Firefighter Fitness: Survive or Thrive

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CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where

I have used the language, ideas, expressions, or writings of another.

Signed: _____

Abstract

Physical fitness is a critical component of a health and wellness program in today's fire service. The problem was that the Homewood Fire & Rescue Service did not have a physical fitness component of its overall health and wellness program. The research questions were 1) What are the national recommendations for firefighter physical fitness training? 2) What processes exist for establishing a physical fitness training program in the fire service? 3) What programs do other fire departments have in place to address the issue of firefighter fitness? 4) How do the physical demands of our job indicate a need for regular physical fitness training?

The data was gathered through an extensive literature review, online survey, and focus groups. The results clearly indicate the need for a fitness program and appropriate options were recommended to Fire Administration for consideration and implementation.

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Introduction

Firefighting under ideal circumstances is difficult and dangerous work. Unfortunately the demands placed upon today's firefighter rarely occur under ideal circumstances. Personnel engaged in firefighting activities are exposed to extremes of temperature, stress, and physical demands. The public depends on the firefighter to be trained, equipped, and ready at all times to meet their emergency response needs. Without adequate emphasis on fitness, our firefighters are an at risk population for cardiovascular disease, cancer, and a variety of other health issues that can have devastating and even deadly results.

There are approximately 100 firefighters killed in the United States annually. Of these deaths, between 40 and 50 percent are attributed to cardiovascular disease. ("Reducing Firefighter Injury and Death," 2003). This statistic alone indicates that perhaps 25% of all firefighter deaths could be preventable with proper emphasis on cardiovascular health and physical fitness along with reduction of other risk factors.

As fire service leaders, we have the duty to intercede and reduce or eliminate safety issues on the fireground and in the station. The lack of emphasis on firefighter fitness is a

significant safety issue that we can no longer afford to overlook.

The problem is that the wellness program of the Homewood Fire & Rescue Service (HFRS) does not have a physical fitness training component, potentially placing our personnel at a higher risk for illness, injury, and possibly death. The research should clearly demonstrate the need for firefighters to engage in regular, aerobically challenging, strength and conditioning exercises. This emphasis on regular exercise and participation in some form of physical fitness training will serve as a means of risk reduction and enhance the ability of the firefighter to perform job tasks in a safe and efficient manner.

This descriptive study has three purposes. The first is to gather information and statistics from various sources describing the physical demands of firefighting. The second is to enumerate firefighter death and injury rates as they relate to physical condition. The third is to identify a physical fitness component for the health and wellness program for the Homewood Fire & Rescue Service.

Background and Significance

The Homewood Fire Department exists to preserve life and property, promote public safety and foster economic growth through leadership, management and actions, as an all-hazard life safety emergency response provider. Our ongoing focus is responding rapidly to emergencies, providing appropriate intervention, actively engaging in fire prevention activities, and community education. Doing this in a safe, efficient way is a priority.

The Homewood Fire & Rescue Service (HFRS) consists of three fire stations serving an 8.3 square mile area. Station One, located in our central business district, houses a 100’ aerial platform, an engine company, a battalion chief response vehicle, and a number of specialized trailers and reserve vehicles. A Special Operations Unit also housed at Station One serves as a component of the Alabama Mutual Aid System (AMAS) as a medium duty rescue.

Station Two, located in the middle of the city houses an engine company and rescue unit with reserve apparatus for both vehicles. Station Three, located in the western section of the city, serves primarily a commercial, and light industrial area and houses a 75’ Quint and a reserve 75’ Quint. All apparatus are equipped as ALS response units.

Homewood, Alabama is a city in southeastern Jefferson County. A suburb of Birmingham residing south of downtown, Homewood serves a

diverse population base. Homewood has one of the highest population densities in Alabama. The racial makeup of the city was 79.75% White- or Caucasian American, 15.30% Black or African-American, 0.20% Native American, 2.57% Asian, 0.03% Pacific Islander, 1.00% from other races, and 1.16% from two or more races. 2.80% of the population is Hispanic or Latino of any race.(United States Census Bureau website, 2011, p. 1)

It is unusual for a city the size of Homewood to fully encompass the needs of the citizens so thoroughly. In addition to the critical infrastructure element in the form of the ATT communications hub for the southeastern United States, this city has a hospital, K4-12 schools, a university, several technical colleges, along with places for shopping, dining and entertainment. There are major state thoroughfares that pass through our city limits.

Our workforce is as dynamic as our city. We currently have 69 firefighters. Of these, 56 are certified as EMT Paramedics, 2 are certified at the EMT Intermediate level and the remaining 11 personnel are EMT Basics. All have firefighter I & II and many have numerous technical rescue certifications.

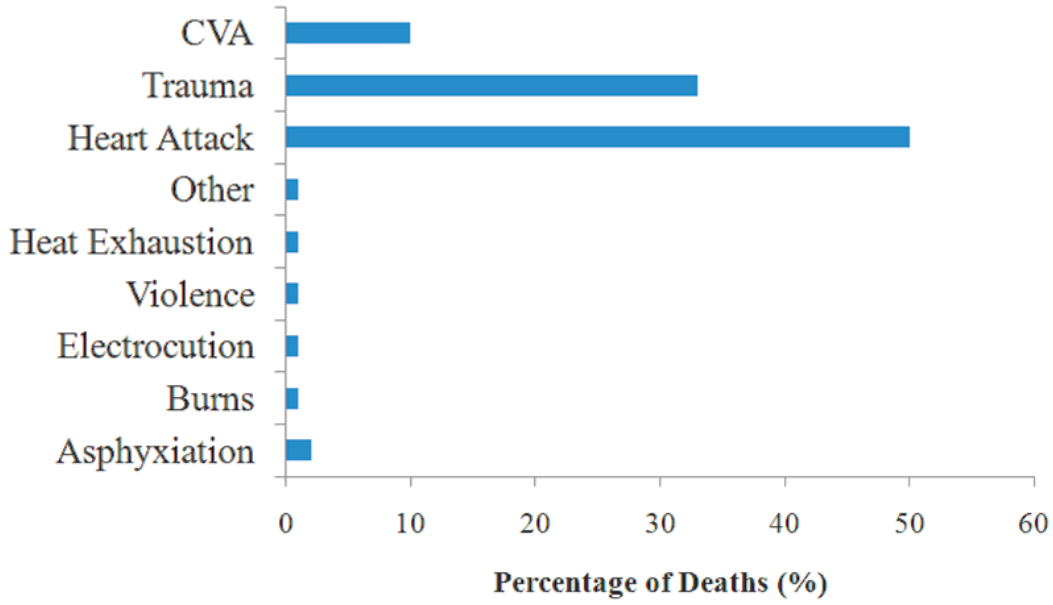
Our firefighters work on a three platoon, 24/48 (24 hours working, off 48 hours) rotation. They are assigned to various positions such as firefighter, apparatus operator, lieutenant, battalion chief, inspector, fire marshal, and fire chief.

All personnel are required to participate in an annual physical exam screening that meets NFPA 1582: Standard on Comprehensive Occupational Medical Program for Fire Departments, 2007 edition, Occupational Medical Evaluation of Members as outlined in chapter six.(National Fire Protection Association, 2007)

Homewood is a dynamic city that requires continual reinvestment, revitalization and improvement by its emergency service provider to ensure the continued superior service her citizens have come to expect. Establishing a physical fitness program to enhance and improve our firefighter's health and fitness would not only benefit our firefighters, but would serve to protect the public's investment in their emergency service providers.

Firefighting is by its very nature a dangerous and demanding profession. Throughout their career firefighters are exposed to extremes of temperature, hazardous chemicals, potential for entrapment, and other life-threatening events that are too numerous to list. Firefighters primarily serve their communities in three types of departments, volunteer, combination, and career. The physical demands of actual firefighting will not vary according to the type of department the firefighter is associated with.

There are, on average, 100 firefighters per year that lose their lives in the line of duty. The following figure denotes the various reported causes of line-of-duty deaths for firefighters.



(Smith, Liebig, Steward, & Feeling, 2010, figure 1)

Given the statistics for death and injury rates for firefighters and the epidemic proportions of obesity and cardiovascular disease among our ranks, it stands to reason a fitness component should be a part of the overall health and wellness program for the Homewood Fire & Rescue Service.

Almost every day we receive reports of firefighters, often in their early 40's dropping dead during or after an emergency response. Discovering the underlying cause of this growing problem and devising means of avoiding these tragedies is of paramount importance to the fire service.

Safety is a key factor in the fire service. The phrase "Everyone Goes Home" (Everyone Goes Home, 2005) has been coined as a reminder that health and safety is important. Without attention to the growing

numbers of firefighters dying in their prime, we will lose more of our brothers and sisters.

In the Homewood Fire & Rescue Service, there is no time set aside in our day or emphasis made on health and fitness. We eat a lot, and do little to stay in the kind of physical condition that enables us to perform the tasks we are called upon to do in the safest and most efficient manner possible. By bringing this issue to light and identifying a reasonable fitness program, it is possible to change the culture of our department resulting in stronger and healthier firefighters to serve the public.

A fitness program as a part of our comprehensive wellness program, that meets the needs of the Homewood Fire & Rescue Service will be identified as a part of this research. This research encompasses the third goal of the United States Fire Administration (USFA) which is to “Improve the fire and emergency services capability for response to and recovery from all hazards” And, more importantly, an emphasis on health and fitness could ensure that in the Homewood Fire & Rescue Service “Everyone Goes Home”!

Literature Review

Why establish fitness standards for firefighters? Firefighting is one of the most physically exacting professions on the planet. There exists a great deal of statistical information regarding the physiological demands the body of a firefighter must endure.

