

PHYSICAL FITNESS ASSESMENT

Physical Fitness Program Assessment for the Wayne Township Fire Department

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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.

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Abstract

Physical fitness has been linked to preventing line of duty deaths (LODD) due to overexertion or stress. Evaluating a program to determine if it is actually working as intended would be critical to ensuring the health and safety of firefighters. Performing such an assessment was the intent of this project.

The problem was that while physical training is a priority in recruit school, the Wayne Township Fire Department (WTFD) does not formally promote a physical fitness program post recruit school. The purpose of this project was to evaluate the current informal physical fitness system used by the WTFD, post recruit school. The research questions were a) what conditions promotes physical fitness activities in the WTFD? b) What conditions discourage physical fitness activities in the WTFD? c) Is the existing WTFD physical fitness program adequate? The project employed a descriptive research methodology to evaluate the current status of the fitness program used by the WTFD. The research analyzed existing data and gathered new data by using focus groups. Risk factors were identified and compared to the current status of the WTFD. The data was then used to evaluate the efficiency of the fitness program by comparing it with known standards. Additional information was gathered to ensure all data was reviewed and analyzed in context. The research showed that the current fitness used by the WTFD does not adequately meet the needs of its firefighters. It was recommended that a new formal physical fitness program is implemented by a committee to ensure the safety and well being of the WTFD firefighters.

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Physical Fitness Assessment for the Wayne Township Fire Department

Introduction

"The discrepancy between the physical preparedness of firefighters and the high physical demand of firefighting stands at the center of fire service line of duty deaths" (Brown, Stickford, 2007, p. 70). The Wayne Township Fire Department (WTFD) has a rigorous physical fitness program for its recruits. The program focuses on preparing the recruits to be successful in the fire academy. The program emphasizes aerobic and anaerobic conditioning, strength development, nutrition, and hydration. The training and education is provided under the supervision of peer trainers who perform assessments, develop, and implement exercise programs for the recruits and document their progress. The goal for the fitness program at the fire academy is for the recruits to continue the learned behaviors in the academy when they go out into the companies as firefighters. At company level it is expected that firefighters will maintain their level of fitness achieved in the academy on their own.

The problem is that while physical training is a priority in recruit school, the Wayne Township Fire Department (WTFD) does not formally promote a physical fitness program post recruit school. The purpose of this project is to evaluate the current informal physical fitness system used by the WTFD post recruit school. The research questions are:

- a) What conditions promote physical fitness activities in WTFD?
- b) What conditions discourage physical fitness activities in WTFD?
- c) Is the existing WTFD physical fitness program adequate?

Background and Significance

The WTFD was an all volunteer fire department until December 1999. Ten years ago the WTFD began to transition into a career fire department. The first career class was hired with seventy four (74) firefighters. An effort was made at the time to hire firefighters at all levels of experience (and age) rather than all new young firefighters. This strategy was meant to provide the best and safest possible service in the short term and to allow for efficient growth in the long term. Today the department has one hundred and thirty-three (133) career firefighters and twenty eight (28) full time EMS staff. The department responded to 11,000 runs in 2009 from 5 stations which cover an area of approximately thirty six square miles.

According to the latest U.S. Fire Administration Firefighter Fatalities Reports, non trauma deaths involving firefighters ages 41-60 accounted for 67 percent of deaths in that age group. In the past five years, according to the same report 50.3 percent of all fatalities were due to stress and overexertion and the majority of those were heart attacks (2009, 2008, 2007). Of the original seventy-four firefighters hired, fifty-six remain as members of the WTFD today. The average age of these fifty-six firefighters is 42.36 years old. The average age of all firefighters in the WTFD is 37.14 years old. With only one anticipated retirement the average age of the WTFD firefighters will be over the forty year mark and in the high risk category in less than three years. This fact alone should prompt a closer look at the overall fitness levels to ensure the WTFD is doing everything it can to ensure the safety of its firefighters.

In addition to the age risk factor identified, it is more evident today that firefighting is a lot more physically and mentally demanding than we had imagined. Several studies highlight the tremendous physical demands on the body during firefighting activities. They show that being physically fit is essential to surviving on the fire ground. The demands on the body are

tremendous (Brown, 2007) (Kales, Soteriades, Christophi, Christiani, 2007) (Drew-Nord, Hong, Froelicher, 2008). "Work here that pushed studied firefighters to 100% of their maximal cardiovascular capacity could not be accomplished by some unhealthy and unfit firefighters" (Brown, 2007, p. 69).

The need for physical fitness in the WTFD may seem obvious at first but what type of program to implement if any is not so easy to determine. At first glance it would seem that the current system is working but unless it is looked at objectively then no accurate determination can be made. Some of the WTFD firefighters work out on a regular basis some do not. Some firefighters follow a healthy life style, some do not. The WTFD provides some limited workout facilities and has a program for discounted access to gym membership which some firefighters take advantage of. It is important then to find out if the WTFD is doing as much as possible to protect their firefighters and enhance the level of service that it provides to the community.

The concept of physical fitness programs is an adaptive problem. Changing behaviors can be very complex process. Just the assessment itself is complicated because of the cultures and subcultures which exist in the WTFD and the potential for change (Schein, 2002). Strong leadership, which is at the core of the Executive Development course, will be required just to look into the problem. More importantly, strong leadership will be required to determine and implement solutions if needed. Physical fitness is critical to ensuring safety on the fire ground and preventing line of duty deaths (Brown, 2007).

This paper relates to the third goal of the United States Fire Administration (USFA) to "Improve the fire and emergency services' capability for response to and recovery from all hazards" (USFA, 2009, p.2) by being more aware and better prepared to prevent injuries and line

of duty deaths in the WTFD. It also supports three of the sixteen Firefighter Life Safety Initiatives:

1. Define and advocate the need for a cultural change within the fire service relating to safety; incorporating leadership, management, supervision, accountability and personal responsibility.
2. Enhance the personal and organizational accountability for health and safety throughout the fire service.
3. Develop and implement national medical and physical fitness standards that are equally applicable to all firefighters, based on the duties they are expected to perform. (National Firefighters Fallen Foundation, n.d.)

It is important for the WTFD to not assume firefighters are maintaining adequate levels of fitness. The WTFD must ensure that everything possible is being done to enhance the levels of fitness and keep their firefighters safer. This may require some changes in the way the WTFD operates and we should be prepared to meet those challenges. The first step to ensuring everything possible is being done is an assessment of the current informal system.

Literature Review

Physical fitness in the fire service is a very complex topic which goes well beyond whether a firefighter works out or not. The literature review was meant to put the research questions into context and to provide a framework that would organize the information. The general categories researched were specific health risks for firefighters, understanding physiological responses of firefighting duties, change and motivational theories, and professional standards.

What are the risks? To determine if the WTFD firefighters face greater risks of injury or line of duty death (LODD) we have to gain a better understanding of hazards of associated with firefighting. It is widely known that firefighting is a dangerous profession. According to the USFA the American fire service has averaged over one hundred (100) LODD per year in the last ten years. Almost half of those deaths were determined to be due to stress or overexertion (2009). The USFA uses this category to include heart attack, strokes and other extreme climatic thermal exposure. In 2008, according to their latest report most (42 out of 52) of the incidents in this category were heart attacks. When reviewing the LODD data another risk factor worth mentioning is the age of the firefighters that died of non trauma causes. It is rare for firefighters under the age of 31 to die of stress related causes. The risk increases significantly at age 41 (2009). Since 2006 firefighters ages 41-60 account for 67% of non traumatic LODD (USFA 2007, 2008, 2009). This information makes it clear that age of firefighters in the WTFD would be critical in assessing the overall risks of the fire department. Age and generation traits might also influence the attitude towards physical fitness.

Why are firefighters at greater risk than the general population to die of a sudden heart attack? The New England Journal of Medicine reported in a 2007 study that compared to other emergency services, firefighters have a significant higher rate of cardiovascular events. Police officers were reported to have 22% of LODD attributed to heart disease, and emergency medical services responders had 11% of their LODD attributed to heart disease. For firefighters heart disease accounted for 45% of LODD. The high rate of these type of deaths have been linked to "Smoke and chemical exposure, irregular physical exertion, the handling of heavy equipment and materials, heat stress, shift work, a high prevalence of cardiovascular risk factors and physiological stressors" (Kales, p1208, 2007). Other reports refer to the work load, the

encapsulating effects of fire gear, hostile conditions encountered during a fire, environmental conditions, and the resulting physiological strains and emotional stress as factors that can contribute significantly to cardiac events. (Smith, 2008) (Brown, 2008) (Haas, Gochfeld, Robson, Wartenberg, 2003). Of all the tasks that firefighters perform many studies point to fire suppression activities as the most dangerous tasks firefighters have to perform. (Smith 2008) (Brown, 2008). A study done by the University of Illinois Fire Service Institute determined the risk to be "12 to 136 times more likely to die of coronary heart disease during fire suppression activities than during nonemergency duties" (Smith, p13, 2008).

