoms; cardiopulmonary symptoms; cutaneous and/or peripheral symptoms; throat and mouth symptoms; headiness; upper respiratory symptoms; extremity tension; itchiness and/or rashes; hunger; and indigestion and/or asthma. Of these, gastrointestinal symptoms, as well as throat and/or mouth symptoms, were among five scales that were found to be significantly elevated when compared to a non-random convenience sample of males (Beaton et al., 1995).

**Prevalence of Emotional Distress**

This study showed that the majority of the recruits' reported self-perceived feelings of positive general well-being during the first week (55%), at the mid-point (52.5%), and at the end (80.0%), of the firefighter academy. In terms of self-perceived feelings of distress, this study revealed that 45% of the firefighter recruits reported feelings of distress during the first week of the academy. Among those who reported pre-academy distress, 27.8% reported feelings of severe distress. At the mid-point of the firefighter academy, nearly half (47.5%) of the firefighter recruits reported feelings of distress. Among those who reported distress at mid-academy, 52.6% reported feelings of severe distress.

No significant difference was found between self-perceived feelings of distress during the first week of the academy when compared to at the mid-point or end of the academy; however, a significant difference was found between self-perceived feelings of distress at the end of the academy when compared to at mid-academy. At the end of the firefighter academy, the percentage of these firefighter recruits who reported self-perceived feelings of distress decreased to 20%. Among those who reported distress at
the end of the academy, 37.5% reported severe distress. Recruits who reported self-perceived feelings of distress had significantly lower scores for all six subcategories of stress – anxiety, depression, positive well-being, self-control, vitality, and general health – when compared to the recruits who reported positive well-being.

**Overall GWB**

During the first week of the academy, the firefighter recruits’ mean total GWB score of 75.60 points towards self-perceived feelings of positive well-being. Their mean total GWB score of 71.45 at mid-academy was lower when compared to during the first week; however, this difference as not found to be significant. Nonetheless, this score indicates that recruits reported self-perceived feelings of moderate distress at the mid-point of the academy. At the end of the academy, the recruits’ mean total GWB score of 82.90 points towards self-perceived feelings of positive well-being, as well as an improvement in their psychological well-being. Although no significant difference was found in the general well-being of recruits at the end of the academy when compared to during the first week, a significant improvement was found when compared to the mid-point of the academy. Conclusions can be drawn that the firefighter academy had an effect on the recruits’ self-perceived feelings of general well-being and distress, and that firefighter recruits report feelings of distress during the academy.

Several possible explanations exist for the marked improvement in the recruits’ psychological well-being at the end of the academy, the first relating to their increased levels of physical fitness. During the 14- to 16-week firefighter academy, recruits take part in various skills practice and practical evolutions that include, but are not limited to hose lays, search and rescue, ladders, extrication, SCBA donning and doffing, power tools, high rise operations, rapid intervention teamwork, hazardous materials, and swift water rescue. In addition, recruits participate in daily PT, which consists of alternating upper and lower body strength training days with some form of cardiovascular conditioning performed every day of the academy (CCFD, 2005; LBFD Training Center, n.d.; New Mexico Public Regulation Comission, 2006; NLVFD, n.d.).
A study conducted by Brown (1991) found that people who are physically fit are less vulnerable to the adverse effects of stress than are those who are not as physically fit. Because PT typically provides a temporary respite from the stressful situations in people’s lives (Bahrke & Morgan, 1978), exercise may function as a beneficial restorative function that allows them to deal with stressful situations more effectively (Brown, 1991). Exercise has also been shown to reduce both depression (North, McCullagh, & Tran, 1989, as cited in Throne, Bartholomew, Craig & Farrar, 2000) and anxiety (Landers & Petruzzello, 1994, as cited in Throne et al., 2000). Throne et al. (2000) found that, among 53 members of the Austin Fire Department, those assigned to 16 weeks of PT on a rowing ergometer reacted to a simulated fire scene with significantly lower pulse and mean arterial pressure than their counterparts who continued their present modes of PT. In addition, exercise participants reported significantly less stress-related state anxiety and negative affect. The study concluded that exercise may be particularly beneficial for firefighters in reducing physical responses to job-related psychological stress.