The firefighter must be able to withstand extremes of heat and physiological demands on the cardiovascular system. The firefighter must maintain minimum recommended aerobic capacities in order to meet the demands of the job. “Successful job performance and minimization of injury depends largely on the fitness level of firefighters”. (Mier & Gibson, 2004, p. 373)

The long hours associated with shift work combined with irregular sleep patterns, high intensity work demands, and the psychological implications of direct involvement in the face of human suffering and tragedy places this occupation at number two on the list of the ten most stressful jobs in America in 2012. (Brienza, 2012)

Statistics have been gathered to indicate the types of activities which are associated with firefighter deaths. The following graph was taken from a study conducted by the New England Journal of Medicine. The United States Fire Administration tracks and maintains statistics on firefighter deaths in the United States.

Table 1. Deaths from Coronary Heart Disease among Firefighters, Classified According to Duty at the Time of Death.*

Duty	Deaths (N=449) *no. (%)*
Fire suppression	144 (32.1)
Alarm response	60 (13.4)
Alarm return	78 (17.4)
Physical training	56 (12.5)
Emergency medical services and other nonfire emergencies	42 (9.4)
Fire-station and other nonemergency duties	69 (15.4)

(as cited in the New England Journal of Medicine, 2007, table 1) This graph illustrates what firefighters are doing when they die on the job from cardiovascular related incidents. The following table shows the average amount of time firefighters spend participating and performing fire service activities.

Table 2. Fire Service Activity and the Estimated Proportion of Time Spent in Specific Firefighting Duties.*

Variable	Municipal Fire Department	Large Metropolitan Fire Departments	National Data
Fire service activity			
Population served (no.)	101,355	760,935±888,916	280,000,000
Uniformed firefighters (no.)	274	1063±785	1,082,855±14,446
Population served per firefighter (no.)	370	655±218	259±3
Emergency incidents (no./firefighter/yr)	44	92±24	18±2
Fire incidents (no./firefighter/yr)	2.0	7.0±6.3	1.7±0.1
Duties (% of annual time)			
Fire suppression	2	5	1
Alarm response	6	9	4
Alarm return	10	15	7
Physical training	8	8	8
Emergency medical services and other nonfire emergencies	23	34	15
Fire-station and other nonemergency duties	51	29	65

(as cited in the New England Journal of Medicine, 2007, table 2)

The following illustration gives a breakdown of activities performed and relationship to on-duty deaths.

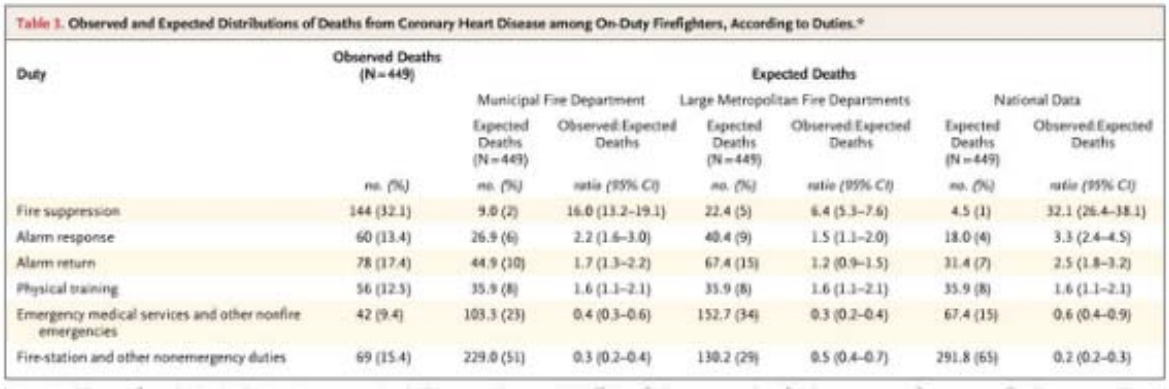


Table 3. Observed and Expected Distributions of Deaths from Coronary Heart Disease among On-Duty Firefighters, According to Duties.*

Duty	Observed Deaths (N=449)	Expected Deaths					
		Municipal Fire Department		Large Metropolitan Fire Departments		National Data	
		Expected Deaths (N=449)	Observed:Expected Deaths	Expected Deaths (N=449)	Observed:Expected Deaths	Expected Deaths (N=449)	Observed:Expected Deaths
	no. (%)	no. (%)	ratio (95% CI)	no. (%)	ratio (95% CI)	no. (%)	ratio (95% CI)
Fire suppression	144 (32.1)	9.0 (2)	16.0 (13.2–19.1)	22.4 (5)	6.4 (5.3–7.6)	4.5 (1)	32.1 (26.4–38.1)
Alarm response	60 (13.4)	26.9 (6)	2.2 (1.6–3.0)	40.4 (9)	1.5 (1.1–2.0)	18.0 (4)	3.3 (2.4–4.5)
Alarm return	78 (17.4)	44.9 (10)	1.7 (1.3–2.2)	67.4 (15)	1.2 (0.9–1.5)	31.4 (7)	2.5 (1.8–3.2)
Physical training	56 (12.5)	35.9 (8)	1.6 (1.1–2.1)	35.9 (8)	1.6 (1.1–2.1)	35.9 (8)	1.6 (1.1–2.1)
Emergency medical services and other nonfire emergencies	42 (9.4)	103.3 (23)	0.4 (0.3–0.6)	152.7 (34)	0.3 (0.2–0.4)	67.4 (15)	0.6 (0.4–0.9)
Fire-station and other nonemergency duties	69 (15.4)	229.0 (51)	0.3 (0.2–0.4)	130.2 (29)	0.5 (0.4–0.7)	291.8 (65)	0.2 (0.2–0.3)

(as cited in the New England Journal of Medicine, 2007, table 3)

The article goes on to state “The risk of coronary heart disease events during fire suppression may be increased because many firefighters lack adequate physical fitness.”(Kales, Soteriades, Christophi, & Christiani, 2007, p. 1207)

Although much has been written regarding the need for physical fitness programs for firefighters, not much has actually been done about it. According to the Bureau of Labor and Statistics (BLS), there were approximately 310,000 career firefighters in the United States in 2010. ("Firefighters: Work environment," 2012). This does not take into account the number of volunteer firefighters in the United States for the same time period. The National Fire Protection Association (NFPA) estimates there were 768,150 volunteer firefighters in that same time period. (Karter & Stein, 2011).

Every year over 100 firefighters die in the line of duty. Of

those deaths, a large percentage is attributed to cardiovascular disease. In 2010 alone, 34 firefighter deaths were attributed to sudden cardiac death. (Fahy, LeBlanc, & Molis, 2011). As the report shows “sudden cardiac death is the number one cause of on-duty firefighter fatalities in the U.S. and almost always accounts for the largest share of deaths in any given year.”(Fahy et al., 2011, p. 8)

Records indicate that from early 1990 forward death due to some sort of cardiovascular collapse has accounted for an average of 50% of all firefighter on-duty deaths. (Fahy, 2005) Armed with the overwhelming evidence of the need for a reduction in preventable deaths, the fire service must give careful consideration to establishing priorities in the area of establishing an adequate physical fitness program.

A large body of research indicates that firefighters “lack adequate physical fitness” (Kales, Soteriades, Christpohi, & Christiani, 2007, p. 1212). This lack of physical fitness standards and programs to support career long physical fitness among firefighters is a contributory factor in the incidence of firefighter fatalities.

Aerobic activities combined with endurance training and exercises such as circuit training, treadmills, running, and cycling help enhance and improve the cardiovascular capacity of the firefighter (Fire, 2010) thus reducing the risk of developing

cardiovascular disease and sudden death.

Maintaining a high degree of physical readiness is critical to performing and functioning adequately in an “in extremis environment”. The Free Dictionary defines “in extremis” as “at the point of death” or “in grave or extreme circumstances”. (The Free Dictionary website, n.d., p. 1)

The work environment may include:

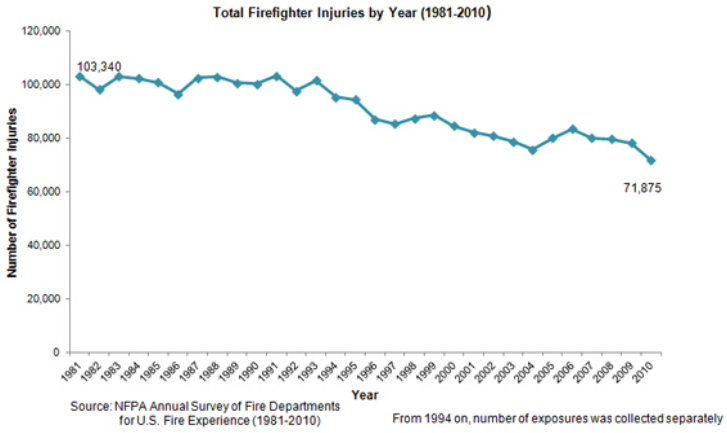
> Immersion in a relatively static layer of hot gases (i.e., crawling or crouching in a room full of hot combustion products and smoke).
> Contact with a moving layer of hot gases (i.e., entry through a door or moving down a hallway with a strong air track)
> Exposure to radiant heat (i.e., working in proximity to flames or below a layer of hot gases)(Compartment Fire Behavior Training- US, LLC [CBFT-US, LLC], n.d., p. 1)