What are the specific physiological responses to firefighting tasks and how could those be improved? These are questions which have been asked before and can help determine how to better deal with the problem of stress and overexertion LODD. (Brown, 2008) (Smith, 2008). Research data by the Indiana University Department of Kinesiology showed that a firefighter in a typical fire scene will operate at 70% of maximal heart rate and about 70% of firefighters will work between 60% and 80% of their maximal heart rate. While these may not seem as excessive they represent an average. The risks are related to the peaks in these rates. Some tasks will push those rates much higher. In rescue operations for instance some rates were recorded at 100% of predicted heart rate maximum and were sustained for 20 to 40 minutes (Brown, 2008).

The body is pushed to its maximum limits during firefighting. Studies of the body's response in simulated and actual fire conditions demonstrate the extremes to which the body is pushed. Donning fire gear at the time of an alarm alone will raise the heart rate to 80% of predicted maximum. Once engaged in fire suppression, ventilation, search and rescue or overhaul activities the heart rate and ventilation increase significantly. The work performed and the positions required, crawling for instance, demands an increase in stroke volume in order to

provide muscles and organs the oxygen and fuel necessary for the muscles to do the work. Blood pressure and core temperature rises. The elevated body temperature adds to the stress as the body attempts to cool down. Sweating begins but the fire gear interferes with heat dissipation and adds to the metabolic work required. Eventually, this leads to lower blood volume and increased waste due to loss of body water (Brown, 2008) (Smith, 2007). This demands on the cardiovascular system increase as the body overheats and it responds by "hastening the onset of muscular fatigue and promoting dehydration" (Smith P. 24, 2007). Some research has also shown that firefighters do not usually hydrate well enough and are dehydrated before responding to fires. Dehydration is an additional risk which adds to the demands for the body to keep up (Smith, 2008) (Brown, 2008). The importance of hydration is emphasized in the recruit fire academy but it is not formally addressed at company level. The physical requirements are best summarized by Brown in his 2008 study:

The firefighter cardiovascular system will be stressed significantly, sometimes under high ambient heat stress conditions. In addition, the need to exert and maintain large muscular forces, usually from an awkward body position, indicates the need for significant muscular strength, muscular endurance and joint flexibility compared to civilian counterparts (Brown, p71, 2008).

The primary recommendations by most of studies that explore the risks of stress and overexertion are for improvements in the health and physical fitness of firefighters (Smith 2008) (Brown 2008) (Rhea, Alvar, Gray, 2004). Researchers agree that a healthy firefighter would be in a state of well being physically and emotionally. Furthermore, physical fitness would include body composition, aerobic capacity, muscular endurance, muscular strength and flexibility (Brown, 2008). (Rhea, 2004) (NFPA 1583, 2007). Body composition is important

because research has shown that it has a significant effect on the ability of the firefighters to perform their duties. Some studies even recommend that obesity be a disqualifying condition for firefighting (Smith 2007). "Increased body fatness actually reduced the firefighter's ability to work hard. Essentially, the firefighters with the highest levels of body fatness were simply not able to push themselves as much as their leaner counterparts" (Brown, 2008, p. 67). This information triggered the efforts to obtain physical evaluation reports from Public Safety Medical (PSMI), the company that does the health and fitness evaluations for the WTFD.

The National Fire Protection Association (NFPA), The American Council on Exercise (ACE), The International Association of Firefighters (IAFF), The International Association of Fire Chiefs (IAFC) all recommend that physical fitness programs be established and that they address body composition, aerobic capacity, muscular endurance, muscular strength and flexibility (2003, 2007). These recommendations can be used to assess the efficiency of the fitness program in the WTFD.

Another possible risk identified is tobacco use. While the levels of smoking and other tobacco use vary by age and region, some studies have found that firefighters have a higher rate of smoking than the average population (Smith, 2008) (Hass, Gochfeld, Robson, Wartenberg, 2003). The American Cancer Society states that tobacco is the cause of 1 in 5 deaths in the United States and it accounts for 30 percent of all cancer deaths. Additionally smoking is a major cause of heart disease and other cardiovascular disease (2009). The WTFD has implemented a total ban on tobacco use while on duty. This policy went into effect January, 2010. The full effects of this policy are not known yet.

The need for a physical fitness program is well documented (Brown, 2007) (Smith, 2008). If firefighters understand the risks and the need for physical fitness, then what motivates

them to workout and what keeps them from working out? What would it take to change the current system? What is the best way to implement what in some cases could be a significant personal or organizational change in the WTFD? Once again the answer is more complex than anticipated. The WTFD can be thought of a system made up of individuals systems and subsystems which all influence each other. In order to implement change it is important to identify which system is more likely to change because it has been identified as a system in motion already. (Schein, 2002). Based on this concept, in the WTFD, the systems could be identified as the individual firefighters, fire companies, stations, shifts and administration. All these groups change at different rates and influence each other at different levels. For instance three shifts at one station could identify a priority for that group. At the same time each of those shifts at the same station would be influenced by the battalion chief and his vision of the shift (Schein, 2002).

According to Edgar Schein once the direction of change is established three concepts must be implemented to effect change. "1) Disconfirmation: your present behavior or attitude is unacceptable. 2) Induction or guilt and or anxiety: It is violating some of our standards or is causing us to fail in getting the job done. 3) Creation of psychological safety: I understand learning something new is itself anxiety producing, so I will help you to change and make you feel safe while you learn a new behavior or attitude." (Schein, p 37, 2002)

The WTFD like most departments will have different and in some cases opposing points of view on any given topic. The idea of change was explored to evaluate the effectiveness of the status quo versus implementing a new program. Would a new system be so difficult to implement that it would be worse than the existing system? To implement effective change it will be important that dialogue is developed among all the systems. This could be the key to a

successful change in the physical fitness program if needed (Schein, 2003). Another consideration to implementing change will be the motivation needed by all to adopt and maintain the programs long enough to make a difference. The goal then would be to use motivator factors such as "achievement, recognition for achievement, the work itself, responsibility, and growth or advancement" (Herzberg, 1987) to get a positive outlook on the program. On the other hand, for an effective change, the programs, if needed must not be introduced as simply a new policy or administrative concept. It should avoid the appearance of what Herzberg refers to as hygiene or dissatisfaction factors which have been shown to not be good motivators (Herzberg, 1987).

It is important to also note that one program will not fit all regardless of the fire department. As noted before, many individual systems make up any given fire department. Each individual will be motivated by different factors and some will not follow through even when the person intends to change. (Pai, Edington, 2008) Different personal and program factors influence the motivation to adhere to the intention to change and follow a specific program. Various strategies and changes may be required at different times to establish the desired behavior. The fire department should understand that the process will be a dynamic one and flexibility will be needed. (Pai, 2008) (Cotton, 2003). All of these ideas are important in understanding what and why something might motivate one person but not another. The motivation concepts also speak of the need for proper management of the change if needed. (Herzberg, 1987)

Other theories address the personal motivation factors that would affect the positive implementation of a formal or informal fitness program. The Self Determination Theory (SDT) developed by Edward L. Deci and Richard M. Ryan states:

SDT conceives of humans as active, growth-oriented organisms, that innately seek and engage challenges in their environments, attempting to actualize their potentialities, capacities and sensibilities. However, this organismic tendency toward actualization represents only one pole of a dialectical interface, the other being social environments which can either facilitate the individuals' synthetic tendencies, or alternatively wither, block or overwhelm them (Deci, Ryan, 2002, p. 8).

In other words, firefighters like many other people have a natural motivation to succeed but have been affected by the environment in which they grow up and develop. The environment and culture influences motivation. (Deci, 2002) From this theory evolved the concept of intrinsic and extrinsic motivation. Intrinsic motivation "stems from the inherent satisfaction or pleasure that a behavior brings." (Sebire, Standage, Vansteenkiste, P. 192, 2009). Extrinsic motivation is "primarily characterized by having an "outward" orientation, with one's pursuits being directly toward external indicators or worth such wealth, fame and appealing image" (Wang, Liu, Lochbaum, Stevenson, P 190, 2009). The concepts of intrinsic and extrinsic motivations are critical to understanding why some programs work and some do not. If the goals of the program are not perceived to be the same as that of the firefighters then the program will not be as efficient. (Wang, 2009) (Sebire, 2009) For instance, knowing and understanding the benefits of participating in a fitness program may not be enough to motivate a firefighter. If the firefighter enjoys the activity and gets a sense of well-being it would be a greater motivator to continue with the program. Other factors may influence participation. For instance, a person who is overweight is not as likely to stay in a fitness program. As many as 70% of obese people quit their program within a year. (Dishman, Sallis, Orenstein, 1985). Several other factors could influence the

motivation to participate in a fitness program. Environmental factors such as ease of access to workout facilities, and condition of equipment. Social interactions, such as with peers or family, could also be influencing factors. Lack of time or perceived lack of time and interruptions are some of the most common reasons given for not participating in physical fitness activities.

