FIRE DEPARTMENT FITNESS AND WELLNESS

PROGRAM IMPLEMENTATION

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Abstract: Health promotion programs are becoming increasingly popular throughout the private sector. The return on investment averages between $3 - $6 for every dollar spent on program costs. Despite this, implementation has lagged among career fire departments. This study examines the barriers that exist in implementing fire department fitness and wellness programs. This quantitative research project utilizes a survey conducted on a major, career department located in the Northeastern US. The goal of the survey is to better understand/predict firefighter motivations and willingness in order to promote fitness and wellness programs. The survey focuses on barriers towards cooperation and how impacts of demographics (age groups/time on job/current health perception) affects responses. Finally, the survey concludes with a list of incentives that increase in value/cost in order to determine willingness of accepting a program if it were voluntary, non-punitive, with age-based fitness goals. Variables include three main groups; older and younger firefighters, those with more/less years on the job and those with higher and lower fitness levels. The survey examines fitness motivation in fourteen distinct categories and an exercise causality index (determining how individuals are orientated to exercise). The survey concludes with incentives and program offerings to determine preferences by department, by groups or individuals. This research determined that younger firefighters and those with fewer years on the job are more willing to accept health promotion programs than older members. Motivation levels decrease in nearly every category for older members. Those with lower fitness scores are also less willing to accept a comprehensive program. Despite this, nearly all ages and demographics understand the importance of firefighters maintaining a high level of fitness and wellness. This survey has proved to be helpful in understanding the demographics of a particular department, understanding likes/dislikes, strengths and weaknesses in order to design and implement a program that has the best chance of being accepted by the majority and that has the best chance of lasting long term.

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CHAPTER I

INTRODUCTION

My research topic of interest is firefighter fitness and wellness programs. The physical nature of the job demands both strength and cardiovascular performance not only upon entry into this profession but throughout an entire career. A firefighter's hazardous work environment and job requirements push the human body to maximum exertion. A member who is in peak physical health best meets these demands. Being in peak physical condition allows members to perform tasks safely and with the least likelihood of being injured. Cardiovascular risk also increases when the body is pushed to maximum exertion, and this is the most significant risk on the fire scene. If the level of aerobic fitness is not adequate, the member is at risk of a cardiac event (Bjerke, 2011).

Kuehl, et al (2013) used survey research to assess firefighters' general health and to gauge willingness of participating in workplace programs . The survey revealed that the majority would like to lower their BMI, and would be willing to learn more about fitness, nutrition, and stress management from their employer. The group also felt as though their employer should be offering more assistance. While there is limited data and research available on fire department

fitness/wellness programs, a 2007 NIOSH report revealed a meager number of mandated physical fitness programs for fire departments nationally. This has caught the attention of the International Association of Firefighters (IAFF) and has prompted this organization to promote a Wellness Fitness Initiative (Staley, Weiner, & Linnan, 2011). Despite the high injury rate and costs associated with firefighting, it is estimated that only 20-30% of departments have established programs (Kuehl Ks Fau - Elliot et al., 2013).

Obesity is a problem across the United States, and firefighters are no exception. With the majority of fire departments not having any fitness standards or wellness programs in place, firefighters are not receiving any motivation, other than internal, to maintain an ideal weight. As a result of not being provided the tools and incentives to stay healthy, they are putting themselves, other co-workers, and their communities at great risk. This does not even factor in the increasing costs that come with obesity. "In multivariable-adjusted Cox proportional hazard regression models, a one-unit increase in BMI was associated with 5% increase in the risk of job disability…while obese firefighters…were two times more likely" (Soteriades, Hauser, Kawachi, Christiani, & Kales, 2008).

Fitness is only one aspect of members performing at their best. In addition to obesity, developing cancer is yet another unfortunate risk that comes with firefighting. A study entitled *Risk of Cancer Among Firefighters: A Quantitative Review of Selected Malignancies* reveals some startling statistics on cancer rates in relation to the number of years on the job (Youakim, 2006). Psychological stress is yet another part of this profession; firefighters suffer from the cumulative effects of witnessing difficult scenes throughout an entire career. Comprehensive wellness programs assist not only with strength and fitness but, help with lifestyle and nutrition to help reduce cancer risks and reduce stress as well.

Wellness programs have become increasingly popular over the years for employers in all types of industries, not just those that are physically demanding or high risk. They are being offered mainly as

a result of the skyrocketing costs of healthcare. Wellness programs offered involve teaching employees to live healthier lifestyles and encouraging yearly health physicals/cancer screenings and fitness through the use of incentives/rewards. These rewards vary from cash bonuses, extra vacation days, and free gym memberships to reduced insurance co-pays for meeting fitness goals. The justification for these fitness/wellness programs comes from the decreased sick/injured on-duty time, health insurance costs, and disability benefits along with increased productivity. The combination of all these factors can lead to tremendous savings for a company or municipality. While the fire service has begun to experiment with similar programs, implementation is not as widespread as it should be.

The purpose of this research is to better understand the barriers that block the implementation of health promotion programs for firefighters. The barriers I will examine include firefighter's individual perception and internal motivation that might cause resistance toward a comprehensive program. Other barriers such as policies or cost should not be a consideration for the type of program I am suggesting. First, because the program is non-mandatory and non-punitive, similar to programs offered at private companies. Also, cost should not be considered a barrier given the high return of investment these programs offer (Chapman, 2012; Henke, Goetzel, McHugh, & Isaac, 2011; Kuehl Ks Fau - Elliot et al., 2013).

In order to better understand implementation of health promotion programs in fire departments, I examine individual perception of fitness and wellness programs in the fire service. Surveying the membership will allow members to provide individual input and opinion on fitness and wellness program goals vs group opinions and will help to uncover firefighter fitness motivations. With this information, a program can be implemented that best serves the unique characteristics of a firefighter cohort. Implementation of a program is important not only for the short term, but as a step towards fostering a lasting culture of fitness and wellness. A well-designed health promotion program is going to improve the performance of firefighters, improve their general well-being, and help them decrease the risk of injuries in hopes of enjoying long healthy careers and retirements.

The next chapter reviews the literature on health and fitness within the fire service, various health promotion programs both in and outside of the fire service, possible solutions, and fitness motivation theory. Chapter 3 covers the methodology of the research to include the details of the survey and data collection. Also included in this chapter are descriptive statistics for the demographics of the department. This provides an illustration of how a department, as a whole, is motivated and "orientated" towards fitness and the overall value on program offerings and incentives. The analysis for the majority of hypotheses are covered within chapters 4 and 5. These two chapters are stand-alone chapters that each cover separate subjects of the hypotheses in greater detail. Chapter 4 examines the impact of age and years of service with respect to support for health promotion programs. The results indicate that as both age and years of service increase, motivation in nearly every category decreases. Age and years of service are not a factor when considering the importance of firefighters' maintaining high levels of fitness and wellness, both groups consider it to be important. Chapter 5 examines how fitness levels affect support for health promotion programs. Results indicate that as fitness levels decrease, willingness to support a comprehensive program and motivation levels also decrease. Finally, chapter 6 is a discussion/conclusion.

CHAPTER II

LITERATURE REVIEW

The Problem

The objective of this literature review is to gain a better understanding of the importance of implementing fitness and wellness programs in fire service organizations. This review covers topics of firefighter fitness, obesity, musculoskeletal injuries, cardiac issues, cancer, and mental health. Examples of health promotion programs that exist both inside and outside the fire service are examined. Program design including critical elements of existing programs and outcomes are assessed. The challenges and strategies that come with implementation are noted. Finally, motivation toward exercise is paramount, without motivation no program will succeed. Therefore, I conclude with fitness motivation studies. This review will form a foundation to aid in both implementing and promoting health promotion programs within the fire service.

The State of the Fire Service

Fire-based Emergency Medical Services (EMS) is common within the US; demographics of EMS providers showed in 2008 that 38.5% of Emergency Medical Technicians (EMTs) worked for

fire-based employers and 42.5% of paramedics as well. This was the most prevalent employer for both groups (Bentley, Shoben, & Levine, 2016). It is common for firefighters to be dual-trained in fire and EMS and either work side-by-side with separate EMS providers or their roles can swap back and forth from one shift to the next. Due to this dual role, this literature review covers fire and, to a lesser degree, EMS, to reveal both the mental and physical effects that come as a result of EMS work. To understand the inherent danger that exists, the fatality rate for firefighters' is 16.5 per 100,000, and the national average is 5.0. In comparison, the fatality rate for EMS is 12.7 per 100,000 workers (Maguire, Hunting, Smith, & Levick, 2002). The life expectancy of a firefighter is 5-9 years less than the national average (Leffer & Grizzell, 2010). Due to the nature of the job, firefighters have one of the highest injury rates; in fact, 88,500 injuries reported in 2007 (FASS, 2013). Looking simply at hospitalization rates, firefighters have a significantly increased risk of hospitalization as compared to those in other occupations (Lee, Fleming, Gomez-Marín, & LeBlanc, 2004). The occupational exposures that firefighters face demand peak physical fitness. The average firefighter worker's compensation claim is $5,168 (Jahnke, Poston, Haddock, & Jitnarin, 2013). The estimated cost of these injuries is estimated at between $2.8 - $7.8 billion per year (Kuehl Ks Fau - Elliot et al., 2013). In comparison, the incidence of work-related injury in the fire service is 4.7 times the private industry and lost work hours is 9.5 times the private industry as well (Reichelt & Conrad, 1995).

Compared to the average worker, EMTs are 2.5 times more likely to be killed on the job (Oglesbee et al., 2015). EMTs can face injuries or death from assaults, vehicle crashes, exposure to hazardous scenes, needle sticks from patients, or suicide. A study examined the exposure effects of EMS personnel operating at ground zero in New York City on September 11, 2001 (Yip et al., 2015). The study was the first of its kind to examine a group of EMS personnel; previous studies had only examined firefighters or police officers. The study revealed that while the percentage of cases was lower than that of firefighters, EMS personnel still had significant

effects from operating in this environment. They suffered from both physical ailments and mental issues, including depression and PTSD.

Fitness levels

Firefighters must not only be physically fit upon entering the job but must maintain healthy fitness levels throughout their entire careers. Both strength and flexibility are necessary to handle heavy loads and avoid injury (Crill & Hostler, 2005). It is also important to remember that it is not extreme activity alone for which the firefighter must be fit. Both physiological and metabolic demands are pushed to the limit when considering the weight of the gear and the intense heat factors (Bjerke, 2011). The gear alone can weigh up to 70 pounds and up to another 30 pounds can be added to that amount when accounting for the weight of managing a hose or ax. Finally, the extreme heat while working in gear pushes the cardiovascular and musculoskeletal systems to the maximum. While there is an agreement on the necessity to maintain fitness, including aerobic, flexibility and strength, few standards or requirements exist.

Research has shown that firefighters are maintaining aerobic capacity below recommended values and insufficient for the physiological demands of firefighting (Storer et al., 2014). The only agreed-upon suggestion is to maintain a minimum of 12 METS (metabolic equivalents) in aerobic capacity to perform firefighter functions (Poston et al., 2011). While much research has determined that 12 METS is necessary to perform firefighting duties adequately, a specific "fitness prescription" must match training to expectations (D. L. Smith, 2011). Smith (2011) outlines the components of this training to include aerobic, anaerobic, sprint interval training, functional training, and resistance training. The training plan should be created with the assistance of certified fitness professionals and must be both progressive and individual, as members have a range of fitness levels when the program is started.

When determining physical activity participation levels for research studies, laboratory tests can prove to be an expensive means of understanding fitness levels for a large group. Therefore, questionnaires are often used to determine activity levels. There are many types of fitness level questionnaires with multiple variations. These questionnaires seek to determine the frequency, duration and type of exercise an individual is performing for comparative purposes.

Obesity

Several studies have found that there is a higher prevalence of obesity amongst firefighters than amongst members of the general population. Studies are inconclusive on the actual number of obese firefighters. Poston et al. (2011) estimated 73% - 88% of firefighters are in the overweight or obese category. However, Storer et al. (2014) showed an average of 22% of firefighters are in the obese category. A greater understanding of obesity in the fire service is important, because one study found that every one-unit increase in BMI represents a 5% increase in the risk of future disability (Soteriades et al., 2008). Obesity puts added strain on the heart, which can lead to hypertension and cardiac issues. Given these startling statistics, it is surprising that many fire departments do not consider obesity as fitness for duty criteria (Soteriades et al., 2008). Departments that perform fitness testing might not be concerned about weight or BMI as long as a member can pass a predetermined fitness test. The US military includes BMI and abdominal circumference in their yearly fitness test, perhaps some or all of these components should be factored in as part of a yearly fitness test or goal (Heinrich et al., 2008). In this case, firefighters would be expected to pass the test as a whole in addition to minimum component scores in each category (such as weight) as well. Body composition is measured because it is an important indicator of health or potential health issue. Meeting a fitness standard is a separate and distinct objective. The other important piece is actually being healthy and avoiding ill health (wellness).

The prevalence of obesity among firefighters may occur for several reasons. Firefighters spend a considerable amount of time sitting around at the station between calls. This sedentary time is interrupted by bursts of intense physical activity (Spratlin, 2011). This puts overwhelming stress on the cardiovascular system and can have severe consequences for those who do not maintain excellent fitness. A focus group of firefighters revealed that unhealthy food options are much more easily accessible than healthier choices (Frattaroli et al., 2013). Also, the nature of the job results in delayed or missed meals, so unhealthy prepared meals and snacks are much more prevalent. This focus group suggested dietary/nutrition training on eating and cooking healthier meals and snacks, healthy cookbooks, and kitchen equipment to support cooking healthy. Also, since an estimated three-quarters of emergency responders (police, fire, and ems) have high blood pressure, the necessity of wellness programs to lower this risk is paramount (Stefanos N Kales, Tsismenakis, Zhang, & Soteriades, 2009). This highlights the importance of wellness programs focusing on nutrition, stress management, aerobic exercise, sleep hygiene, and weight management. All of these factors help to lower blood pressure, in place of or combined with drug therapy.

Uncontrollable factors that may lead to injury

Workplace risk factors that are inevitable and often beyond individual firefighter's control include lifting patients in awkward positions, heavy lifting, staffing levels, work schedule, safety training (Reichelt & Conrad, 1995; Walton, Conrad, Furner, & Samo, 2003). Also, completely unavoidable factors include the hazards involved at the incident, working conditions, and atmospheric conditions. Chronic sleep deprivation is another issue firefighters face. This also increases the likelihood of obesity, stroke, and heart disease. Fatigue is another effect of chronic sleep deprivation, which is a result of the work schedule. Eating nutritious foods, exercising, and getting adequate sleep whenever possible can all lower risks from sleep deprivation. Any one of these conditions or a combination of these might easily lead to an unpreventable injury. For

example, another study showed that fires having five or more alarms or occurring at buildings higher than three stories resulted in a 400% and 250% respective increased injury rate compared to lower alarm fires or single-story fires (Jahnke et al., 2013). At this type of incident, fatigue can result from a number of factors including increased workload from a multi-alarm fire or climbing multiple staircases with heavy gear and equipment.

Improving equipment is another way to reduce these types of injuries. As an example, the newest EMS stretchers are designed with battery-operated hydraulics operated by a pushbutton to both raise and lower stretcher. A focus group on injuries in the fire service suggested equipment such as the "one man loader," lighter air pack and lighter protective gear are all ways to reduce injury in addition to maintaining fitness (Conrad, Batch, Reichelt, Muran, & Oh, 1994). Firefighter tasks and equipment should be carefully examined and science should be applied rather than tradition. By applying science, firefighter task redesign or equipment modifications along with ergonomic and fitness training and programs could both reverse the trend in firefighter injuries (Walton et al., 2003).

Musculoskeletal injuries

In an interesting study examining musculoskeletal injuries for firefighters, the data from 1998 indicates the incidence of work-related injury is four times that of the private sector (Walton et al., 2003). Overexertion accounts for over 1/3 of all injuries to firefighters and back injuries are the most common of these injuries with the highest costs compared to other types of injuries. While this statistic is probably not surprising to most, many factors lead to this type of injury for firefighters. Walton, et al, (2003) then explain controllable factors that include but are not limited to lack of training, unsafe posture, lifting technique, and fitness levels. These controllable factors offer the best protection in this unsafe and unpredictable environment. Ergonomic training and fitness programs may prevent many injuries caused by overexertion.

An example of a controllable factor is physical flexibility. Increased flexibility can help overcome some uncontrollable factors as well. Examples of this could be preventing injury from fatigue or increased workload due to size of incident or reduced staffing or even preventing heavy lifting injuries. Hilyer, et al (1990) studied flexibility interventions in fire departments in an experimental study. The research suggests that flexibility training aids in preventing injuries. The intervention was performed in 2 out of the four districts within a city, with the remaining two districts as the control group . Firefighters in all four districts performed both pre-and post-flexibility assessments. The results showed not only an increase in flexibility within the experimental group but also a significant decrease in costs representing lost work time. While the number of injuries between each group over the course of six months was reasonably close, the severity of the injury resulted in a speedier recovery for the experimental group.

Crill and Hostler (2005) examined the susceptibility of EMS providers toward injury. They used a survey to assess flexibility, BMI, and back extension time. The results revealed that the EMS providers surveyed were much more overweight as compared to the general population. Interestingly enough, compared to the males, the females in this survey had lower BMIs and flexibility was significantly better than the males. This survey was conducted in 2005 and noted that it was the first time research was performed to investigate the fitness of EMS personnel (Crill & Hostler, 2005). An EMS injury profile study revealed that low back strain due to lifting was found to be the most common injury among EMS providers in a busy urban area (Hogya & Ellis, 1990). EMTs are required to carry heavy equipment, lift patients in awkward situations and, at times, carry them up or down several flights of stairs. Lower back injuries are common among EMS personnel for these reasons (Crill & Hostler, 2005). A study concluded that EMS workers take slightly more sick time than firefighters. The leading cause of sick time was for musculoskeletal injury (Stilwell & Stilwell, 1984). A research study was conducted utilizing surveys to dig deeper into back problems among EMS personnel (Studnek, Crawford, Wilkins, &

Pennell, 2010). This study concluded that a history of back problems, self-reported health status, and job satisfaction were all strongly associated with recently occurring back pain. This indicates that both physical and mental well-being are essential aspects of any fitness/wellness program.

In one of the early studies of firefighter fitness levels and the costs associated with injury, the strength and fitness levels of firefighters in Los Angeles County was assessed (L. D. Cady, Bischoff, O'connell, Thomas, & Allan, 1979). The firefighters were placed into one of three groups: "least fit", "middle fit", and "most fit". The strength and fitness measurements included flexibility, isometric strength, bicycle exercise endurance (measured in watts), diastolic blood pressure during exercise and heart rate after training. The participants were tracked for three years and in that time, 7.1% were injured in the "least fit" group, 3.2% were injured in the "middle fit" group and 0.8% were injured in the "most fit" group. Also, of interest, the cost per claim for the 19 injured men in the "least fit" group was more than the 36 injured men in the "middle fit" group. This research illustrates the high importance of fitness in avoiding serious injuries for firefighters. Municipalities have an opportunity to realize real cost savings when adopting effective fitness programs for their members.

Cardiac issues

"Firefighters experience more occupational fatalities due to heart attack than persons in any other profession" (Kay, Lund, Taylor, & Herbold, 2001). Cardiac problems account for 45% of all on-duty firefighter deaths (S.N. Kales, Soteriades, Christophi, & Christiani, 2007). This 10-year study showed that the unique cardiovascular demands during fire suppression along with a lack of fitness/wellness promotion programs were reasons for this increased risk. An indicator of risk for heart disease is elevated blood pressure. A study examining high blood pressure among emergency responders (police, fire, and EMS) highlights the need for careful attention and treatment for any elevation for those within this group (Stefanos N Kales et al., 2009).

Cardiovascular disease risk factors directly relate to firefighter job performance; the strenuous nature of the job necessitates low-risk profiles (Plat, Frings-Dresen, & Sluiter, 2012). Alarming research shows that more than 50% of firefighters studied had three or more cardiovascular risk factors and 57% met criteria for prediabetes and 50 percent were prehypertensive or hypertensive at rest (Storer et al., 2014). Research has shown that firefighters who participate in well-established fitness-wellness programs have fewer cardiovascular risk factors in addition to improved fitness (Patterson, Smith, & Hostler, 2016).