The work environment of the firefighter meets the “in extremis” definition. Exercise is a “stress release and a functional endeavor, focused on improving both appearance and health.”(Kolditz, 2007, p. 219) Aerobic and cardiovascular fitness training are important to the overall physical capacity of the firefighter. However, the importance of strength training cannot be overlooked. Benefits include an increase in bone density that reduces the potential for fractures. Another byproduct of strength training is a reduction in the loss of bone and muscle mass that occurs with age. (LLiades, 2009)

> Soldiers, fire department personnel, and others in dangerous professions have extreme physical demands placed on their

> bodies, including the need to move rapidly while carrying heavy loads over rugged and dangerous terrain. As a result, musculoskeletal injuries (which include injuries of bones, joints, ligaments, tendons, muscles, and other soft tissues) are common among those who operate in dangerous and demanding environments. (Kolditz, 2007, p. 220)

The U.S. Army Research Institute of Environmental Medicine (USARIEM) studies the demands of soldiers as they face in extremis environments. They have identified musculoskeletal injuries as the leading cause of discharge due to disability in the army. (Pandolf et al., 2011) The National Fire Protection Association reports that in 2010, there were 71,875 firefighter injuries in the United States. The primary injuries reported (52.8%) were “strain, sprain or muscular pain”.(Karter & Molis, 2011, p. 3)



(National Fire Protection Association [NFPA], 2011, table 1)

This report cites the need for the implementation of a firefighter fitness training program as a means of injury reduction. In the early 90’s, a suburban fire department near Washington D.C. implemented a

fitness program and tracked the results of the program over the next eight years. The data demonstrated that when fitness levels of the participants rose the amount of time lost a due to on the job injuries fell and a the department also noted an accompanying decline in workers' compensation claims. "the most significant injury reduction has been in the area of muscular strains, especially the lower back"("Firefit Injury Reduction Study," 2011, p. 1)

The initial cost outlay involved with developing a comprehensive program would seem to be offset by the reduced costs associated with on the job injuries. When considering the ratios of maintenance costs to repairs in the average fire department budget, the savings becomes evident.

	FIRE APPARATUS	FIREFIGHTER
Maintenance	70%	3%
Repair	30%	97%
Total	100%	100%

("Does it work?," 2007, p. 1)

As maintenance costs rise, repair and replacement costs fall. The fire service spends a disproportionately small amount on firefighter maintenance as compared to fire apparatus maintenance. Apparatus are replaced all the time in the fire service. It is a different matter altogether to replace an injured or dead firefighter.

It has long been established in the business world that preventive maintenance is a cost reduction solution for companies. The amount of money saved over time can be significant. One study shows that

preventive maintenance “not only pays for itself, but also produces a huge return on investment.”(Koo & Van Hoy, n.d., p. 4)

Insurers often base the rates given to an organization on previous claims. By reducing the number of preventable illnesses and injuries it is possible for the department to realize significant savings on health insurance expenses.(Nathan, 2012)

The addition of free weights is an integral part of fitness training. Weight machines that function by the isolation of muscles using a system of cables or that turn weights around a mechanically fixed point may serve to increase strength. However, when coupled with the aerobic activity performed solely within the predictable stability of streets, treadmills or elliptical machines may be a recipe for injury for the firefighter functioning in the in extremis environment.

The introduction of “deliberate instability” (Kolditz, 2007, p. 224) that occurs with the use of free weights enhances the body’s ability to maintain heightened awareness with regard to kinesthesia and proprioception. Muscle development that provides greater joint stability is the result.

Utilizing free weight workout regimens that span multiple muscle groups provide greater core strength and balance that facilitate the various activities encountered on the fireground.(Brown, 2011)The IAFF-IAFC Wellness Fitness Initiative recommends an Olympic bar and

an assortment of weights (minimum of 30 pounds) and various dumbbells ranging in size from 5-80 pounds and various medicine balls. (International Association of Fire Fighters [IAFF], 2008)

CrossFit is relatively new to the exercise scene. Many military special operations units, police and fire academies, tactical operations teams and other professional athletes participate in CrossFit training. It is “by design, broad, general, and inclusive.”(CrossFit.com website, 2011, p. 1)

“Honolulu Fire Department, Hawaii; Orange County Fire Authority and Oakland Fire Department, California; Woodinville Fire and Life Safety District, Washington; Marietta Fire Department, Georgia; Parker Fire District, Colorado”(Kilgore, 2007) are just a few of the fire departments across the country utilizing CrossFit as a physical fitness program for their fire department. The CrossFit Training Guide defines CrossFit as “constantly varied, high-intensity, functional movement”. (Glassman, 2011, p. 3)

The CrossFit program works to provide a broadly based core conditioning and strength program. There are certain primary components that make up an individual’s overall fitness level. Body composition, endurance, flexibility, strength and speed are components that allow for various physical demands to be met without becoming fatigued.(Davis, Bull, Roscoe, & Roscoe, 2000, p. 121-122)

The next physical fitness components have to do with motor

function. They are “agility, balance, coordination, power, and reaction time.”("Conditioning," 2012, p. 1)These components relate to the ability to effectively perform certain job tasks. CrossFit is a program that addresses all ten components of physical fitness.

CrossFit is intended to be used as a functional, practical approach to increasing an individual’s ability to perform a wide range of physical tasks. This is the level of fitness “demanded of military, and police personnel, firefighters and many sports requiring total or complete physical prowess. CrossFit has proven effective in these arenas.”(Glassman, 2011, p. 6)

The United States Army recognizes the importance of physical fitness training for soldiers expected to execute tasks in the in extremis environment of the battlefield. “Physical fitness has a direct impact on combat readiness.”(Headquarters, United States Army, 2011, p. 13)

Physical fitness programs and standards that emphasize aerobic fitness are emerging as a focus for reducing the annual firefighter fatality rate. The National Fire Protection Association (NFPA) is recognized as “The world's leading advocate of fire prevention and an authoritative source on public safety” (NFPA, 2012, p. 1) NFPA Standard 1583: Standard on Health and Fitness Programs for Fire Department Members(National Fire Protection Association [NFPA], 2008) sets the recommendations for creation of a fitness program.

Most fire departments have a program that meets the NFPA standard for annual physical examinations by the department appointed physician. NFPA Standard 1582: Standard on Comprehensive Occupational Medical Program for Fire Departments (National Fire Protection Association [NFPA], 2007) outlines the necessary components of an annual medical evaluation for employees. This evaluation should be completed prior to implementation of a physical fitness component of a wellness program.

NFPA 1583 identifies eight components of a fitness program within a fire department. These components are an integral part of the implementation process and should be the standard for establishing a physical fitness program for the fire service.

(1) Educational curriculum that teaches the firefighter of the importance of exercise to overall health.
(2) The exercise design of the program must be customized to meet individual needs.
(3) Guidelines that define warm-up and cool-down activities
(4) Aerobic exercises
(5) Strength and endurance exercises
(6) Flexibility enhancement exercises
(7) Back strengthening and support exercises
(8) And an in depth safety conscious injury prevention program ("NFPA," 2012, Chapter 7)

The data gathered regarding firefighter fitness demonstrates the implications of raising physical fitness levels as a means of reducing risk factors for developing cardiovascular disease or sudden cardiac death. Age is a significant factor in firefighter deaths. The

findings in this study indicate that as many one-third of all firefighters killed in the line of duty were over the age of 50. (*Firefighter Fatality* Study, 2002, p. 11)

The average career span for a firefighter is 25-30 years depending on the retirement offered by their employer. It is imperative that a physical fitness program is implemented that will enable firefighters to not just exist or survive a 30 year career journey, but to thrive.

The body of information indicates a clear need to provide a physical fitness training program to protect the investment the citizens make in the firefighter and to enhance the overall longevity, health, and well-being of the firefighter. The investment made in each firefighter is significant. The National Volunteer Fire Council (NVFC) lists the costs associated with training and equipping each firefighter at “approximately $27,095”. (National Volunteer Fire Council [NVFC], 2010, p. 6)

It is interesting to note that while the data supporting the need for physically fit firefighters is broad and easily accessed, there little data as to why fire departments *do not* provide fitness programs as a part of the wellness program within their department.

The motivational factors and their influence on the implementation of and participation in a physical fitness training component are subjective and widely varied in nature. There are no

one size fits all programs that meet the needs of every department and every firefighter.

When considering risk factors for firefighters, both modifiable and non-modifiable factors exist. Modifiable risk factors include: “hypertension, abnormal blood lipid levels, tobacco use, physical inactivity, type 2 diabetes, and a diet high in saturated fat.”("Cardiovascular Disease Risk Factors," 2012) These risk factors can be change by the individual to avoid or at lessen the potential for developing cardiovascular disease. “Firefighters can control their modifiable risk factors through diet, exercise, physician follow-up and proper education about heart disease and its associated risk factors.” (Scanlon & Ablah, 2008, p. 1)

Non-modifiable risk factors include “age, gender, race, family history, and personal history”("Non-modifiable risk factors," 2008, p. 1) In addition to addressing the modifiable and providing education for the non-modifiable risk factors, the ability to identify and implement programs that address the motivational issues regarding health and lifestyle changes is critical to the success of a physical fitness program. “Firefighters can control their modifiable risk factors through diet, exercise, physician follow-up and proper education about heart disease and its associated risk factors.” (Scanlon & Ablah, 2008, p. 1)

The National Volunteer Fire Council has developed the “Heart

Health Firefighter Program” (National Volunteer Fire Council Heart Healthy Firefighter website, n.d.) to address the growing body of evidence regarding cardiovascular disease and its link to firefighter death and injury or illness statistics. The fitness link provides many suggestions for making a change toward a healthier lifestyle.