(Dishman, 1985)

Would a formal health and exercise program make a difference in the fitness levels of the WTFD firefighters? The NFPA 1583 recommends an exercise and fitness program that includes education, and individualized training programs. The programs should address aerobic endurance, muscular strength and endurance, injury prevention and flexibility (2007). Many studies recommend that a formal fitness program be implemented in order to improve the performance of firefighters on the fire ground and to reduce the risk of stress or overexertion in order to reduce LODD. The recommendations are made based on the findings that show the extreme physiological demands on firefighters and the known benefits of specific exercise that would improve on the specific demands (Brown, 2008) (Smith, 2008) (Roberts, O'Dea, Boyce, Mannix, 2002). Other studies actually measured the level of improvements by firefighters participating in formal fitness programs. After a sixteen week program one study showed improvements on VO₂max and muscle endurance. Additionally the firefighters showed great improvement on lean mass and reduced their percentage of body fat.(Roberts, 2002) "It is a simple fact that sound physical training programs are the only way line of duty deaths due to heart attacks are going to be reduced" (Brown, p. 72, 2008).

Procedures

A descriptive methodology was used to assess the current status of the WTFD as it relates to physical fitness. The research was broken down into several sectors: Attitude towards physical

fitness, analysis of the available WTFD statistical information, research of critical risk factors and comparison to the WTFD, research on motivation, and change concepts. Tobacco use information was also collected from those participating in the focus groups. The research project focused on career firefighters and excluded civilian EMS and civilian office staff. The first step was to obtain permission from the WTFD to review the available data. Because the WTFD is a relatively young career department (only 10 years) and it hired a very large first class, age data was collected from personnel records. OSHA injury reports (OSHA 300 forms) for the last five years were available and obtained for review. Also, the latest general medical data was reviewed. The medical data was obtained from Public Safety Medical (PSM) in the form of a report outlining levels of obesity based on BMI and percentage of body fat. The report also indicated levels of predicted Vo₂max which is used to gauge the levels of cardiopulmonary fitness

An extensive literature review was performed using the Learning Resource Center at the NFA in Emmitsburg, Maryland; the Hamilton County library in Fishers, IN; and online sources including Google and Google Scholar search engines. The search yielded previous APRs which were helpful in obtaining additional references and several studies and reports which provided a tremendous amount of technical and specific information. Books and fire service articles were reviewed but the majority of the information gathered came from the studies, medical and professional journals. The literature review provided greater understanding of concepts influencing the research questions and it provided the framework necessary to seek additional information.

Focus groups were used in order to determine the general attitude of the firefighters in regards to physical fitness. All three shifts for all five stations were used as focus groups for a

total of fifteen groups. Each group ranged from three to nine firefighters for a total of 88 firefighters involved. For each group the following statement was read:

I am currently working on a research project as part of the requirement for the EFO program at the NFA. I am meeting with you today as part of the research process and the purpose of the discussion is to gain a better understanding of the attitude towards physical conditioning in our department. Your names will not be published or reported to anyone. They will be part of the data to support my research and will remain strictly confidential. Your participation is strictly voluntary but greatly appreciated.

The following questions were asked:

- 1) Do you think that physical conditioning is important in recruit school? Why?
- 2) Do you think it is important for firefighters to continue to work out after leaving recruit school? Why?
- 3) Do you feel you work out enough? What kind of training do you do?
- 4) What facilitates your work out?
- 5) What prevents you from working out on duty?
- 6) What prevents you from working out off duty?
- 7) Are you aware of the higher health risks firefighters experience?
- 8) Do you have any other thoughts about physical fitness?
- 9) Do you use tobacco?

Question 1 and 2 were meant to assess the attitude towards physical fitness and to gauge their understanding of the need for fitness. Questions 3-6 were looking at personal opinions and levels of personal of motivation. Question number 7 explored if health risks was enough to

motivate firefighters to work out. Question number 8 opened the door to concerns not addressed by the other questions and allowed for participants to reinforce their opinion in previous questions or any other additional issue they felt strongly about. Because smoking is a significant health risk the last question was intended to provide another look at the health risk assessment along with the medical information addressed previously.

Results

All information gathered was compared when possible to existing standards and established concepts. The assessment began with looking at several identified possible risks.

The first of the risks examined was age (Appendix A). The age analysis of LODD by the USFA shows that significant risk for stress/overexertion LODD begins at age 41 (2009). The WTFD hired its first class in 1999. This first class currently has an average age of 42.93 years of age. This first class also currently accounts for 42% of the merit personnel in the department. In a short amount of time the numbers will increase. The average age of all the firefighters in the WTFD is 37.14 years old (N= 133; SD \pm 7.84) With only one anticipated retirement the average age of all the WTFD firefighters will be over the forty year mark and in the high risk category in less than three years. Currently only 27.07% of all firefighters in WTFD are in what is considered a high risk age group. The WTFD is not anticipating hiring new recruits at this time. Based on the current number of firefighters, by 2015 the WTFD will have 59.85% of their firefighters in the high risk age groups, which is more than double the number of the current WTFD firefighters in approximately five years (Appendix B). Age is a critical factor for firefighting especially as it relates to cardiopulmonary fitness (Drew-Nord, 2009)

After looking at the age of firefighters it was important to determine what are the current levels of health and fitness for the WTFD? The medical data was obtained from PSMI in the

form of a report outlining levels of obesity based on the body mass index (BMI), percentage of body fat, and cardiovascular endurance based on predicted Vo₂max levels (Appendix C). The age related data included only current career firefighters (n=133). The data provided by Public Safety Medical includes civilian paramedics and medical technicians (n=168). A request to Public Safety Medical Inc. (PSMI) was made to include only merit firefighters but they were unable to separate the personnel and maintain the confidentiality levels necessary. While the data will not be an exact representation of the WTFD firefighters it was decided that it would not alter the results enough to change the conclusions and could still be used to provide a general idea.

The report provided by PSMI shows an average BMI of 29.73 for the WTFD personnel (n=168; SD ± 4.49) (Public Safety Medical Inc., 2010). A comparison of BMI with a reference chart from the American Council on Exercise (ACE) would put the average member of the WTFD in the overweight category and almost obese (Cotton, LaForge, Nieman, King, Young, 2003). The reference chart indicates a range of 18.5-24.9 for normal weight, 25.0-29.9 for overweight, and greater than 30 for obesity (Cotton, 2003). It is recommended by ACE that BMI be used along with other body composition assessments in order to get a clear picture level of health of a subject.

The next piece of data provided by PSMI is the percentage of body fat. On average the WTFD has 30.8% body fat (N=168; SD ±8.65) (Public Safety Medical Inc., 2010). According to general body-fat percentage categories the average range for men is 18-24% and for women 25-31% (Cotton, 2003). Firefighters are often considered occupational athletes and because of the physical demands of the job they often fall into the athlete higher demand category (Brown, 2008). The average range for athlete males is 6-13% and 14-20% for athlete women. The high

percentage of body fat average for the WTFD is concerning because it has been established that overweight firefighters do not perform as well as their fit counterparts. (Brown, 2008)

VO₂max is generally expressed in milliliters of oxygen per kilogram of body weight per minute. (Cotton, 2003) The typically recommended minimum VO₂max for firefighting activity is between 39.6 and 48.5 (Brown, 2008). Other studies recommend a minimum VO₂max of 45. (Rhea, Alvar, Gray, 2004). The WTFD predicted average VO₂max is 41.25 (N=168; SD ±5.5). In this case the average is below or just at the lower limits of the recommended range. The median for this data is 36 which indicates that many of the members do not meet the recommended standard.

The fitness data provided by PSM is concerning because it indicates a general lack of health and fitness in the WTFD. In addition to the stress due to fire gear the lack of fitness increases the inability of the WTFD firefighters to meet the demands of firefighting.(Brown, 2008) (Smith 2008)

The data contained in the OSHA 300 form - Log of Work related Injuries and Illnesses was at best inconclusive. The reports are used to keep track of reportable injuries and the time off associated with it. The reports show that the number of days off or partly off (light duty) due to injuries have dropped from 2005 to 2009 (Wayne Township Fire Department, 2010). The reports, however, include injuries to part-time firefighters and EMS personnel (Smith, 2008). The WTFD no longer has part-time firefighters and since 2009 it has reduced its part-time EMS personnel significantly. Some studies relate physical fitness levels to firefighter injuries. No specific conclusion could be made as to why the number of days off was reduced. Further analysis and additional data might be necessary to determine if any specific conclusions could be made.