Cancer

The rate of cancer among firefighters is alarming. A meta-analysis of 32 firefighter cancer studies shows a markedly increased rate for several types of cancer (LeMasters et al., 2006). The strong evidenced-based research on cancer for firefighters has led to the adoption of presumption laws for certain cancers. Presumption disability laws originated in the United States within the military (Taylor, Phillips, & Hall, 2012). These laws protect exposed workers from diseases that may have a long latency period. Exposed workers may receive additional compensation and/or medical coverage. Taylor, et al, (2012) suggest that that that since causation is difficult, if not impossible to prove, society has decided to offer care to those workers who put their lives at risk. The origins of presumptive disability laws within the military has followed the natural progression to include police and fire as well. Presumptive disability for firefighters has expanded to heart disease, several types of cancer and certain infectious diseases in over 40 states (Taylor et al., 2012). Evidence suggests that presumption exists for brain cancer, lymphatic cancer, leukemia, and lung cancer (for firefighters who do not smoke) (Guidotti, 2007). A national firefighter cancer registry is currently in the works to focus on this issue on a national level and to illustrate the severity of the problem.

The toxic environment that a firefighter is exposed to lasts long after a fire is extinguished. Research has shown that toxic levels of gas can still be present during overhaul, the period when suppression is complete and little, or no smoke is present (Bolstad-Johnson, Burgess, Crutchfield, Storment, & et al., 2000). This respiratory exposure is dangerous during a period considered by many to be safe. The cancer risk is markedly increased after years of exposure is increased (Youakim, 2006). Compared to the general public, the risk of firefighters contracting kidney, brain, colon or bladder cancer or leukemia and non-Hodgkin's lymphoma all increased with years on the job.

Contaminated Personal Protective Equipment (PPE) places firefighters at risk for developing cancer, therefore firefighters are urged to clean gear after any exposure. Research has shown that hazard adjustment in the fire service is affected by cultural issues and self-perception (Caffee, 2018). An example of this includes not washing contaminated PPE to appear as a "seasoned" firefighter and avoid looking like an inexperienced new member. Education can play an important role in overcoming cultural and perception issues that exist within the fire service. With such increased risk, fitness and wellness programs can help reduce risk through education, routine medical examinations, the procurement of two sets of turnout gear, proper equipment to wash contaminated gear, along with improved physical fitness and proper nutrition. With respect to nutrition, several studies have indicated that limiting processed meats or red meat, increasing fruits and vegetables and choosing whole grains over refined grains have all proven to decrease risk of cancer (Kushi et al., 2012).

Mental Health

In addition to the fact that many firefighters are overweight, are not physically fit, and have elevated cholesterol and blood pressure levels, they also face mental health stress on a level higher than the general public (Hofman, 2015). Firefighters witness events over a career that can

lead to traumatic stress. This stress increases inflammatory biomarkers that can increase the risk of a heart attack. To combat this, the research suggests intervention strategies, mental health resources, fitness, yoga, and other healthy activities to reduce this risk (Hofman, 2015). Research has shown that a moderate level of exercise has proven to reduce the harmful effects of other stressors and ensures successful brain functioning (Deslandes et al., 2009).

Halbesleben (2009) examined the influence of the shift schedule and how it affects the psychological well-being of firefighters. Demanding shift schedules can lead to work-family conflict that further compounds the cumulative stress that firefighters experience. The research concluded that shift schedules that allow longer continuous blocks away from work reduce the work-family conflict. Therefore, department policies and shift schedules along with comprehensive fitness and wellness programs that include educational components and mental health resources can aid in reducing the stress that leads to a multitude of health risks.

Health Promotion Programs outside of Fire Departments

When examining workplace wellness programs in other organizations, the news is promising. Successful programs that are comprehensive in design and well-run have shown a return on investment rates as high as 6 to 1 (Berry, Mirabito, & Baun, 2010). The same study revealed that companies have not only shown a reduction in health care expenditures but increased productivity and morale as well. Another study strictly examining health care costs and absenteeism expenses found a 25-30% decrease in participants vs. non-participants (Goetzel & Ozminkowski, 2008). A decreased injury rate, lower absenteeism, and lower worker's compensation costs could equate to an even more substantial ROI for Fire and EMS organizations.

Workplace fitness/wellness programs are a way to encourage healthy behaviors and promote physical fitness. By doing so, an employer can reduce insurance costs, increase productivity for

workers that are fit and reduce injuries or sick time. A number of studies have examined fitness/wellness programs in place in other organization types, with research indicating a positive return of investment (ROI). Goetzel and Ozminkowski (2008) examined costs associated with employer health care and ten modifiable risk factors. The modifiable risk factors include obesity, high cholesterol, high blood pressure, stress, depression, smoking, diet, excessive alcohol use, physical fitness/exercise, and blood glucose levels. The study, involving more than 46,000 employees, found that these modifiable risk factors accounted for approximately 25% of employer health care costs. Furthermore, seven of these risk factors cost employees 228% more than employees without any risk factors.

A meta-evaluation of 62 studies on comprehensive fitness/wellness programs in various organizational types found the average ROI of 22 studies was $3.27 per dollar spent in health care savings and $2.73 per dollar spent in absenteeism savings (Chapman, 2012). This meta-evaluation provides strong support for fitness/wellness programs, and a 25% average reduction in health care, absenteeism, worker's compensation, and disability costs. The author concludes that the future necessitates the institutionalization of fitness/wellness programs in every type of organization and that these programs are the most effective way of reducing both medical and absenteeism costs.

Beyond monetary benefits, a study on the quantifiable impact of wellness programs suggests that employees feel more loyalty toward an organization (Stave, Muchmore, & Gardner, 2003). This loyalty results in a “cultural effect” that can result in increased productivity and less sick and disability time. One research study that implemented a workplace health promotion program resulted in a cost savings of $15.60 for every dollar spent on the program (Aldana, Merrill, Price, Hardy, & Hager, 2005). While this was only a two-year study, the significant decrease in absenteeism may have been attributed to improvements in both employee health and morale that translated into lower absenteeism.

An analysis of 47 peer-reviewed studies on fitness/wellness programs revealed long-term health behavior changes, positive effect on biometrics, and financial benefits toward employers (Goetzel & Pronk, 2010). Since multiple variations exist for types of programs and elements involved, it can be challenging to evaluate these programs and to quantify effectiveness. Also, since these programs are relatively new, it is hard to examine long-term effects. The physical nature of the job of firefighting makes fitness and wellness programs easier to accept and validate as compared to other workplace programs.

A Workplace Health Promotion survey was conducted in 2004 and offers much insight into types of programs/services being provided and also lists the characteristics of the worksites offering these programs (Linnan et al., 2008). As far as the programs and services that were reported, these include educational programs, fitness programs, screenings, and counseling services along with disease management programs. For the facility portion, these include characteristics such as fitness centers, showers, walking trails, and cafeteria services. Fitness policies are another aspect mentioned in the survey. Policies include occupant protection policies, smoking, drug use, fitness break policies, catering policies, and incentives. The survey revealed that worksites with fewer employees were least likely to offer comprehensive programs or contain critical elements of programs.

Wellness programs outside of the fire service have continued to expand every year. This is occurring for many reasons: the rising costs of healthcare, the statistics on decreased health and fitness levels for the general population, and the increasing evidence of ROI in wellness programs. Johnson and Johnson started their wellness program in 1979 and is often considered to have a "model" program. It was introduced by chairman James Burke, with the "purpose of making Johnson & Johnson workers the healthiest in the world" (Henke et al., 2011). The program has continued to expand and modify offerings to its employees based on feedback and research. Programs include on-site fitness, reimbursements, nutrition, fitness challenges, lifestyle

management, health coaching, biometrics/assessments, and disease management, along with other applications.

The Johnson & Johnson health promotion program is worth examining in greater detail, as it is one of the longest-lasting wellness programs in existence. A study revealed five essential program elements of the Johnson & Johnson program to ensure success. This includes health education, linkage to employee programs, supportive social environment, integration into the organization's structure, and screening programs with treatment and follow-up (Henke et al., 2011). The ROI for this comprehensive program is $1.88 - $3.92 saved for every dollar spent. The participation rate was high for this program; the company re-invested savings by offering financial incentives to employees who participated in screenings and targeted improvement programs. The success of this program can be attributed to the "culture of health" evident, strong leadership support, responding to feedback, offering incentives and making modifications over time (Henke et al., 2011).

Finally, a health promotion program for employees at a public university examined the impact on blood pressures (Eng, Moy, & Bulgiba, 2016). Blood pressures were checked and compared six years after the health promotion program began. Results were significant for both systolic and diastolic blood pressure reduction among hypertensive and at-risk groups. This program was comprehensive and focused on health behaviors, prevention, and risk factors. With this goal, employees at risk were targeted, yet all participants were educated to ensure continued healthy lifestyles.

Fire Department Health Promotion Programs

Perhaps one of the earliest examples of firefighter fitness/wellness programs began in 1970, in the city of Los Angeles Fire Department. The program had three goals, first to increase strength and endurance, second to reduce coronary heart disease risk factors and third, as a result, decrease

insurance claims for both injuries and illnesses (J. L. Cady, Thomas, & Karwasky, 1985). The program consisted of examinations, fitness counseling, fitness equipment, nutritional counseling, and periodic examinations. The 14-year study tracked injury costs and divided workers into groups, most/least flexible, strongest/weakest, thinnest/most obese. The workers' comp costs for all injury costs and back injury costs was markedly decreased for the most flexible and strongest group. This program proved that a city such as LA has the potential to realize tremendous savings by merely enacting a program without even necessarily making fitness mandatory or adding mandatory assessments.

An injury prevention program highlighted in a research study revealed back strains as the most common injury among EMS personnel (Hogya & Ellis, 1990). Proper lifting techniques, stretching, and suggested physical fitness routines should all be part of initial and on-going training to reduce injuries. If a prevention program proves to minimize injuries, even slightly, it has the potential to decrease workers' compensation drastically.

A POWR (Physician Organized Wellness Regime) was implemented in a recent research study and utilized the NFPA 1582 standard (Leffer & Grizzell, 2010). This program was studied for two years and was comprehensive; it involved baseline exams/biometrics/lab work/stress test, on-duty fitness time and equipment, nutritional guidance, and individualized physician-led fitness goals. The reductions in injuries with this program were substantial: 40% the first year and 60% the second year. This resulted in estimated savings of $254,980 the first year and $322,080 the second year, all at the cost of only $200 per firefighter. A vital element of this program was that one physician was assigned to lead the entire program. This physician performed all of the physical exams, counseled members one-on-one, and issued follow up letters to each member. Studies have shown that one-on-one counseling is very effective for the firefighting population. Having a robust doctor-patient relationship was key to the effectiveness of this program, along with the comprehensive nature of the fitness/wellness elements.

IAFF Peer Fitness Program

The International Association of Firefighters (IAFF) Peer Fitness program originated in 1996 in ten departments across the United States. Since the inception of the Peer Fitness program, the IAFF along with the International Association of Fire Chiefs and the National Fallen Firefighters Foundation have all been strong advocates for mandatory fitness and wellness programs for fire departments (Patterson et al., 2016). Both labor and management from these ten departments developed a fitness and wellness program with the goal of "a holistic, positive, rehabilitating, and educational approach to firefighter health" (Dezelan, 1997). Both the union and the administration realized that a program like this was necessary. The program involves medical screening, non-punitive fitness testing, wellness, and a fitness education component. The ten departments involved had varying levels of fitness/wellness programs previously in place. Preliminary data from the Indianapolis Fire Department wellness program after five years showed a significant decrease in blood pressure (Dezelan, 1997).

A major research study examined ten fire departments that participate in the IAFF Peer Fitness program with ten departments who do not participate in any type of program (Poston, Haddock, Jahnke, Jitnarin, & Day, 2013). The IAFF program departments all had a history of participating in at least some type of medical/fitness program for a minimum of 4 years to a maximum of 40 years. The research found that the members in the Peer Fitness program departments were significantly less likely to be obese, had increased fitness with better endurance, higher VO2Max capacity, were less likely to smoke or have hypertension, and reported higher job satisfaction. It was noted, however, that the members of the Peer Fitness departments were more likely to have a worker's compensation claim than non-participating departments; but the proportion of injuries was still relatively low for both groups. The results from this study prove that departments with comprehensive programs in place can significantly improve members' health and job performance and even job satisfaction. This results in lower health care costs and increased

morale for a fire department. It was also noted that simply reducing the number of obese members can result in significant savings alone considering that the health care costs attributed with obesity can be extreme, not to mention the effect on job performance or the increased likelihood of duty-related fatality.

A recent example of the IAFF Peer Fitness Program combined with the NFPA 1582 standards is the wellness-fitness evaluation for the Dallas Fire Department (Winter, Seals, Martin, & Russell, 2010). National Fire Protection Association (NFPA) 1582 is the standard on wellness-fitness programs for firefighters. The standard includes comprehensive medical examinations for both initial hires and incumbent firefighters. The Dallas program was mandatory and involved both a medical exam and a fitness assessment. A point value was assigned to each component, and if a firefighter scored in one of the top three categories (good, excellent or superior), a cash incentive was offered. Physicians would determine during the medical evaluation whether firefighters are allowed to return to full duty, conditional duty, or limited duty. The exam results found at least 15 cases of cancer, and at least 12 angioplasties were performed. This exam was received favorably by the majority of the Dallas firefighters, and for those members who were initially skeptical, providing education about the exam and the fact that it was non-punitive added to its success.

Critical Program Considerations

The evidence is increasingly showing that a critical aspect of a successful workplace program is a health assessment upon implementation and for all new personnel (Goetzel & Pronk, 2010). Skipping this step and not tailoring a program toward individual needs and helping to lower risks for that particular individual might be counterintuitive and lead to higher costs. The value of health risk assessments was noted to be the "cornerstone of an effective program" and "associated with significant cost savings" (Goetzel & Ozminkowski, 2008). Another caution for program design is to include education with motivation and engagement to encourage employees and

increase opportunities with variation over time (O'Donnell, 2013). Therefore, health assessments combined with knowledge and skill-building with social support will increase the likelihood of success and make a program long-lasting.

An example of a successful comprehensive firefighter fitness program with these two components is "FIT Firefighter" (McDonough, Phillips, & Twilbeck, 2015). Researchers designed a program that included an education component, pre-and post-assessments along with health coaching. Experts agree that the educational component, along with careful attention to program design and implementation is critical in successful programs. The results of this program are impressive, considering the post-assessment was only eight weeks after starting. Improvements in blood pressure, weight, flexibility, strength, and other metrics were all positive for the FIT Firefighter program.

The importance of an educational component cannot be overstated. A research study was conducted on firefighter's cardiovascular disease knowledge (Kay et al., 2001). The study revealed that firefighters lacked an understanding of the importance of weight, cholesterol, and blood pressure management as risk factors for cardiovascular disease. Dietary and nutritional guidance, along with knowledge on physical activity regimens to reduce risks, must be a component of any health promotion program.

A focus group of active firefighters revealed several strategies likely to have a positive outcome (Frattaroli et al., 2013). First, leadership support is essential to have buy-in from the membership. Also, members cautioned against making any fitness or wellness program mandatory. There would be significant resistance if it were mandatory and for a program such as this to succeed, a person needs to have a personal willingness to commit. The focus group also suggested that competition is an excellent way to promote a program like this due to the competitive nature

inherent among firefighters. Finally, incentives are a great way to enhance this program and include more members who may be reluctant (Frattaroli et al., 2013).

Fitness programs that are not punitive, focus on health promotion, and include health education are going to be more successful (Joan E. Pynes, 1996). Recommendations by Pynes also include medical screenings to lower department liability and detect medical issues early. Resources are also recommended to include access to fitness facilities or gym membership reimbursement and possibly add on-duty workout time. The study concludes that these recommendations might initially seem cost-prohibitive. However, when considering workers' compensation costs, disability pensions, or costs for recruits, the potential exists for long-term savings.

Improvements in technology can aid in improving fitness goals and promoting fitness; however, the cost-benefit of technology must be considered. Devices that track steps and biometric data may be useful in health promotion or workplace fitness challenges. Sophisticated devices such as continuous physiologic monitoring were evaluated in a firefighter fitness cost-effectiveness model (Patterson et al., 2016). The results of this research revealed that this technology, while initially appealing, likely has similar effects to a comprehensive fitness program in reducing cardiovascular risk and the technology costs much more than fitness program costs. This type of technology might have some practical applications but serves as a great example of how actual fitness cannot be substituted.

Strategies for implementing (Practices/policies)

While the majority of health promotion programs have produced positive results, a systematic review was conducted on the impact of these programs (Osilla et al., 2012). The investigation found that while the vast majority produced significant health savings, some elements of comprehensive programs did not yield positive results. This is where careful attention to program design comes into play, and constant re-evaluation must occur. What works in one organization

type might not work for all, and elements of a program might need to be re-introduced in a completely different format. Re-evaluation should come in the form of surveys, biometrics, and other assessment types. Health promotion programs should be in a state of constant evolution for several reasons, first to find out what works best for employees of a particular organization and to change offerings of programs to keep employee's motivations and interest high over the long-term.

In consideration of maintaining fitness for both health and proficiency throughout a career, as stated previously, it is highly recommended to have professional expertise when developing fitness programs (Storer et al., 2014). Further recommendations include collaboration with major fitness organizations to access qualified, credentialed trainers in both the design phase and implementation phase. The military has conducted extensive research on avoiding injuries during training (Jahnke et al., 2013). For example, the analysis showed that there is a threshold when aerobic fitness does not improve, yet injuries increase when performing longer distance running. The study examined all types of fitness and generally recommended a gradual increase in training, avoiding over-training, and focusing on endurance training before anaerobic and strength training.

Consideration of age is paramount when designing programs and during an assessment. Measurements should include elements of strength, power, endurance, anaerobic threshold, and aerobic capacity (Abel, Palmer, & Trubee, 2015). While the fire service has long held a culture of strength and weight training, this stigma has been slowly changing to focus more on endurance and high stamina with aerobic exercise (L. Davis, 2003). Higher levels of aerobic fitness will lead to lower risk factors for cardiovascular disease, increased performance on the fire ground, and overall better firefighter health. To overcome stigmas such as this one, professional trainers and education are essential. Increasing aerobic fitness will be recognized by the members on the

fire ground when he/she is functioning better for increased periods, and blood pressure (when routinely taken at the fire scene) has decreased.

It is also important to remember during program design what the goal is. One research study put it simply that health promotion programs "adhere to the premise that most causes of premature death and disease are related to lifestyle and can be prevented" and "programs are focused on helping employees stay healthy, satisfied, and productive" (Aldana et al., 2005). A health promotion goal or mission should be to protect the fire department's number one asset best, its members. Promoting and maintaining an adequate fitness level to offer the best protection to avoid injuries working in a hazardous environment. One author mentions that firefighters should be trained like soldiers or elite athletes to prepare for any challenges they may face (D. L. Smith, 2011). A recent buzzword for the fire service is to be trained as "tactical athletes." Fitness levels to perform as a tactical athlete to best protect the public and your crew from harm. Finally, to be fit not only throughout a long career in the fire service but into retirement as well, for the member and his/her family to enjoy a long, happy life. If this remains the goal of the fitness program, then the intention of an assessment should not be used for punitive or promotional purposes, only to assess the ability to perform tasks on the fire ground (Abel et al., 2015).

Fitness goals should be realistic, short-term, flexible, and set by the participant rather than imposed (Goetzel & Ozminkowski, 2008). Further recommendations by Goetzel & Ozminkowski (2008) state that goal setting is a crucial component of an effective program. Continually striving towards a goal is essential for employees to maintain compliance and increase motivational behavior. This will encourage continuous health-conscious behavior; it is unrealistic to expect employees to change all aspects of an unhealthy lifestyle. This takes time and occurs incrementally; when one goal is achieved, it leads to further goals and moves to fitness, nutrition, modifying risk behaviors. The fitness program should offer variation and be continuous throughout employment. It is interesting to note that NFPA 1583 (standard on health-related

fitness programs), recommends fire departments implement a program that is non-punitive and does not set fitness standards (D. L. Smith, 2011). Therefore, a comprehensive fitness program without mandating and types of levels may inevitably increase buy-in.

Departments can also implement policies to allow companies to utilize a rotating time to be "out-of-service" for fitness. This would allow for a dedicated time period without having too many companies out at once. A flexibility study allowed for intervention to be performed on duty, during a pre-designated 30 minute time period (Hilyer et al., 1990). By designating this time, all firefighters were required to perform the activity as a group. This type of group activity during a selected period may have significantly improved results and thus add to cost savings due to increased flexibility. While setting aside on-duty time for fitness intervention is a common theme in wellness programs, it can raise potential issues within the fire service due to the nature of the industry. One concern that departments have is the high injury rate that occurs while exercising, particularly if that exercise time is occurring while on-duty. A research study addressed this very issue (Jahnke et al., 2013). The study examined all injury types and found that the highest percentage of injuries occurred during exercise (32.9%). Also, there was a fourfold increase in exercise injury for those who reported exercising on duty compared to those who did not. Despite these findings, those who did exercise on duty were half as likely to have non-exercise injuries than those who did not. Also, the study found that those having exercise injuries had increased cardiorespiratory fitness and missed fewer work days due to injury than those who did not report exercise.

