

## Literature Review

This research is intended to develop positive solutions for increasing fire fighter longevity through the establishment of an effective wellness and fitness program. A literature review has been conducted to provide an understanding in the investigation of elements, attitudes, implementation, and compliance of successful wellness programs. Furthermore, the literature review identifies components of other successful wellness and fitness programs that are relevant to fire rescue personnel of DCFR. In the process of conducting research the author found that there was a copious amount of information on health and wellness, both from the public and private sectors.

Making wellness and fitness a priority in organizations is not a new concept; however, it has historically been minimized as a significant factor to overall production and effectiveness of an organization (Cox, 2003). Cox asserts that creating a healthy workplace culture includes a system of changing behaviors, beliefs, attitudes, and values. Establishing lifestyle patterns and behaviors that contribute to long-term health and fitness begins with changing the organizational culture of encouraging and supporting wellness and fitness (Greenburg et al., 2004). The American Heart Association (2007) states that “Investing in the health of employees is one of the best decisions a company can make. At least 25% of the health care costs incurred by working adults are attributed to modifiable health risks such as poor diet and lack of exercise.” (§ 2)

According to the AHA (2007) fitness programs reduce employer health costs from 20-55%. Reducing a person’s health risk increases a person’s productivity by 2-52% and reduces absenteeism by 6-32%. For every \$1 spent on worksite wellness programs, the net benefit to the employer is between \$3.40–\$7.88. Kaiser Permanente and United Way insurance companies are addressing health concerns by proactively advertising wellness prevention strategies and healthy living, and providing free classes and online support for members (Kaiser Permanente, 2007; United Health Care, 2007). Insurance companies understand that health prevention is the most significant way to cut long term health costs. With these statistics concerning saving money through wellness programs, one would imagine that governmental agencies would enthusiastically implement prevention strategies.

Several sources, including the AHA, have conducted research studies with findings that illustrate when an organization implements a proactive wellness program, that addresses cardiovascular disease prevention, then that company receives immense benefits (ACSM, 2006; AHA, 2007; Greenburg et al., 2004; Pearson et al., 1995). The benefits of employer wellness programs include: an increase in overall morale, a decrease in the risk of diabetes, obesity, cancer, and heart disease; and improvements in stress management. When employees feel better they are more productive and take less sick leave (AHA, 2007; Cox, 2003; Greenburg et al., 2004, Quinlam, 2005). Research shows that 70% of cardiovascular disease can be prevented when programs advocate physical fitness, education and training on cholesterol, smoking cessation, obesity, stress management, sleep deprivation, substance abuse, nutrition, blood pressure, and injury prevention (ACSM, 2006; AHA, 2007; Greenburg et al., 2004; Pearson et al., 1995).

The Quinlam study (2005) on building a healthier workforce and a better bottom line, found that health premiums had increased by as much as 23% in the previous 3 years: “A wellness program that alerts employees to the risks of cardiovascular disease and offers healthy options to prevent and manage the disease, would save employers millions of dollars each year” (p. 3). Greenburg et al. (2004) found that a person can be physically fit without being well. An

effective wellness program must have a balance between the physical, emotional, social, mental, and spiritual realms (Cox, 2003; Greenburg et al., 2004; Pearson et al., 1995). Furthermore, ACSM (2006) claims that creating a healthy workplace culture that includes behaviors, beliefs, attitudes, and values is imperative for the success of a wellness program “to bring out the potential of the people within the organization may only be accomplished in an environment that freely incorporates this set of principles in its daily operations” (p 4). These studies show that being physically fit can promote overall wellness. Fitness is vital for a fire fighters profession; on the other hand, wellness is essential for better quality of life and life expectancy.

Fire fighting is one of the most stressful occupations; not only are fire fighters exposed to intense physical exertion, uncontrolled and toxic environments, but also to intense human suffering and psychological stress (Merrell et al., 2006). Having strength and endurance are critical factors to being an emergency responder; however, being physically fit is not enough for long-term longevity. Wellness concerns should encompass the broader goal of improving the overall health and well being of the department’s members. When the fire department’s members “buy-in” to the wellness concept, departmental injuries and illness go down and productivity and morale go up (Pearson, 1994).