The results of the focus group sessions generated a lot of useful data (Appendix D). All three research questions were addressed by the focus group questions. A total of nine questions were asked.

1) Do you think physical conditioning is important in recruit school? Why? 100% of the focus groups agreed that physical conditioning was important for new recruits. The groups overwhelmingly (11 out of 15) recognized that establishing a pattern of concern for physical fitness early in their careers would result in positive habits for the future. Most groups (8 of 15) acknowledged that firefighting was a physical job with tremendous demands on the body and that this would require firefighters that are in good physical condition. About a third (5 of 15) groups expressed concern for what they saw as overtraining. These groups felt that in some cases the academy focused too much on physical training and not enough on firefighter training. Also, these groups cautioned that overtraining would result in injuries and that little knowledge would be gained if the recruits were too tired.

2) Do you think it is important for firefighters to continue to work out after leaving recruit school? Why? Again 100% of the groups agreed that continued physical fitness was important. The reasons varied slightly. The most common (7 of 15) was to ensure that whatever level of fitness was achieved in the fire academy would not be lost out on the streets. The goal was to at least maintain their level of fitness. The next two reasons both had 6 of 15 groups agree. First of these two reasons was to prevent heart disease or stay healthy, and the second one was to keep up with the physical demands of the job. These groups understood that firefighting is a physical job and that stress or heart diseases are a serious risk for firefighters. Some of the groups (3 of 15) were concerned for longevity in the fire service. They were concerned with ensuring that they could last for a full (20 year minimum) career. Also, the same number of

groups thought that working out would develop better teamwork and that teamwork was a very important component of firefighting.

3) Do you feel you workout enough? What kind of training do you do? For the first part of this question participants were asked to give individual answers (n=88). 58% of the firefighters that participated felt that they did not work out enough. Some felt they were in good shape but felt they could improve. 42% felt they worked out sufficiently. The type of physical training varied some for all groups. The most common (10 of 15) type of training was weight lifting. The next most common (7 of 15) form of training was cardio training followed by circuit training for 6 of 15 groups. Also, 6 of 15 groups indicated that they engaged in physical training while in fire gear or what is commonly known in the WTFD as bottle drills.

4) What facilitates your workout? The number one motivator for the 15 groups was a "peer pressure" or workout partner. Most (14 of 15) commented that having someone to workout with helped more than most things. Some participants used the term "peer pressure" but expanded their comments to define it as "someone to workout with". The second most popular (7 of 15) motivator was having workout facilities on station. Also 6 of 15 groups cited the WTFD policy to provide a subsidized membership to a gym as a motivator for working out off duty. Both of these reasons speak to having facilities available on or off duty. The fourth item found from the focus groups was that having a goal was important for starting and continuing a workout routine. This reason was stated in 4 of 15 groups.

5) What prevents you from working out on duty? The primary reason for not working out on duty was expressed as "available time" (9 of 15). The other primary reason given was "motivation" or "laziness" (9 of 15). Another reason which addresses the time available was how many "runs or details" were scheduled or came up during a shift. Groups (7 of 15) that

expressed this as a concern said they did not like to be interrupted during their workout. The answer to this question is consistent with other studies which cite time as the most common reason given for lack of participation in physical fitness activities (Dishman, 1985). Another reason worth mentioning was a concern for having to respond to a fire while being already fatigued from working out (4 of 15).

6) What prevents you from working out off duty? The answers to this question were similar to the previous question regarding on duty activities. The three primary reasons given were motivation or "laziness", family commitments, and available time (9 of 15). The next most common answer was part time work commitments (4 of 15). Many firefighters work second jobs and they found it difficult to balance family, work and available time to be able to workout off duty. Fatigue was also cited by 3 out of 15 groups but unlike on duty the fatigue related to coming off shift tired from overnight runs.

7) Are you aware of the higher health risks firefighters experience? The answer to this question was a 100% (15 of 15) acknowledgement of the risks. The answer for all groups was "yes". All groups also cited heart attacks as a primary risk. This was a simple straight forward question designed to determine if awareness of the risks involved in firefighting was a sufficient motivator to workout. Since the majority (58%) of the WTFD does not feel they work out enough, it would appear the awareness of the risks is not always a strong motivator.

8) Do you have any other thoughts about physical fitness? This question provided a wide array of topics and discussions amongst the participants. The most common concern (6 of 15) expressed during the discussions was the need for additional education. Firefighters felt they needed to know more about nutrition and specifics on how to workout. Most felt they had a general idea on fitness concepts but did not know enough to design and implement a physical

fitness program. They felt like when they worked out they were not sure they were doing the right thing. Additionally, firefighters acknowledged that nutrition was an important component to achieve a better physical fitness level and that they did not know enough about this subject. The next issue that surfaced (4 out of 15) was the concern for overtraining. The groups that mentioned this concern referred to what they perceived as overtraining by recruits and by some shift personnel specially those engaging in fire gear drills. These groups felt that it was dangerous to do fire gear drills to the point of exhaustion then having to respond on fire runs. Along the same line, other groups (3 out of 15) felt that the WTFD had two extremes when it came to fitness. Some workout too much and some did not workout at all. These groups felt that it was important to find a middle ground so that the department as a whole would be more consistent. The next two topics that came out from question number eight were the need for standards. In one case (4 out 15) noted that the WTFD should have a standard that applies to all personnel including administrative personnel and that not meeting the minimum should have consequences. The standards would be age based but they would apply to everyone in the department. Some groups mentioned that if firefighters were exceeding the minimum standards they should be compensated with a fitness bonus. The next area of concern (4 out of 15) was the need for consistency in the workout equipment. Most of the workout equipment available on stations was purchased as requested individually by station. A lot of the equipment is now outdated ad it was originally purchased when the WTFD was an all volunteer organization. As firefighters move from one station to the next they have to adapt to whatever equipment is there. Some stations have twice as many firefighters as others, yet they have similar amounts of workout equipment. This causes congestion during fitness times and it becomes a deterrent to participating in physical fitness activities. During this question many other topics emerged and

were documented but were not tallied due to the infrequency. Infrequent as they were these comments should not be dismissed entirely. Some good suggestions were made and could be used in the future.

9) Do you use tobacco? 26 out of 88 firefighters that participated in the focus groups admitted to using tobacco. This represents almost 30% of those who participated in the focus groups. Further investigation would be necessary to fully understand the effect of the on duty no smoking policy which went into effect January 1, 2010. The intent of this question was to further assess the risks and health levels of the WTFD firefighters. This particular group of firefighters who use tobacco would pose an even greater health risk and heart related risk for LODD based on the information provided by the American Cancer Society (2009).

All of the collected data and background research provide a clear assessment of the current WTFD physical fitness program and provide answers to the four research questions.

a) What conditions promote physical fitness activities in WTFD? Research points to several motivating factors for different individuals (Dishman, 1985). The WTFD is no different. Several reasons were given for participating in fitness programs however the most common answer to this question was the ability to workout with a partner or "peer pressure". This may not be surprising since firefighters are typically encouraged to work as partners for all fire ground activities. Access to workout facilities on or off duty was the next most common motivator for firefighters to engage in physical fitness activities. Along the same lines the current program subsidizing gym memberships appears to be working as it was the third most common factor mentioned as helpful to encourage working out. It was also clear from the focus group data that fitness and nutritional education would improve participation in a physical fitness program.

b) What conditions discourage physical fitness activities in WTFD? According to the focus groups, the primary factors keeping WTFD firefighters from working out are motivation and time. Time is the most often cited reason for not working out in the general population as well (Dishman, 1985). The firefighters of the WTFD felt that on duty runs and details thru out the day take up a lot of the time needed for physical fitness activities. Off duty their time for physical fitness was taken up by family and part time work commitments. Finding motivation was a significant factor. WTFD firefighters mentioned that sometimes they lacked motivation because they were tired from the shift before or sometimes because they did not want to be tired for the shift ahead. Often, firefighters did not want to be interrupted during workouts by other activities so they found themselves not starting. Some by their own admission were just simply "lazy" or unmotivated.

c) Is the existing WTFD physical fitness program adequate? The WTFD does many things well when it comes to physical fitness. It has an outstanding program that prepares recruits to meet the demands of the fire academy and sets the pattern for future fitness behavior. The WTFD meets many of the recommendations found in the NFPA 1582 standard on Comprehensive Occupational Medical Program for Fire Departments, and NFPA 183 standard for Health-Related Fitness Programs for the Fire Department Members. Data however, shows that additional commitments are necessary and that the existing system is not adequate. First the data shows that members of the WTFD will be in a very high risk category as the majority will be over the age of 40 by the year 2015. At this age it will be more important than ever to make sure firefighters are in good physical shape and at this time the current program does not address this concern. Additionally the members of the WTFD on average are overweight based BMI and body fat percentages (Cotton, 2003). Also, they barely meet the recommended minimum

cardiopulmonary requirements based on average predicted Vo2max data (Brown, 2007). Based on feedback from the firefighters, more education is needed and not enough time is available for physical fitness activities. While gym memberships are available to many, fitness facilities are not always available at all stations. The combination of all these factors clearly indicates that the current system is just not adequate.