Another concern is performing too rigorous a workout, and that this is potentially affecting performance on the fire ground immediately following. A research study investigated the effects of exercise fatigue when performing firefighter functions immediately following (Dennison, Mullineaux, Yates, & Abel, 2012). The results of the study indicated that moderate-intensity circuit training reduces the efficiency of task performance. The study did state that maintaining

higher levels of fitness would compensate for these effects. Critics who might argue against fitness on duty would be ignoring research on the importance of maintaining high levels of fitness for injury prevention and cardiovascular disease for a minimal decrease in fire ground performance. Another research study revealed that offering on-duty time for fitness increased adherence rates and promoted social support toward fitness (Reichelt & Conrad, 1995). Promoting fitness both on and off duty should be emphasized, and policies should be in place to advance this objective.

A study on firefighter fitness program design offers some key considerations when initially planning a program (Abel, Sell, & Dennison, 2011). First, having support from the fire chief and fire officers is essential because leaders play a crucial role in the encouragement and creation of a "fitness culture." Both the administration and union will have to determine whether the program is mandatory or not, punitive, or incentive-based. Previously mentioned research has shown incentive-based programs may provide equal or even greater results than mandatory or punitive programs. Buy-in will more than likely be easier for an “optional” program, but may not have 100% participation.

Health promotion programs in most organizations other than the fire service would never be mandatory; this leads to issues of self-selection bias, where healthy and motivated employees would be more likely to participate (Naydeck, Pearson, Ozminkowski, Day, & Goetzel, 2008). Due to this bias, in some reports, especially those comparing participants with non-participants, the ROI may be over-inflated. Another consideration is the fact that mandatory and punitive based programs will have to have guidelines that are clear and concise and must follow laws to avoid litigation due to non-compliance.

Incentive-based programs must be designed in such a way that all members can participate, even those in excellent shape already. Problems can arise with wellness program implementation that

might violate HIPAA laws. Any incentives offered to individuals through a program must be reasonable for ALL employees; if not advisable for any, a reasonable alternative must be provided (K. J. Smith & Duffy, 2013). Additionally, wellness program goals or incentives have to factor in differences in ages along with differences between male and female firefighters as well. With the goal of improving fitness and reducing costs, incentives must be appropriate enough to motivate but not too large to lose any savings. According to a Health Promotion Workplace study, for those companies that offered cash incentives, the average was $556.88 (Linnan et al., 2008). An interesting research study was performed using incentives for weight loss (Volpp et al., 2008). Two different types of incentives were offered, along with a non-incentive control group. Both incentive groups lost significantly more weight than the control group; these findings are consistent with other studies that show that both rewards and punishments can have excellent incentive value as long as they occur immediately. Other possible contributing human behaviors are mentioned in the study as well, such as loss aversion and decision isolation. Understanding both individual and group behavior is important when developing fitness and wellness programs, especially concerning matters such as mandatory/non-mandatory, punitive, incentives, and group challenges. Finally, the study found that while the particular incentives chosen were effective in initial weight loss, the loss was not sustained over an extended period, which would be the goal of any program.

The Abel study suggests challenges between stations or shifts that can promote fitness as an alternative to incentives (Abel et al., 2011). The study concludes that any fitness program must not begin until medical evaluations have been performed, and members are cleared to perform. Any pre-existing conditions must be identified, so that medical treatment or modified activities can be offered to such members prior to implementation. Finally, continuous medical and fitness assessments provide metrics to analyze how a program is working, whether there are

deficiencies, offer personalized assistance. Assessments should take place every six months or annually for best results.

As far as medical assessments are concerned, several firefighter health promotion programs mentioned, especially those guided by a physician (POWR, Dallas Program, IAFF Peer Fitness, etc.) require yearly in-depth medical assessments. The NFPA 1582 standard on medical includes physician-based, complete firefighter physicals, blood work along with essential biometric readings. This is what separates firefighter health promotion programs from those of other organization types. Due to the high stresses put on the body during firefighting, for example, it is recommended that exercise stress testing is performed early and regularly (Dueñas-Laita et al., 2007). Also, due to the high risk of cancer, in-depth blood work, routine chest x-rays, and other cancer screenings, including colonoscopies, are recommended regularly and much earlier than the general population. Finally, medical assessments should be performed without any negative recourse that would discourage full disclosure or participation in fitness/medical testing (Joan E. Pynes, 1996). Also, medical assessments should be tailored to age groups, with added tests or increased frequency as members age. Department policies should be focused on protecting members and their crew by promoting early detection.

Motivation studies / Self Determination Theory

A study was conducted to identify the elements of a comprehensive program that gained the most participants (Naydeck et al., 2008). These elements include growth in on-site fitness centers, online programs, and individual nutrition coaching. A similar study revealed socio-cultural factors that impact the success of firefighter fitness programs (Staley et al., 2011). Factors affecting fitness adherence included motivation, fitness/wellness education, crew-level dependability, social cohesiveness, and captain-level fitness norms. As far as strategy and design

of programs, factors cited include participation strategies, management level of support, and fitness norms.

A qualitative study examined the motivational effects of a firefighter wellness program (Mabry, Elliot, MacKinnon, Thoemmes, & Kuehl, 2013). The members were enthusiastic and highly motivated even after four years of the program is in place. Members noted a "drastic change" in eating habits and credited the team approach as a primary reason for success. The comprehensive nature of the program, members stated that the bloodwork, in-depth physical exam and VO2 Max test produced metrics that members could use year to year to gauge how fitness levels were going up or down. In addition, members were trying to outperform each other on group fitness. This was achieved by tapping into the competitive culture of the fire service; members noted "productive competition." A team approach, along with the comprehensive nature and extensive testing, proved to work very well for this cohort of firefighters.

Self-Determination Theory (SDT), was developed by (Deci & Ryan, 1985) and is a motivational theory that has been used multiple times in both predicting physical activity and in promoting physical activity (Fortier, Duda, Guerin, Teixeira, & Activity, 2012). This motivational theory includes both intrinsic and extrinsic motivation. For example, intrinsic motivation is performed for competence or enjoyment, where extrinsic motivation is performed for appearance. This theory applies to physical activity, fitness/wellness because of both the intrinsic and extrinsic factors that play a role in why one engages in an activity or not. The theory can be used in promoting physical activity by satisfying psychological needs and leading others into autonomous (self-determined) behavior (Fortier et al., 2012).

Self-determination theory led to the development of a survey tool used to gauge participation motives, the Exercise Motivations Inventory version 2 (Ingledew, Markland, & Health, 2008). "The study of participation motives has formed a cornerstone of exercise adherence research"

(Markland & Ingledew, 1997). Utilizing this survey, researchers can understand how individuals are motivated to participate in exercise among the following 14 scales (Affiliation, Appearance, Challenge, Competition, Enjoyment, Health Pressures, Ill-Health Avoidance, Nimbleness, Positive Health, Revitalization, Social Recognition, Strength and Endurance, Stress Management, and Weight Management). This revised Exercise Motivation survey (version 2) was tested in three phases and the tests indicated both convergent and discriminant validity within these phases (Markland & Ingledew, 1997). The results from a survey conducted on 252 office workers revealed that while appearance/weight management may be a strong motivator for exercise initially, it is unlikely to be a long-term motivator. Health promotion is the key to both engaging individuals to exercise along with long-term sustainment (Ingledew et al., 2008).

The EMI-2 survey was recently used at Oklahoma State University to understand the disparity between exercise participation between international and non-international students (D. Cho, Beck, & Dance, 2016). While research has shown that the rates of exercise and physical activity of international students is 29% compared to 46.5% for non-international, this survey not only confirmed this statistic, it was able to offer even more useful data. It revealed that international students were likely to exercise for health reasons, and competition motivation was low. The study concluded that colleges would be wise to find ways in increasing affiliation, challenge, and competition among international students to increase low competitive physical activity. Once the motives are understood for a group, such as the International college student group, programs can be designed that best fit the needs of the membership. Also, a unique aspect of the EMI-2 survey, as opposed to the original EMI survey is that it applies to both current exercisers and non-exercisers.

Causality Orientation Theory is a part of Deci and Ryan's Self Determination Theory (Rose, Markland, & Parfitt, 2001). This theory suggests that each individual's motivational orientation differs in how they engage in the behavior. There are three types of causality orientations:

autonomy, control, and impersonal. How each individual is orientated reflects how they initiate participation and how to encourage participation in the long-term. Autonomy orientation prefers the freedom of choice in exercise, control orientation prefers a prescribed or controlled environment, and finally, impersonal orientation feels unable to regulate behavior and achieve desired outcomes. Individuals are not necessarily classified as one type of behavior; they may have qualities of more than one, the goal is of the survey is to understand the dominant orientation. Once the dominant orientation is determined, an exercise environment can be matched that best suits the individual. This scale was tested and proven to have good factorial validity, internally consistent and to have good retest reliability (Rose et al., 2001). Understanding the individual characteristics of those participating in health promotion programs is critical in engaging individuals for both the short and long term for not only the benefits of exercise but enjoyment as well.

Hypotheses

While extensively researching this topic, I formed several hypotheses and research questions. Within chapter four, the research leads from potential barriers towards fitness/wellness from age, motivation, and incentives. As discussed previously, literature on incentives is mixed therefore, I examine the preferences this department has with a list of incentives to explore in greater depth how both monetary or non-monetary incentives are desired based on other factors. The first three hypotheses and first six research questions all pertain to age, motivation and incentives and will be discussed in greater detail in chapter four.

H4.1: As age, BMI, and years on the job increases, members are less likely to support the implementation of a fitness/wellness program

H4.2: Both older firefighters and those with more years on the job and younger and those with less years on the job equally understand the importance of annual health exams and screenings along with maintaining a high level of fitness (both strength and cardiovascular).

H4.3: Younger firefighters are going to have greater satisfaction with current weight and fitness level than older firefighters.

RQ4.1: Is there a difference in motivation levels between older and younger firefighters?

RQ4.2 How can overall motivation preferences aid in developing fitness/wellness programs?

RQ4.3: How does age and years of service affect incentive support?

RQ4.4: What are the important incentives that can be used to promote a fitness program?

RQ4.5: Does age have an effect on how firefighters are orientated to exercise?

RQ4.6: How can determining the causality orientation of a department aid in developing fitness/wellness programs?

The final hypothesis and research questions are examined in chapter five. All pertain to the fitness index of firefighters. The fitness of members is determined using a formula (5 item physical activity questionnaire). This questionnaire is discussed in further detail within chapter 5, it is a proven reliable and detailed scale to assess fitness.

H5.1: Members with a higher activity fitness index are more likely to support the implementation of a fitness/wellness program than members with a lower index.

RQ5.1 Is there a relationship between age and years on the job and fitness scores?

RQ5.2: Is there a difference in motivation levels between those firefighters who have a higher activity fitness index vs those who have a lower index?

RQ5.3: Does fitness level have an effect on how firefighters are orientated to exercise?

RQ5.4: How do fitness levels affect incentive preferences?

In the following chapter, I will describe a survey that I designed which includes multiple theory-based elements to aid in both identifying and overcoming the barriers of implementation of health promotion programs within the fire service. I will discuss the survey in detail, the sample and data collection. Finally, I will provide descriptive statistics for the demographics of the department.

CHAPTER III

DATA

The literature review clearly made the case of the risks firefighters face from injuries, levels of obesity and heart disease, risk of psychological issues and higher rates of cancer. In consideration of this, the importance of maintaining high levels of fitness and the need for health promotion programs is paramount in reducing these risks. These programs have been proven to work in both private and fire-based organizations as well. Implementation of these programs that are well planned out, those that are designed based on motivational theory, and include critical components are going to have the best chance for success in both the short and long term.

Intent

The goals of this study include the following. First, the purpose is to better understand how a firefighter's motivation affects the willingness of accepting fitness and wellness programs in order to further promote implementation. Second, I will focus on barriers towards cooperation and how impacts of demographics (age/time on job/fitness levels) affect motivation. Third, the survey concludes with a list of incentives that vary in value/cost in order to determine the willingness of accepting a program if it were voluntary and non-punitive, with age-based fitness

goals.

Survey Development

Starting out, it was my opinion that all members in this profession, especially having a medical background (Emergency Medical Technicians) would consider wellness to be very important. Any member who has performed firefighting tasks truly knows how important being in the best physical condition pays considerable dividends in performance on the fire ground. My question was how to bridge the gap from acceptance to having enough support by members for implementation? I started with the expectation that a significant pushback would be the fear of a mandatory or punitive program and the potential of not meeting the standard. Therefore, I made it clear that any implementation questions added that the program was not mandatory and not punitive.

In order to promote physical activity among firefighters, the first step is to determine the current fitness of the entire membership. Fitness levels are assessed through a comprehensive anonymous survey. In addition to fitness levels, the survey seeks to understand how the membership is motivated to exercise and to honestly assess their willingness of accepting a health promotion program. This detailed survey is unique to the characteristics and demographics of the particular department and offers the greatest opportunity of implementing a program that is going to have the best chance of being accepted initially and lasting long-term as well.

My initial consideration concerning program implementation, I wanted to go beyond an individual city/town level. I presently work as a full-time career firefighter in the Northeast. Implementing a program on a larger scale might prove to be more beneficial for several reasons. Instead of examining a smaller community or one larger city, implementation costs could be shared across multiple communities. For example, wellness visits and annual screenings can be the responsibility of an appointed clinic or regional hospital vs. having dedicated

department physicians. Nutritionists/dieticians, healthy living educators, and health/fitness coaches could be used and shared for all communities. Many states have presumption laws protecting all current and retired firefighters; this law protects firefighters who contract cancer, heart disease, or other illness because they are presumed to have contracted this while performing firefighter duties. The cost burden may not just be at the local level; the state pays disability claims for state firefighters and those municipal firefighters in a state pension plan. This makes the state a significant stakeholder in fitness and wellness plans. It would be in the state's best interest to appropriate funds toward a program in order to try and reduce the overall costs. By pooling resources, the state and local jurisdictions could benefit from such a program together.

While a large study is usually preferable and I intended to survey a large geographic region consisting of multiple career departments of varying sizes, there are examples of research conducted of firefighter health promotion programs where only one department is examined (J. L. Cady et al., 1985; L. D. Cady et al., 1979; Griffin et al., 2016; Hilyer et al., 1990; Storer et al., 2014; Winter et al., 2010). While the results of this study will not be generalizable to the larger fire service, they will drill down into the details of that department alone as a case study in order to specifically determine barriers to implementation and potential methods for implementation. In the future, I hope this survey can be used by individual fire departments to gain insight into their own. I also hope that the survey will be disseminated more broadly in the fire service to help both academia and policy makers better understand barriers to implementing health programs.

This research focuses on a fire department in a Northeastern city of which I agreed to keep the city and any members completely anonymous. I also agreed to provide department leadership with anonymous data for their use in developing future health programs. The survey had the support of the union president and executive board.

When creating the survey, an online survey was preferred for several reasons. The firefighters home addresses were not available and the email addresses are open records. The department surveyed had email addresses on file for all members and that email was currently being utilized by both the union and administration for communication. Also, the survey is designed to follow a logical order and an online survey only allows the participant to answer in that designed order. Another advantage of online surveys is that participants would be able to answer the survey at a convenient time without being pressured and while also remaining anonymous. They would access the survey from an internet link provided in an email, and responses would remain anonymous. This aspect is important for the survey in particular due to the population being surveyed. Members would be able to take their time in answering each question and would be more likely to give an honest answer vs. giving a popular or safe answer if/when the survey is discussed within a fire station or department-wide.

This survey was designed using Qualtrics software. This software allows you to easily create a computer survey that is accessible by clicking a link in an email. It is imperative that users can only answer certain blocks of questions before moving on to the next block. Additionally, the ranking incentive questions were designed to be in a random order for each participant. This random order will accurately gauge the level of motivation it would take to gain support to have each participant re-order the list according to his/her preference.

The first 250 respondents were offered a $5 Dunkin Donuts gift card[1]. When initially considering incentives for this survey, I explored the research on the effects that incentives have on surveys. The findings of a study, specifically on online surveys, recommended the use of incentives by researchers to achieve higher response rates (Cobanoglu & Cobanoglu, 2003). My concern was the time required to complete the survey, which I estimated originally to be 10-15 minutes. Therefore, adding an incentive would be even more of a necessity in order to achieve an

[1] All incentives costs paid for by The Last Call Foundation

adequate level of responses. Further research by (Shaw, Beebe, Jensen, & Adlis, 2001) indicates that a $5 incentive results in a higher response rate than a $2 incentive.

The survey included an introduction letter (see appendix) which contains some background information first about the survey and purpose. The letter explains that the Oklahoma State University Institutional Review Board has approved this study, and any questions can be forwarded to myself (contact provided) or the IRB contact. All participants had to consent to participate by choosing the "I consent" selection. The email that is distributed by the union president briefly summarizes the consent letter. The introduction letter explains that all respondents will remain anonymous and any data provided will not be linked to any respondent name even if a gift card incentive is requested. This is possible because the primary survey and gift card survey are two separate surveys entirely. A respondent is only offered a link to the survey if he/she completed the primary survey first.

Components

Exercise motivation theory is a key component of my research and insight from self-determination theory (SDT) was critical in creating a survey to aid in understanding how the levels of intrinsic and extrinsic motivation influence exercise behavior in firefighters. The literature shows that the EMI-2 survey, which is derived from self-determination theory is an effective tool to both predict and promote physical activity (Markland & Ingledew, 1997). What sets this survey apart from others, is how the components were carefully chosen to cover all possible areas of motivation from elements of the SDT theory, including those who currently exercise and those that do not. Markland (1997) includes other instruments for measuring exercise motivation on his webpage[2] and states that researchers are free to use any and all surveys. My survey is a combination of demographics, EMI-2, the Exercise Causality

[2] (http://pages.bangor.ac.uk/~pes004/exercise_motivation/scales.htm).

Orientations Scale, program components, and ranking incentives (see appendix for EMI-2 and the Exercise Causality Orientations Scale). This combination offers an opportunity to gauge the willingness and motivation factors of firefighters who work in a department without a comprehensive program in place. (See appendix for the survey in its entirety)

Demographics

The purpose of the first section, demographics, is to understand the composition of the department. It is important to determine whether the department consists of mostly younger or older members, or a mix along with gender, race, education level, and the number of years on the job. Some departments have age limits, while others do not place limits. Since many departments are dual role (fire and ems), it's important to determine what a member's primary job assignment is.

One of the components of the demographics section is an established and proven exercise questionnaire that quantifies activity based on multiple factors; the five-item physical activity questionnaire (M.-H. Cho, 2016). According to Cho (2016), the questionnaire was evaluated, revised and approved by experts in the field of recreation, physical education and medical services. This questionnaire quantifies an individuals' physical activity level by using metrics, including intensity, frequency, duration, and type of activity. Unique to this scale is that it includes sports/arts and cultural activities/sedentary activities as physical activity in addition to aerobic exercise, flexibility exercises, and muscular exercises, this allows for a very accurate fitness score. The activity level is scored and ranked indicating the following activity levels: "very high level (>96)", "high level (95–64)","acceptable (63–36)", "low level (35–16)", and "inactive level (15–4)." This scale was determined to be very accurate because of its all-inclusive nature on recommended type, duration, intensity, frequency and length, thus being more accurate on the true nature of an individual's physical activity pattern (M.-H. Cho, 2016).

Included within the demographics section are some questions concerning current fitness and health status of members along with an individual's personal values on health. The following questions are all self-reported. Both current health and current fitness level perception is assessed on a 5 point likert scale (excellent/very good/good/fair/poor). Weight perception is on a 9 point likert with 3 values labeled (1=underweight, 5=ideal weight, and 9=overweight). Actual height (inches) and weight (lbs.) are entered into a text box to determine BMI. Nutrition is assessed by asking the frequency of consuming fast food per week in a 5 point likert (Never/1-2 times/3-4 times/5-6 times/7 or more times). The nutrition scale of 0 to 7+ was taken directly from a research study linking the consumption rate of fast food and severity of obesity (Garcia, Sunil, & Hinojosa, 2012). This research study found that the weekly consumption rate of fast food was a key determinant of higher levels of obesity. The data from this question is helpful in possible nutrition education or dietician consult especially if a department proves to have BMI levels well above average. Finally, firefighters are asked about the importance of maintaining a high level of fitness (strength and cardiovascular) and the importance of annual health exams and screenings. Both of these items are on a 5 point likert scale (extremely important/very important/moderately important/slightly important/not at all important).