Another limitation of successful physical fitness programs is the perception that implementing a fitness program can have a detrimental or punitive effect on the job status of career firefighters. This idea can cause motivational roadblocks on the part of firefighters and union members if it is perceived that the program is punitive in nature. (National Fallen Firefighters Foundation [NFFF], 2006)

There is a pressing need to take proactive steps to add a physical fitness component to the wellness program of the Homewood Fire & Rescue Service. The body of literature available on the topic shows a direct cost savings correlation with an increased fitness level that coincides with lower injury rates among firefighters.

The National Fallen Firefighters Foundation Life Safety Initiative states that “insurers and risk managers should be encouraged to invest in health, wellness and fitness programs as a strategy to reduce claims and losses”.(NFFF, 2006, p. 5) The benefits of the program should outweigh any necessary cost outlays on the part of the department.

An extensive study by the National Institute of Standards and Technology (NIST) in 2004 stressed that “fire departments need to take physical fitness seriously and adopt a formal program that monitors progress against goals and goals met against number and severity of injuries”(TriData Corporation, 2004, p. 10). This literature review and research project is intended to identify a cost effective, reliable, scalable and realistic physical fitness program for the Homewood Fire & Rescue Service.

The problem is that the Homewood Fire & Rescue Service currently has no physical fitness component for their health and wellness program. The literature demonstrates that this is a pressing need that must be addressed in a careful, thorough manner. The benefits gained from the development of a comprehensive fitness program designed to meet the individual needs of Homewood Fire & Rescue Service firefighters would far outweigh the overall investment in time and associated costs.

As demonstrated in this literature review, firefighting is a difficult and physically demanding profession. The nature of our work places us at a higher risk for the development of certain occupational illnesses and certain injuries. Increasing the overall fitness level of our firefighters in a responsible, educated manner should result in not only long term cost savings for the Homewood Fire & Rescue Service, but fitter, healthier firefighters to serve

the citizens of our city.

Procedures

The descriptive methodology of research was utilized to assess the current status of participation in some form of physical fitness by members of the Homewood Fire & Rescue Service and other fire departments and firefighters. The purpose was to identify a physical fitness component of a wellness program to be offered to the members of the Homewood Fire & Rescue Service.

The research focused on several areas: Why physical fitness is important to the firefighter, factors that hinder participation in a physical fitness program, motivational factors, and suitable fitness activities to meet the demands of firefighting. Information was collected via the literature review, focus groups, and a survey to aid in identifying a physical fitness component that would meet the needs of our firefighters while addressing concerns of both the administration and of members of our department.

The research focused on firefighters and included career, volunteer and combination departments. Civilian EMS and office staff was excluded from the surveys and focus groups. Age data was collected on the survey, during the focus groups and from Homewood Fire & Rescue Service personnel records.

Extensive research was conducted and included in the literature review. Information was obtained from various online sources such as

Google, Bing, and from material obtained using the Learning Resource Center at the National Fire Academy in Emmitsburg, Maryland, a branch of the Birmingham Public Library located at 1224 Old Springville Rd Birmingham, Alabama. Fire service journals such as Fire Engineering, and Fire Chief magazine, along with numerous medical journals provided insight into the means to provide a recommendation of a fitness component to be added to the health and wellness program of the Homewood Fire & Rescue Service.

The literature review provided insight and a greater understanding of the complex nature and physiological demands of our profession and of the importance of health and fitness programs to provide our firefighters the latest information regarding health and fitness and its impact on their overall health and well-being.

The focus groups provided insight into the attitudes and potential stumbling blocks to the idea of an on-duty fitness program, and to attitudes toward fitness in general. Crews from various shifts and various fire houses in the Birmingham Metropolitan area made up a total of 6 focus groups. The groups ranged in number from three to seven firefighters. The information obtained from the focus groups was compiled to determine the attitudes and motivational factors of those involve in the groups.

Age is an important factor in physical fitness levels of firefighters. The average of the Homewood Fire & Rescue Service was

obtained through a search of personnel records. The ages of the online survey participants were compiled along with that of the focus groups. Information regarding these results may be found in the

The survey was conducted using the website “Survey Tool” (Survey Tool website, 2012) The purpose of the survey was to gather information from a wide range of firefighters to evaluate their understanding of the importance of physical fitness during their career.

RESULTS

The information gathered during the course of this project was gathered from and compared to existing standards whenever possible. The project began by looking at the various known occupational diseases faced by firefighters. Included among those are cardiovascular disease and cancer.

Cardiovascular disease accounts for as much as 50% of the annual firefighter deaths in America, and many of these deaths are preventable("Reducing Firefighter Injury and Death," 2003) through addressing modifiable risk factors and engaging in regular physical fitness activities.

Age as a factor in physical fitness levels and line of duty deaths was considered. A United States Fire Administration (USFA) study showed that age is of particular significance in volunteer organizations where as much as 40% of volunteers “are over the age of

50 as compared to only 25% of career firefighters."(*Firefighter Fatality Study*, 2002, p. 11).

As noted in the FireFit study that occurred in the 1990's, while the extremes of our job are physically demanding much of our time is occupied by activities such as apparatus, equipment, and station maintenance, public education fire inspections and investigations. These activities are often sedentary in nature. The combination of these two extremes in physical activity is responsible for a significant number of on-the-job injuries and illnesses"(*Firefit History*, 2011, para. 1)

Identifying and implementing a physical fitness program would serve to balance the two extremes of the firefighting profession by ensuring the firefighter maintains a fitness level that enables them to function at the lower physical demands of the job and quickly move into the "in extremis" environment of the fireground.

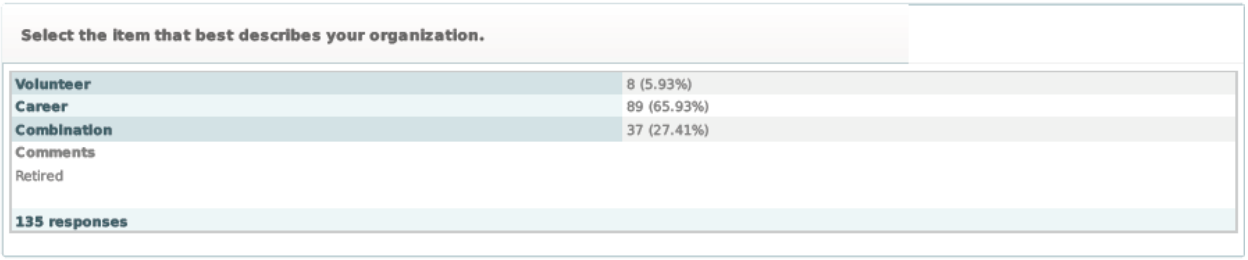
Regular exercise that balances areas of strength, aerobic and anaerobic activity, flexibility, and cardiovascular conditioning will enable the firefighter to more safely and effectively meet the demands of their job.

There are many options available to the fire service administrator who wishes to take a proactive approach to the health and wellbeing of the firefighters he or she leads. The International Association of Fire Fighters (IAFF) in conjunction with the

International Association of Fire Chiefs created the Wellness Fitness Initiative (WFI) (IAFF, 2008, p. 1) that provides a step-by-step plan for implementing a fitness program, training peer fitness trainers, and promoting health conscious behaviors in the workplace. This program is distributed through the International Association of Firefighters and is comprehensive in nature.

The National Volunteer Fire Council has a website dedicated to providing information for developing a health conscious attitude among the ranks of the nation's firefighters. Education, healthy diet, regular exercise by utilizing the "Fired up for Fitness Challenge"(National Volunteer Fire Council Heart Healthy Firefighter website, n.d.) which tracks certain benchmarks over the course of a year to encourage firefighters to make health conscious choices.

Survey revealed some interesting topics regarding attitudes and action with regard to health and fitness in the fire service. The results of the survey are as follows:



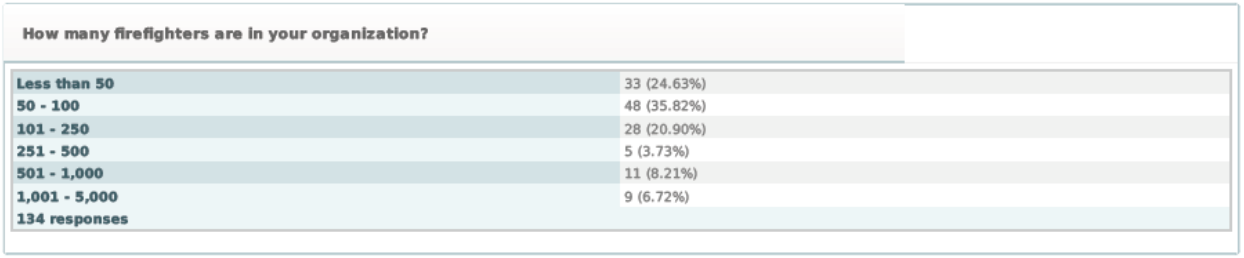
Select the item that best describes your organization.	
Volunteer	8 (5.93%)
Career	89 (65.93%)
Combination	37 (27.41%)
Comments	
Retired	
135 responses	

(Stoney, 2012, table 1)

The results of consisted of 135 respondents from 8 volunteer, 89 career, and 37 combination departments. One respondent was a retiree.