The analysis of the available data and the results of the focus groups clearly show that the current informal or indirect approach to physical fitness in the WTFD does not efficiently provide for the needs of its firefighters.

Discussion

The one factor that might have triggered interest in this research was age. The WTFD celebrated its tenth year as career department in 2009. This prompted the question of age. As many firefighters approach what could be the half way point in their career the following questions emerged: How old are we? And is age a significant factor? As the available data showed the average age of all WTFD firefighters is 37.14 years old. Currently 27.07% of the firefighters in the WTFD are 41 or older. By the year 2015 it will increase to 59.85% of the current firefighters. This is a significant increase in a short span of time. The significance of the age was determined by looking at statistics available from USFA. These statistics show that at the age of 41 years old the risk for a LODD due to stress or overexertion increased significantly. A LODD due to heart attacks happens very rarely for firefighters under the age of 35 years old (2009). In 1999 the WTFD was a young department in many different ways. Today, the WTFD has significantly grown in numbers, experience and of course age. This risk factor alone is significant enough to take a look at how the WTFD is conducting business and evaluate if changes are required.

It has always been known that firefighting is a risky profession for many reasons. The tasks that firefighters have to perform and the environment in which these tasks have to be done are often cited as examples of the risks involved in firefighting. (Brown, 2007). However the statistics show that close to half of all LODD are attributed to stress or overexertion and the great majority of those were due to heart attacks (USFA 2009). Recent studies show that perhaps a greater risk is the tremendous physical demands on the body. Some physiological responses to the physical and emotional demands can even continue to stress the body for hours after an incident. Firefighters must often use large muscle groups in hostile environments, in awkward positions which combined with the encapsulating effects of structural fire gear place tremendous stress on the cardiovascular system and demands significant flexibility, muscular strength and endurance as well as aerobic and anaerobic endurance (Brown, 2007) (Smith, 2008). One particular rescue event cited as an example in one of these studies noted that the event

Resulted in severe physical and emotional stress on the firefighters driving heart rates to levels in excess of 100% of their predicted maximum. Two hours after returning to station (some three hours following the completion of rescue operations), heart rates of individuals involved in the rescue remain in excess of 100 beats per minute (Brown, p70, 2007).

These types of demands on the body can only be successfully met by a firefighter who is in good physical condition. Firefighters who participated in a study conducted by the Indiana University Firefighter Health and Safety Research were well trained, healthy, and physically fit. "The same work in a less well trained and less fit group of firefighters would result in much higher levels of cardiovascular stress" (Brown, p69, 2007).

If the demands of the job are so extreme then firefighters should be in the best possible physical shape. Firefighters should be healthy and physically fit not just to prevent LODD but also to prevent injuries. "Higher levels of fitness have been correlated to decreased risk of injury" (Rhea, p. 348, 2004). While many firefighters in the WTFD regularly engage in physical fitness activities, the data shows that many WTFD firefighters are not physically fit and have other significant risks. The latest medical report obtained from Public Safety Medical Inc. (PSMI) shows that WTFD firefighters are overweight based on BMI and body fat percentage. ACE notes that a range of 18.5 to 24.9 BMI would be considered normal, 25.0 to 29.9 would be overweight and 30 and over would be obese. The average BMI for the WTFD was reported at 29.73. On average the fire department is overweight and close to being obese. (Cotton, 2009) In addition the average the WTFD has 30.8% body fat According to general body-fat percentage categories the average range for men is 18-24% and for women 25-31%. The percentage of body fat is significantly higher than recommended (Cotton, 2009). If firefighters are considered occupational athletes then the discrepancy between what is suggested and the actual numbers increases significantly (Brown, 2007). The average range for athlete males is 6-13% and 14-20% for athlete women (Cotton, 2009). Obesity is associated with additional health risks such as cardiovascular disease, hypertension and high cholesterol. These are all potential additional risks for a firefighter to experience a heart related event. Additionally, studies have shown that obese firefighters do not function as well as their thinner counterparts. Some studies even recommend considering obesity a disqualifying condition for firefighting (Brown, 2008) (Smith, 2008) (Drew-Nord, 2009).

Another test that quantifies the level of fitness is the Vo₂ max levels. The typically recommended minimum Vo₂max for firefighting activity is between 39.6 and 48.5 (Brown,

2007). Other studies recommend a minimum Vo_{2max} of 45. (Rhea, Alvar, Gray, 2004). The WTFD predicted average Vo_{2max} is 41.25 (N=168; SD ± 5.5). In this case the average is below or just at the lower limits of the recommended range. The median for this data is 36 which indicates that many of the members do not meet the recommended standard. Vo_{2max} levels can be improved by participating in a formal physical fitness program which incorporates aerobic exercise (Roberts, 2002)

The physical demands of the job and the physiological response the body requires dictates that firefighters should be in the best possible physical shape in order to endure and successfully meet the challenges of firefighting activities (Brown, 2007) (Smith, 2008). Clearly the WTFD is not meeting these requirements. Based on the numbers provided the WTFD it is simply not in good physical condition. The WTFD must do better. Literature indicates that a formal or supervised workout program leads to improvements in health and fitness. Improvements on in BMI, body fat percentage, Vo_{2max} , muscular strength and endurance have been documented after only 16 weeks of a supervised program. (Roberts, 2002). Various reports link or recommend physical fitness programs to better prepare firefighters to meet the demands and to reduce the risk for LODD (Brown, 2007) (Smith, 2008) (Roberts, 2002) (Rhea, 2004).

Firefighters will not always find the motivation required to consistently engage in physical fitness activities on their own (Dishman, 1985). The majority of the firefighters that participated in the focus groups did not feel they worked out enough. Many did not know how to work out. The focus groups also highlighted the fact that there is no consistency on the amount and type of physical training that the department firefighters participate in and that more education was needed to improve fitness levels and improve motivation. All 88 WTFD firefighters who participated in the focus groups admitted to knowing of the increased risks of

their profession including the high risk for a heart attack. (USFA, 2009). This fact however, was not enough to motivate many of them to work out. This observation is not all that unusual as this behavior has been noted on other studies. (Dishman, 1985) Understanding what motivational factors would encourage or discourage participation is critical if improvements are to be made. Intrinsic and extrinsic factors; motivator or hygiene factors and environmental and social factors, can all influence the level of motivation and thus participation in physical fitness programs (Deci, 2002) (Sebire, 2009) (Dishman, 1985) (Herzberg, 1987). For instance, knowing and understanding the benefits of participating in a fitness program may not be enough to motivate a firefighter. If the firefighter enjoys the activity and gets a sense of well-being it would be a greater motivator to continue with the program. A person who is overweight is not as likely to stay in a fitness program. As many as 70% of obese people quit their program within a year. (Dishman, 1985). Environmental factors such as ease of access to workout facilities, condition of equipment. Social interactions such as with peers, or family could also be a factor. Lack of time or perceived lack of time are some of the most common reasons given for not participating in physical fitness activities. (Dishman, 1985) The focus groups indicated that lack of time was the most common reason not to workout. The reasons for not having the time varied. In some cases the anticipation of not having time was a problem. This was expressed by the groups that did not want to be interrupted by runs and would therefore not attempt to workout. The critical concept regarding motivation is that it will vary with the individual and will also change with time. Additionally it will have to address the different "systems" within the department (Schein, 2002). For the WTFD these systems could be easily identified as individual firefighters, shifts, stations, headquarters personnel but others may not be as easy to identify such as systems within one station or shift.

Significant information was gathered to identify risks and better understand the implications of the risks. Additionally information was gathered to put the data collected into context. The individual risks identified in this research are all very serious. The combined effects of all these risks together are very alarming. Something must change in the WTFD in order to allow its firefighters to prepare to do the best possible work and to reduce the risk of LODD due to stress or overexertion.