EMI-2

The second component of my survey is the Exercise Motivations Inventory – 2 (EMI-2). In this popular motivations inventory, participants are asked why they exercise (or might exercise). Everyone has different motivations towards exercise, for some, it may be to lose weight or look better or others it may be for the health benefits. This survey is important to understand the motivations of firefighters within a department in order to implement a program that works best for the majority. For example, if weight loss is important for the majority, then a nutritionist/dietician might prove helpful or perhaps competitive weight loss challenges might provide additional motivation towards weight loss. If members indicate that they want to remain

more agile or become flexible, yoga classes might be a great option and would also aid in injury reduction. Members may also be motivated to exercise to reduce stress/tension, or to "recharge batteries." In this case, members might benefit from a type of yoga class or classes that focus on stress reduction or perhaps mental health professionals can assist.

The EMI-2 is scored (see appendix) for each member, and the results indicate various areas of motivation to include: Stress Management, Revitalization, Enjoyment, Challenge, Social Recognition, Affiliation, Competition, Health Pressures, Ill-Health Avoidance, Positive Health, Weight Management, Appearance, Strength & Endurance, and Nimbleness. By targeting key areas of motivation when implementing the program, it will be better received by the majority of the membership.

The EMI-2 survey consists of 51 questions on a 6 point likert scale ranging from 0 to 5. Only 0 and 5 are labeled on the survey. (0 (Not at all true for me) and 5 (Very true for me). All questions begin with "Personally, I exercise (or might exercise) …" A few examples of the 51 questions are as follows. "To stay slim." "To avoid ill-health." "Because it makes me feel good." "To help me look younger." "To show my worth to others. (see appendix for the EMI-2 scale in its entirety).

ECOS

The Exercise Causality Orientations Scale (survey questions 23-30), includes various scenarios that are scored and will aid in determining how the membership is orientated towards exercise. The three causality orientations are autonomy, control, and impersonal. By determining orientations, membership as a whole can be assessed along with determining how individual groups are orientated. This will allow the creation of a health promotion program that is prescribed for the membership rather than assumed. If, for example, members or particular groups are not autonomous, and are more of the control or impersonal orientation, this indicates that they

might require fitness coaching or a prescribed fitness program rather than being given equipment or membership. This group might benefit more having fitness goals or challenges because they are not "driven" to exercise on their own without direction. This scale is simply another tool to aid in creating a custom program.

The ECOS survey consists of 7 scenarios that all have three statements that can be rated. They are rated on a 7 point likert scale ranging from 1 to 7. Only 1, 4 and 7 are labeled on the survey. (1 (Very unlikely) 4 (Moderately unlikely) and 7 (Very likely). An example of two of the questions are as follows. "You are beginning a new exercise program. You are likely to:" 1. "Attend a structured exercise class where an exercise leader is telling you what to do." 2. "Decide for yourself which type of exercise you would like to complete." 3. "Tag along with your friends and do what they do." Another question example is: "You are asked to keep a record of all the weekly exercise you have completed in an exercise diary. You are likely to view the diary:" 1. As a reminder of how incapable you are at fulfilling the task." 2. As a way to measure your progress and to feel proud of your achievements." 3. "As a way of pressuring yourself to exercise" (see appendix for the ECOS scale in its entirety).

Support for Program Components/Ranking Incentives

The support for program components and ranking incentives are the last two sections of the survey. All questions in the support for program components section include a category entitled "My Department already offers this program/incentive" along with a (1-5) likert scale. This is important because it allows for metropolitan area departments to all utilize a single survey and rank program components even if a particular department has components of a program already in place. The list of offerings and incentive questions from this section originated from a combination of sources. These sources include examination of local department contracts, readings from the literature review and discussions at local health and safety conferences. While

the literature (Linnan et al., 2008; K. J. Smith & Duffy, 2013; Volpp et al., 2008) is mixed on program incentives, this list is comprised of both monetary and non-monetary incentives as supplemental/exploratory measures to see how this sample of firefighters are motivated. The first question in this section (31-1) asks members how likely they would be to support a comprehensive (non-punitive) health/wellness program. Having the support for program components section allows for detailed explanations of each individual component first before abbreviating each incentive for the ranking (final section). First, the department as a whole can rank both program support and incentives. In addition, you can determine how age affects responses, years on the job, health/fitness levels/perception, weight, and BMI. These variables can further be divided into groups (i.e., younger/older or more fit/less fit).

Survey Response

I distributed this survey via email directly from the Union President to all full-time, career firefighters presently employed in an anonymous metropolitan department in the Northeastern United States. The survey was distributed to 445 firefighters. The survey was distributed 5 times over a six week period (May 3, 14, 21 and June 3, 12). 211 firefighters responded to the survey for a response rate of 47.4%. In order to get the best reflection of all members with a 95% confidence interval, I was hoping to have approximately 186-276 returned surveys. This number is based on a similar study on a firefighter cohort that achieved a 52% response rate (Kay et al., 2001). All emails originated directly from the union president with slight variations to the email each time. During the survey, I received word from the union president that two individuals were having difficulty gaining access and filling out the survey. I immediately completed two attempts of the survey (that were deleted) from both a mobile device and a computer, and I could not duplicate the issues. No other complaints or issues were brought to my attention while the survey was open.

Twenty-six of the 211 respondents either failed to complete a significant portion of the survey, or those who completed the entire survey in less than three minutes were eliminated, resulting in 185 usable responses. I created a separate variable to exclude these cases before each analysis. The average response time was calculated in Qualtrics to be 13 ½ minutes. This was calculated by starting with the 185 usable responses and eliminating four responses that were over one hour in duration. Qualtrics continues to count survey time if the browser is left open before completing survey. While, these four respondents answered a significant portion of the survey, it is reasonable to assume that they either left the browser open by accident or had to respond on an emergency call during this time if it was completed at work. If these respondents were included it would have made the average time commitment grossly inaccurate, as these were extreme outliers.

At the close of the survey, only 100 out of the 211 participants requested the incentive. Therefore, I distributed $500 worth of Dunkin Donuts gift cards for the survey incentive. I periodically sent out incentive gift cards as the responses came in. The final incentives were sent out immediately after the survey closed. While the survey was open, I had a meeting and discussed my research with Kathy Crosby-Bell, founder of the Last Call Foundation (https://www.lastcallfoundation.org). She understands the importance of health promotion programs in the fire service and how this research could help in promoting programs to other departments. She offered to fund the incentives for the survey once she received and reviewed my proposal and contingent on board approval. A few weeks later, she advised me that the entire board approved funding for "any and all expenses for my research."

Survey Results

Listed in the table below are the results for the demographics portion of the survey. The results for the remaining three sections of the survey will be discussed within their respective chapters.

TABLE 1
Participant Demographics

Continuous

	Count	Minimum	Maximum	Mean
Age (years)	184	20	60	38.50
Experience (years)	186	0.5	34.0	11.765
Height (inches)	185	57	77	69.87
Weight (lbs)	184	135	300	200.11

Categorical

	Count	Percentage
Gender		
Male	175	94.1%
Female	11	5.9%
Race		
White	147	79%
Black or African American	13	7%
American Indian or Alaska Native	--	--
Asian	3	1.6%
Native Hawaiian or Pacific Islander	--	--
Other	22	11.8%
Primary Job Assignment		
Firefighting	163	87.6%
EMS	23	12.4%
Highest Education Level		
Less than high school	--	--
High School Graduate/GED	25	13.4%
Some college	79	42.5%
2 year degree	33	17.7%
4 year degree	44	23.7%
Graduate degree	5	2.7%
Current health rating		
Excellent	25	13.4%
Very Good	80	43%
Good	71	38.2%
Fair	10	5.4%
Poor	--	--
Average weekly fast food consumption		
Never	76	40.9%
1-2 times	91	48.9%
3-4 times	14	7.5%
5-6 times	4	2.2%
7 or more times	1	0.5%
Current weight rating		
1 - Underweight	--	--
2	--	--
3	1	0.5%
4	8	4.3%
5 - Ideal weight	54	29%
6	43	23.1%

7	57	30.6%
8	12	6.5%
9 - Overweight	11	5.9%
Overall fitness level rating		
Excellent	17	9.1%
Very good	62	33.3%
Good	72	38.7%
Fair	32	17.2%
Poor	3	1.6%
Type of physical activity performed		
Perform all types (aerobic & sports, muscular, and flexibility exercises)	73	39.2%
Perform 2 types of above	69	37.1%
Perform 1 type of above	29	15.6%
Perform arts & crafts	3	1.6%
Sedentary activity	12	6.5%
Frequency performing activity in an average week		
Almost every day	35	18.8%
4-5 days/week	57	30.6%
3 days/week	54	29%
1-2 days/week	30	16.1%
Sometimes	10	5.4%
Intensity of exercise		
Very hard	23	12.4%
Hard	68	36.6%
Moderate	86	46.2%
Light	7	3.8%
Very light	2	1.1%
How long exercise is performed		
More than 150 minutes	6	3.2%
90-120 minutes	26	14%
60-90 minutes	74	39.8%
30-60 minutes	71	38.2%
Less than 30 minutes	8	4.3%
How long have you been performing activity		
More than 5 months	144	77.4%
5-6 months	9	4.8%
3-4 months	16	8.6%
1-2 months	8	4.3%
Less than 1 month	8	4.3%
Importance of firefighters maintaining a high level of fitness (both strength & cardiovascular)		
Extremely important	133	71.5%
Very important	50	26.9%
Moderately important	3	1.6%
Slightly important	--	--
Not at all important	--	--
Importance of annual health exams & screenings for firefighters		
Extremely important	149	80.1%
Very important	30	16.1%
Moderately important	4	2.2%
Slightly important	1	0.5%
Not at all important	2	1.1%

Note: All participants answered the majority of demographic questions however, a small number of participants chose not to disclose their weight, height, race and/or age.

In the following chapter I begin examining in detail how demographics affect willingness to participate in a health promotion program. Specifically, how age and years of service affect willingness. I also examine the literature and theories into why this may be occurring and possible strategies to overcome barriers.

CHAPTER IV

AGE & TIME IN SERVICE AND SUPPORT FOR HEALTH PROMOTION PROGRAMS

Introduction and literature review

The nature of firefighting requires peak physical fitness, mental alertness, and psychological well-being throughout an entire career. Most career departments require members to perform an initial physical agility test in order to qualify for employment. Often, this initial agility test is timed or weighted with only the best of the best accepted when there are hundreds of applicants. The problem that faces most departments is not having a system in place that maintains peak fitness throughout the course of a career.

Health promotion programs are expanding within the private sector to help combat the ever-rising costs of healthcare and to maintain workers' health. Despite numerous studies proving the high return of investment (ROI) in health promotion programs (Chapman, 2012), implementation has lagged throughout the fire service (Kuehl et al., 2013; Staley et al., 2011). This chapter examines

the effect that age and time in service play a role in supporting a health promotion program to understand better why implementation is lagging.

Firefighters are in a unique risk category due to irregular physical exertion, unhealthy diet and shift work, noise exposure, posttraumatic stress disorder and high job demand (Stefanos N Kales et al., 2009). This becomes even more important the longer a firefighter is employed as the natural effects of aging takes its toll on the body. Despite this, physical fitness is frequently only assessed upon entry to most career fire departments. It takes hard work and discipline to physically prepare for initial physical fitness evaluations when applying to fire departments and in many cases during initial training, once accepted. The problem is maintaining this level of fitness after hire and what departments are doing to preserve and promote fitness.

The US Fire Service has noted that the fire service has focused primarily on the acquisition and maintenance of equipment and apparatus and ignoring the health and fitness of those who use it (Poston et al., 2013). In fact, until the last few years, much of the focus on reducing firefighter fatalities has been on equipment or technology improvements, government regulations, and firefighting procedures (Fender, 2003). Fitness and wellness have largely been ignored, perhaps there has been an assumption that having peak fitness is a requirement for job entry and with the type of work performed on a regular basis, fitness levels should naturally remain reasonably constant. It is now apparent that this is not the case.

Increased cancer risks for firefighters have also been noted in numerous studies (Guidotti, 2007; LeMasters et al., 2006). As years on the job increases, and the number of exposures increases, so do the risks of contracting cancer (Youakim, 2006). Wellness programs help reduce cancer risks by promoting nutrition and healthy lifestyles, along with education and routine medical examinations. Proper decontamination techniques and cleaning turnout gear after every exposure are examples of additional ways to reduce risk.

In consideration of the effects of age, the need for fitness and wellness programs becomes even more critical for aging firefighters. While genetics plays a role in health, the natural effects of age can increase cholesterol, blood pressure, and body fat mass (S. C. Davis, Jankovitz, & Rein, 2002). The same research has shown that age decreases aerobic power, muscular strength, endurance, and flexibility.

In order to gauge aerobic power or capacity, a person could either be asked a series of questions to self-report fitness levels or a type of scientific diagnostic test could be performed in a laboratory setting. An example of a scientific test of aerobic capacity is called VO2 Max. This test was used in a research study to examine firefighters aged 20 – 65 years (Sothmann et al., 1990). The purpose of this research was to propose a cutoff for aerobic fitness as levels decline in advanced age. The study utilized firefighters, separated into age groups, performing firefighting tasks and while measuring VO2 Max, analyzing performance. Results indicated that members with "VO2 max between 33.5 – 51.0 ml kg min had a much higher probability of successfully completing a firefighter protocol than firefighters with VO2 Max 26.0 – 33.49" (Sothmann et al., 1990). Surprisingly, results indicated that members over 40 would fail this standard! This is indicative of lifestyle vs. aging, maintaining poor fitness and lack of periodic assessment are contributing factors into why results indicated age 40. Research has shown that high fitness can be maintained well into the sixth decade of life. This research proves that fitness assessments such as VO2 Max and METS score can be successful tools in measuring and motivating fitness along with other commonly used metrics.

These statistics highlight the necessity of starting programs early to promote a lifelong fitness culture with constant education, but also to assist in offering fitness selections that appeal to and are appropriate for each age group. Other research has shown that training can reduce some effects of aging, thus decreasing biological age by as much as 20 years (J.E. Pynes, 1995). For those older firefighters who have been committed to fitness, assessments can prove their

proficiency rather than age. Departments that have a mandatory retirement age could instead choose to utilize physical and psychological tests for retirement decisions (Joan E. Pynes, 1996). This research by Pynes has also shown that age can be a poor predictor of performance and can vary widely from one person to the next.

Age-appropriate fitness goals should be another important consideration. While members are expected to perform strenuous activities regardless of age, it is unreasonable to expect the same from a 20-year-old firefighter as a 55-year-old, even if he/she has the same role. A focus group offering opinions on program implementation suggested that job-relevant and age-graded performance standards were critical to success (Conrad et al., 1994). Also, to increase buy-in from membership, the focus group suggested "grandfathering" older members. While the research did not go into detail about what exactly this meant, there are a few options with this. This could mean to either exempt all existing firefighters or any current firefighters over a certain age from any fitness standards. It could also mean exempting either of these two groups from a requirement to meet a standard but still require them to perform the assessment or that they would not have to complete an evaluation at all. Any willingness or motivation questions such as those mentioned by the previous focus group may be best answered by utilizing a quantitative survey for members of a department without a program in place. Furthermore, results by age group and years on the job would provide a more accurate way to design program policies such as these.

Data

For the purposes of this paper, I examine how age and years of service affect supporting the implementation of a health promotion program. I also examine BMI in respect to support. Specifically, the questions on how important it is for firefighters to maintain a high level of physical fitness, the importance of annual screenings and the likelihood of supporting a comprehensive fitness/wellness program (if it were non-mandatory and non-punitive). Finally, I

examine both fitness and weight satisfaction levels with respect to both younger and older firefighters. This research seeks to further understand how demographics such as age and years on the job affects the willingness to participate in a health/wellness program. My age-related hypotheses are as follows:

H4.1: As age, BMI, and years on the job increases, members are less likely to support the implementation of a fitness/wellness program.

H4.2: Both older firefighters and those with more years on the job and younger and those with less years on the job equally understand the importance of annual health exams and screenings along with maintaining a high level of fitness (both strength and cardiovascular).

H4.3: Younger firefighters are going to have greater satisfaction with current weight and fitness level than older firefighters.

To gain further understanding of why an individual who is younger/older or those with more or fewer years on the job and their willingness to participate in a fitness/wellness program, I also examine motivational theory. Specifically, self-determination theory and exercise motivation theory and how levels of intrinsic and extrinsic motivation influence exercise behavior. SDT is a motivational theory has long been used to help predict and promote physical activity (Deci & Ryan, 1985). A research study was conducted on adults ranging in age from 18 to 51 examining how exercise motivation levels change as adults age (Frederick-Recascino, 2002). The study showed that as age increases, both intrinsic and extrinsic motivation decreases. I would expect similar results from this study to also reflect motivation levels of the firefighting population.

The EMI-2 (Exercise Motivation Inventory vs. 2) was carefully designed and modified to cover all levels of motivation and even can be used for those who do not presently exercise (Ingledew et al., 2008). The survey asks why an individual exercises (or might exercise) utilizing 14 different criteria to include: stress management, revitalization, enjoyment, challenge, social recognition,

affiliation, competition, health pressures, ill-health avoidance, positive health, weight management, appearance, strength & endurance, and nimbleness. This inventory is included in its entirety as part 2 of my survey and will aid in further understanding of why a particular age group or those with more or less years may be willing or unwilling to participate in a comprehensive program.

Additionally, the Exercise Causality Orientations Scale consists of scenarios that seek to determine how an individual is "orientated" to exercise (Rose et al., 2001). The three orientations are autonomy, control, and impersonal. Those that are autonomous are driven on their own to exercise without guidance or control; they prefer freedom. Those who are control orientated prefer to have a prescribed program with controlled routines and goals. Finally, those that are impersonal lack the ability to follow either type and feel as though they will not achieve stated outcomes. This scale is included to provide further insight for departments when designing an initial program. How members are "orientated" to exercise will help guide program selection and show whether there are orientation differences among age groups.

Survey design

This survey was sent to a full-time, career fire department in the northeastern United States. The Oklahoma State University IRB approved the survey in 2019. The department has approximately 445 members, and the response rate was 211 during the six weeks it was available. The survey was conducted using Qualtrics software and was distributed to all members directly from the union presidents' email account. Participation was voluntary, and all participants remained anonymous. An incentive in the form of a $5 Dunkin Donuts gift card was offered to the first 250 respondents; however, only 100 elected to receive the incentive.

The survey took approximate 12-13 minutes to complete and consisted of 4 sections. First, the demographics section is where participants listed age, years on the job, health/fitness levels,

frequency/type of exercise, weight, etc. The second section was EMI-2 (Motivation inventory). The third section was the exercise causality orientation scale.

The final section of the survey was the support and ranking of program offerings and incentives. Respondents were presented with a series of 16 wellness program offerings and asked to indicate whether their department currently offered each incentive or indicate likelihood to support each incentive. The 16 sub-questions were recoded as a new variable to reflect the likert scale only of the support for each individual incentive. This removed the option of whether the department already offers each particular incentive.

Analysis

Once all the data was obtained, I processed my analysis using SPSS statistical software. In order to address the following H4.1 – H4.3, I utilize the following dependent variables. (Q31_1) If your department were to implement a comprehensive (non-punitive) health/wellness program, how likely would you be to support this? A likert scale (1-5), continuous variable. 1 = Extremely likely, 2 = Somewhat likely, 3 = Neither likely nor unlikely, 4 = Somewhat unlikely, 5 = Extremely unlikely. Mean: 1.6181. (Q19) How important is it for firefighters to maintain a high level of fitness (both strength and cardiovascular)? A likert scale (1-5), continuous variable. 1 = Extremely important, 2 = Very important, 3 = Moderately important, 4 = Slightly important, 5 = Not at all important. Mean = 1.30. (Q20) How important are annual health exams and screenings for firefighters? A likert scale (1-5), continuous variable. 1 = Extremely important, 2 = Very important, 3 = Moderately important, 4 = Slightly important, 5 = Not at all important. Mean = 1.26. (Q12) How would you rate your current weight? A likert scale (1-9), continuous variable. Labels only for: 1 = Underweight, 5 = Ideal weight, 9 = Overweight. Mean: 6.22.

(Q13) In general, how would you rate your overall fitness level? A likert scale (1-5), continuous variable. 1 = Excellent, 2 = Very good, 3 = Good, 4 = Fair, 5 = Poor. Mean: 2.69.

The following independent variables are used for analyses in H4.1 – H4.3. (age) What is your current age? A continuous variable. (Range: 40, Minimum: 20, Maximum: 60, Mean: 38.5, Median: 36.0). I then took the median age (36.0) and created the following group (young_old) to represent those above and below the median age.

(Q5) How many years have you been employed as a firefighter on a career department? A continuous variable. (Range: 33.5, Minimum: 0.5, Maximum: 34.0, Mean: 11.765, Median: 7.50). I then took the median number of years (7.50) and created the following group (seven_or_less_years_more_than_seven) to represent those with seven or less years and those with more than seven years.