The second question provided insight into the number of

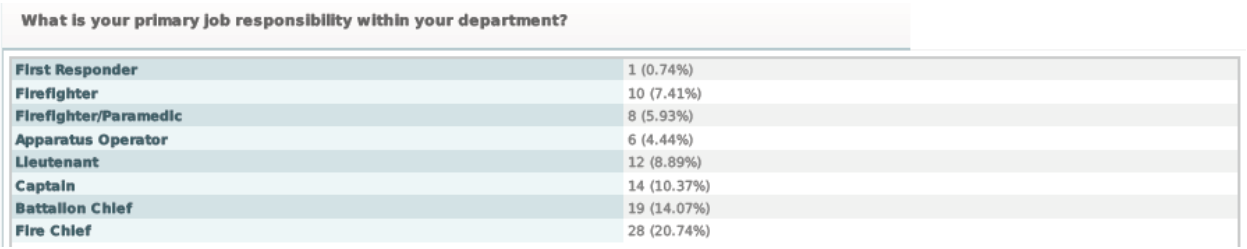
personnel represented by the 135 respondents to the survey.



How many firefighters are in your organization?	
Less than 50	33 (24.63%)
50 - 100	48 (35.82%)
101 - 250	28 (20.90%)
251 - 500	5 (3.73%)
501 - 1,000	11 (8.21%)
1,001 - 5,000	9 (6.72%)
134 responses	

(Stoney, 2012, table 2)

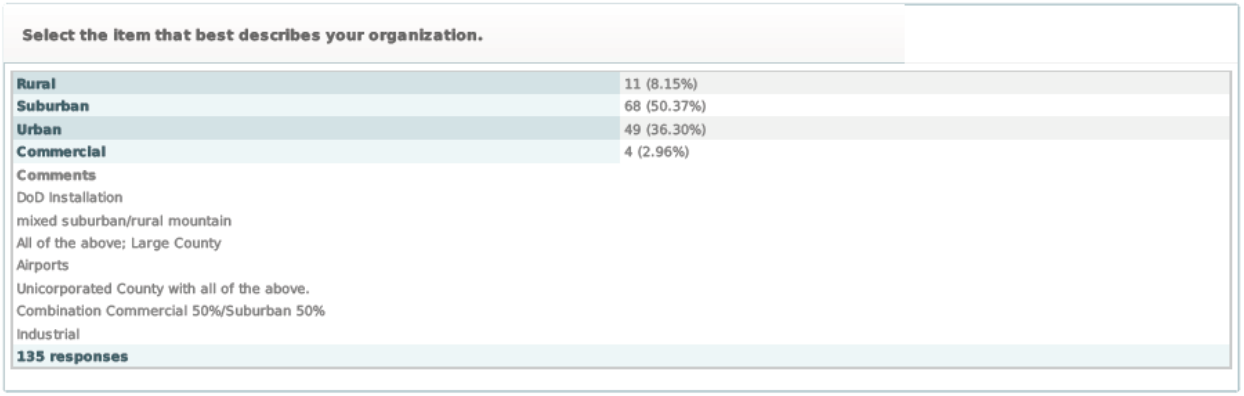
The third question gave the position of the respondents within their respective departments. The table below outlines the responses and percentages per position of 135 respondents.



What is your primary job responsibility within your department?	
First Responder	1 (0.74%)
Firefighter	10 (7.41%)
Firefighter/Paramedic	8 (5.93%)
Apparatus Operator	6 (4.44%)
Lieutenant	12 (8.89%)
Captain	14 (10.37%)
Battalion Chief	19 (14.07%)
Fire Chief	28 (20.74%)

(Stoney, 2012, table 3)

The next table represents the type of are the respondents department protects.

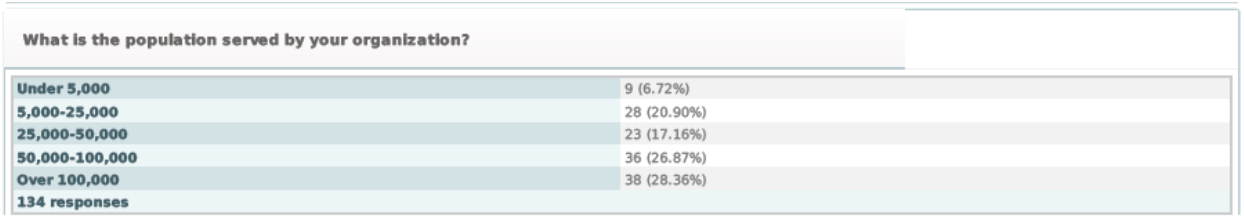


Select the item that best describes your organization.	
Rural	11 (8.15%)
Suburban	68 (50.37%)
Urban	49 (36.30%)
Commercial	4 (2.96%)
Comments	
DoD Installation	
mixed suburban/rural mountain	
All of the above; Large County	
Airports	
Unicorporated County with all of the above.	
Combination Commercial 50%/Suburban 50%	
Industrial	
135 responses	

(Stoney, 2012, table 4)

The next table demonstrates the wide range of population served

By the respondents departments.

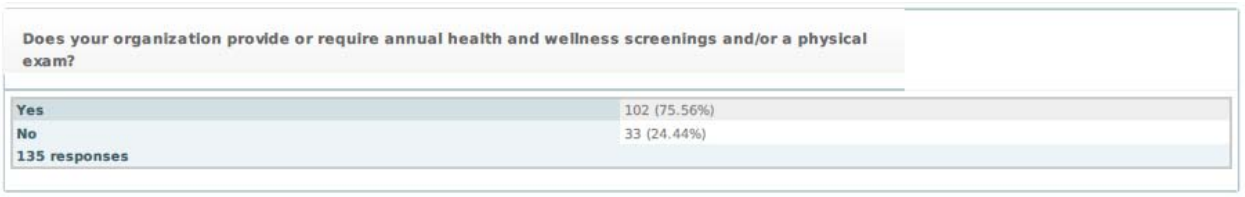


What is the population served by your organization?	
Under 5,000	9 (6.72%)
5,000-25,000	28 (20.90%)
25,000-50,000	23 (17.16%)
50,000-100,000	36 (26.87%)
Over 100,000	38 (28.36%)
134 responses	

(Stoney, 2012, table 5)

The departments ranged in population density from small rural departments to large metropolitan departments giving a fair cross-section of the populations served by fire departments in the United States.

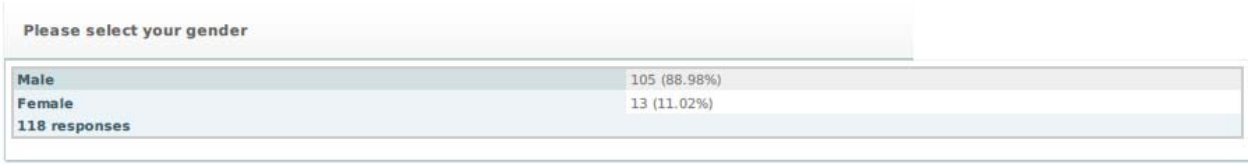
The next table gave the number of departments represented by the respondents that provide or require an annual health and wellness screening and/or physical.



Does your organization provide or require annual health and wellness screenings and/or a physical exam?	
Yes	102 (75.56%)
No	33 (24.44%)
135 responses	

(Stoney, 2012, table 6)

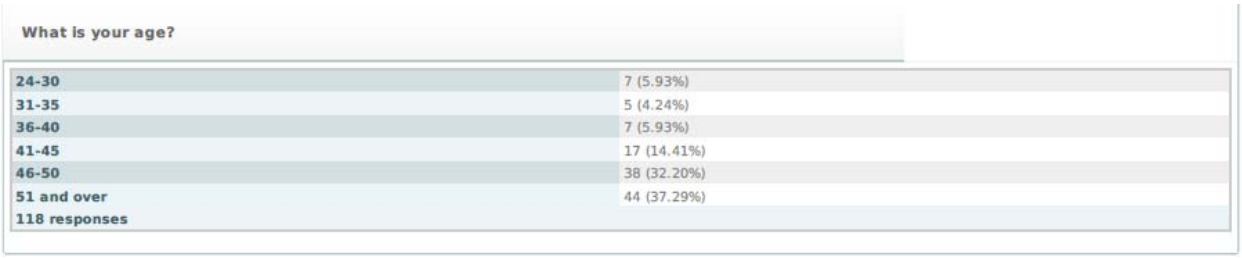
Of the 135 respondents, 118 gave their gender on the survey. This number made the percentage of female respondents 11.02%. This number is above the national average number of females which was said to be less than 4%in a 2008 report on female firefighters in the United States.(Hulett, Benedict, Thomas, & Moccio, 2008, p. 8)



Please select your gender

Male	105 (88.98%)
Female	13 (11.02%)
118 responses	

(Stoney, 2012, table 7)



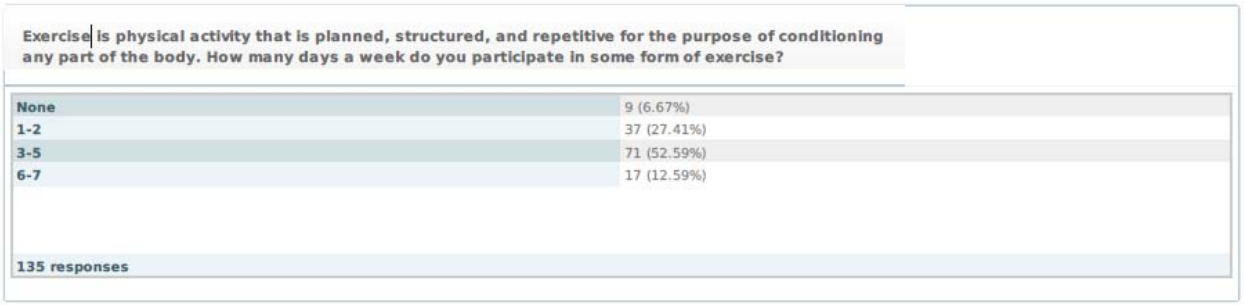
What is your age?