As early as 1983, Curtis & Davis provided research on fire fighter fitness. Curtis & Davis discovered that the physical effects of fire fighters wearing breathing apparatus and protective clothing are one-third greater than that of an individual wearing gym clothes: “before fire fighters do any work at the scene of a fire, they are already one-third less efficient than if they were not wearing the 50 pounds of equipment required to protect themselves” (p. 3). Curtis and Davis examined the requirements of fire fighters’ occupation and found that there was a direct correlation between strength and endurance in accomplishing the physical tasks of the job. Research determined that physically fit fire fighters were twice as efficient in completing a series of fire ground tasks as their less fit coworkers (Curtis & Davis, 1983; Pearson et al., 1995).

Curtis and Davis (1983) ascertain that physically fit fire fighters have less exhaustion, fatigue, and on-the-job injuries under normal and adverse environmental situations. Additionally, exercise has been shown to reduce tension and stress associated with the fire fighting (Curtis & Davis, 1983). The long-term effects of stress are devastating; not only do fire fighters have the every day stressors, but they also have the stress of the nature of the job they perform (Dollard et al., 2003). When a person receives stress signals, adrenaline is released; too much adrenaline turns into cortisol that destroys the immune system and internal functions, thereby increasing the likelihood of having a heart attack when called to fight fire (Dollard et al., 2003). The antidote to reducing cortisol levels is physical fitness (Dollard et al., 2003). Cortisol levels increase when a person does not exercise regularly, has poor nutritional habits, and doesn’t get enough sleep, thereby increasing the risk for cardiac problems. Curtis and Davis state that “the physical effects of exercise—improved oxygen delivery, physical capability, increased heart function, and reduced muscular fatigue—will help you fulfill your role as a protector of the public—such a role is your number one priority and responsibility” (p. 10).

#### *What are the elements of a comprehensive wellness program?*

The elements of a comprehensive wellness and fitness program were discovered through researching national fire fighting organizations along with private sector institutions. The National Institute of Occupational Safety and Health (NIOSH), United States Fire Administration (USFA), International Association of Fire Chiefs and Fire Fighters (IAFC), International Association of Fire Fighters (IAFF) and National Fire Protection Agency (NFPA)

have comparable recommendations for a comprehensive wellness and fitness program. Here is a summary of these organizations' chief suggestions: NIOSH (2007) recommends phasing in a mandatory wellness and fitness program for fire fighters to reduce risk factors for cardiovascular disease and improve cardiovascular capacity. Additionally NIOSH (2007) suggests performing an annual physical performance assessment to ensure fire fighters are physically capable of performing the essential job tasks. IAFC & IAFF (1997) recommend an overall wellness and fitness system must be developed to maintain fire fighters' physical and mental capabilities and should be the objective of every fire department. IAFC requires mandatory participation of wellness and fitness by all uniformed personnel once the wellness and fitness program is implemented. IAFC suggests developing a holistic wellness approach that includes: annual fitness assessments and physical agility testing, annual medical physicals, rehabilitation, and behavioral health components. IAFC also recommends using the Candidate Physical Ability Test (CPAT) for new hires. USFA (2007) recommends adopting the IAFC "Fire Service Joint Labor Management Wellness-Fitness Initiative" and educating the fire service on the importance of wellness and fitness issues.

Specific components of NFPA 1500 (2007) relating to the elements of a comprehensive wellness and fitness program are: (a) Developing physical performance requirements for candidates and members (10.2.1), (b) all members shall be annually qualified as meeting the physical performance requirements (10.2.3), (c) members who do not meet the required level of physical performance shall not be permitted to engage in emergency operations (10.2.4), (d) members who are unable to meet the physical performance requirements shall enter a physical performance rehabilitation program to facilitate progress in attaining a level of performance commensurate with the individual's assigned duties (10.2.5), (e) the fire department shall provide health promotion activities through education and counseling for the purpose of preventing health problems and enhancing well being (11.2), and (f) the fire department shall provide a program on the health effects of tobacco products and a tobacco use cessation program (11.2.2).