(BMI) This was calculated using the following two questions. (Q10) What is your height in inches? (ie 5 feet 4 inches = 64). A continuous variable. (Range: 20, Minimum: 57, Maximum: 77, Mean: 69.87). (Q11) What is your current weight in pounds? A continuous variable. (Range: 165, Minimum: 135, Maximum: 300, Mean: 200.11). BMI Formula: 703 x weight (lbs.) / [height (in)]^2 (Range: 28.07, Minimum: 21.7, Maximum: 49.77, Mean: 28.8402).

H4.1: As age, BMI, and years on the job increases, members are less likely to support the implementation of a fitness/wellness program

I performed a bivariate correlation analysis in order to identify the association between the following continuous variables (age, bmi, years, support for implementation), see table 2 below:

TABLE 2

Correlation Matrix

Variable	M	SD	Age	Years on the job	BMI	Support of comprehensive health/wellness program
Age	38.50	10.303	__			
Years on the job	11.765	10.642	.884**	__		
BMI	28.840	4.275	.059	.123	__	
Support of comprehensive health/wellness program	1.618	1.01	.200*	.183*	.149	__

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

With regards to hypothesis 4.1, the correlation matrix shows that both age and years on the job support the hypothesis that as both increase, members are less likely to support implementation of a fitness/wellness program. A positive relationship for age ($r = .200$, $p < .05$) and years ($r = .183$, $p < .05$) with respect to likelihood of supporting implementation. With respect to BMI, the results did not support the hypothesis ($r = .149$, $p > .05$). Meaning, there was no relationship at all between a member's BMI and his/her likelihood of supporting a comprehensive program.

H4.2: Both older firefighters and those with more years on the job and younger and those with less years on the job equally understand the importance of annual health exams and screenings along with maintaining a high level of fitness (both strength and cardiovascular).

For this analysis, I performed two independent samples t-tests using the following variables (Q19: Importance of maintaining high level of fitness and Q20: Importance of annual health exams/screenings) in order to identify the mean differences among the following groups (young_old and seven_or_less_years_more_than_seven), see table 3 and 4 below:

TABLE 3

T-Test Group Statistics – Above and Below Median Age (36) (young_old)

Survey Question	Median age	N	Mean	t	df	Sig. (2-tailed)
Q19 – Importance of maintaining a high level of fitness	Below	90	1.27	-1.009	181.814	.314
	Above	94	1.34	-1.009		.314
Q20 – Importance of annual health exams/screenings	Below	90	1.27	.008	180.769	.994
	Above	94	1.27	.008		.994

TABLE 4

T-Test Group Statistics – Above and Below Median Number of Years on the Job (7.5)

(seven_or_less_years_more_than_seven)

Survey Question	Median age	N	Mean	t	df	Sig. (2-tailed)
Q19 – Importance of maintaining a high level of fitness	Below	93	1.29	-.296	181.584	.767
	Above	93	1.31	-.296		.767
Q20 – Importance of annual health exams/screenings	Below	93	1.34	1.748	146.138	.082
	Above	93	1.18	1.748		.083

With regards to hypothesis 4.2, the t-tests supported the hypothesis, no significant differences exist ($p > .05$). Both older and younger ($t(181.81) = -1.009$, $p > .05$) and those with more and less years on the job ($t(180.77) = .008$, $p > .05$) understand the importance of maintaining a high level of fitness. Both older and younger ($t(181.81) = -1.009$, $p > .05$) and those with more and less years on the job ($t(146.14) = 1.748$, $p > .05$) understand the importance of annual health

exams/screenings. The results from H4.1 and H4.2 start to indicate a disconnect between older members and those with more years on the job compared to younger members and those with less years on the job. This is because despite all groups indicating the importance of maintaining a high level of fitness and the importance of exams and screenings, older members and those with more years on the job are also indicating less of a likelihood to support a health/wellness program.

H4.3: Younger firefighters are going to have greater satisfaction with current weight and fitness level than older firefighters.

For this analysis, I performed an independent samples t-test using the following variables (Q12: How would you rate your current weight? and Q13: How would you rate your overall fitness level?) in order to identify the mean differences among the following group (young_old), see table 5 below:

TABLE 5

T-Test Group Statistics – Above and Below Median Age (36) (young_old)

Survey Question	Median age	N	Mean	t	df	Sig. (2-tailed)
Q12 – How would you rate your current weight?	Below	90	6.03	-2.022	182	.045
	Above	94	6.40	-2.024		.044
Q20 – How would you rate your overall fitness level?	Below	90	2.49	-2.806	182	.006
	Above	94	2.86	-2.811		.005

With regards to hypothesis 4.3, the t-test supported the hypothesis, younger firefighters have greater satisfaction with their weight than older firefighters ($t(182) = -2.2022$, $p < .05$) and

younger firefighters have greater satisfaction with their fitness level than older firefighters (t (182) = -2.806, $p < .01$).

The second section of the survey was the EMI-2 (Exercise Motivation Inventory vs. 2). The purpose of this section was to see how motivation levels were affected by age and how understanding motivation preferences overall can aid in developing a fitness/wellness program.

RQ4.1: Is there a difference in motivation levels between older and younger firefighters?

RQ4.2 How can overall motivation preferences aid in developing fitness/wellness programs?

The EMI-2 survey consists of 51 questions on a 6 point likert scale ranging from 0 to 5. Only 0 and 5 are labeled on the survey. (0 (Not at all true for me) and 5 (Very true for me). All questions begin with "Personally, I exercise (or might exercise) …" A few examples of the 51 questions are as follows. "To stay slim." "To avoid ill-health." "Because it makes me feel good." "To help me look younger." "To show my worth to others. (see appendix for the EMI-2 scale in its entirety). I began by scoring the EMI-2 (motivation index) per the guidelines on the EMI-2 score sheet (see appendix). Each scale has a set of numbers corresponding to associated questions. The mean sum from the corresponding questions was figured to determine a score for each individual for every scale. In this way, EMI-2 scores were unique for each participant. For this analysis, the IV (young_old) was used as in earlier analyses to represent those above and below the median age (36). The dependent variables were positive health, strength & endurance, ill-health avoidance, nimbleness, weight management, revitalization, enjoyment, appearance, stress-management, challenge, competition, health pressures, affiliation and social recognition. Below are all the t-tests results that show a statistically significant difference in means between the two groups, young and old.

TABLE 6

T-Test Group Statistics – Above and Below Median Age (36) (young_old)

Survey Question	Median age	N	Mean	t	df	Sig. (2-tailed)
Positive Health	Below	88	5.28	2.434	175	.016
	Above	89	4.90	2.435		
Strength & Endurance	Below	87	5.39	5.547	171	.000
	Above	86	4.56	5.533		
Nimbleness	Below	87	4.65	2.206	173	.029
	Above	88	4.18	2.208		
Weight Management	Below	86	4.53	2.238	171	.027
	Above	87	4.08	2.239		
Revitalization	Below	86	4.50	2.682	172	.008
	Above	88	3.95	2.683		
Enjoyment	Below	85	4.38	3.110	171	.002
	Above	88	3.66	3.111		
Appearance	Below	86	4.28	2.851	172	.005
	Above	88	3.71	2.855		
Stress Management	Below	87	4.18	2.141	173	.034
	Above	88	3.66	2.139		
Challenge	Below	86	3.97	4.042	171	.000
	Above	87	3.12	4.038		
Competition	Below	87	3.52	3.629	173	.000
	Above	88	2.65	3.626		
Affiliation	Below	87	2.86	2.832	173	.005
	Above	88	2.26	2.829		
Social Recognition	Below	86	2.60	3.194	172	.002
	Above	88	2.01	3.183		

With respect to the EMI-2 scale, every significant relationship for the younger group had a higher mean than the older group. Specifically, the categories included, stress management ($t(173) = 2.141$; $p < .05$), revitalization ($t(172) = 2.682$; $p < .01$), enjoyment ($t(171) = 3.110$; $p < .01$),

challenge (t (171) = 4.042; p < .01), social recognition (t (172) = 3.194; p < .01), affiliation (t (173) = 2.832; p < .01), competition (t (173) = 3.629; p < .01), positive health (t (175) = 2.434; p < .05), weight management (t (171) = 2.238; p < .05), appearance (t (172) = 2.851; p < .01), strength & endurance (t (171) = 5.547; p < .01), and nimbleness (t (173) = 2.206; p < .05). In all of these motivational categories, the younger group was more motivated to work out for all of these reasons than the older group. Not one category was higher for the older group, the only two categories of motivation that was not statistically significant was health pressures and ill-health avoidance. This provides further validation on how age affects willingness to participate.

RQ4.2 How can overall motivation preferences aid in developing fitness/wellness programs?

I then ranked the means of the entire department overall to answer this research question. The following ranked EMI-2 means are unique to this particular department. The statistics listed do not look at associations between variables, it is only intended to illustrate the preferences for this particular department being surveyed. This table provides a useful visual display in descending order to illustrate where an individual department that might utilize this survey stands.

TABLE 7

Mean EMI-2 Scores

	N	Mean	Std. Deviation
EMI-2 – Positive health	179	5.0857	1.04582
EMI-2 – Strength & Endurance	175	4.9829	1.06356
EMI-2 – Ill health avoidance	177	4.9510	1.09065
EMI-2 – Nimbleness	177	4.4087	1.38329
EMI-2 – Weight management	175	4.3000	1.30923
EMI-2 – Revitalization	176	4.2254	1.39535
EMI-2 – Enjoyment	175	4.0171	1.55262

EMI-2 – Appearance	176	3.9815	1.33497
EMI-2 – Stress management	177	3.9251	1.59379
EMI-2 – Challenge	175	3.5400	1.45447
EMI-2 – Competition	177	3.0763	1.63909
EMI-2 – Health pressures	177	2.8927	1.28968
EMI-2 – Affiliation	177	2.5424	1.41884
EMI-2 – Social recognition	176	2.2983	1.24777

Since there are only dependent variables in this analysis, I performed a repeated measures ANOVA in order to ensure that there are statistically significant differences among the means. In this case, the lower-bound test was significant ($t(1.000) = 129.328$; $p < .01$). The mean scores of the entire department reveals how the department as a whole is motivated to exercise. As you can see in the above table, this particular department is more motivated to exercise for health reasons and strength/endurance and what would equate to performance on the job rather than for appearance, social recognition, challenge, competition or other reasons. Understanding the motivation (or lack of) is important when considering program type. For example, a department that places a higher emphasis on challenge/competition/social recognition or affiliation might improve motivation by offering athletic leagues, fitness challenges, or other sponsored events. This particular department surveyed could offer professional/medical guidance on exercising for health purposes or fitness coaching by licensed personal trainers. This survey provided an abundance of important data that fire departments without a comprehensive health promotion program should take note of. The unique component of this survey is how using a survey prior to implementation can aid individual departments in creating a program that would be a "best-fit" for that particular department.

One way of increasing motivation is to offer incentives (Frattaroli et al., 2013; Henke et al., 2011; Linnan et al., 2008). The following two research questions were the reason I included the incentives questions within the survey.

RQ4.3: How does age and years of service affect incentive support?

RQ4.4: What are the important incentives that can be used to promote a fitness program?

For the first analysis, I used (young_old) as my IV, to represent those above and below the median age (36). The dependent variables were all from the last section of the survey, the list of various program offerings and incentives and likelihood of supporting along with the ranking incentives.

For the first list, participants were asked to "indicate how likely you would be to support each health promotion program/incentive." The responses were ranged (1-5) on a likert scale how likely they were to support each. 1= Extremely likely, 2=Somewhat likely, 3=Neither likely nor unlikely, 4=Somewhat unlikely, and 5=Extremely unlikely. The following questions were asked: "If the city contributed towards an Athletic League or competitive fitness challenges, (such as a road race, stair climb, sports league, weight loss challenge or fitness challenge) how likely would you be to participate?" "If the department agreed to purchase new equipment for each station, would you be willing to support?" "If the department offered un-interrupted time for working out on duty (rotating trucks out-of-service for fitness training, with the exception of a fire or major incident), would you be willing to support?" "If the department offered individualized health or fitness coaching, would you be willing to support?" "If the department offered nutritional/dietician training or programs, would you be willing to support?" "If the department offered a smoking cessation program, would you be willing to support?" "If the department offered group fitness programs, would you be willing to support?" "If the department offered gym membership reimbursement, would you be willing to support?" "If the department offered a paid day off to attend an annual wellness check, would you be willing to support this?" "If the department offered bonus vacation days based on fitness scores that are on a graduated scale from passing to excellent, would you be willing to support?" "If the department offered a cash bonus

for meeting a fitness goal or meeting a fitness standard (non-punitive), would you be willing to support?" "If the department offered reduced medical co-pays based on a graduated scale from passing to excellent, would you be willing to support?" "If the department offered a stress management program, would you be willing to support?" "If the department offered a peer-based behavioral health assistance program, would you be willing to support?" "If the department offered a dedicated Fire Department Chaplain that provided spiritual guidance along with a non-peer based option for the behavioral health assistance program, would you be willing to support?"

For the ranking incentives question, participants were asked to "rank the following incentives from most desirable (1) to least desirable (14): (1) City contribution towards Fire Department Athletic League/Competitive fitness challenges, (such as a road race, stair climb, sports leagues, weight loss challenge or fitness challenge). (2) New equipment for each station. (3) Un-interrupted time for working out on duty (rotating trucks out-of-service for fitness training, with the exception of a fire or major incident). (4) Individualized health or fitness coaching. (5) Nutritional/dietician training or programs. (6) Stress management program. (7) Smoking cessation program. (8) Group fitness programs. (9) Gym membership reimbursement. (10) 1 paid day off to attend an annual wellness check. (11) Bonus vacation days based on fitness scores that are on a graduated scale from passing to excellent. (12) Cash bonus for meeting a fitness goal or meeting a fitness standard (non-punitive). (13) Reduced medical co-pays based on a graduated scale from passing to excellent. (14) Behavioral health program.

I performed a t-test in order to determine the mean differences among the groups young and old. The following table indicates those categories that had a statistically significant difference among the age groups.

TABLE 8

T-Test Group Statistics – Above and Below Median Age (36) (young_old)

Survey Question	Median age	N	Mean	t	df	Sig. (2-tailed)
Athletic league contribution	Below	55	1.65	-4.198	124	.000
	Above	71	2.58	-4.363		
New equipment	Below	33	1.24	-2.413	72	.018
	Above	41	1.83	-2.619		
Health/fitness coaching	Below	70	1.54	-2.415	142	.017
	Above	74	1.99	-2.434		
Nutritional/dietician counseling	Below	71	1.31	-3.006	149	.003
	Above	80	1.75	-3.125		
Group fitness	Below	72	1.76	-2.993	145	.003
	Above	75	2.35	-3.011		
Gym reimbursement	Below	71	1.04	-3.599	146	.000
	Above	77	1.53	-3.740		
Paid day off for wellness check	Below	68	1.13	-3.867	142	.000
	Above	76	1.74	-4.050		
Bonus vacation days for fitness score	Below	72	1.42	-4.125	150	.000
	Above	80	2.26	-4.239		
Cash bonus for fitness goal	Below	72	1.15	-4.744	150	.000
	Above	80	2.00	-4.959		
Reduced co-pays	Below	72	1.28	-3.310	149	.001
	Above	79	1.85	-3.401		
Behavioral health	Below	68	1.43	-2.180	142	.031
	Above	76	1.79	-2.227		

With respect for the support for nearly every incentive to include athletic league contribution ($t(124) = -4.198$; $p < .01$), new equipment ($t(72) = -2.413$; $p < .05$), health/fitness coaching (t

(142) = -2.415; p < .05), nutrition/dietitian (t (149) = -3.006; p < .01), group fitness (t (145) = -2.993; p < .01), gym reimbursement (t (146) = - 3.599; p < .01), paid day off for wellness check (t (142) = -3.867; p < .01), bonus vacation days for fitness score (t (150) = -4.125; p < .01), cash bonus for fitness goal (t (150) = -4.744; p < .01), reduced co-pays for fitness score (t (149) = -3.310; p < .01) and behavioral health (t (142) = -2.180; p < .05) all of these incentives were more likely to be supported by younger members vs older members.

I then performed a t-test for the ranking incentives question in order to determine the mean differences among the groups young and old. The following table indicates those categories that had a statistically significant difference among the age groups.

TABLE 9

T-Test Group Statistics – Above and Below Median Age (36) (young_old)

Survey Question	Median age	N	Mean	t	df	Sig. (2-tailed)
Stress management program	Below	66	8.50	2.701	141	.008
	Above	77	6.87	2.685		
One paid day off for wellness check	Below	66	6.73	-1.996	141	.048
	Above	77	7.95	-2.011		

The difference in means for ranking incentives was only significant for 2 out of the 14. This included the paid day off for annual wellness check being more desirable for the younger group compared to the older group (t (141) = -1.996; p < .05). The one standout between the support for incentives question and ranking incentives is the ranking for the stress management program which was ranked as less desirable for younger members and more desirable by older members (t (141) = 2.701; p < .01).

RQ4.4: What are the important incentives that can be used to promote a fitness program?

For this analysis, I simply ranked the responses of both sets of questions by means in ascending order to reflect entire department preferences.

TABLE 10

Likelihood of supporting program incentives

	N	Mean	Std. Deviation
9: Gym membership reimbursement	150	1.3000	.85726
10: Paid day off for wellness check	146	1.4521	.97614
6: Nutritional/dietician training program	153	1.5425	.91757
4: Uninterrupted workout time	152	1.5526	1.11456
3: New equipment purchase	75	1.5600	1.06847
13: Reduced co-pays for fitness score	153	1.5686	1.08679
12: Cash bonus for meeting fitness goal/standard	154	1.5909	1.16940
14: Stress management program	146	1.6096	1.00600
1:Support for comprehensive health/wellness program	144	1.6181	1.01041
5: Health or fitness coaching	146	1.7671	1.11443
11: Bonus vacation days for fitness score	154	1.8506	1.32242
15: Behavioral health assistance program	132	1.9318	1.14046
8: Group fitness programs	149	2.0671	1.42984
7: Smoking cessation program	152	2.0921	1.42984
2: Athletic league or competitive fitness challenges	128	2.1875	1.32064
16: Fire Department Chaplain for spiritual guidance/behavioral health	112	2.4643	1.33510

TABLE 11

Ranking of incentives

	N	Mean	Std. Deviation
9: Gym membership reimbursement	145	4.84	3.591
3: Uninterrupted workout time	145	5.98	4.117
5: Nutritional/dietician training	145	6.34	3.400
13: Reduced co-pays for fitness scores	145	6.36	3.507
12: Cash bonus for fitness goal/standard	145	6.38	4.257
11: Bonus vacation days for fitness score	145	6.46	3.972
10: 1 paid day off for annual wellness check	145	7.38	3.659
6: Stress management program	145	7.61	3.692
4: Health or fitness coaching	145	7.77	3.521
2: New fitness equipment for stations	145	8.20	3.698
1: Athletic league or competitive events	145	8.65	4.058
8: Group fitness programs	145	8.65	3.465
14: Behavioral health program	145	9.20	3.614
7: Smoking cessation program	145	11.19	3.539

For this analysis, there are no independent variables, so I performed a repeated measures ANOVA to ensure that there were statistically significant differences among the means. The analysis was significant in both tests, the lower bound test was ($t(1.000) = 4.278$; $p < .05$) in the likelihood of supporting program incentives and ($t(1.000) = 25.364$; $p < .01$) in the ranking of incentives. What was interesting about the first analysis (table 10) only one direct monetary incentive was in the top 5 (which was the paid day off to attend wellness check) (see tables 6 and 7 below). This analysis showed that monetary incentives aren't necessary components of an effective program. It illustrates now the needs and desires of the membership should be surveyed for program design and these results may prove surprising.

On the ranking incentives test (table 11), all four direct monetary incentives (10: 1 paid day off to attend a wellness check, 11: bonus vacation days based on fitness scores, 12: cash bonus for meeting a fitness goal or standard and, 13: reduced medical co-pays based on fitness scale) did not even rank in the top three on the list of ranking incentives. These results provide even more useful information in order to create a sustainable, effective health promotion program. If, for instance, the department were to focus on the top three ranking choices, gym membership reimbursement, un-interrupted workout time and nutritional/dietician training, it clearly indicates that the members are serious about improving health and performance. These three are also non-monetary options, meaning the members are not opting to receive incentives that result in direct monetary benefits but ones that only serve to enhance their own health and performance. The gym membership reimbursement pays dividends not only in reducing injuries on the fire ground and decreasing costs of injuries and lost wages, but reducing overall medical costs for individuals as well. Un-interrupted workout time is a policy that can work effectively and costs the town/city nothing to implement. Finally, nutritional/dietician training ranking at the top was a surprise, however, with firefighters spending much time in the station and cooking meals on a regular basis, it makes sense because training in healthy cooking is not commonplace. By educating the membership on tips/techniques and ordering healthy food and dieting, this will all add to a health-conscious culture and pay dividends in reducing medical costs long-term.