24-30	7 (5.93%)
31-35	5 (4.24%)
36-40	7 (5.93%)
41-45	17 (14.41%)
46-50	38 (32.20%)
51 and over	44 (37.29%)
118 responses	

(Stoney, 2012, table 8)

The highest percentage of the respondents to this survey was in the 51 and over category.

The next question defined exercise and asked the respondents how frequently they engaged in exercise.



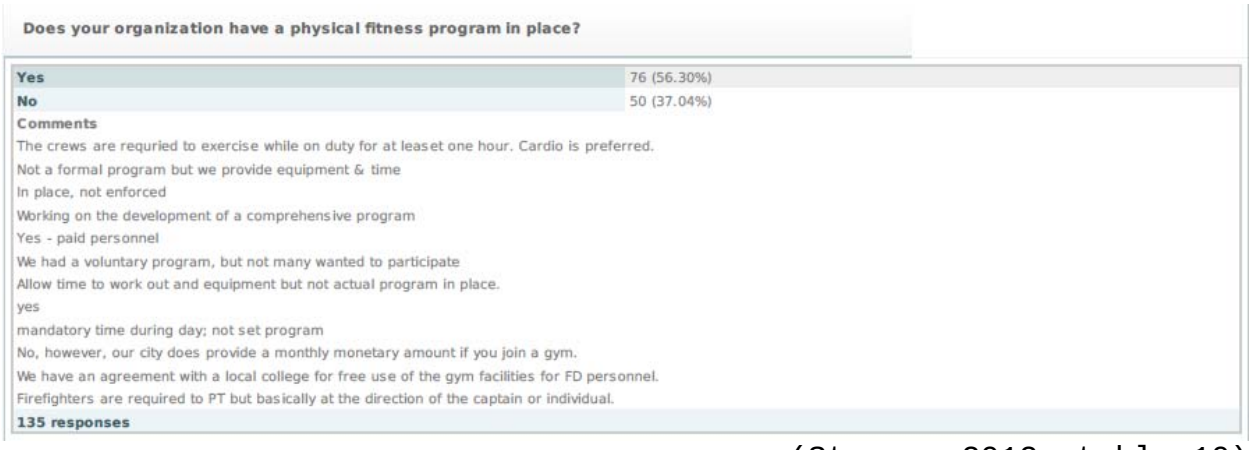
Exercise is physical activity that is planned, structured, and repetitive for the purpose of conditioning any part of the body. How many days a week do you participate in some form of exercise?

None	9 (6.67%)
1-2	37 (27.41%)
3-5	71 (52.59%)
6-7	17 (12.59%)
135 responses	

(Stoney, 2012, table 9)

Although 73% of the respondents indicated that exercise is either important or extremely important for the firefighter, 27% only engage in some form of exercise two or fewer days. This indicates a gap in knowing that exercise is a necessary activity for the firefighter who wishes to maintain the level of fitness required by the job and the participation in regular exercise.

The next table identified the percentage of departments who have a physical fitness program in place.

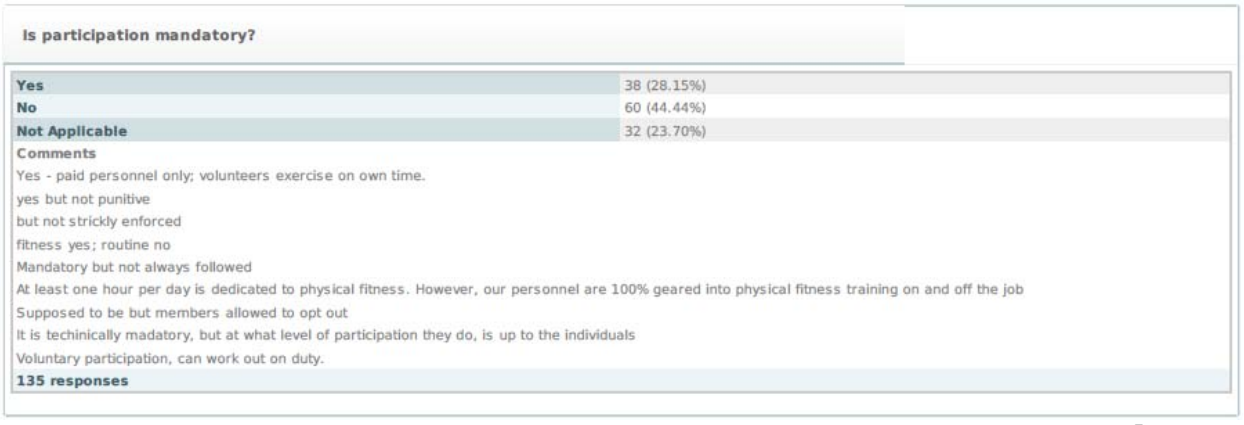


Does your organization have a physical fitness program in place?	
Yes	76 (56.30%)
No	50 (37.04%)
Comments	
The crews are requried to exercise while on duty for at leaset one hour. Cardio is preferred.	
Not a formal program but we provide equipment & time	
In place, not enforced	
Working on the development of a comprehensive program	
Yes - paid personnel	
We had a voluntary program, but not many wanted to participate	
Allow time to work out and equipment but not actual program in place.	
yes	
mandatory time during day; not set program	
No, however, our city does provide a monthly monetary amount if you join a gym.	
We have an agreement with a local college for free use of the gym facilities for FD personnel.	
Firefighters are required to PT but basically at the direction of the captain or individual.	
135 responses	

(Stoney, 2012, table 10)

Roughly 56% of the respondents indicated that their department has some form of physical fitness program in place. The programs ranged from mandatory programs with an hour per shift required exercise time; to programs that are in place but not enforced.

Table 11 identified how many physical fitness programs among the respondents departments were mandatory.



Is participation mandatory?	
Yes	38 (28.15%)
No	60 (44.44%)
Not Applicable	32 (23.70%)
Comments	
Yes - paid personnel only; volunteers exercise on own time.	
yes but not punitive	
but not strickly enforced	
fitness yes; routine no	
Mandatory but not always followed	
At least one hour per day is dedicated to physical fitness. However, our personnel are 100% geared into physical fitness training on and off the job	
Supposed to be but members allowed to opt out	
It is techinically madatory, but at what level of participation they do, is up to the individuals	
Voluntary participation, can work out on duty.	
135 responses	

(Stoney, 2012, table 11)

What types of exercise activities do your personnel participate in while on duty? Check all that apply.	
Walking	82 (60.74%)
Running	70 (51.85%)
Swimming	6 (4.44%)
Treadmill	102 (75.56%)
Stationary Bike	76 (56.30%)
Eliptical	74 (54.81%)
Stair Climber	68 (50.37%)
Free Weights	99 (73.33%)
Weight Machines	94 (69.63%)
Crossfit	38 (28.15%)
Basketball	26 (19.26%)
Racketball	3 (2.22%)
Tennis	3 (2.22%)
Volleyball	4 (2.96%)

(Stoney, 2012, table 12)

Table 12 showed the exercises utilized among the respondents who participated in a fitness program.

Select items you feel are barriers to participation in a physcal fitness program. Check all that apply.	
Age	33 (24.63%)
Current Physical Condition	60 (44.78%)
Health Issues	41 (30.60%)
Potential for Injury	33 (24.63%)
Motavition/Attitude	114 (85.07%)
Cost of Exercise Equipment	31 (23.13%)
Time Constraints	82 (61.19%)
Peer Pressure	22 (16.42%)
Fear the Program May Result in Punitive Action	36 (26.87%)
Comments	
previous injury	
dept. constraints on the use of free weights	
Union	
I eliminated contact sports due to injuries. Basketball, Vollyball	
possible Human Resource changes to wellness	
134 responses	

(Stoney, 2012, table 13)

Table 13 identified the barriers to participation in a physical fitness program as identified by the respondents.

Are you familiar with NFPA 1583: Standard on Health-Related Fitness Programs for Fire Department Members?	
Yes	96 (71.64%)
No	38 (28.36%)
134 responses	

(Stoney, 2012, table 14)

The final question on the survey identified how many respondents

were aware of NFPA 1583: Standard on Health-Related Fitness Programs for the Fire Department.

The focus groups consisted of 6 groups of between 3 and 4 firefighters ranging in age from 23 to 52 years old. The questions asked in the focus groups (Appendix A) demonstrated a gap in perceived fitness levels that meet the requirements of the job and actual fitness levels of the individual firefighter.

Lack of support by chief officers and fire administration was cited as a barrier to participation in some form of exercise. Many of the respondents indicated their feeling that little to no emphasis is placed on physical fitness by department leadership.

Many of the participants indicated that a mandatory exercise period as a part of our routine duties is the desired solution to engaging in a successful fitness program. A number of respondents indicated some means of tracking improvement and having an accompanying reward system of some type would be a positive part of a fitness program. The focus group questions and responses are found in Appendix C. The results of the focus groups are examined below.

There were 26 participants in the focus groups. The median age of the focus group participants was 32 years old. There were 24 males and 2 females in the groups. 100% of the participants indicated that they felt being physically fit was an important part of being a firefighter.

Ninety five percent (95%) of the participants indicated that the physical demands of the job made it necessary for firefighters to be physically fit. Fifty percent (50%) of the participants indicated that being physically fit would result in increased job performance.

Twenty three percent (23%) identified cardiovascular disease as a risk factor to firefighters and that being physically fit can have long term health benefits to the firefighter. Nineteen percent (19%) reported that they recognized regular exercise can help reduce stress.

While one hundred percent (100%) of the participants indicated that being physically fit was important, fifty three percent (53%) reported that they were not physically fit. Fifteen percent (15%) of the participants indicated they did not participate in any type of exercise on or off-duty. Walking, running, weight lifting, and CrossFit topped the list of preferred activities among the focus group participants.