A second explanation for the distinct improvement in the recruits’ general well-being at the end of the academy is that firefighting is a team-oriented career and, during the academy, recruits are expected to operate within a team-oriented environment. Recruits become family with their fellow recruits and rely on each other for social support. A study by Beaton et al. (1997) found that, in terms of job satisfaction and work morale, social satisfaction and conflict at work were more strongly correlated than equivalent at-home measures among professional firefighters. Reports of more frequent and/or numerous stress symptoms were associated with lower social support ratings and higher conflict ratings. Low degrees of emotional support have been associated with a number of negative cardiovascular health effects; however, emotionally supportive relationships have been shown to be cardio-protective (Orth-Gomer et al., 1993; Uchino et al., 1996).

Thirdly, the distinct improvement in the recruits’ general well-being at the end of the
academy may be related to the high self-esteem they must feel as a result of their successful completion of the firefighter academy. Self-esteem has been found to be one of the strongest predictors of subjective well-being (Diener, 1984) and is widely accepted as a key indicator of emotional stability and adjustment to life demands. High self-esteem has been related to numerous positive qualities such as life satisfaction, positive social adjustment, independence, adaptability, leadership, resilience to stress, and high level of achievement in education and work. Low self-esteem, on the other hand, frequently accompanies depression, trait anxiety, neuroses, suicidal ideation, sense of hopelessness, lack of assertiveness, and low perceived personal control (Fox, 2000).

Recommendations

The majority of the recruits reported self-perceived feelings of positive well-being throughout the firefighter academy; still, nearly half of them reported moderate to severe distress at mid-academy. In addition, the literature regarding occupational stressors and stress-related mental and physical health outcomes among professional firefighters raises considerable concerns. Individuals who are anxious, depressed, angry, hostile, or who have more stressful lives are more socially isolated, have poor behavioral risk profiles or less healthy lifestyles, including higher rates of smoking, more sedentary lifestyles, excessive consumption of alcohol, and exhibit poor compliance with medical regimens (Anda et al., 1990; Kawachi et al., 1994; Lobstein et al., 1983). Individual response to stress, cigarette smoking, physical inactivity, surplus body fat, and drinking alcohol in excess have been identified as modifiable lifestyle risk factors that increase the risk of CHD and heart attack (American Heart Association, 2008).

Addressing the effect of stress on firefighters, particular recruits in training, becomes paramount since high stress and its associated consequences can result in either losing firefighters to stress-related disorders or putting both firefighters, as well as the public they serve at risk. The way in which firefighter recruits choose to cope
with stressors during the academy may act as blueprints for how they will deal with stress in the future, both at professional and personal levels. Thus, the recommendation of this research is to implement a stress management education program during the firefighter academy to help recruits to manage stress, since learning to cope with stress early in their firefighter training will prepare them to better deal with the high levels of stress they will be exposed to in their professional career.

In 1991, the USFA published a Stress Management Model Program for Firefighter Well-Being to provide the fire service with resources to conduct a stress management program within departments. The program includes the following components:

- **A Program Implementation and Evaluation (PIE) Committee**, which might be comprised of the instructors in the firefighter academy setting. The purpose of this committee is to coordinate the implementation of the stress management program, as well as maintain and modify it so that the needs of individuals and the department are met. The committee is also responsible for developing additional stress management learning modules.

- **A core program** consisting of 2, 6-hour sessions scheduled over a 2-day period, when possible, and held at the department’s training facility. The core program provides a concise overview of stress in the fire service and aims to help participants achieve the following objectives: 1) define a number of stress terms and build a vocabulary; 2) understand the mechanics of stress and how it affects their well-being; 3) learn several methods for dealing with stress, the rationale for each, and suggestions for when and where each method will work best; and 4) learn how to use stress to improve themselves to an optimum point.

- **A program evaluation** to measure the extent to which program objectives are realized.