It is also important to look at the bottom of the ranking as well, in this case, a smoking cessation program is not surprising considering the decrease in smoking rates nationwide, perhaps having a question in the survey determining the number of smokers would provide insight into why this ranked at the bottom of this list. Finally, the behavioral health program ranked 2nd to the bottom; additional information would be needed as to why this ranked so low. Perhaps the behavioral health program in place currently is adequate for the majority, so members ranked this low preference for that reason? With stress management ranking 8th out of 14 in incentives yet this

being a concern in other sections of the survey for the older members, in this case, it may be necessary to skip over some higher-ranking incentives in order to further motivate a particular group.

For my final two analyses, I examined the results of the Exercise Causality Orientations Scale (ECOS).

RQ4.5: Does age have an effect on how firefighters are orientated to exercise?

RQ4.6: How can determining the causality orientation of a department aid in developing fitness/wellness programs?

For these two tests I used the ECOS portion of the survey. These seven questions had three parts to them that participants would indicate how they would react under each situation. For each question they would indicate their response (1-7) on a likert scale. (1) Very unlikely, (4) Moderately likely and (7) Very likely. Please see appendix for the survey containing all seven ECOS questions in their entirety. An example of one of the ECOS questions is as follows. "During an exercise session how hard you are working out is likely to be governed by:" (a) The intensity you have been told to exercise at. (b) What everyone around you is doing. (c) How you are feeling whilst exercising at the intensity you choose. I scored the ECOS according to the instructions provided (see scoring sheet in appendix) and calculated how each participant and the entire department were "orientated" towards exercise. The scores from this portion of the survey reveal three sets of scores "autonomy," "control," and "impersonal." Each of these three dependent variables will be used in answering the final two research questions for this chapter. The independent variable for RQ4.5 is (young_old), to represent those above and below the median age (36). For RQ4.5 I perform an independent samples t-test using the variables "autonomy," "control," and "impersonal" to identify the mean differences among the following groups (young_old), see table 12 below.

TABLE 12

T-Test Group Statistics – Above and Below Median Age (36) (young_old)

Survey Question	Median age	N	Mean	t	df	Sig. (2-tailed)
Autonomy	Below	74	5.58	2.978	155	.003
	Above	83	5.09	3.012		
Control	Below	73	3.53	2.571	153	.011
	Above	82	3.05	2.580		

As you can see in table 12, the Exercise Causality Scale indicated that the younger group was more autonomous than the older group ($t(155) = 2.978$; $p < .01$) and had a greater desire for control than the older group ($t(153) = 2.571$; $p < .05$). Also, the highest rated orientation preference was autonomous for both younger and older firefighters. The t-test for impersonal was not significant (>.05) and was not listed in the table above.

RQ4.6: How can determining the causality orientation of a department aid in developing fitness/wellness programs?

In this final analysis, the repeated measures ANOVA was performed due to the fact that there are no independent variables. This test was performed in order to ensure that there were statistically significant differences among the means of the three dependent variables (autonomy, control and impersonal). The following descriptive means chart represents the results of the Exercise Causality Orientations Scale portion of the survey:

TABLE 13

Mean Exercise Causality Orientations Scale

	N	Mean	Std. Deviation
Autonomy	159	1.71	1.04845
Control	157	3.2675	1.18133
Impersonal	158	2.6817	1.03806

The analysis was significant in the repeated measures ANOVA, the lower bound test was (t (1.000) = 350.474; $p < .01$). The results indicate that the department is primarily orientated towards autonomy. Those with autonomous orientation prefer freedom of choice in exercise versus a prescribed plan or controlled environment. Therefore, having this information is just another tool that can be used in building a program for a department. The primary autonomy orientation, as mentioned previously is not only for the department as a whole but for all of the groups examined (younger/older members). The critical point is to build and introduce a program that is going to engage members and be successful in both the short and long term.

Discussion

The data shows that as age or years on the job increases, satisfaction with weight and fitness level decreases and overall motivation decreases. The data also shows that nearly all members, regardless of age, recognize the importance of fitness and wellness and support health promotion programs. Therefore, it is paramount to create a "culture of fitness" within departments. Younger and more fit firefighters will embrace plans at its onset. The data also shows that merely implementing a program is not enough; there is a disconnect between nearly all members recognizing the importance of programs and a portion of the members with less motivation and less support for a program. Therefore, the program must contain an educational component. The

older, unfit group must also understand why it is important and must be convinced, or the program will inevitably fail.

Educating the membership was an important aspect of many health promotion programs mentioned in numerous studies (Kay et al., 2001; McDonough et al., 2015; O'Donnell, 2013; Joan E. Pynes, 1996) All studies emphasize education as a critical component for program success. Firefighters must be trained as technical athletes, and while learning tactics on the fire ground are essential, the body must be in correct shape in order to perform these tactical maneuvers. The education should be presented in a variety of ways to include a combination of experts, outsiders, and firefighters from other departments. It is essential to include empirical research, and present proven success of programs using statistics on how improving physical fitness and health prevents injuries and decreases the risk of cancer.

This survey serves as a great starting point in implementing a comprehensive health promotion program. It provides valuable information on current fitness, the importance of fitness/wellness, motivation, orientation, and preferences. As seen in the survey conducted, it safe to assume that younger members are going to agree with the benefits and importance of exercise. Older members on departments lacking a comprehensive health promotion program are going to be more reluctant in committing to a comprehensive program. By conducting a survey, you can also reveal the top preferences department-wide for program incentives. Further analyses will indicate how the more reluctant groups might be orientated or may be more motivated to exercise.

In this example, older members were less autonomous than younger members. Therefore, providing an educational component along with coaching would likely make the program more appealing. In addition, by implementing one or more top incentives indicated department-wide, this will further strengthen support and help ease the transition. As indicated in this case study, older members were less interested in any program incentives or offerings with the exception of

the stress management program. Since appealing to the older members would further gain support, offering a stress management program is a way to gain interest for this group.

This research provides insight into the challenges of implementing a program. Even in this example, the program was non-mandatory and non-punitive, and it was clear that older members and those with lower fitness scores still lacked motivation. While every group agreed with the importance of maintaining high fitness and periodic health screenings, the motivation levels were lacking. This is where incentives come into play. Incentives provide and maintain motivation and periodic re-assessment of needs/desires through the feedback of the membership is vital.

Overcoming the hurdle of implementation might be a challenge for some departments. I believe this research has made clear that surveying the members is an important first step before any components are considered. Next, taking the advice of the IAFF and IAFC, implementing a non-mandatory and non-punitive program is going to decrease any fears of failure for members. Providing education to members to prove the worth of the program and providing statistics with success stories is necessary to gain buy-in from those reluctant members. A variety of motivation techniques should be utilized in order to reach the greatest number of members as possible. Finally, collecting data throughout the entire process, continually evaluating, re-assessing, and revising the program must never end.

CHAPTER V

FITNESS LEVELS AND SUPPORT FOR HEALTH PROMOTION PROGRAMS

Introduction and literature review

Firefighting is a unique profession, one that requires peak physical fitness, both strength, and cardiovascular fitness to best meet the demands of the profession. While entry into this profession most often begins with a physical agility test, this is often a one-time requirement, and fitness levels can decrease over time. In order to perform at peak performance throughout a long career, firefighters must work hard to maintain fitness while also combating the forces of aging. The purpose of my research is to gain a deeper understanding of why implementation is lagging in the fire service and how to overcome this. This will be accomplished by examining the demographics of firefighters and their willingness to support such programs.

For some, internal motivation is all that's necessary to maintain fitness. This is not true for all; other forms of motivation are necessary. One form of motivation is a workplace health promotion program; they are becoming increasingly common across the private sector. As a way to

decrease health insurance costs, increase worker health and performance, these programs have a history of proven success. Unfortunately, fire departments, which should have been first to implement such programs, have lagged in implementation. Despite the fact that firefighting has one of the highest injury rates of all professions, it is estimated that only 20-30% of departments have established programs (Kuehl Ks Fau - Elliot et al., 2013; Storer et al., 2014).

An analysis of general workplace wellness programs revealed common themes and cost-savings benefits (Baicker, Cutler, & Song, 2010). First, most programs begin with an employee risk assessment survey. This survey provides valuable information that employers use to tailor a program to fit general needs. This is followed by clinical assessments, including biometrics, to serve as a baseline and to offer individual interventions for those with risk factors. Organizations would most commonly provide educational materials in the form of self-help, individual counseling (if requested) and on-site fitness by trained professionals. Examining health care savings across a number of programs, the average return on investment was $3.27 for every dollar spent (Baicker et al., 2010). These savings represented immediate health care cost savings and did not factor in the potential of long-term savings. Non-monetary benefits listed in the study include improved morale, increased productivity, improved health, and reduction in turnover.

A health promotion program entitled PHLAME (Promoting Healthy Lifestyles: Alternative Models' Effects) was conducted on a group of 599 firefighters (MacKinnon et al., 2010). This trial program was evaluated at several points to investigate the long-term effects of a health promotion program. The program consisted of a peer-based, team learning approach with one-on-one motivational coaching and follow-up testing. The objective was to increase daily servings of fruit and vegetables, increase physical activity, and maintain a healthy weight. The results showed significant improvement in health behaviors and long-term improvement for years following the program.

As far as monetary costs savings for the PHLAME program, another research study compared departments with this program in place with other departments without a program (Kuehl Ks Fau - Elliot et al., 2013). The results indicated a decrease in worker's compensation claims and less of an increase in medical costs compared to other departments. Both of these savings translated to an ROI of every dollar spent on the program resulted in $2 - 6 dollar saved. In addition to this ROI, the costs savings did not include savings from lost workdays, additional overtime costs, and backfill costs.

A report on the keys to the implementation of the PHLAME program was conducted, the critical concepts noted within apply to starting any type of program within the fire service (Kuehl et al., 2013). It was noted that breaking through the culture of resistance to change within the fire service can be difficult. A key suggestion into breaking this barrier is a fire chief who has complete buy-in and an additional firefighter who is willing to champion the program. The research study showed that without these two individuals, the program would not be adopted. It is imperative that evidence-based research is conducted on fire-based fitness-wellness programs among comparably sized non-fire-based organizations to prove effectiveness and thus expand programs to all departments within the US.

Self-determination theory is used in understanding motivation towards exercise (Deci & Ryan, 1985). Both intrinsic and extrinsic factors are reasons for why one engages in physical activity. Intrinsic would be for competence or enjoyment, and extrinsic would be for appearance. Two separate survey tools were developed as a result of self-determination theory. The first is the Exercise Motivations Inventory, version 2 (Ingledew et al., 2008). This tool seeks to understand how individuals are motivated (or might be motivated) to exercise. It utilizes 14 different criteria to understand the area that each person is inclined to exercise. These areas are Affiliation, Appearance, Challenge, Competition, Enjoyment, Health Pressures, Ill-Health Avoidance, Nimbleness, Positive Health, Revitalization, Social Recognition, Strength and Endurance, Stress

Management, and Weight Management. The scale can be used in helping to implement a program that best suits the intended population. The key is gaining support for program implementation and engaging subjects long-term.

The second survey is Causality Orientation Theory which is also derived from Deci and Ryan's Self Determination Theory (Rose et al., 2001). This survey seeks to understand how individuals are "orientated" to exercise (autonomy, control, or impersonal). Individuals may fall under a combination of these orientations; however, the goal is to determine one's dominant orientation. An autonomous individual prefers freedom in choosing exercise programs without control. One that is control orientated prefers more of a set or controlled program. Finally, those that are impersonal are unable to regulate behavior and fail to achieve fitness goals. Again, once the dominant orientation is determined, an exercise program can best match the set of individuals targeted.

A recent poll determined that in the United States, nearly half exercise less than three days per week and only one quarter achieve the recommended 150 minutes per week (Mendes, 2009). Another study conducted on US Military members suggests that members engage in more days of actual physical fitness if they have intrinsic health reasons compared to those exercising for obligatory purposes (to maintain fitness levels for job) (Wilson, Markey, & Markey, 2012). In a separate study on self-determination theory, it was found that body related motives are, on average, not sufficient in maintaining a regular exercise regimen (Richard, Christina, Deborah, Rubio, & Kennon, 1997). The research noted that the key to promoting exercise is finding ways to enhance intrinsic motivation. By conducting a survey, a department can best determine the support (or lack of) for a comprehensive program. Further analysis can determine how demographics, such as fitness levels impact the willingness of supporting. This research is a case study to illustrate how such a survey can be utilized.

Hypotheses and Research Questions

H5.1: Members with a higher activity fitness index are more likely to support the implementation of a fitness/wellness program than members with a lower index.

RQ5.1 Is there a relationship between age and years on the job and fitness scores?

RQ5.2: Is there a difference in motivation levels between those firefighters who have a higher activity fitness index vs those who have a lower index?

RQ5.3: Does fitness level have an effect on how firefighters are orientated to exercise?

RQ5.4: How do fitness levels affect incentive preferences?

Survey Design

The survey consisted of four main components. First, a demographics section, which obtained information such as age, gender, weight, years on the job, perceived fitness level, and importance of fitness and annual screenings. Next, the EMI-2 survey and Exercise Causality Orientations scale, both discussed previously. Finally, a likert scale survey used to indicate support for various program offerings and incentives, concluding with a ranking of incentives by order of preference.

I proceeded to examine how fit firefighters were. The key component of my research included in the demographics section contains an established exercise questionnaire that can be scored and includes all types of exercise, including sports. Many other exercise frequency surveys do not include leisure sports as exercise. The "five-item questionnaire" is a useful scale to explore those firefighters who are more fit compare to those who are less fit. For the purposes of my research, it was more practical to examine fitness scores to determine the current level of fitness from a survey rather than using weight, BMI, perceived weight, or perceived fitness level. I analyzed

responses based upon the participants' level of physical fitness, as measured by the "five-item questionnaire," with higher scaled responses indicating greater physical fitness. Participants were classified as having a high (low) level of physical fitness if they fell above (below) the mean scaled response of 58.2108.

Survey questions 14 -18 come directly from the five-item physical activity questionnaire (M.-H. Cho, 2016). This proven, reliable questionnaire quantifies activity using metrics including intensity, frequency, duration, and type of activity. The activities are divided into five different categories, including aerobic exercise and sports, flexibility exercises, muscular exercises, arts, and cultural activities, and sedentary activities. After the respondent answers all five items, a formula is utilized to determine a physical activity index. According to Cho, 2016, "The maximum and minimum scores are "100" and "4, respectively. The author divided the physical activity index into five categories; "very high level," "high level," "acceptable level," "low active level," and "inactive level." The specific cut-offs used for classification of physical activity index were "very high level (>96)", "high level (95–64)","acceptable (63–36)", "low level (35–16)", and "inactive level (15–4)". Higher scores indicated higher activity levels during their leisure time." I contacted the author about utilizing this formula for my research and clarification on analysis. The author authorized use in this research. The formula is as follows:

The types of physical activity were coded on a five-point point scale:

(5 = performing all types of cardiovascular exercise, resistance exercise & flexibility exercise; 4 = performing two types of physical activity among cardiovascular exercise, resistance exercise & flexibility exercise; 3 = performing one type of physical activity among them; 2 = performing arts & crafts; 1 = sedentary activity).

It was calculated by: score = type of physical activity x (frequency + intensity + duration + overall length)

Analysis

Following is the dependent variable needed to test the hypotheses. (Q31_1) If your department were to implement a comprehensive (non-punitive) health/wellness program, how likely would you be to support this? A likert scale (1-5), continuous variable. 1 = Extremely likely, 2 = Somewhat likely, 3 = Neither likely nor unlikely, 4 = Somewhat unlikely, 5 = Extremely unlikely. Mean: 1.6181.

The following independent variable is used in this analysis. The variable (mean_five_item) which is the mean split of the five-item score (58.2108). Those above this mean labeled "high fitness" and those below labeled "low fitness." The (five-item) fitness score comes directly from survey questions (Q14-Q18), all are likert scale 1-5, continuous variables. See formula above on how (five-item) fitness score is calculated. The five-item fitness questions (and stats) are listed below:

TABLE 14 Five Item Fitness Descriptives

	Count	Percentage	Mean
Q14: Type of physical activity performed			1.99
1: Perform all types (aerobic & sports, muscular, and flexibility exercises)	73	39.2%	
2: Perform 2 types of above	69	37.1%	
3: Perform 1 type of above	29	15.6%	
4: Perform arts & crafts	3	1.6%	
5: Sedentary activity	12	6.5%	
Q15: Frequency performing activity in an average week			2.59
1: Almost every day	35	18.8%	
2: 4-5 days/week	57	30.6%	
3: 3 days/week	54	29%	
4: 1-2 days/week	30	16.1%	
5: Sometimes	10	5.4%	
Q16: Intensity of exercise			2.45
1: Very hard	23	12.4%	
2: Hard	68	36.6%	
3:Moderate	86	46.2%	
4: Light	7	3.8%	
5: Very light	2	1.1%	
Q17: How long exercise is performed			3.26
1: More than 150 minutes	6	3.2%	
2: 90-120 minutes	26	14%	
3: 60-90 minutes	74	39.8%	

4: 30-60 minutes	71	38.2%	
5: Less than 30 minutes	8	4.3%	
Q18: How long have you been performing activity			1.52
1: More than 5 months	144	77.4%	
2: 5-6 months	9	4.8%	
3: 3-4 months	16	8.6%	
4: 1-2 months	8	4.3%	
5: Less than 1 month	8	4.3%	

Once all the data was obtained, I performed my analysis using SPSS statistical software. When I calculated my five-item score, I originally intended to perform the analysis using the author's five categories. However, when I separated into the five categories, I did not have even 1 participant that fell into the "very high" activity category and I had only 22 out of 186 fall into both the "inactive" and "low level" category total. Therefore, I did not have enough statistical power to separate into the five categories. It was at this time I made the decision to do a mean split (58.2108) and create the group variable (mean_five_item).

Hypothesis testing

H5.1: Members with a higher activity fitness index are more likely to support the implementation of a fitness/wellness program than members with a lower index.

For this analysis, I performed an independent samples t-tests using the following variable (Q31_1: Likelihood of supporting the implementation of a fitness/wellness program) in order to identify the mean differences among the following two group variable: Five-item fitness group variable: mean_five_item, see table 9 below:

TABLE 15

T-Test Group Statistics – Mean five item scores

Survey Question	Five Item Mean Score	N	Mean	t	df	Sig. (2-tailed)
Support for comprehensive fitness/wellness program	Below mean (low fitness)	72	1.7917	2.120	141	.036

	Above mean (high fitness)	71	1.4366	2.125	

With regards to hypothesis 5.1, the t-test supported the hypothesis by the mean_five_item t-test (t (141) = 2.120; p < .05). Those members with higher fitness levels were more likely to support the implementation of a fitness/wellness program than those members with lower fitness levels.

Research Question testing

RQ5.1 Is there a relationship between age and years on the job and fitness scores?

For this analysis, I performed a bivariate correlation analysis in order to identify the association between the following continuous variables (age, years on the job, five-item score), see table 16. The variable (five-item) score was explained previously. The variable (age) from the survey question "What is your current age?" A continuous variable. (Range: 40, Minimum: 20, Maximum: 60, Mean: 38.5, Median: 36.0). Finally, the variable (years) from the question "How many years have you been employed as a firefighter on a career department?" A continuous variable. (Range: 33.5, Minimum: 0.5, Maximum: 34.0, Mean: 11.765, Median: 7.50).

TABLE 16

Correlation Matrix

Variable	M	SD	Age	Years on the job	Five-item score
Age	38.50	10.303	__		
Years on the job	11.765	10.642	.884**	__	
Five-item score	58.2108	21.037	-.230**	-.266**	__

**. Correlation is significant at the 0.01 level (2-tailed).

With regards to RQ5.1, the correlation analysis revealed that as both age ($r = -.230$, $p < .01$) and years on the job ($r = -.266$, $n = 185$, $p < .01$) increase, fitness scores decrease. This analysis confirms previous research (Mendes, 2009; Sothmann et al., 1990) on age and fitness levels. It also provides evidence that firefighters need assistance with maintaining fitness for job performance and to decrease risk of injury.

RQ5.2: Is there a difference in motivation levels between those firefighters who have a higher activity fitness index vs those who have a lower index?