The number one motivational factor indicated (50%) for the focus groups to participate in an exercise program were upper and middle management support of the program. Goal based incentives such as granted off-time or monetary incentive along with dedicated time to exercise on-duty were next on the list with thirty eight percent (38%) indicating these as motivational factors.

Fifty three percent (53%) named lack of support or emphasis on

fitness by upper and middle management as the reason they do not exercise on duty. Fifty percent (50%) of the group participants cited “too much busy work” as a reason for not exercising on duty. This was followed by forty three percent (43%) reporting the lack of a designated exercise period as the reason for no on duty exercise.

Lack of personal motivation accounted for lack of exercise on and off duty in thirty six percent (36%) of those who did not engage in regular exercise.

Discussion

My own gradual slide into diminishing physical fitness ability necessary to excel in this profession is the motivating factor behind this research. I became a firefighter in 1990 and as the first female in our department, maintaining fitness levels and being able not only to do the job, but do to it well was critical to my success in the department.

Twenty two years of service, the birth of three additional children (we have five), and several significant injuries resulting in surgery and lost time at work led me to a place I was not happy with. My saying jokingly when asked about getting in shape was “round is a shape!”

One day I realized that as a person occupying a leadership role in our department, a company officer (who had become potentially the

weakest link in our chain), a wife, and a mother, round was no longer the shape I desired to be in. This is a work in progress. Regular exercise in the form of CrossFit workouts 2-3 times a week, swimming, and walking have become a part of my routine.

The most difficult part of becoming a physically fit firefighter is not incorporating exercise into my daily routine; it is the change in the eating habits that over the course of 23 years have added nearly seventy five pounds to the 5’6 frame of a girl who weighed 123 pounds at the start of my career.

My experience is not that different from those around me. It is not uncommon for a firefighter to put on ten to 15 pounds during his first year of service. The weight sneaks up on us. The same is true for decreasing fitness levels. It became evident that if I was to make a change and be a positive influence to those I lead and serve beside, I had (and still have) quite a job before me.

As I observe those around me age, and watch the younger firefighters enter the workforce, it became evident that fitness was not an area our department placed any emphasis upon. The average age of the Homewood firefighter is 40.4 years. 21 of our firefighters are over the age of 45.

We know that muscle loss and decrease in bone density occurs with age and that strength training and regular exercise and conditioning can diminish this problem. (LLiades, 2009) Maintaining

muscle strength over time minimizes the risk of pulled muscles, sprains and strains that can result in worker's compensation claims and lost time. Maintaining bone density as we age keeps our bones strong. This lessens the likelihood of fractures that too result in job related injuries and costly lost time.

Studies have indicated that as many as one-third of all firefighter deaths are attributed to firefighters over the age of 50. These deaths are primarily cardiovascular related. (*Firefighter Fatality Study*, 2002). Armed with the information we have regarding the physiological demands of firefighting and the effects of regular exercise diminishing many risk factors and better enabling the firefighter to perform his or her duties, it borders on negligence for both the individual firefighter and the department administration to lack emphasis on fitness as a matter of routine in the life of the firefighter and the department as a whole. It is a given that injury prevention and health and wellness programs "depends largely on the fitness level of the firefighters" (Mier & Gibson, 2004, p. 343).

The combination of long hours, irregular sleep patterns, high intensity, physiologically demanding work all add up to firefighting being number two on the list of the ten most stressful jobs in America.(Brienza, 2012) To combine the stress of the job with declining fitness levels is simply a recipe for injury, illness, and possibly death of our firefighters.

Review of a study on why we die on the fireground revealed that many of the activities where firefighters died as a result of a cardiovascular incident could potentially have been avoided. The authors stated “The risk of coronary heart disease events during fire suppression may be increased because many firefighters lack adequate physical fitness.”(Kales et al., 2007, p. 1207). Armed with this knowledge alone, fire service leaders and administrators should seek to become the instrument of a cultural change within their departments that could save the lives of their members.

The problem we face is that while much has been written and discussed on the national level regarding physical fitness, the sad reality seems to be that not much is being done about it at our level. The number of firefighter deaths remains steady at about 100 per year. We know that “sudden cardiac death is the number one cause of on-duty firefighter fatalities in the U.S. and almost always accounts for the largest share of deaths in any given year.”(Fahy, 2005, p. 8)Exercise strengthens the cardiovascular system and enhances the ability of an individual to endure physical stresses and activities. A way to motivate and encourage our firefighters to remain physically fit throughout their career must be identified and implemented for the number of deaths attributed to cardiovascular incidents to decline.

Aerobic activities, strength training can improve the

cardiovascular capacity of the firefighter (Fire, 2010) and should be incorporated as a part of the daily routine of the fire house. Exercise for those of us who work in an “in extremis” environment is critical to the success of the mission of the fire service. Exercise is a “stress release and a functional endeavor, focused on improving both appearance and health.”(Kolditz, 2007, p. 219) Balancing aerobic exercise with strength training is critical for the ability of the firefighter to meet the widely varied demands of the job.

The focus of the fitness program has to be as varied as the demands of the job. In 2010 alone there were 71,875 firefighter injuries and of these 52.8% were “strain, sprain or muscular pain”. (Karter & Molis, 2011, p. 3). This report emphasized the need for the implementation of a fitness training program as a means of injury reduction for the fire service.

While there may be an initial cost involved in the proper implementation of a fitness program, having a maintenance program for our firefighters is at least as important as the maintenance programs we employ for apparatus and equipment. Studies show that a health, wellness, and fitness program “not only pays for itself, but also produces a huge return on investment.”(Koo & Van Hoy, n.d., p. 4)

Balancing the program with aerobic activities, weight machines, and free weights is important to meeting all the strength and conditioning needs of the firefighter. Introducing “deliberate

instability” (Kolditz, 2007, p. 224) that free weights employ is an important part of the program. There are lists of equipment for a firefighter fitness program that can be found in the IAFF/IAFC Wellness (International Association of Fire Fighters [IAFF], 2008) program along with lists of equipment utilized in a CrossFit workout (RogueFitness website, 2011).

Each department should examine the current condition of its workforce and introduce a non-punitive workout regimen that will gradually bring its firefighters to a “battle ready” level of fitness that will provide for more safe and efficient fireground readiness levels for the public.

Having a health and wellness program that provides physical exams, educational programs, healthy eating, and that recommends fitness activities based on current abilities is an important first step in healthier firefighters.

Age is a significant factor in line-of-duty deaths (LODD. Studies indicate that nearly one-third of all LODD occur in firefighters over the age of 50. (*Firefighter Fatality* Study, 2002, p. 11). As we age, fitness levels become a critical factor in our ability to perform our job tasks in a safe efficient manner.

One of the biggest obstacles to implementation of a fitness program will rest in the ability to educate and motivate our firefighters. Many of the firefighters in the focus groups and survey

used for this study indicated that lack of motivation was a primary reason for not participating in some form of physical activity. While not much can be done off-duty, we can make participation while on-duty mandatory and offer incentives for improvement.

Education and training in proper eating habits, risk factors, and correct techniques for the various exercises will result in a healthier firefighter. There is a clear need to implement a physical fitness component to the health and wellness program for the Homewood Fire and Rescue Service. The body of literature reviewed in this research shows the potential for a direct cost savings association with increased fitness levels that corresponds with potentially lower injury rates.

Increased Fitness levels and potentially lower injury rates will translate into savings for the city and dollar for dollar could be one of the best investments we could make both for our firefighters and for the citizens we protect.

Recommendations

There are many options available for fitness programs and activities. To the department with little money and minimal time available to invest, a program such as CrossFit should be strongly considered. The constantly varied nature of the workouts relates directly to the wide range of activities a firefighter could engage

in during an emergency response.

These workouts utilize functional movements that often require little or no equipment to perform. The highly intense nature of the workout coupled with the relatively short period of time required to complete the workout makes CrossFit a good consideration for a busy department. Most CrossFit workouts can be completed (including warm-up and cool-down) in around 45 minutes.

The scalability of the workout makes it especially convenient for utilization in a department where participants may range in age from their early twenties to their early sixties. The physical fitness levels of the individual firefighters are often as widely varied as their ages. CrossFit is “by design, broad, general, and inclusive.”(CrossFit.com website, 2011, p. 1)

Emphasis is placed on proper executions of each movement within each CrossFit workout, especially when the workouts include weights. As with anything in life, if something is worth doing, it is worth doing right. The emphasis on proper lifting and movement techniques aids in the prevention of training related injuries.

The International Association of Fire Fighters (IAFF) and International Association of Fire Chiefs (IAFC) have launched the Wellness Fitness Initiative. This initiative is a comprehensive guidebook for a health and fitness program that meets the needs of today’s firefighter and the departments they serve.

This program takes into consideration the requirements of the National Fire Protection Association (NFPA) 1583: Standard on Health Related Fitness Programs for Fire Department Members and NFPA 1582: Standard on comprehensive occupational medical program for fire departments in its recommendations for adoption and implementation of a fitness program. This program includes education and training of fire department personnel as “peer fitness trainers” to facilitate many aspects of the program. These individuals help identify the current fitness levels of the firefighter, set goals and objectives, select exercises that facilitate meeting these goals and objectives, and track the employee progress through the program.

There is some cost to implementation of this program involved with the training and education of the number of peer fitness trainers required to meet the needs of each department. This cost could easily be offset by the savings recognized by placing emphasis on the health and fitness of the individual firefighter.