- **Supplemental stress management learning modules** to be developed by the
PIE Committee that firefighters may access at any time. Recommended topics include alcohol and drug education, death and dying, and pre-retirement planning, among others.

- An organizational needs assessment to identify the unmet stress-related needs of the entire fire department, and to assign program development priorities.

- A follow-up/refresher session that provides an opportunity for firefighters to review the core program on a yearly basis. In addition, the program designers recommend that program evaluation measures be collected and examined on a yearly basis.

- Optional program components include an in-house stress resource library and a family-oriented program.

The USFA's core stress management program consists of the following six sections:

- Section 1: Overview - defines stress, what causes it, how individuals react to stress, and its consequences. This section also covers stressors and stress-related health outcomes, including the high incidence of CHD, that are common among fire service personnel.

- Section 2: Fire Service Solutions - reviews the programs and services recommended to the fire service to treat and/or prevent excessive stress among firefighters.

- Section 3: Employee Assistance Programs and Debriefing Teams - covers two technologies, in addition to stress management, used by the fire service: Member Assistance Programs (MAPS) and Critical Incident Stress Debriefing (CISD) teams.

- Section 4: Designing a Personal Stress Management Plan - reviews the traits of Type A and Type B personalities and how these traits influence a person's susceptibility to stress-related diseases.
• Section 5: Managing Stress, A Personal Plan – covers a conceptual framework, called the Stress Adaptation Model, which the fire service uses to organize the different aspects of stress.

• Section 6: Stress Control Techniques – examines the three types of stress control techniques that come from the Stress Adaptation Model: 1) techniques that operate on the environment (e.g. time management); 2) techniques that operate on the mind (e.g. cognitive reappraisal); and 3) techniques that operate on the body (e.g. physical activity). Techniques that work on the environment, mind, and body are provided as well, including meditation, guided imagery, peripheral relaxation techniques, yoga, biofeedback, and progressive muscle relaxation.

The designers of the USFA stress management program recognize that the individual stress management needs of the fire service cannot be met by a single program; therefore, this program is intended as a basic outline that can be modified to best serve the individual participant. The USFA Stress Management Model Program for Firefighter Well-Being document provides recommendations for implementation including: a preferred method of presentation (a classroom setting); class size; classroom setup; text, notes, and handouts from which the instructor(s) can prepare standard lesson plans; and overhead masters to be made into transparencies and used as a training aid. Additionally, the document provides materials to be used for program evaluation and a needs assessment, as well as final reports on the pilot testing of the program in Florida, Kansas, and Oregon (International Association of Fire Chiefs Foundation, 1991).

The Promoting Healthy Lifestyles: Alternative Models' Effects (PHLAME) study found that a team-centered intervention promoted healthy behaviors among professional firefighters in an innovative, exportable manner that may enlist influences not accessed with individual-oriented interventions. Moreover, the team-centered format was found to be the more economically feasible means for health promotion (Elliot et al., 2007).
The study's team-centered curriculum was based in Social Cognitive Theory (SCT), which focuses on the interaction between individuals and their immediate environment (Bandura, 1986, as cited in Edberg, 2007). According to SCT, changing a behavior is a function of individual "internal" characteristics (e.g. self-efficacy, behavioral capacity, expectations, self-control, emotional coping ability), environmental "external" factors (e.g. the social/physical environment, vicarious learning, negative or positive reinforcements), and the interactive process of reciprocal determinism, a cycle in which a person acts based on individual factors and social/environmental cues, receives a response from that environment, adjusts behavior, and acts again, which begins the cycle over again (Edberg, 2007).

In terms of SCT internal characteristics, a stress management education program implemented during the firefighter academy may help recruits gain knowledge and skills (behavioral capability) with respect to stress, stress-related health outcomes, and techniques to manage stress as a result of participating in the intervention. The group format might also enable the recruits to gain peer feedback and reinforcement. Likewise, their improved level of self-control in terms of reducing their stress may enhance their self-efficacy about adopting new coping behaviors. Perceived self-efficacy to cope with stressors has been investigated as a buffering factor in the physiological stress response, representing a "secondary appraisal" (Lazarus & Folkman, 1984, as cited in O'Leary, 1992) regarding the personal assets that may be utilized against a potential threat. Individuals who believe themselves to have sufficient capabilities for managing or controlling a stressor in a manner that inhibits impairment will be less anxious and should exhibit reduced physiological response to a stressor (O'Leary, 1992).