Specific components of NFPA 1583 (2000), fire department fitness programs must possess, are: (a) Shall assign a Health and Fitness Coordinator (3.1.1 & 3.1.6), (b) all fire department members shall participate in a periodic fitness assessment (4.1.1), (c) fitness assessments shall be conducted annually to all members (4.1.2), (d) return to duty after an extended leave of illness or injury whereby the health and fitness coordinator shall develop an exercise program under the direction of the fire department physician (5.2.4), and (e) health promotion education is essential (6.1).

Specific components of NFPA 1582 (2000), on fire department medical, are: (a) Shall provide a Health and Fitness Coordinator, Health and Safety Officer, Infection Control Officer, and a Health and Safety committee (3.3.9-12), (b) provide or arrange for a prescriptive rehabilitation and/or fitness program when indicated to aid a members' recovery from illness or injury and enhance his/her ability to safely perform essential job tasks. The fire department physician shall be a member of the fire department occupational safety and health committee chaired by the health and safety officer (4.2.1 -9), and (c) a mandatory annual fitness evaluation that is not punitive or competitive shall be conducted as part of an individualized program (8.2.1).

Moore-Merrell et al., (2006) provided an inclusive study from 2000-2005 to identify and quantify the factors that contribute to fire fighter line of duty deaths. This study revealed through frequency analysis that 53.88% of fire fighters died from health, wellness, and fitness issues.

These authors state that many of these deaths are under the direct control of the individual. In concurrence with NFPA 1500, IAFC, NIOSH, and the USFA, these authors propose the following recommendations for a comprehensive fire department wellness and fitness program: (a) Phase in a mandatory wellness and fitness program to reduce the risk of cardiovascular disease, including medical evaluations and fitness evaluations along with behavioral rehabilitation and data collection, (b) conduct mandatory pre-employment and annual medical evaluations, (c) incorporate exercise stress tests, (d) determine clearance to wear self-contained breathing apparatus, (e) clear fire fighters for duty by a physician knowledgeable about the physical demands of fire fighting and the components of NFPA 1582, (f) provide exercise equipment in all fire stations and establish a designated workout time on-duty, (g) preclude from fire fighting duties individuals with medical conditions that present significant risk to safety and health; (h) perform an autopsy on all fire fighters who died as a result of an on-duty incident (USFA protocol), (i) provide automated external defibrillators on fire apparatus and assure that all personnel are trained to use them, (j) determine if Hepatitis C Virus is of sufficient severity to prevent employees from performing the essential job functions; provide communicable disease program for infection control, (k) test carboxyhemoglobin levels and test for cyanide poisoning on symptomatic or unresponsive fire fighters exposed to smoke, and (l) provide a members assistance program that identifies and assists members with substance abuse (Moore-Merrill et al., 2006).

A study published in the *New England Journal of Medicine* (2007) reveals that heart disease accounts for 45% of fire fighter on-duty deaths compared to 22% of deaths in the police department, 11% for emergency medical technicians, and 15% of all other on-duty deaths in general. This study points out that although fire fighters are only involved in fire suppression activities 1% - 5%, fire fighters are dying from cardiac deaths 32% of the time while fighting fire. These statistics indicate that fire fighters relative risk of coronary artery disease is 100 times as high as the risk associated with non-emergent duties. This study recommends that: (a) Fire fighters have a mandatory pre-placement, (b) annual medical physical examination, (c) a wellness and fitness program that focuses on proper diet and exercise and related topics, and (d) required annual fitness evaluations.

Fire department and private sector studies reveal that successful wellness and fitness programs result in decreased on-the-job injuries, decreased health care costs, decreased risk of heart disease and pulmonary disease, decreased risk of cancer, decreased risk of early retirement, and decrease risk of sick leave, resulting in an increased cost savings to fire departments (Pearson et al., 1995; USFA, 1996; NFPA, 2000). Numerous studies agree that comprehensive health, wellness, and fitness programs include nutrition, weight management, stress management, substance abuse prevention, medical exams, fitness assessments, disease prevention, psychological counseling and support, education, tobacco cessation, and occupational and personal safety (IAFC, 1997; National Fallen Fire Fighters Foundation, 2004; NFPA 1500, 2007; USFA, 2007; Pearson et al., 1995). Moreover, these researchers agree that the most important aspect of a successful wellness program is administrative and member support (Curtis & Davis 1983; IAFC, 1997; NFPA 1583, 2000; Pearson et al., 1995).