Recommendations

The purpose of this research project was to evaluate the current informal physical fitness system used by the WTFD post recruit school. The WTFD seeks like many other departments to provide the best possible service within its budgetary restrictions and while making every effort possible to ensure the safety of its personnel. The WTFD has an outstanding program that prepares recruits to meet the demands of the fire academy and sets the pattern for future fitness behavior. The WTFD meets many of the recommendations made by NFPA standards 1500, 1582 and 1583 and others but there is room for improvement. Based on results of the research it would seem obvious that the primary recommendation for the WTFD would be to improve the physical fitness program for firefighters after recruit school. This general goal could be achieved by following several more specific recommendations.

First, it is recommended that a physical fitness committee be established to design, implement and evaluate a formal physical fitness program. The committee should focus its efforts in developing a program that meets the NFPA 1583 standard and follows the recommendations made by the American Council on Exercise (ACE), The International Association of Firefighters (IAFF), and The International Association of Fire Chiefs (IAFC). According to their recommendations the program should address five areas of concern. These

areas are Aerobic capacity, body composition, muscular strength, muscular endurance and flexibility.

Second, it is recommended that the information gathered in this research regarding motivation be used to design and to implement the new formal fitness program. It is critical for the success of the program to consider and acknowledge the concerns of the members of the department. Also, the committee should seek a better understanding of the motivation and change concepts discussed in this project. The committee should seek additional information as needed to clarify, improve or expand the program.

Third, it is recommended that data generated during annual physicals be collected and analyzed to ensure that progress is being made by the firefighters or to alert of any shortcomings that the new program may have. Feedback should be requested from the WTFD firefighters to assess the effectiveness of the program especially in the areas of participation and motivation.

Fourth, it is recommended that the committee pay special attention to those members over the age of 41. As mentioned in this research the risk for heart attacks and other related LODD increases significantly at this age (USFA, 2009). While the TWFD can do very little to change the age of its members it must acknowledge that this group of firefighters will require additional attention and perhaps resources.

Fifth, the committee should insure that health and fitness as well as nutritional education is provided to the firefighters of WTFD. Additionally, the WTFD should continue its no tobacco use policy. It should continue to provide additional education and assistance to those members that still use tobacco in order to minimize this risk.

Sixth, the committee should review the WTFD policies and procedures to minimize conflicts between physical fitness goals and operational goals.

Seventh, the committee should also develop and oversee a plan to provide access to workout equipment at the firehouse and off duty at local fitness facilities. The program should include a fitness equipment purchasing and maintenance program.

The WTFD needs to understand that these recommendations will require a significant personnel, financial and time commitments (NFPA 1583, 2007). Fulfilling its commitment to the community must begin with ensuring that the WTFD looks after its most valuable resource which is their firefighters.

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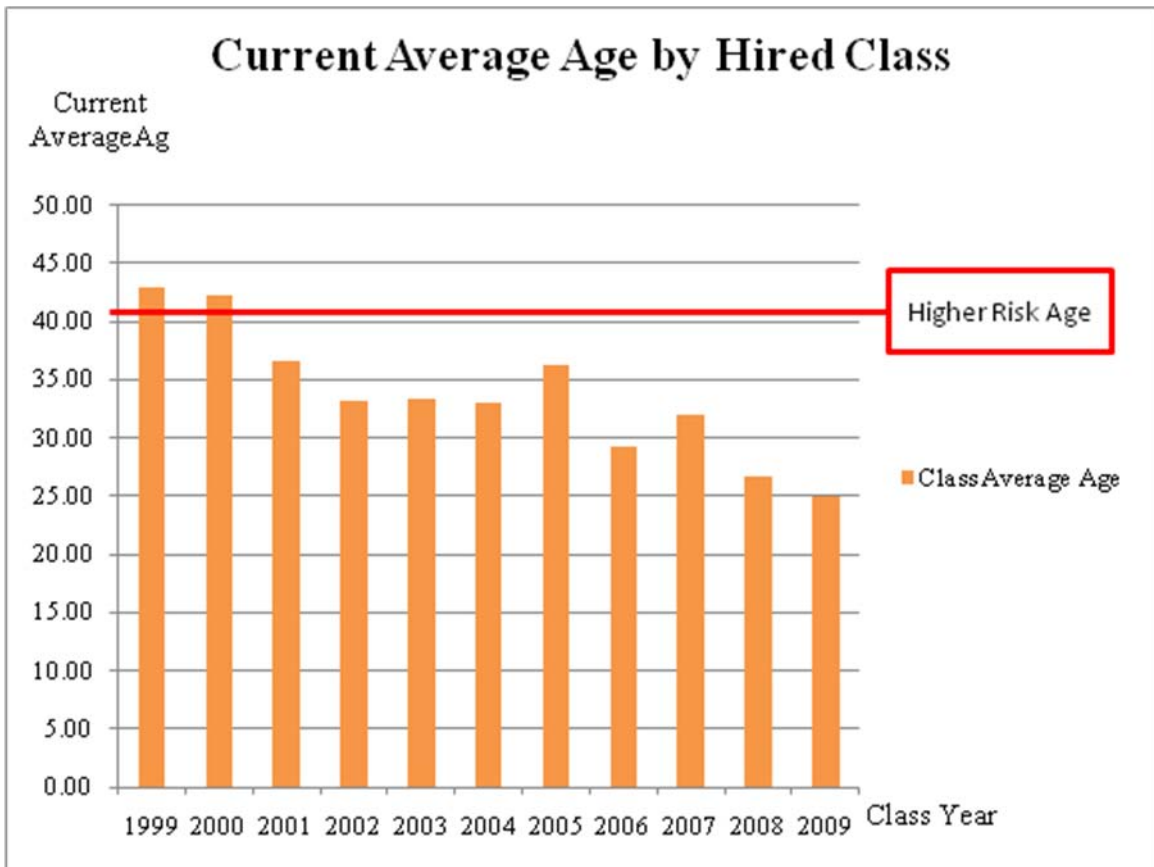
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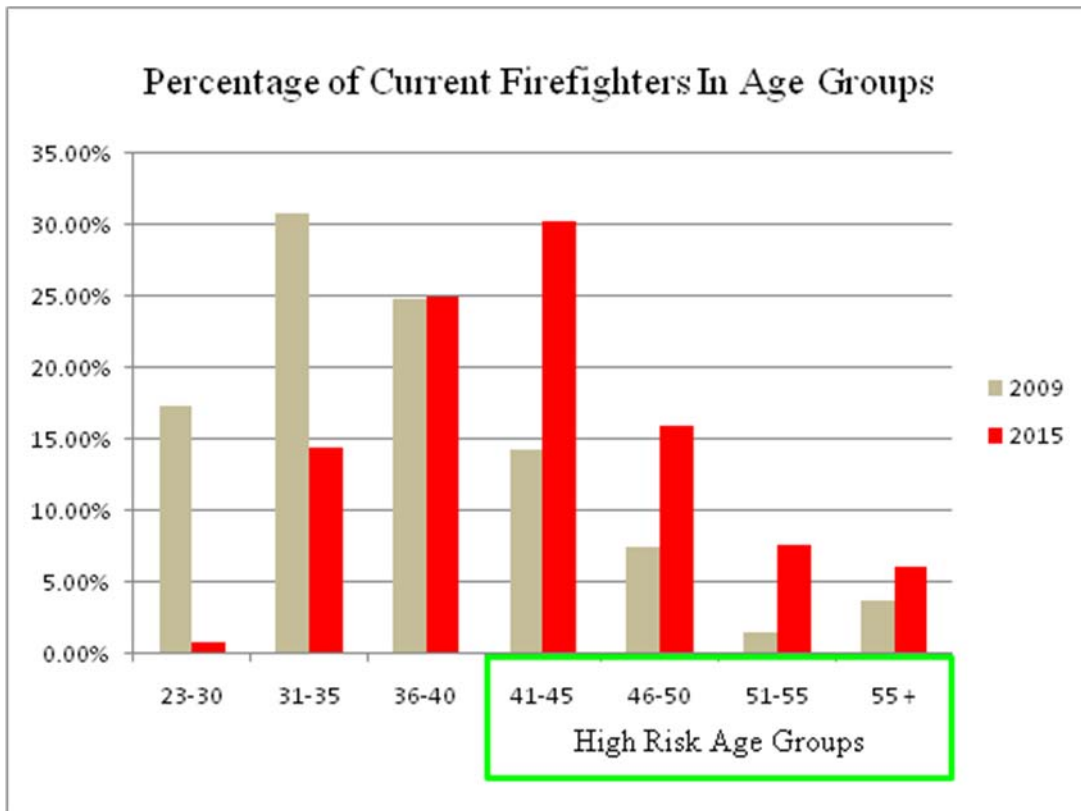
Appendix A