In terms of SCT external factors, the manner in which the academy's instructors "model" their own techniques for handling stress could result in vicarious learning among the recruits. In addition, the ways in which the instructors reinforce (i.e. positively or negatively) the recruits' responses to stressful situations may be
influential; therefore, it would be essential that the instructors receive stress
management training prior to the academy in order for them to convey and reinforce
positive coping behaviors to the recruits. Frueh, Turner, Beidel, Mirabella, and Jones
(1996) revealed that, in the treatment of army veterans afflicted with chronic
posttraumatic stress, education and exposure therapy implemented individually
reduced stress reactions. However, social and emotional rehabilitation administered in
small group sessions (two to five patients) involving instruction, modeling, behavioral
rehearsal, supportive feedback, and reinforcement not only reduced stress reactions,
but also improved the quality of social and emotional life among the veterans.

Limitations

Several limitations to the current study warrant caution in the interpretation of the
findings. First, this research utilized secondary data; therefore the researcher had no
control over the administration (i.e. timing, testing environment) of the GWB
questionnaire to the firefighter recruits. Nonetheless, the recruits’ GWB score
calculations were verified and corrected, when necessary. A second limitation of this
study is that the data was collected from three separate academy classes, which limits
the generalizability of the results. Moreover, each class had a different set of instruction
personnel, which may have affected the culture, as well as interpersonal dynamics, of
the three academies. A third limitation is that the use of self-report questionnaires
regarding self-perceived distress in the last month prior to testing makes it difficult to
determine the actual validity of the measure; however, all recruits were tested during
similar periods of time. In some cases, responses may have been made because of the
close proximity of fellow recruits and/or instructors and the fear of appearing
vulnerable. A final limitation of the study is the use of the GWB questionnaire to assess
general well-being and distress. Commentators have suggested that the GWB is
primarily one-dimensional, noting the high internal consistency and inconsistent
results of factor analyses. Sub-scores may be redundant given the high internal
consistency, which has lead to debate over the most useful way to score the GWB. Because the GWB has so few items, sub-scores provide only crude measurements and an overall score is better in assessing emotional distress (Fazio, 1977; Taylor et al., 2003; Wan & Livieratos, 1978); however, it continues to be used in several studies (McDowell, 2006).

Suggestions for Additional Research

The above-mentioned limitations emphasize the importance of further controlled studies aimed at assessing the impact of a firefighter academy on the self-perceived general well-being and distress among recruits. Future research should also be aimed at evaluating the impact of a stress management education program, such as the USFA's Stress Management Model Program for Firefighter Well-Being, on the general well-being and distress among firefighter recruits. Moreover, future researchers should perform follow-up assessments after the recruits complete the fire service academy. For example, data regarding the general well-being and distress, as well as coping behaviors, might be collected at the end of the recruits' probationary period as rookies, and on a yearly basis after that. This type of research is necessary in continuing to support fire service administrators in designing effective programs that assist firefighters to cope with the high levels of stress they are exposed to, beginning in the academy, and throughout their professional career.

Concluding Summary

This research regarding the self-perceived general well-being and distress among firefighter recruits was conducted through a systematic research process. The researcher provided an introductory chapter in which the problem statement and aims of the research were presented. Relevant literature was utilized by the researcher to obtain a better understanding of the research domain. A detailed outline of the research procedures was also provided. The literature was used as a foundation for the empirical
analyses, from which the specific findings were obtained. The findings of the research were interpreted and discussed, and conclusions and recommendations were made by the researcher.