Whichever program, method, or solution Homewood Fire & Rescue Service chooses, the department, the firefighter, their families, and the citizens in our community will all benefit. Selecting a national program such as implementation of the Wellness Fitness Initiative, or an easily scalable program such as CrossFit will ease the process of establishment of the program.

The WFI provides a step-by-step method of adopting and

implementing the program that is easy to follow.

A CrossFit type program requires a minimal purchase of equipment followed by training and education in proper technique. Access to the internet makes keeping the workouts varied simple. Daily workouts are posted on many CrossFit sites and are easy to obtain. Regardless of the program chosen, a change in the cultural norms of the individual department must occur for the program to be successful.

Adopting a fitness program such as the IAFF/IAFC Wellness Fitness Initiative, or CrossFit that has a mandatory participation requirement along with incentives such as 12-24 hours of compensatory time when the employee shows improvement in their fitness level and remains injury free is the recommendation resulting from this research.

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Appendix A

At the beginning of the group session the following statement was read: I am gathering information for a research project that is being completed as a part of the required work for the Executive Fire Officer Program at the National Fire Academy. Part of the research process is information gathering and the purpose of this meeting is to gather information regarding your ideas and attitudes toward physical fitness and its importance in the life of a firefighter. Any information gathered will be kept strictly confidential. All information gathered is to be used as part of the data supporting this research project. While participation in the focus group is voluntary, your cooperation is vital to the research process and is greatly appreciated. The group was then asked the following questions:

1. Do you think that being physically fit is important to a firefighter? Why?

2. Do you think you are physically fit?
3. Do you participate in any type of physical fitness related activities? If so, in which activities do you participate?

4. What would motivate you to participate in a fitness program?

5. What prevents you from exercising while on duty?
6. What prevents you from exercising while off duty?
7. What types of exercise would you be most willing to participate in?

8. Can you identify the risk factors that the firefighter experiences which are higher than the general population? How do these factors affect your attitude toward fitness? Questions one and two helped identify the participants' attitude toward fitness.

    Question three through seven addressed the various barriers to fitness and identified activities participants would most likely willingly engage in. Question eight investigated the impact knowledge of risks had on the motivation of a firefighter to work toward maintaining physical fitness.

Appendix B
Online Survey

The survey was conducted using the website “Survey Tool” (Survey Tool website, 2012) The purpose of the survey was to gather information from a wide range of firefighters to evaluate their understanding of the importance of physical fitness during their career. The following questions were asked:

1. Select the item that best describes your organization.

   ☐ Volunteer ☐ Career ☐ Combination ☐ Other (Please Specify)

   This question was intended to describe the type of department the respondent was affiliated with at the time of the survey.

2. How many firefighters are in your organization?

   ☐ Less than 50 ☐ 50 – 100 ☐ 101 – 250 ☐ 251 – 500

   ☐ 501 - 1,000 ☐ 1,001 - 5,000 ☐ over 5,000

   This question was intended to describe the size of the department the respondent was affiliated with at the time of the survey.

3. What is your primary job responsibility within your department?

   ☐ First Responder ☐ Firefighter ☐ Firefighter/Paramedic

   ☐ Apparatus Operator ☐ Lieutenant ☐ Captain

☐ Battalion Chief ☐ Fire Chief ☐ Other (Please Specify)

This question was intended to determine if rank or position of the respondent demonstrated a trend in attitudes toward physical fitness.

4. Select the item that best describes your organization.

☐ Rural ☐ Suburban ☐ Urban ☐ Commercial ☐ Other

This question was intended to identify the type of community the department served.

5. What is the population served by your organization?

☐ Under 5,000 ☐ 5,000-25,000 ☐ 25,000-50,000
☐ 50,000-100,000 ☐ Over 100,000

This question was intended to identify the size of the community the respondent's department served.

6. Does your organization provide or require annual health and wellness screenings and/or a physical exam?

☐ Yes ☐ No

This question was intended to identify any correlation or trend in attitudes toward physical fitness as they relate to the financial commitment to health and fitness necessary for a department to provide a health and wellness screening and/or physical exam.

7. Please select your gender

☐ Male ☐ Female ☐ Prefer not to answer

This question was intended to identify any variances in attitudes toward physical fitness between genders.

8. What is your age?

☐ 18-23 ☐ 24-30 ☐ 31-35 ☐ 36-40 ☐ 41-45 ☐ 46-50 ☐ 51 and over

This question was intended to identify any variances or trends in attitudes toward physical fitness that is age specific.

9. Exercise is physical activity that is planned, structured, and repetitive for the purpose of conditioning any part of the body. How many days a week do you participate in some form of exercise?

☐ None ☐ 1-2 ☐ 3-5 ☐ 6-7 ☐ Other (Please Specify)

This question gave a definition of exercise and identified the frequency with which the respondent participated in some form of exercise.

10 How important is it for the firefighter to regularly exercise?

☐ Not important ☐ Somewhat Important ☐ Important

☐ Extremely Important

This question demonstrated the emphasis the respondent placed on the importance of regular exercise.

11. Does your organization have a physical fitness program in place?

☐ Yes ☐ No ☐ Other (Please Specify)

This question provided information as it relates to the overall number of departments included in the survey that have a physical fitness program in place.

12. Is participation mandatory?

☐ Yes ☐ No ☐ Not Applicable ☐ Other (Please Specify)

This question provided statistical insight to identify if mandatory participation provided better over compliance with the requirements of a physical fitness program.

13. What types of exercise activities do your personnel participate in while on duty? Check all that apply.

☐ Walking ☐ Running ☐ Swimming ☐ Treadmill

☐ Stationary Bike ☐ Elliptical ☐ Stair Climber

☐ Free Weights ☐ Weight Machines ☐ CrossFit

☐ Basketball ☐ Racquetball ☐ Tennis

☐ Volleyball ☐ Other (Please Specify)

14. Select items you feel are barriers to participation in a physical fitness program. Check all that apply.

- ☐ Age
- ☐ Current Physical Condition
- ☐ Health Issues
- ☐ Potential for Injury
- ☐ Motivation/Attitude
- ☐ Cost of Exercise Equipment
- ☐ Time Constraints
- ☐ Peer Pressure
- ☐ Fear the Program May Result in Punitive Action
- ☐ Other (Please Specify)

This question was needed to provide insight as to motivational factors and barriers to participation in regular fitness activities.

15. Are you familiar with NFPA 1583: Standard on Health Related Fitness Programs for Fire Department Members?

- ☐ Yes
- ☐ No

Appendix C

Focus Groups Results (26 Responses)

What is your age?

20-25	1	(3.85%)
26-31	4	(15.38%)
32-37	3	(11.54%)
38-42	8	(30.77%)
43-48	5	(19.23%)
49-53	4	(15.38%)
54-60	1	(3.85%)

What is your gender?

Male 24 (92.31%) Female 2 (7.69%)

Do you think being physically fit is important to a firefighter?

Yes 26 (100.00%)

Why or Why Not?

Physical Demands of the Job	25	(96.15%)
Reduce Cardiovascular Risk Factors	6	(23.08%)
Exercise Helps Manage Stress	5	(19.23%)
Reduces Injuries	3	(11.54%)
Long Term Health Effects	6	(23.08%)
Increased Job Performance	13	(50.00%)

Do you think you are physically fit?

Yes 12 (46.15%) No 14 (53.85%)

Can you identify the risk factors experienced by firefighters which are higher than the general population?

Cardiovascular Disease	19	(73.08%)
Pulmonary Disease	6	(23.08%)
Cancer	7	(26.92%)
Stress	12	(46.15%)
Job Related Injuries	8	(30.77%)
Exposure to Communicable Disease	2	(7.69%)
Lack of Aerobic Conditioning	5	(19.23%)
Sudden Changes in Activity Levels	11	(42.31%)

Do you participate in any type of regular fitness related activities?

Yes 22 (84.62%) No 4 (15.38%)

What activities do you participate in?

Walking	11	(42.31%)
Running	6	(23.08%)
Treadmill	1	(3.85%)
Bicycle	3	(11.54%)
Elliptical	1	(3.85%)
CrossFit	5	(19.23%)
Cardio	5	(19.23%)
Plyometric	2	(7.69%)
Free Weights	10	(38.46%)
Weight Machine	2	(7.69%)
Resistance Training	1	(3.85%)
None	4	(15.38%)

What would motivate you to participate in a fitness program?

Better Heath	7	(26.92%)
Goal Based Incentives	10	(38.46%)
Peer Pressure	3	(11.54%)
Fitness Trainer	3	(11.54%)
Designated Exercise Period	10	(38.46%)
Upper Management/Leadership Support	13	(50.00%)
Unsure	4	(15.38%)

What prevents you from exercising while on-duty?

Daily Duties	4	(15.38%)
No Designated Exercise Period	12	(46.15%)
Projects	3	(11.54%)
Busy Work	13	(50.00%)
Upper & Middle Management	14	(53.85%)
Call Volume	1	(3.85%)
Limited Exercise Choice/No Structure	6	(23.08%)
Lack of Personal Motivation	9	(34.62%)
Nothing	1	(3.85%)

What prevents you from exercising while off-duty?

Other Jobs	6	(23.08%)
Family	5	(19.23%)
Motivation	10	(38.46%)
Time Constraints	8	(30.77%)
Nothing	11	(42.31%)

What types of exercise would you be most willing to participate in?

Weight/Resistance Training/Free Weights	15	(57.69%)
Cardio	14	(53.85%)
Plyometric	1	(3.85%)
CrossFit	10	(38.46%)
Walking	9	(34.62%)
Running	2	(7.69%)
Swimming	2	(7.69%)
Aerobic	2	(7.69%)
ANY	1	(3.85%)