The USFA data shows that at age 41 the risk for LODD due to overexertion/stress increases significantly. (2009)

Appendix B

Age Group	Number of Firefighters	2009	Number of Firefighters	2015
23-30	23	17.29%	1	0.76%
31-35	41	30.83%	19	14.39%
36-40	33	24.81%	33	25.00%
41-45	19	14.29%	40	30.30%
46-50	10	7.52%	21	15.91%
51-55	2	1.50%	10	7.58%
55 +	5	3.76%	8	6.06%
% Of Firefighters in the High Risk Age Groups		27.07%		59.85%



The USFA data shows that at age 41 the risk for LODD due to overexertion/stress increases significantly. (2009)

Appendix C

WAYNE TOWNSHIP FIRE DEPARTMENT					2009
* Test Dates March 2009-February 2010					REPORT
					Data Provided by Public Safety Medical

Gender	Ht (in)	Wt (lbs)	BMI	Body Fat %	Max VO2
M	61	158	30	n/a	39.72
M	68	189	28.8	n/a	42.7
M	72.5	240	32.2	29.7	41.59
M	72	209	28.5	27.7	41.1
M	67.5	162	24.8	21.8	49.08
M	70	189	27.3	31.1	41.1
M	69	236	34.8	37.2	39.28
M	68.5	178	26.5	30	47.98
M	69	242	35.5	32.3	39.28
M	67	169.7	26.3	26.1	42.7
M	69.5	196.5	28.6	38.4	42.7
M	68	203	30.5	36.1	38.85
M	71.5	175	23.7	22.2	43.57
M	71.5	220.45	30.4	32	39.25
M	69.5	198	28.9	34	35.35
M	72.5	213	28.6	30.5	44.48
M	70	195.69	27.7	25.7	44.02
M	69.5	259.68	38.8	44.2	26.92
M	71	211	29.3	n/a	46.92
M	71.5	231	31.8	23.1	45.91
M	76	247.4	30.1	18.9	46.41
M	70	206.57	29.8	17.9	50.23
M	67	185	29	31.4	40.63
M	74	281	36.1	36.6	38.01
M	69.5	161	23.8	23.5	35.7
M	71	203.67	28	17.6	53.12
M	67	245	38.4	47.2	38.85
M	75	230	29	26.8	35.7
M	71.5	194	26.3	17.8	49.65
M	68.5	192.63	28.5	30.2	41.59
M	74.5	236	29.7	29.2	45.91
M	73	258.06	34.1	38.9	39.72
F	67.5	161	24.4	29.8	49.65
M	68.5	161	24.1	33.6	36.44

M	67.5	161	24.9	17.5	49.65
M	69	199.6	29.1	29.3	42.7
M	72	213	29.8	34.7	39.72
M	68	193.8	29.1	31.7	35.35
M	67.5	260.5	40	41.9	41.1
M	71	225	31.3	28.8	49.65
M	73	210	27.6	23.1	49.65
M	66.5	186.4	29.7	23.4	47.44
M	70	191	27.4	35	35.35
M	70	219.8	31.3	29.3	40.63
M	68	206.4	31.4	35.6	37.61
F	64	131	22.2	20.8	52.5
M	71	206	28.6	26.6	40.63
M	71.5	201.1	27.7	27.6	41.59
M	71	230	32.5	33.3	39.72
M	74	322.3	41.5	41.9	35.35
M	67	167	26	30.5	38.42
M	66.5	240.8	38.1	40.4	35.35
M	66.5	202.3	31.7	34.8	41.1
M	69.5	245	36.5	39.9	35.35
M	68.5	205.5	30.9	29.8	44.95
M	66.5	161	25.5	20.1	51.31
M	68.5	172.45	25.9	18	42.7
M	71	184	25.8	27.6	48.52
M	69.5	185	26.6	21.2	47.44
M	75	201	25	24.5	46.92
M	71	194	27	20	48.52
M	73	224	29.4	22.3	40.63
F	66	140.9	22.6	32.9	38.42
M	76	229	28.1	16.1	49.62
F	63	129	23	26.3	38.01
M	75.5	215.4	26.3	26.7	38.8
M	70	209.7	38.3	37.1	37.61
M	72	233	31.5	19.5	38.85
M	73.5	228	29.5	27.8	38.42
M	75.5	259.7	32	32.8	47.44
M	67.5	186	28.5	32	38.85
M	70.5	205	28.5	38.4	35.35
M	75.5	236.64	29.1	23.9	41.1
M	71	199	28	24.6	47.98
M	66	185	30	28.6	35.35

M	73	257	33.9	28	48.52
M	68.5	292.1	43.8	47.9	38.85
F	62	173	31.3	40.3	38.85
M	70	188.4	26.7	21.1	50.23
M	70	157	22.5	16.6	46.41
M	68	172	26	22.2	41.1
F	64.5	153	25.8	43.7	38.01
M	71.5	225	30.5	41.4	35.35
M	71	238	33.3	31.8	49.65
F	67.5	182	27.5	34.4	38.01
M	75	234.8	29.3	36.9	35.7
M	74.5	239.5	30.2	34.2	41.1
M	76	236	28.5	28.6	50.23
M	66.5	176.9	27.8	13.1	50.23
M	72	193	26.25	14.7	57.94
M	69	232	34	25.8	38.85
M	68.5	159	24.1	5.4	46.92
M	69	232	34	25.8	38.85
F	62.5	148.6	26.7	38.7	35.35
M	72	206	28	26.2	37.21
M	73	219.5	28.7	27.8	50.23
F	69	180	26.7	39.9	40.17
F	69	245	36	51.1	35.35
M	70.5	179.2	24.9	22.2	43.57
M	70	212	30.5	24.1	41.1
F	62	164.5	30	38	42.7
F	67.5	189	28.6	41.9	37.21
M	69	187	27.8	26.9	49.08
M	70.5	175.9	24.5	24.1	42.7
M	70	193	27	28.5	53.12
M	72	207	28	35.5	38.85
F	68.5	279.1	40	48.7	36.82
M	69	187.9	27.4	23.5	42.7
M	71	203	28.3	28.4	45.43
M	69	222	32.8	36.6	37.21
M	79	204.55	24	n/a	50.73
M	69	303	40	38.5	35.35
F	69	197.4	29.5	48.6	37.61
F	68.5	195.87	29	35.7	35.35
M	72.5	182	24.5	17.9	49.65
M	73.5	200.9	26.2	16.6	41.59

M	72	216	29.5	26.3	40.63
M	68	168.1	25.2	26.8	36.82
M	69	194	28.8	28.7	44.48
M	69.5	172	24.5	22	49.65
M	70.5	213	30.3	30.6	35.35
M	73.5	271.9	35.3	34.6	35.35
M	71	162	23	10.1	45.91
M	65.5	183	29.9	15.2	41.59
M	74	232	30	20.8	51.31
M	70.5	224	31.2	31.1	36.82
M	71	264	37	44.2	39.28
M	76	205	25	22.7	48
M	74	213	29.5	29.5	38.42
M	67	172.75	26.8	16.3	52.1
F	62.5	184.5	32.7	41	35.35
M	73	163	21.6	13.9	44.02
M	61.5	161.67	29.8	32	35.35
M	75	257	32	36.9	38.01
M	66	158	25.6	25.1	38.85
F	65.5	177	29.5	34.4	38.85
F	64	140	24	37.5	39.72
M	69	307	40	50.4	35.35
M	68.75	164	24.5	21.5	47.44
M	74	252.4	32.2	43.7	35.35
F	66.5	157.7	24.8	33.8	39.28
M	69	177	26	n/a	36.82
M	72	272	37	39	35.35
M	74	327	42	47.2	35.35
M	68.5	236.57	35.3	39.4	35.35
M	70	231	33	n/a	42.7
M	67	141	22	n/a	42.7
M	70	238.93	34.5	26.4	40.63
M	70.5	190	26.5	n/a	37.61
M	67	220	34.5	n/a	38.01
M	68.5	229.94	34.5	35.6	35.35
M	71.5	222.45	31	29.3	37.61
F	65	187.35	31.1	39.5	35.35
M	71	239.63	33.2	29.3	40.17
M	74	199.2	25.5	29.9	35.35
M	71	206.07	28.5	29.7	45.91
F	61	170.3	32.1	41.8	35.35