In conclusion, stress affects the health and well-being of firefighters and is acknowledged as one of the most serious occupational health hazards facing the fire service (International Association of Fire Chiefs Foundation, 1991). Stress, however, cannot be avoided absolutely as it is essential for maintaining vitality and optimal functioning. Thus, rather than being treated for stress-related health outcomes well into their career, firefighter recruits would benefit from an educational program, such as the USFA's Stress Management Model Program for Firefighter Well-Being, before they enter the fire service. Addressing the stress-related risk factors associated with CVD during the academy may go a long way in improving the overall health and well-being among on-duty firefighters.
APPENDIX

SAMPLE GENERAL WELL-BEING SCHEDULE QUESTIONNAIRE

1. How have you been feeling in general? (DURING THE PAST MONTH)

<table>
<thead>
<tr>
<th></th>
<th>Place a check mark in front of the appropriate response.</th>
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<tbody>
<tr>
<td></td>
<td>1 In excellent spirits</td>
</tr>
<tr>
<td></td>
<td>2 In very good spirits</td>
</tr>
<tr>
<td></td>
<td>3 In good spirits mostly</td>
</tr>
<tr>
<td></td>
<td>4 I have been up and down in spirits a lot</td>
</tr>
<tr>
<td></td>
<td>5 In low spirits mostly</td>
</tr>
<tr>
<td></td>
<td>6 In very low spirits</td>
</tr>
</tbody>
</table>

2. Have you been bothered by nervousness or your nerves? (DURING THE PAST MONTH)

<table>
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<tr>
<th></th>
<th>Place a check mark in front of the appropriate response.</th>
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<tbody>
<tr>
<td></td>
<td>1 Extremely so – to the point where I could not work or take care of things</td>
</tr>
<tr>
<td></td>
<td>2 Very much so</td>
</tr>
<tr>
<td></td>
<td>3 Quite a bit</td>
</tr>
<tr>
<td></td>
<td>4 Some – enough to bother me</td>
</tr>
<tr>
<td></td>
<td>5 A little</td>
</tr>
<tr>
<td></td>
<td>6 Not at all</td>
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</tbody>
</table>

3. Have you been in firm control of your behavior, thoughts, emotions, OR feelings? (DURING THE PAST MONTH)

<table>
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<tr>
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<tbody>
<tr>
<td></td>
<td>1 Yes, definitely so</td>
</tr>
<tr>
<td></td>
<td>2 Yes, for the most part</td>
</tr>
<tr>
<td></td>
<td>3 Generally so</td>
</tr>
<tr>
<td></td>
<td>4 Not too well</td>
</tr>
<tr>
<td></td>
<td>5 No, and I am somewhat disturbed</td>
</tr>
<tr>
<td></td>
<td>6 No, and I am very disturbed</td>
</tr>
</tbody>
</table>

4. Have you felt sad, discouraged, hopeless, or had so many problems that you wondered if anything was worthwhile? (DURING THE PAST MONTH)

<table>
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<tr>
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<tbody>
<tr>
<td></td>
<td>1 Extremely so – to the point that I have just about given up</td>
</tr>
<tr>
<td></td>
<td>2 Very much so</td>
</tr>
<tr>
<td></td>
<td>3 Quite a bit</td>
</tr>
<tr>
<td></td>
<td>4 Some – enough to bother me</td>
</tr>
<tr>
<td></td>
<td>5 A little bit</td>
</tr>
<tr>
<td></td>
<td>6 Not at all</td>
</tr>
</tbody>
</table>
5. Have you been under or felt you were under any strain, stress, or pressure? (DURING THE PAST MONTH)  

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<tr>
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<th>Place a check mark in front of the appropriate response.</th>
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<tbody>
<tr>
<td>1</td>
<td>Yes – almost more than I could bear or stand</td>
</tr>
<tr>
<td>2</td>
<td>Yes – quite a bit of pressure</td>
</tr>
<tr>
<td>3</td>
<td>Yes – some, more than usual</td>
</tr>
<tr>
<td>4</td>
<td>Yes – some, but about usual</td>
</tr>
<tr>
<td>5</td>
<td>Yes – a little</td>
</tr>
<tr>
<td>6</td>
<td>Not at all</td>
</tr>
</tbody>
</table>