I then scored the EMI-2 (motivation index) per the guidelines on the EMI-2 score sheet (see appendix). Each scale has a set of numbers corresponding to associated questions. The mean sum from the corresponding questions was figured to determine a score for each individual for every scale. In this way, EMI-2 scores were unique for each participant, and could be analyzed with respect to the individual's fitness score or group. The purpose of this section was to understand how fitness levels affect motivation preferences. Knowing this can aid in developing a fitness/wellness program.

For this analysis, I again use the independent variable (mean_five_item), which was used in H5.1, which is the mean split of the five-item score (58.2108). Those above this mean labeled "high fitness" and those below labeled "low fitness." The dependent variables were all 14 categories of the EMI-2 motivation index; positive health, strength & endurance, ill-health avoidance, nimbleness, weight management, revitalization, enjoyment, appearance, stress-management, challenge, competition, health pressures, affiliation and social recognition. Below are all the t-tests results that show a statistically significant difference in means between the two groups, low fitness and high fitness.

TABLE 17

T-Test Group Statistics – Mean five item scores

Survey Question	Five Item Mean Score	N	Mean	t	df	Sig. (2-tailed)
Stress management	Below mean (low fitness)	83	3.38	-4.606	174	.000
	Above mean (high fitness)	93	4.43	-4.579		
Revitalization	Below mean (low fitness)	83	3.64	-5.860	173	.000
	Above mean (high fitness)	92	4.77	-5.776		
Enjoyment	Below mean (low fitness)	82	3.24	-7.138	172	.000
	Above mean (high fitness)	92	4.72	-7.070		
Challenge	Below mean (low fitness)	83	3.05	-4.556	172	.000
	Above mean (high fitness)	91	4.00	-4.541		
Affiliation	Below mean (low fitness)	83	2.20	-3.137	174	.002
	Above mean (high fitness)	93	2.86	-3.170		
Competition	Below mean (low fitness)	83	2.75	-2.615	174	.010
	Above mean (high fitness)	93	3.38	-2.622		
Ill-health avoidance	Below mean (low fitness)	83	4.65	-3.628	174	.000
	Above mean (high fitness)	93	5.23	-3.569		
Positive health	Below mean (low fitness)	85	4.68	-5.395	176	.000
	Above mean (high fitness)	93	5.47	-5.302		
Appearance	Below mean (low fitness)	83	3.77	-2.050	173	.042
	Above mean (high fitness)	92	4.18	-2.042		
Strength & endurance	Below mean (low fitness)	83	4.57	-5.200	172	.000
	Above mean (high fitness)	91	5.36	-5.082		
Nimbleness	Below mean (low fitness)	83	4.02	-3.723	174	.000
	Above mean (high fitness)	93	4.77	-3.706		

The t-test results for the EMI-2 scale revealed that every significant relationship for the higher fitness score group had a higher mean than the lower fitness score group. Specifically, the categories included, stress management ($t(174) = -4.606$; $p < .01$), revitalization ($t(173) = -5.860$; $p < .01$), enjoyment ($t(172) = -7.138$; $p < .01$), challenge ($t(172) = -4.556$; $p < .01$),

affiliation (t (174) = -3.137; p < .01, competition (t (174) = -2.615; p = .01), ill health avoidance (t (174) = -3.628; p < .01), positive health (t (176) = -5.395; p < .01), appearance (t (173) = -2.050; p < .05), strength & endurance (t (172) = -5.200; p < .01), and nimbleness (t (174) = -3.723; p < .01). In all of these motivational categories, the better fit group was more motivated to work out for these reasons than the less fit group. Not one category was higher for the low fit group.

I then examined the results from the Exercise Causality Orientations Scale portion of the survey.

RQ5.3: Does fitness level have an effect on how firefighters are orientated to exercise?

To perform this analysis, I used "autonomy," "control," and "impersonal" as my dependent variables. These variables are the scored components of the ECOS section of the survey. The independent variable is the group (mean_five_item), which was used previously and indicates those above (high fitness) and below (low fitness) the mean fitness score (58.2108). For the analysis of RQ5.3, I perform an independent samples t-test using the variables "autonomy," "control," and "impersonal" to identify the mean differences among the following groups (mean_five_item), see table 17 below.

TABLE 18

T-Test Group Statistics – Mean five item scores

Survey Question	Five Item Mean Score	N	Mean	t	df	Sig. (2-tailed)
Autonomy	Below mean (low fitness)	77	5.01	-3.795	156	.000
	Above mean (high fitness)	81	5.62	-3.785		
Impersonal	Below mean (low fitness)	77	2.88	2.359	155	.020
	Above mean (high fitness)	80	2.49	2.361		

As you can see in table 17, the Exercise Causality Scale t-test revealed that those with higher fitness were more "autonomous" than those in the low fitness group ($t(156) = -3.795$; $p < .01$) and those in the low fitness group were more "impersonal" than those in the high fitness group ($t(155) = 2.359$; $p < .05$). Overall, as indicated prior, "autonomy" ranked highest for all members in all groups and the department as a whole. The t-test for "control" was not significant (> .05) and was not listed in the table above. This test, is not surprising, that those with higher fitness would be more autonomous. It does however reaffirm the importance of having health coaching, classes or instruction to aid those who are in the lower fitness category to help progress from impersonal orientation towards more autonomous fitness orientation.

RQ5.4: How do fitness levels affect incentive preferences?

For this final analysis, I seek to understand how a firefighter's current level of fitness affects how they would rank incentives for fitness and wellness programs. Once again, the independent variable is the group (mean_five_item), which indicates those above (high fitness) and below (low fitness) the mean fitness score (58.2108). In this case, the dependent variables come directly from the last question on the survey, where participants are asked to rank (14) incentives in order of preference. For this test, I was seeking to determine if fitness levels caused a statistically significant difference in ranking preferences. I performed an independent samples t-test using these variables in table 18 below.

TABLE 19

T-Test Group Statistics – Mean five item scores

Survey Question	Five Item Mean Score	N	Mean	t	df	Sig. (2-tailed)
Health/Fitness Coaching	Below mean (low fitness)	74	6.93	-3.241	142	.001
	Above mean (high fitness)	70	8.76	-3.248		

The results from this t-test indicate that the only ranking incentive with a significant difference between these two groups is health/fitness coaching, those with low fitness would like to see health/fitness coaching more than those with higher fitness scores ($t(142) = -3.241$; $p < .01$).

Discussion

This case study provides a practical example of how the demographics of firefighters affect the willingness to accept a comprehensive health promotion program. Due to the fact that demographics and policies can vary widely among departments, conducting this survey is a beneficial first step prior to implementation. An important factor to keep in mind is that it was made clear to the participants of the survey that the program was not mandatory and was non-punitive, and still, motivation and willingness was lacking. By first examining the demographics and support, a program can be created that is a "best fit" for the membership it will serve.

Incentives will definitely aid in getting the membership on board, but as seen in this case study, there is a disconnect that exists when all members agree as to the importance of maintaining a high level of health and wellness, yet only a portion are motivated and willing to see a program put into place. Due to the fact that the job demands members be in excellent shape and health, perhaps members feel that any type of program has potential to result in consequences for those that are not in good health or fitness? Other workplaces with health promotion programs are solely in place to aid employees in improving their health by choice; the job does not demand it. It is therefore imperative to aid in convincing the membership that programs like this have achieved tremendous support by firefighters in other departments and with encouraging results. Educating those members who are less motivated due to age or fitness levels is necessary for implementation to be a success.

CHAPTER VI

CONCLUSION

I have attended the Michael Mullane Health, and Safety Symposium put on by the Boston Fire Department for the past four years. These conferences have covered various topics, including the latest gear and equipment, firefighter nutrition, cancer studies, keynote speakers from major incidents, fitness, and tactics. The conference includes medical professionals, academic researchers (including a few that have been referenced in this research), and various other professionals. It serves as a regional conference on firefighter health and wellness. During this time, I have learned all the aspects of the Boston Fire Department's comprehensive health and wellness program. The program began with numerous reports about the high cancer rate of Boston firefighters to include both active and retired members. With the overwhelming support of both the administration and union, the program has evolved over several years, and as a result, has truly transformed the culture of the department. The program includes such components as Navy Seals teaching fitness to both existing members and new recruits, nutritionists traveling to the stations and preparing meals, comprehensive fitness programs, and in-depth annual screenings. As I learned more about the program, I kept wondering why my own department

did not have even one of these components. I started to examine surrounding communities to realize that they either had no program at all or maybe one or two minor components, nothing even resembling a comprehensive program such as Boston Fire.

When initially thinking of my research interest and dissertation topic, as a career firefighter and paramedic, I felt as though the benefits Boston firefighters received from this program needed to expand to other departments as well. Being in the profession for fifteen years, I know how difficult it is for this profession to accept change. I also knew that my research would benefit by sticking to my own discipline (Silverman, 2013). Most of all, I wanted to conduct research that would benefit the profession of firefighting. My wife is a physical education/health teacher, and we are both runners. I have been interested in the topic of fitness/wellness while serving in both the fire service and the military.

The intent of this dissertation was to understand/predict firefighter motivations and willingness in order to promote fitness/wellness programs. By conducting a survey, I was able to focus on barriers towards cooperation and how impacts of demographics (age groups/time on job/fitness levels/current health perception) affect responses. The challenge is to convince members and department administrators that implementation is suitable for all parties involved. This is not easy with closely scrutinized budgets, and any additional cost is difficult to justify. For the members it's a combination of fear of change or fear in being unable to meet fitness expectations or the concern of medical issues being discovered and putting their career in jeopardy (Round & Green, 1998). This final chapter reviews the findings of my case study in Chapters three, four, and five, and the study as a whole. I then discuss the limitations of my research and suggestions for future research. Finally, I close with a discussion on theoretical implications.

The firefighting profession demands peak physical fitness; however, it is common to only have fitness expectations on job entry. Similar to the military, this profession demands a fit force;

however, it does not share the same mandates and discipline to force fitness on its members. The wellness initiative has been gaining momentum in the private industry over the last several years as health care costs have skyrocketed. Companies have realized there are real cost savings, even when offering incentives for fitness due to the reduction in health care costs. As outlined in the literature review, past research has clearly made the case on awareness of increased injury rates, cardiac risks, and cancer rates for firefighters. The fire service stands ready to realize tremendous savings in comparison to the private sector due to the high injury rates and potential savings from worker's compensation, absenteeism, and backfill costs. This topic has also been gaining momentum on a national level as well. The International Association of Firefighters has been pushing for similar programs; even starting its own wellness/fitness initiative to encourage participation.

In Chapter three, I explained the survey and how it was designed and distributed. The first section of the survey, demographics contains important data on the membership of the department. These initial questions include important information such as member's self-perception on current health and fitness status along with initial thoughts on importance of maintaining high fitness and annual exams and screenings. By understanding how the department member's initially feel about this topic and what their current health and fitness status is important in initial consideration of a program.

Chapter four initially examined whether age and years in service had an effect on the willingness to participate in a health promotion program. I hypothesized that as both age and years of service increase, members are less likely to support a program. The survey concluded that younger members were more likely to support a comprehensive program and showed a decreased level of motivation for every category as both age and years of service increase. It was interesting that despite the fact that motivation decreased, both groups understand the importance of maintaining fitness and health. Educating the membership on the value and benefits of fitness and wellness

programs, easing fears on implementation, and providing statistics of successful programs in place will all contribute towards acceptance. In addition, the data provided by the survey will aid in creating a program that is the best fit for the department at this time. Choosing the top preferences, particularly the program offerings or incentives indicated by the group that is less willing or less motivated, will help increase buy-in. Refinement comes over time as feedback from the membership never ends.

In chapter four I also performed supplemental in-depth analysis on multiple sections of the survey, which concluded with a list of incentives that vary in value/cost in order to determine the willingness to accept a program if it were voluntary and non-punitive, with age-based fitness goals. One of my research questions was to determine what incentives can be used to promote health/wellness programs. In this case, direct monetary incentives did not even rank in the top three on the list of ranking incentives. On the "likelihood to support incentives," only one direct monetary incentive was in the top 5 (which was the paid day off to attend wellness check). The survey was able to provide descriptive statistics to determine how members are "orientated" to exercise and how willing they are to participate in various aspects of a comprehensive program. In this way, a specific program can be tailor-made for this department that best suits the membership. Matching member's needs and wants will increase buy-in and further encourage support.

Finally, chapter five examined how fitness levels impacted the willingness to support a health promotion program. Again, the results supported the hypothesis in this case where those with a higher fitness index are more likely to support a program than those with a lower index. More in-depth analysis showed that motivation in every category was higher for those with a higher fitness index. Unique to this analysis, as compared to the older/younger group or more/less time on the job group, is the importance of maintaining fitness. There was a statistically significant difference in responses that those with a lower fitness index rated the importance of maintaining

high levels of fitness lower than those with a higher index. In the previous analysis, both groups gave a high rating for maintaining fitness with no significant difference between the two groups.

By examining the demographics of the membership prior to creating a program, it will help to determine the willingness of the membership at the onset. This case study shows that older members and those with lower fitness levels are going to be more reluctant. Therefore, a department with a greater number of members fitting these criteria is wise to be more cautious in how the program is initially implemented. It may be best to avoid unreasonable expectations for a department. Also, the program should be focused on maximum participation vs. aggressive goals. Keep in mind that in this case study, all participants were made clear that the program was non-mandatory and non-punitive, and still motivation and willingness were lacking.

Limitations

The obvious weakness of my study is the inability to generalize my findings. Ideally, I could have surveyed multiple departments across the country in several different sized departments in various locations. This would have taken considerably more time and resources to do so. Another limitation is having members self-report health and fitness information. I asked members to report satisfaction about health and fitness levels rather than assessing both by medical professionals. Performing evaluations on a large number of members would increase costs drastically. Therefore, I also asked participants to indicate weight and height in order to calculate BMI and included the five item fitness score in addition to straightforward questions on self-reporting current fitness and health levels. In this way, I had multiple metrics to gauge both health and fitness. Also, by making the survey anonymous and surveying a large number of participants, the combination of all these factors help to counter some of the bias of self-reporting.

In spite of these limitations, a positive thing about surveying one department is to examine a single department in-depth. By performing one case study, I was able to illustrate how conducting a survey provides a wealth of information and analyses to start planning for the implementation of a comprehensive program. Not only finding the best fit for members but also giving members a voice in the process. Starting the conversation of wellness and proving to members that the goal is creating a program that best serves the needs of the membership rather than forcing a program without feedback and expecting compliance.

Future Research

Suggestions for further research on the topic of implementation would be to follow a fire department during the implementation process. Researching department(s) pre and post-implementation, in order to see how motivation levels, orientation, and incentives change over time. Research would help to understand how attitudes change following implementation, determining whether or not differences between groups become less or more. Another suggestion would be to add qualitative interview data in gaining perspectives on promoting and implementing programs or adding open-ended questions or suggestions in surveys. Cultural factors, such as "resistance to change" discussed in the literature review, may prove to be a difficult factor to overcome on certain departments (Caffee, 2018; Kuehl Ks Fau - Elliot et al., 2013). This may be especially challenging on departments with a larger proportion of older members.

Current studies do not examine the "true return on investment" on firefighter fitness/wellness programs. A comprehensive long-term, cost/benefit analysis is currently underway on several departments that were initially part of the 1996 IAFF Peer Fitness program. However, it is not clear just how effective these programs are in fire departments. Data such as sick time, injured on duty data, cost of back-filling positions, and medical costs should all be tracked pre/post-

implementation. This is so important in justifying program incentives and to enable program expansion if necessary in the future. By proving that a ROI matches or exceeds those seen in private industry, this will advance implementation in much more expeditious fashion. Additional research on the long-term effects will help to advance the prevalence of fitness and wellness programs further.

While my research is understanding the barriers to implementation, further research could compare programs. Especially those programs that are rich with data and ROI that could best enable departments to adopt model programs to best fit the demographics of its' members. Also, any study should include EMS since they face significant hazards and can benefit from any medical surveillance and treatment program (Yip et al., 2015). A public service organization is going to be much more scrutinized than a corporate company when offering any "extra programs" at taxpayer expense. This should not, however, deter an organization from starting a program. Promoting fitness, offering educational opportunities, nutritional guidance, and increasing awareness does not have to cost a community a substantial amount of money. Offering fitness classes or paying gym membership fees could be provided as part of a future raise.

Theoretical Implications

With respect to self-determination or motivation theory, this research has illustrated that there is a resistance to change in the fire service when it comes to implementing a health promotion program. This case study illustrated how both age and years of service prove to decrease the willingness to accept a comprehensive program. It has also been shown that as individual members become more unfit, it reduces the likelihood of accepting a program. The results from this case study are similar to a study on adults aged 18-51 that showed as age increases, both intrinsic and extrinsic motivation decreases (Frederick-Recascino, 2002). Despite the lack of motivation in this case study, nearly all members share one thing in common, that is the

importance of maintaining a high level of fitness and the importance of annual health screenings for firefighters.

The main issue is the lack of motivation, especially as age increases. This is where creating an effective program that is best suited for the members is paramount. The positive aspect about this study was that the members were more motivated (or would be motivated) for health related reasons, strength and endurance or what would equate to job performance rather than appearance and weight loss. Past studies on self-determination theory have shown that weight management and appearance motives may motivate initially, but are not likely to be sufficient in maintain a long-term exercise regimen (Ingledew et al., 2008; Richard et al., 1997). Past motivational studies have indicated that finding ways to motivate that include affiliation, competition and challenge may prove to be better in both increasing and maintaining physical activity levels (D. Cho et al., 2016; Mabry et al., 2013). It was noted that the competitive culture and teamwork approach that is common within the fire service would prove to be an added benefit when exercise is promoted in this fashion.

This research has added to exercise motivation theories and firefighter exercise motivation specifically. This research indicates that firefighters recognize the importance of high fitness, but require assistance with maintaining fitness long-term, especially as motivation levels decline with age. Several past studies have indicated that the key to long-term adherence is education, health promotion and variation in program elements over time (Kay et al., 2001; O'Donnell, 2013; Joan E. Pynes, 1996). This study also proves that it does not require expensive incentives to motivate. Simple, no cost to low-cost incentives or offerings may be all that's needed when building a program. As a firefighter myself, I started with an expectation that it would require monetary incentives in order to get the greatest number of people on board. I was quite surprised to find that members chose other non-monetary incentives and offerings and generally showed that the

ranking of motivation was aimed more at improving health and fitness rather than appearance or other extrinsic reasons.

Firefighters have an expectation that the community they work for will provide and maintain equipment, including safety equipment, to best protect its' members. Equally, city and town administrators and the taxpayers should expect its' firefighters to maintain their health and fitness to be ready to respond to any emergency adequately. I agree with the US Fire Service statement that too often, the focus has been on equipment and apparatus ignoring the fitness and health of those members that utilize it (Poston et al., 2013). The focus is on technology and tactics instead of health and wellness (Fender, 2003). The truth is that the fire service is an industry that demands excellent fitness, not only for peak performance but in avoiding injuries, decreasing stress, and longevity post-retirement. With the proof that health promotion programs work, the savings potential far exceeds the cost of a comprehensive program. The fire service industry is long overdue for implementation.

REFERENCES

Abel, M. G., Palmer, T. G., & Trubee, N. (2015). Exercise Program Design for Structural Firefighters. *Strength & Conditioning Journal, 37*(4), 8-19.

Abel, M. G., Sell, K., & Dennison, K. (2011). Design and implementation of fitness programs for firefighters. *Strength & Conditioning Journal, 33*(4), 31-42.

Aldana, S. G., Merrill, R. M., Price, K., Hardy, A., & Hager, R. (2005). Financial impact of a comprehensive multisite workplace health promotion program. *Preventive medicine, 40*(2), 131-137.

Baicker, K., Cutler, D., & Song, Z. (2010). Workplace wellness programs can generate savings. *Health affairs, 29*(2), 304-311.

Bentley, M. A., Shoben, A., & Levine, R. (2016). The demographics and education of emergency medical services (EMS) professionals: a national longitudinal investigation. *Prehospital and Disaster Medicine, 31*(S1), S18-S29.

Berry, L., Mirabito, A. M., & Baun, W. B. (2010). What's the hard return on employee wellness programs?

Bjerke, W. (2011). Health and Fitness Programs for Firefighters. *Strength and Conditioning Journal, 33*(2), 55-57. Retrieved from http://argo.library.okstate.edu/login?url=http://search.proquest.com/docview/877651561?accountid=4117

Bolstad-Johnson, D. M., Burgess, J. L., Crutchfield, C. D., Storment, S., & et al. (2000). Characterization of firefighter exposures during fire overhaul. *AIHAJ, 61*(5), 636-641. Retrieved from http://argo.library.okstate.edu/login?url=http://search.proquest.com/docview/236335635?accountid=4117

Cady, J. L., Thomas, P. C., & Karwasky, R. J. (1985). Program for increasing health and physical fitness of fire fighters. *Journal of occupational medicine.: official publication of the Industrial Medical Association, 27*(2), 110-114.