M	68.5	260	39.5	30	35.35
M	68.5	231	34.7	35.4	35.35
F	62	125.74	23	28.9	36.82
F	60.5	194.4	37.8	n/a	27.84
F	62	157.44	28.6	38.7	35.35
F	63.5	149.06	25.6	23.6	35.35
M	70	218.29	31.5	29.5	39.72
F	63	180	32	n/a	35.35
M	68.5	232.44	34.8	29.7	35.35
F	63	180.76	32	32.1	35.35
M	68.5	225.89	33.2	29.8	36.44
			BMI	Fat	VO2 max
Average			29.73	30.08	41.25
Standard Deviation			4.49	8.65	5.55
Median			29.1	29.7	39.72

2009 Annual physical information provided by Public Safety Medical.

Appendix D

<i>1) Do you think physical conditioning is important in recruit school ? Why?</i>						
81-A	Yes	Establishes future habits	Physical Job			
81- B	Yes	Establishes future habits		Overtraining Concern		
81-C	Yes	Establishes future habits		Overtraining Concern		
82-A	Yes	Establishes future habits	Physical Job		Health	
82-B	Yes	Establishes future habits			Prevents injury	Sets a standard for all recruits
82-C	Yes				To do job well	Air management requirement
83-A	Yes	Establishes future habits		Overtraining Concern		
83-B	Yes		Physical Job			
83-C	Yes	Establishes future habits		Overtraining concern		
84-A	Yes		Physical Job		Team building	Physical preparedness
84- B	Yes	Establishes future habits				
84- C	Yes		Physical Job			
85-A	Yes	Establishes future habits	Physical Job			
85-B	Yes	Establishes future habits	Physical Job	Overtraining Concern	Discipline	
85- C	Yes	Establishes future habits	Physical Job		Prevents Injury	
	15	11	8	5	-	-

Focus Group Question number 1

2) Do you think it is important for firefighters to continue to workout after leaving recruit school? Why?								
81-A	Yes	Maintain level			Longevity		never enough	
81-B	Yes			To do the job	Longevity			
81-C	Yes						No -Need endurance not strength	
82-A	Yes				Longevity			
82-B	Yes	Maintain level		Physical job			Owed to community	Owed to crew
82-C	Yes		Prevent heart disease	To do the job well			Airway requirements	
83-A	Yes			Job Requirement				
83-B	Yes		Prevent heart disease			Teamwork	Prevent injury	Not elite workouts
83-C	Yes	Maintain level						
84-A	Yes	Maintain level	Prevent heart disease				Getting older	
84-B	Yes		Prevent heart disease	Job performance		Teamwork	Health wellness	Opportunities/ Attitude
84-C	Yes			Job Requirement				
85-A	Yes	Maintain level	Health / Stress			Team Building	Confidence	
85-B	Yes	Maintain level					More off duty	
85-C	Yes	Maintain level	Avoid health problems					
15		7	6	6	3	3	-	-

Focus Group Question number 2

<i>3) Do you feel you work out enough? What kind of training do you do?</i>						
	Yes	No	Weights	Cardio	Gear workouts	
81-A	1	3				
81- B	4	1	Weights	Cardio		Cross-training
81-C	2	2	Weights			
82-A	3	5			Bottle drills	Circuit training
82-B		8			Gear workouts	
82-C	3	3	Weights			Circuit training
83-A		5	Weights			
83-B	5			Cardio	Bottle drills	Yoga
83-C	3	3				Cross-training
84-A	2	7	Weights	Cardio	Bottle drills	
84- B	5	4		Cardio		
84- C	4	4	Weights	Cardio		Circuit Training
85-A	1	2	Weights			
85-B	3	1	Weights	Cardio	Gear workouts	
85- C	1	3	Weights			
	37	51	10	7	6	6

Focus Group Question number 3

<i>4) What facilitates your workout?</i>					
81-A	Peer Pressure	Facilities/ Equip.	Gym Deal		
81-B	Partner	Equipment		Goals	Routine
81-C	Partner			Goals	Positive Motivation
82-A	Peer Pressure				
82-B	Peer Pressure		Gym Deal		Team Concept
82-C	Partner	Facilities/ Equip.	Gym Deal	Goal driven	
83-A	Partner	Facilities/ Equip.			Marking out
83-B	Partner	Equipment			Routine
83-C	Partner				Music
84-A	Peer Pressure		Gym deal		
84-B	Partner			Goals / Results	
84-C		Facilities/ Equip.			
85-A	Partner	Facilities/ Equip.	Gym Deal		
85-B	Partner				Music
85-C	Partner		Gym Deal		
	14	7	6	4	-

Focus Group Question number 4

<i>5) What prevents you from working out on duty?</i>					
81-A	Lazy				
81-B	No motivation	Available Time			
81-C		Available Time	Runs/ Details		
82-A			Runs/ Details	Fatigue	
82-B	No motivation	Available time			
82-C	No motivation	Schedule		Fatigue	No goals
83-A	No motivation	Available time			Lack of incentives
83-B					No access to gym / poor facilities
83-C	No motivation	Available Time			
84-A	No motivation	Available time	Runs/ Details		Knowledge
84-B			Runs/ Details	Fatigue	
84-C	Lazy		Runs/ Details	Fatigue	
85-A		Available Time			
85-B		Available Time	Runs/ Details		
85-C	No Motivation		Runs/ Details		
9		9	7	4	-

Focus Group Question number 5

<i>6) What prevents you from working out off duty?</i>							
81-A	Lazy			Part time work			
81-B	No motivation		Available time			Cost	
81-C						Cost	
82-A		Family			Fatigue		
82-B	No motivation	Family	Available time				
82-C	No motivation	Family	Available time				No goals
83-A	No motivation	Family	Available time				Lack of incentives
83-B		Family					
83-C	No motivation		Available time			Cost	
84-A	No motivation		Available time	Part time work			Knowledge
84-B		Family		Part time work	Fatigue		
84-C	Lazy	Family			Fatigue		
85-A			Available time				Busy Lives
85-B		Family	Available time				
85-C	No Motivation	Family	Part time work	Part time work			
	9	9	9	4	3	3	-

Focus Group Question number 6

<i>7) Are you aware of the higher health risks firefighters experience?</i>				
81-A	Yes			
81-B	Yes			
81-C	Yes			
82-A	Yes			
82-B	Yes			
82-C	Yes			
83-A	Yes			
83-B	Yes			
83-C	Yes			
84-A	Yes			
84-B	Yes			
84-C	Yes			
85-A	Yes			
85-B	Yes			
85-C	Yes			
15				

Focus Group Question number 7

8) Do you have any other thoughts about physical fitness?								
81-A	Need PT and Diet Education					Focus on Basics		
81-B		Concerned With Overtraining			Two Extremes - Too Much/ Not Enough	DVD Based Training	Need to Rest Also	
81-C			Need Age Based Standards		Need Consistency in Programs/ Admin		New Programs Need to be followed thru	
82-A						HazMat / Rescue Pay Nothing for PT	Base WPE with time based incentives	More Incentives from Admin
82-B						Goal Should be Retirement		
82-C			Standards Should Apply to All (Chiefs)		Two Extremes - Too Much/ Not Enough	WPE should not be a struggle	Develop a program for non compliance	Goal Should be Retirement
83-A	Need PT and Diet Education			Need to maintain equipment better		Dietary habits are difficult to manage	No fitness in promotion process	
83-B	Need PT and Diet Education			Need Standard Equip. All Stations		PT Should be Mandatory	Balance Elite Vs Others Attitude	PT should be positive
83-C	Need PT and Diet Education			Need to maintain equipment better		Training Should be Physical	Money is a Good Motivator	Fitness is Individual Choice - Not Forced
84-A		Concerned With Overtraining	Need Standards with Consequences			Hiring Standard Promotes Fitness		
84-B	Need PT and Diet Education	Concerned With Overtraining				Mandatory PT would help schedule	Bottle drill Vs bad attitude	Gear Pt is important
84-C			Need Standards with Consequences			Preach Fitness - Need to Support It	Need Stationary Bike	Set and Enforce Higher Standard
85-A						Motivated Vs not based on hire date	Smoking Vs mandatory workout	
85-B	Need PT and Diet Education			Need Standard Equip. All Stations				
85-C		Concerned With Overtraining				Like to do More Pt with Recruits	Like to do More Pt with Recruits	Need Motivation
	6	4	4	4	3	-	-	-

Focus Group Question number 8

9) Do you use Tobacco?			
	Smoke	Tobacco	None
81-A	0	0	4
81-B	1	1	3
81-C	1	0	3
82-A	1	3	4
82-B	0	2	6
82-C	1	0	5
83-A	0	0	5
83-B	1	0	4
83-C	2	1	3
84-A	0	0	9
84-B	2	1	6
84-C	1	2	5
85-A	0	1	2
85-B	0	0	4
85-C	1	1	2
	11	12	65

Focus Group Question number 9