6. How happy, satisfied, or pleased have you been with your personal life? (DURING THE PAST MONTH)  

<table>
<thead>
<tr>
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<th>Place a check mark in front of the appropriate response.</th>
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<tbody>
<tr>
<td>1</td>
<td>Extremely happy – could not have been more satisfied or pleased</td>
</tr>
<tr>
<td>2</td>
<td>Very happy</td>
</tr>
<tr>
<td>3</td>
<td>Fairly happy</td>
</tr>
<tr>
<td>4</td>
<td>Satisfied – pleased</td>
</tr>
<tr>
<td>5</td>
<td>Somewhat dissatisfied</td>
</tr>
<tr>
<td>6</td>
<td>Very dissatisfied</td>
</tr>
</tbody>
</table>

7. Have you had any reason to wonder if you were losing your mind, or losing control over the way you act, talk, think, feel, or of your memory? (DURING THE PAST MONTH)  

<table>
<thead>
<tr>
<th></th>
<th>Place a check mark in front of the appropriate response.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not at all</td>
</tr>
<tr>
<td>2</td>
<td>Only a little</td>
</tr>
<tr>
<td>3</td>
<td>Some – but not enough to be concerned or worried about</td>
</tr>
<tr>
<td>4</td>
<td>Some and I have been a little concerned</td>
</tr>
<tr>
<td>5</td>
<td>Some and I am quite concerned</td>
</tr>
<tr>
<td>6</td>
<td>Yes, very much so and I am very concerned</td>
</tr>
</tbody>
</table>

8. Have you been anxious, worried or upset? (DURING THE PAST MONTH)  

<table>
<thead>
<tr>
<th></th>
<th>Place a check mark in front of the appropriate response.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Extremely so – to the point of sick or almost sick</td>
</tr>
<tr>
<td>2</td>
<td>Very much so</td>
</tr>
<tr>
<td>3</td>
<td>Quite a bit</td>
</tr>
<tr>
<td>4</td>
<td>Some – enough to bother me</td>
</tr>
<tr>
<td>5</td>
<td>A little bit</td>
</tr>
<tr>
<td>6</td>
<td>Not at all</td>
</tr>
</tbody>
</table>