One controversial component of wellness and fitness programs for fire departments is required participation in a wellness program with mandatory annual fitness assessments, (Curtis & Davis, 1983; IAFC, 1997; NFPA 1500, 2007; NIOSH, 2007; Pearson et al., 1995;). Curtis & Davis (1983) affirm that "It is found that voluntary programs do not last, the only successful programs are mandatory" (p. 20). Components of a physical fitness assessment (fitness test

battery) include aerobic capacity tests, body composition, muscular strength and muscular endurance tests, and flexibility (NFPA, 1583; IAFC, 1997, Pearson et al., 1995; The Cooper Institute, 2002). The reason that physical fitness experts propose using a fitness test battery is because it provides 80% accuracy of overall fitness levels, whereby physical agility testing provides only 20% accuracy of overall fitness levels (Georgia Public Safety Training Center, 2007; The Cooper Institute, 2002). Other important components of a wellness program that many authors agree upon are: annual medical physicals, selecting an appropriate manager, forming a committee, providing incentives, rehabilitation, hiring an exercise physiologist, building a peer trainer program, and data collection (Curtis & Davis, 1983; IAFC, 1997; NFPA, 2007).

Although mandatory wellness and fitness programs are suggested by these researchers, Curtis and Davis (1983) and Pearson (1994) disagree on one component of a mandatory wellness and fitness program. Curtis and Davis state that there should be a minimum standard on the physical fitness test while Pearson states that standards limit buy-in because employees view it as punitive. Having a fitness standard requires that there be a consequence if an employee does not meet the standard. Pearson states that a fitness standard is not useful in determining job performance or overall wellness. Pearson's view on fitness standards could be associated with an organization's technical change while a wellness program is more of an adaptive challenge (Heifetz & Linsky, 2002). Pearson proposes that standards do not assist in changing organizational culture. He suggests that with a standard the focus becomes fitness as a job requirement rather than fitness as a necessary component of personal health. He quotes "Individuals tend to look at a test as something to prepare for as little as possible and then go back to their old ways as soon as it's over. This short term perspective is actually more damaging than helpful in the long run" (p. 46).

#### *What are management and members attitudes about wellness?*

The literature review clearly identified that attitude is fundamentally important to the success of a wellness and fitness program. Developing cultural change within the fire department is a necessary component to changing behaviors. Traditionally, fire department members have a "machismo" attitude and unhealthy diets (Cox, 2003). The emphasis on being "macho" can inhibit a person's ability to seek or give help, or even to recognize that a problem exists. This inability to ask for or receive help can lead to post-traumatic stress syndrome that can add to health risks (Dollard, Winefield, A.H., & Winefield, H., 2003). Some common characteristics that contribute to stress in many emergency service personnel are: controlling, obsessive, compulsive, highly motivated, action-oriented, easily bored, highly dedicated, risk-takers, and need immediate gratification (Dollard et al., 2003). Pearson (1994) ascertains that the fire service culture may contribute to the problem of integrating wellness concepts. If members do not buy-in to the concept of wellness, they will not take the necessary action needed to be healthy, as the old proverb goes: "you can lead a horse to water, but you can not make him drink" (Anonymous). Furthermore, Cox (2003) states that individuals need to be responsible for changing, developing, and implementing his/her own health needs.

The IAFC (1997) states the need to "incorporate fitness into the fire service philosophy." NFPA 1583 (2000) states: "Health and fitness needs to become a value within the organization, just as safety is a value. In creating cultural change in the fire department education and training are extremely important in assisting with long-term behavior changes" (A 2.11.1). The National Fallen Fire Fighter Foundation (2004) "Everyone Goes Home" initiative reveals that there needs to be a culture change within the fire department mentality in order to reduce fire fighter

fatalities. Pearson (1994) emphasizes that participants need to look at their own beliefs, values, attitudes, goals, and personal situations in order to change. Organizations can create internal motivation for change by individualizing training that should be positive, realistic, and focus on the personal benefits of exercise and health, and not simply be perceived as management's desire to improve employee performance (Pearson, 1994).

*What are effective implementation strategies used by other organizations?*

Designing a comprehensive wellness and fitness program must be followed by implementation strategies and then action. NFPA (2000) states that change should be incorporated gradually, such as setting a date for compliance and establish a phase-in schedule for specific requirements. Also fire departments should provide adequate facilities where exercise equipment is centrally located and easily accessible (NFPA, 2000). The USFA (2007) recommends adopting the IAFC "Fire Service Joint Labor Management Wellness-Fitness Initiative," which includes forming a committee with management and labor representatives, educating fire fighters on the importance of wellness-fitness, and providing medical, fitness, rehabilitation, and behavioral health components.

It is a Fire Chief's job to ensure excellent customer service by having healthy fire fighters (IFAC, 1997). The IFAC also reports that fire fighters' performance is enhanced with an atmosphere of work place safety, regulatory compliance, and positive attitudes (IAFC, 1997). Additionally, uniformed personnel have the responsibility to commit to their own health (Pearson et al., 1995). Pearson et al. (1995) also discuss implementing a successful wellness program and share that a fire department should evaluate each member's condition prior to beginning a program.

Greenburg et al. (2004) share the idea that it is important to understand and access the needs of the individual and organization in order for implementation strategies to be effective. These authors state that there are several beliefs that access readiness for change such as: the value that is placed on a goal, the likelihood of achieving the goal, the availability of the tools to take action, the perceived severity of the consequences if the actions aren't taken, the perceived benefits of the actions, and the perceived barriers will all influence an individuals or organizational ability to implement changes (Greenburg et al., 2004). In order for implementation of a wellness and fitness program to be effectively used the research proposes several suggested steps: a social diagnosis of the needs and wants, the resources and barriers; an epidemiological diagnosis of health problems; behavioral and environmental diagnosis of factors for the program to address; educational and organizational diagnosis of reinforcing conditions that affect behavior; administrative and policy diagnosis of resources needed as well as barriers and supports available; and implementing the program and finally evaluating the program to see if long-term effects of the program change the quality of life (Greenburg et al., 2004).

*How do fire departments promote positive compliance of wellness and fitness programs?*

Promoting positive compliance of wellness and fitness programs was addressed through an external questionnaire distributed to 100 like-sized fire departments nationally (see Appendix E for results). Additionally, the literature review revealed information on how fire departments can create positive compliance of wellness and fitness programs. NFPA states that positive compliance of wellness programs within fire departments allows members to participate during scheduled working hours (NFPA, 2007). Providing rewards such as awards, extra leave time, T-shirts, patches, pins, and competitions also assists with individual motivations to participate in

wellness and fitness programs (Curtis & Davis, 1983). Pearson (1994) states the most effective strategy for promoting wellness compliance among unfit fire fighters is personal motivation through education and training. Providing information through education about fitness and wellness is the initial step and then providing the tools to help them achieve lifestyle changes by prescribing personalized exercise prescriptions (Pearson, 1994). Additionally, support from the department and personnel are necessary for long-term lifestyle perspectives, emphasizing gradual change and individual needs. In order for a fire fighter to comply with a long-term exercise and healthy lifestyle changes he or she must have internal motivation (Pearson, 1994).

Greenburg et al. (2004) agree with Pearson (1994) and include that in order for individuals to create positive behavior changes they must: (a) Make realistic goals, (b) assess how they will meet those goals, (c) create a social network of support, (d) sign a contract, and (e) individualize the exercise program. Research shows that employees who are physically fit come to work more frequently, morale improves, spiritual connection improves, and there is an increased level of self-esteem and productivity (Greenburg et al., 2004).

In summary, documenting the fact that fire fighters have a stressful and physically challenging job validates the importance of continuing the research in this area of wellness and fitness. In an attempt to develop a wellness program for DCFR fire rescue personnel, it is imperative to adopt the findings of this report, including components such as: mandatory participation in annual fitness assessments; education on nutrition, physical fitness, cancer prevention, stress management and smoking cessation; individualized exercise programs; a practical assessment; a wellness committee; additional wellness staff; and unequivocal support from top management. Furthermore, changing individual behavior, fire department culture, and the nation's attitude about the vital importance of wellness and fitness programs must become the forefront of concern for all members and departments.