9. Have you been waking up fresh and rested? (DURING THE PAST MONTH)  

<table>
<thead>
<tr>
<th></th>
<th>Place a check mark in front of the appropriate response.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Every day</td>
</tr>
<tr>
<td>2</td>
<td>Most every day</td>
</tr>
<tr>
<td>3</td>
<td>Fairly often</td>
</tr>
<tr>
<td>4</td>
<td>Less than half the time</td>
</tr>
<tr>
<td>5</td>
<td>Rarely</td>
</tr>
<tr>
<td>6</td>
<td>None of the time</td>
</tr>
<tr>
<td>Question</td>
<td>Scale</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>10. Have you been bothered by any illness, bodily disorder, pains, or fears about your health? (DURING THE PAST MONTH)</td>
<td>√ Place a check mark in front of the appropriate response.</td>
</tr>
<tr>
<td></td>
<td>1 All of the time</td>
</tr>
<tr>
<td></td>
<td>2 Most of the time</td>
</tr>
<tr>
<td></td>
<td>3 A good bit of the time</td>
</tr>
<tr>
<td></td>
<td>4 Some of the time</td>
</tr>
<tr>
<td></td>
<td>5 A little of the time</td>
</tr>
<tr>
<td></td>
<td>6 None of the time</td>
</tr>
<tr>
<td>11. Has your daily life been full of things that were interesting to you? (DURING THE PAST MONTH)</td>
<td>√ Place a check mark in front of the appropriate response.</td>
</tr>
<tr>
<td></td>
<td>1 All of the time</td>
</tr>
<tr>
<td></td>
<td>2 Most of the time</td>
</tr>
<tr>
<td></td>
<td>3 A good bit of the time</td>
</tr>
<tr>
<td></td>
<td>4 Some of the time</td>
</tr>
<tr>
<td></td>
<td>5 A little of the time</td>
</tr>
<tr>
<td></td>
<td>6 None of the time</td>
</tr>
<tr>
<td>12. Have you felt down-hearted and blue? (DURING THE PAST MONTH)</td>
<td>√ Place a check mark in front of the appropriate response.</td>
</tr>
<tr>
<td></td>
<td>1 All of the time</td>
</tr>
<tr>
<td></td>
<td>2 Most of the time</td>
</tr>
<tr>
<td></td>
<td>3 A good bit of the time</td>
</tr>
<tr>
<td></td>
<td>4 Some of the time</td>
</tr>
<tr>
<td></td>
<td>5 A little of the time</td>
</tr>
<tr>
<td></td>
<td>6 None of the time</td>
</tr>
<tr>
<td>13. Have you been feeling emotionally stable and sure of yourself? (DURING THE PAST MONTH)</td>
<td>√ Place a check mark in front of the appropriate response.</td>
</tr>
<tr>
<td></td>
<td>1 All of the time</td>
</tr>
<tr>
<td></td>
<td>2 Most of the time</td>
</tr>
<tr>
<td></td>
<td>3 A good bit of the time</td>
</tr>
<tr>
<td></td>
<td>4 Some of the time</td>
</tr>
<tr>
<td></td>
<td>5 A little of the time</td>
</tr>
<tr>
<td></td>
<td>6 None of the time</td>
</tr>
<tr>
<td>14. Have you felt tired, worn-out, used-up, or exhausted? (DURING THE PAST MONTH)</td>
<td>√ Place a check mark in front of the appropriate response.</td>
</tr>
<tr>
<td></td>
<td>1 All of the time</td>
</tr>
<tr>
<td></td>
<td>2 Most of the time</td>
</tr>
<tr>
<td></td>
<td>3 A good bit of the time</td>
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<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>5 A little of the time</td>
</tr>
<tr>
<td></td>
<td>6 None of the time</td>
</tr>
</tbody>
</table>

For each of the four scales below, note that the words at each end of the 0 to 10 scale describe opposite feelings. Place a check mark (√) below the number along the bar which seems closest to how you have generally felt DURING THE PAST MONTH.
<table>
<thead>
<tr>
<th>Question</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. How concerned or worried about your HEALTH have you been? (DURING THE PAST MONTH)</td>
<td>Place a check mark under the appropriate response.</td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td></td>
<td>Not at all</td>
</tr>
<tr>
<td></td>
<td>Very concerned</td>
</tr>
</tbody>
</table>

| 16. How RELAXED or TENSE have you been? (DURING THE PAST MONTH)         | Place a check mark under the appropriate response.                                |
|                                                                        | 0 1 2 3 4 5 6 7 8 9 10                                                            |
|                                                                        | Very relaxed                                                                     |
|                                                                        | Very tense                                                                       |

| 17. How much ENERGY, PEP, VITALITY have you felt? (DURING THE PAST MONTH) | Place a check mark under the appropriate response.                                |
|                                                                        | 0 1 2 3 4 5 6 7 8 9 10                                                            |
|                                                                        | No energy                                                                        |
|                                                                        | Very AT ALL,                                                                     |
|                                                                        | ENERGETIC, listless                                                              |
|                                                                        | dynamic                                                                          |

| 18. How DEPRESSED or CHEERFUL have you been? (DURING THE PAST MONTH)    | Place a check mark under the appropriate response.                                |
|                                                                        | 0 1 2 3 4 5 6 7 8 9 10                                                            |
|                                                                        | Very depressed                                                                    |
|                                                                        | Very cheerful                                                                    |
REFERENCES


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Inventory. In C. P. Zalaquett, & R. J. Wood (Eds.), *Evaluating Stress: A Book of Resources* (pp. 405-420). Landham: Scarecrow Press.


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Impact of the Firefighter Academy on Recruits' General Well-Being and Distress

Thesis Examination Committee:
Chairperson, Dr. L. Jean Henry, Ph. D.
Committee Member, Dr. Charles Regin, Ph. D.
Committee Member, Dr. Warren McNab, Ph. D.
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