Cady, L. D., Bischoff, D. P., O'connell, E. R., Thomas, P. C., & Allan, J. H. (1979). Strength and fitness and subsequent back injuries in firefighters. *Journal of occupational medicine.: official publication of the Industrial Medical Association, 21*(4), 269-272.

Caffee, B. (2018). *Firefighter Occupational Cancer Risk Adjustment.*

Chapman, L. S. (2012). Meta-evaluation of worksite health promotion economic return studies: 2012 update. *American Journal of Health Promotion, 26*(4), 1-12.

Cho, D., Beck, S. J. J. o. t. O. A. f. H., Physical Education, Recreation,, & Dance. (2016). Competitive Physical Activity Participation: Effect on Motivation of International College Students. *53*(3), 63-70.

Cho, M.-H. (2016). Preliminary reliability of the five item physical activity questionnaire. *Journal of physical therapy science, 28*(12), 3393-3397.

Cobanoglu, C., & Cobanoglu, N. (2003). The effect of incentives in web surveys: application and ethical considerations. *International Journal of Market Research, 45*(4), 1-13.

Conrad, K. M., Batch, G. I., Reichelt, P. A., Muran, S., & Oh, K. (1994). Musculoskeletal injuries in the fire service: Views from a focus group study. *AAOHN journal, 42*(12), 572-581.

Crill, M. T., & Hostler, D. (2005). Back strength and flexibility of EMS providers in practicing prehospital providers. *Journal of occupational rehabilitation, 15*(2), 105-111.

Davis, L. (2003). Are you fighting fit? *Occupational Health, 55*(4), 20-21. Retrieved from http://argo.library.okstate.edu/login?url=http://search.proquest.com/docview/207359649?accountid=4117

Davis, S. C., Jankovitz, K. Z., & Rein, S. (2002). Physical fitness and cardiac risk factors of professional firefighters across the career span. *Research Quarterly for Exercise and Sport, 73*(3), 363-370. Retrieved from http://argo.library.okstate.edu/login?url=http://search.proquest.com/docview/218499818?accountid=4117

Deci, E., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*: Springer Science & Business Media.

Dennison, K. J., Mullineaux, D. R., Yates, J. W., & Abel, M. G. (2012). The effect of fatigue and training status on firefighter performance. *The Journal of Strength & Conditioning Research, 26*(4), 1101-1109.

Deslandes, A., Moraes, H., Ferreira, C., Veiga, H., Silveira, H., Mouta, R., . . . Laks, J. (2009). Exercise and mental health: many reasons to move. *Neuropsychobiology, 59*(4), 191-198.

Dezelan, L. (1997). Labor and management efforts to improve the health of firefighters. *Public Management, 79*(8), 20.

Dueñas-Laita, A., Peréz-Castrillón, J. L., Ruiz-Mambrilla, M., Raymond, L. W., Barringer, T. A., Konen, J. C., . . . Christiani, D. C. (2007). Heart Disease Deaths among Firefighters. *The New England Journal of Medicine, 356*(24), 2535-2537. doi:http://dx.doi.org/10.1056/NEJMc071117

Eng, J., Moy, F., & Bulgiba, A. (2016). Impact of a workplace health promotion program on employees' blood pressure in a public university. *PloS one, 11*(2), e0148307.

FASS, B. (2013). STARTING A FIREFIGHTER FITNESS PROGRAM. *TSAC REPORT*, 5.

Fender, D. L. (2003). Controlling risk taking among firefighters. *Professional Safety, 48*(7), 14-14. Retrieved from

http://argo.library.okstate.edu/login?url=http://search.proquest.com/docview/200389975?accountid=4117

Fortier, M. S., Duda, J. L., Guerin, E., Teixeira, P. J. J. I. J. o. B. N., & Activity, P. (2012). Promoting physical activity: development and testing of self-determination theory-based interventions. *9*(1), 20.

Frattaroli, S., Pollack, K. M., Bailey, M., Schafer, H., Cheskin, L. J., & Holtgrave, D. R. (2013). Working inside the firehouse: developing a participant-driven intervention to enhance health-promoting behaviors. *Health promotion practice, 14*(3), 451-458.

Frederick-Recascino, C. M. (2002). Self-determination theory and participation motivation research in the sport and exercise domain. *Handbook of self-determination research, 277*.

Garcia, G., Sunil, T. S., & Hinojosa, P. (2012). The fast food and obesity link: consumption patterns and severity of obesity. *Obesity surgery, 22*(5), 810-818.

Goetzel, R. Z., & Ozminkowski, R. J. (2008). The health and cost benefits of work site health-promotion programs. *Annu. Rev. Public Health, 29*, 303-323.

Goetzel, R. Z., & Pronk, N. P. (2010). Worksite health promotion: how much do we really know about what works? *American journal of preventive medicine, 38*(2), S223-S225.

Griffin, S. C., Regan, T. L., Harber, P., Lutz, E. A., Hu, C., Peate, W. F., & Burgess, J. L. (2016). Evaluation of a fitness intervention for new firefighters: injury reduction and economic benefits. *Injury prevention, 22*(3), 181-188.

Guidotti, T. L. (2007). Evaluating causality for occupational cancers: the example of firefighters. *Occupational medicine, 57*(7), 466-471.

Halbesleben, J. R. (2009). The influence of shift work on emotional exhaustion in firefighters: The role of work-family conflict and social support. *International Journal of Workplace Health Management, 2*(2), 115-130.

Heinrich, K. M., Jitnarin, N., Suminski, R. R., Berkel, L., Hunter, C. M., Alvarez, L., . . . Haddock, C. K. (2008). Obesity classification in military personnel: a comparison of

body fat, waist circumference, and body mass index measurements. *Military medicine, 173*(1), 67-73.

Henke, R. M., Goetzel, R. Z., McHugh, J., & Isaac, F. (2011). Recent experience in health promotion at Johnson & Johnson: lower health spending, strong return on investment. *Health affairs, 30*(3), 490-499.

Hilyer, J. C., Brown, K. C., Sirles, A. T., & Peoples, L. (1990). A flexibility intervention to reduce the incidence and severity of joint injuries among municipal firefighters. *Journal of occupational medicine.: official publication of the Industrial Medical Association, 32*(7), 631-637.

Hofman, J. (2015). Health concerns with the fire service and the benefits of a health and wellness program for a fire department. *Strength & Conditioning Journal, 37*(4), 69-73.

Hogya, P. T., & Ellis, L. (1990). Evaluation of the injury profile of personnel in a busy urban EMS system. *The American journal of emergency medicine, 8*(4), 308-311.

Ingledew, D. K., Markland, D. J. P., & Health. (2008). The role of motives in exercise participation. *23*(7), 807-828.

Jahnke, S. A., Poston, W. S. C., Haddock, C. K., & Jitnarin, N. (2013). Injury among a population based sample of career firefighters in the central USA. *Injury prevention, 19*(6), 393-398.

Kales, S. N., Soteriades, E. S., Christophi, C. A., & Christiani, D. C. (2007). Emergency duties and deaths from heart disease among firefighters in the United States. *New England Journal of Medicine, 356*(12), 1207-1215.

Kales, S. N., Tsismenakis, A. J., Zhang, C., & Soteriades, E. S. (2009). Blood pressure in firefighters, police officers, and other emergency responders. *American journal of hypertension, 22*(1), 11-20.

Kay, B. F., Lund, M. M., Taylor, P. N., & Herbold, N. H. (2001). Assessment of firefighters' cardiovascular disease-related knowledge and behaviors. *American Dietetic Association. Journal of the American Dietetic Association, 101*(7), 807-809. Retrieved from

http://argo.library.okstate.edu/login?url=http://search.proquest.com/docview/218448400?accountid=4117

Kuehl, H., Mabry, L., Elliot, D. L., Kuehl, K. S., & Favorite, K. C. (2013). Factors in Adoption of a Fire Department Wellness Program: Champ and Chief Model. *Journal of occupational and environmental medicine/American College of Occupational and Environmental Medicine, 55*(4), 424.

Kuehl Ks Fau - Elliot, D. L., Elliot Dl Fau - Goldberg, L., Goldberg L Fau - Moe, E. L., Moe El Fau - Perrier, E., Perrier E Fau - Smith, J., & Smith, J. (2013). Economic benefit of the PHLAME wellness programme on firefighter injury. (1471-8405 (Electronic)). doi:D - NLM: PMC3617369 [Available on 04/01/14] EDAT- 2013/02/19 06:00 MHDA- 2013/02/19 06:00 CRDT- 2013/02/19 06:00 PMCR- 2014/04/01 00:00 PHST- 2013/02/15 [aheadofprint] AID - kqs232 [pii] AID - 10.1093/occmed/kqs232 [doi] PST - ppublish

Kushi, L. H., Doyle, C., McCullough, M., Rock, C. L., Demark-Wahnefried, W., Bandera, E. V., . . . Gansler, T. (2012). American Cancer Society Guidelines on nutrition and physical activity for cancer prevention: reducing the risk of cancer with healthy food choices and physical activity. *CA: a cancer journal for clinicians, 62*(1), 30-67.

Lee, D. J., Fleming, L. E., Gomez-Marín, O., & LeBlanc, W. (2004). Risk of Hospitalization Among Firefighters: The National Health Interview Survey, 1986-1994. *American Journal of Public Health, 94*(11), 1938-1939. Retrieved from http://argo.library.okstate.edu/login?url=http://search.proquest.com/docview/215094430?accountid=4117

Leffer, M., & Grizzell, T. (2010). Implementation of a physician-organized wellness regime (POWR) enforcing the 2007 NFPA standard 1582: injury rate reduction and associated cost savings. *Journal of occupational and environmental medicine, 52*(3), 336-339.

LeMasters, G. K., Genaidy, A. M., Succop, P., Deddens, J., Sobeih, T., Barriera-Viruet, H., . . . Lockey, J. (2006). Cancer risk among firefighters: a review and meta-analysis of 32 studies. *Journal of occupational and environmental medicine, 48*(11), 1189-1202.

Linnan, L., Bowling, M., Childress, J., Lindsay, G., Blakey, C., Pronk, S., . . . Royall, P. (2008). Results of the 2004 national worksite health promotion survey. *American Journal of Public Health, 98*(8), 1503-1509.

Mabry, L., Elliot, D. L., MacKinnon, D. P., Thoemmes, F., & Kuehl, K. S. (2013). Understanding the Durability of a Fire Department Wellness Program. *American Journal of Health Behavior, 37*(5), 693-702. doi:10.5993/AJHB.37.5.13

MacKinnon, D. P., Elliot, D. L., Thoemmes, F., Kuehl, K. S., Moe, E. L., Goldberg, L., . . . Ranby, K. W. (2010). Long-term effects of a worksite health promotion program for firefighters. *American Journal of Health Behavior, 34*(6), 695-706.

Maguire, B. J., Hunting, K. L., Smith, G. S., & Levick, N. R. (2002). Occupational fatalities in emergency medical services: a hidden crisis. *Annals of emergency medicine, 40*(6), 625-632.

Markland, D., & Ingledew, D. K. J. B. J. o. H. P. (1997). The measurement of exercise motives: Factorial validity and invariance across gender of a revised Exercise Motivations Inventory. *2*(4), 361-376.

McDonough, S. L., Phillips, J. S., & Twilbeck, T. J. (2015). Determining best practices to reduce occupational health risks in firefighters. *The Journal of Strength & Conditioning Research, 29*(7), 2041-2044.

Mendes, E. (2009). In the US, nearly half exercise less than three days a week. *Gallup Wellbeing*.

Naydeck, B. L., Pearson, J. A., Ozminkowski, R. J., Day, B. T., & Goetzel, R. Z. (2008). The impact of the highmark employee wellness programs on 4-year healthcare costs. *Journal of occupational and environmental medicine, 50*(2), 146-156.

O'Donnell, M. (2013). Does workplace health promotion work or not? Are you sure you really want to know the truth? *American journal of health promotion: AJHP, 28*(1), iv.

Oglesbee, S., Riss, D., Ernst, A. A., Weiss, S. J., Brady, W. H., Brady, N. W., & Otero, S. L. (2015). A program to improve health among prehospital providers. *The American journal of emergency medicine, 33*(4), 590-592.

Osilla, K. C., Van, K. B., Schnyer, C., Larkin, J. W., Eibner, C., & Mattke, S. (2012). Systematic review of the impact of worksite wellness programs. *The American journal of managed care, 18*(2), e68-81.

Patterson, P. D., Smith, K. J., & Hostler, D. (2016). Cost-effectiveness of workplace wellness to prevent cardiovascular events among US firefighters. *BMC cardiovascular disorders, 16*(1), 229.

Plat, M. C. J., Frings-Dresen, M. H. W., & Sluiter, J. K. (2012). Diminished health status in firefighters. *Ergonomics, 55*(9), 1119-1122.

Poston, W. S., Haddock, C. K., Jahnke, S. A., Jitnarin, N., & Day, R. S. (2013). An examination of the benefits of health promotion programs for the national fire service. *BMC Public Health, 13*(1), 805.

Poston, W. S., Haddock, C. K., Jahnke, S. A., Jitnarin, N., Tuley, B. C., & Kales, S. N. (2011). The prevalence of overweight, obesity, and substandard fitness in a population-based firefighter cohort. *Journal of occupational and environmental medicine, 53*(3), 266-273.

Pynes, J. E. (1995). The ADEA and its exemptions on the mandatory retirement provisions for firefighters. *Review of Public Personnel Administration, 15*(2), 34-45.

Pynes, J. E. (1996). Implementing health and fitness programs for firefighters. *Public Personnel Management, 25*(2), 237. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=f5h&AN=9608052632&site=ehost-live

Reichelt, P. A., & Conrad, K. M. (1995). Musculoskeletal injury: ergonomics and physical fitness in firefighters. *Occupational medicine (Philadelphia, Pa.), 10*(4), 735-746.

Richard, M., Christina, M. F., Deborah, L. S., Rubio, N., & Kennon, M. S. (1997). Intrinsic motivation and exercise adherence. *Int J Sport Psychol, 28*(4), 335-354.

Rose, E. A., Markland, D., & Parfitt, G. J. J. o. S. S. (2001). The development and initial validation of the Exercise Causality Orientations Scale. *19*(6), 445-462.

Round, A., & Green, D. (1998). Can money motivate firefighters to exercise?

Shaw, M. J., Beebe, T. J., Jensen, H. L., & Adlis, S. A. (2001). The use of monetary incentives in a community survey: impact on response rates, data quality, and cost. *Health services research, 35*(6), 1339.

Silverman, D. (2013). *Doing qualitative research: A practical handbook*: SAGE Publications Limited.

Smith, D. L. (2011). Firefighter fitness: improving performance and preventing injuries and fatalities. *Current sports medicine reports, 10*(3), 167-172.

Smith, K. J., & Duffy, R. (2013). Avoiding the Legal Pitfalls in Designing and Implementing Employee Wellness Programs. *Employment Relations Today, 39*(4), 81-88. doi:10.1002/ert.21393

Soteriades, E. S., Hauser, R., Kawachi, I., Christiani, D. C., & Kales, S. N. (2008). Obesity and risk of job disability in male firefighters. *Occupational medicine, 58*(4), 245-250.

Sothmann, M. S., Saupe, K. W., Jasenof, D., Blaney, J., Fuhrman, S. D., Woulfe, T., . . . Landy, F. J. (1990). Advancing age and the cardiorespiratory stress of fire suppression: determining a minimum standard for aerobic fitness. *Human performance, 3*(4), 217-236.

Spratlin, K. (2011). Firefighter Obesity: A Public Safety Risk. *Fire Engineering, 164*(1), 20-26.

Staley, J. A., Weiner, B., & Linnan, L. (2011). Firefighter Fitness, Coronary Heart Disease, and Sudden Cardiac Death Risk. *American Journal of Health Behavior, 35*(5), 603-617.

Stave, G. M., Muchmore, L., & Gardner, H. (2003). Quantifiable impact of the contract for health and wellness: health behaviors, health care costs, disability, and workers' compensation. *Journal of occupational and environmental medicine, 45*(2), 109-117.

Stilwell, J., & Stilwell, P. (1984). Sickness absence in an ambulance service. *Occupational medicine, 34*(3), 96-99.

Storer, T. W., Dolezal, B. A., Abrazado, M. L., Smith, D. L., Batalin, M. A., Tseng, C.-H., . . . Group, P. S. (2014). Firefighter health and fitness assessment: a call to action. *The Journal of Strength & Conditioning Research, 28*(3), 661-671.

Studnek, J. R., Crawford, J. M., Wilkins, J., & Pennell, M. L. (2010). Back problems among emergency medical services professionals: The LEADS health and wellness follow-up study. *American journal of industrial medicine, 53*(1), 12-22.

Taylor, J., Phillips, J., & Hall, B. (2012). The History and Impact of Presumptive Disability Laws for Firefighters. *At Work in The World*, 178.

Volpp, K. G., John, L. K., Troxel, A. B., Norton, L., Fassbender, J., & Loewenstein, G. (2008). Financial incentive–based approaches for weight loss: a randomized trial. *Jama, 300*(22), 2631-2637.

Walton, S. M., Conrad, K. M., Furner, S. E., & Samo, D. G. (2003). Cause, type, and workers' compensation costs of injury to fire fighters. *American journal of industrial medicine, 43*(4), 454-458.

Wilson, J. N., Markey, C. N., & Markey, P. M. (2012). Fitness correlates of obligatory versus health motives for exercise: An examination of men in the military. *Psychology of Sport and Exercise, 13*(4), 371-377.

Winter, F. D., Seals, N., Martin, J., & Russell, B. (2010). *Implementation of the first wellness-fitness evaluation for the Dallas Fire-Rescue Department.* Paper presented at the Baylor University Medical Center Proceedings.

Yip, J., Zeig-Owens, R., Webber, M. P., Kablanian, A., Hall, C. B., Vossbrinck, M., . . . Kelly, K. J. (2015). World Trade Center-related physical and mental health burden among New York City Fire Department emergency medical service workers. *Occupational and environmental medicine*, oemed-2014-102601.

Youakim, S. (2006). Risk of Cancer Among Firefighters: A Quantitative Review of Selected Malignancies. *Archives of Environmental & Occupational Health, 61*(5), 223-231. Retrieved from http://argo.library.okstate.edu/login?url=http://search.proquest.com/docview/201280958?accountid=4117

APPENDICES

The Exercise Motivations Inventory - 2 (EMI-2)

Scoring Key

Scale scores are obtained by calculating m eans of the appropriate items

Scale	Items			
Stress Management	**6**	**20**	**34**	**46**
Revitalisation	**3**	**17**	**31**	
Enjoyment	**9**	**23**	**37**	**48**
Challenge	**14**	**28**	**42**	**51**
Social Recognition	**5**	**19**	**33**	**45**
Affiliation	**10**	**24**	**38**	**49**
Competition	**12**	**26**	**40**	**50**
Health Pressures	**11**	**25**	**39**	
Ill-Health Avoidance	**2**	**16**	**30**	
Positive Health	**7**	**21**	**35**	
Weight Management	**1**	**15**	**29**	**43**
Appearance	**4**	**18**	**32**	**44**
Strength & Endurance	**8**	**22**	**36**	**47**
Nimbleness	**13**	**27**	**41**	

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Exercise Motivation Measurement

The Exercise Causality Orientations Scale

Scoring the ECOS

Causality orientations theory adopts a multidimensional view of personality. Thus individuals are not categorised according to types (e.g autonomy oriented versus control oriented). Instead individuals can be profiled according to the strength of each orientation that they exhibit. Thus scores are derived for each orientation. The strength of each orientation is calculated by summing scores on each orientation item response as follows:

Scenario	Autonomy	Control	Impersonal
1	Item 2	Item 1	Item 3
2	Item 2	Item 3	Item 1
3	Item 2	Item 1	Item 3
4	Item 3	Item 1	Item 2
5	Item 1	Item 2	Item 3
6	Item 2	Item 1	Item 3
7	Item 3	Item 1	Item 2

Although Deci and Ryan (1985b) have argued against employing a typological approach to causality orientations, Koestner and Zuckerman (1994) have argued that it may be appropriate to classify individuals according to their predominant orientation. They suggested that this can be achieved by standardising respondents' scores on the the three orientations and then classifying individuals to groups according to the following schema:

Autonomous: z autonomy > z control AND z autonomy > z impersonal
Controlled: z control > z autonomy AND z control > z impersonal
Impersonal: z impersonal > z autonomy AND z impersonal > z control

Researchers might find this method more appropriate than the dimensional approach in some circumstances.

Firefighter Health Promotion Survey

Start of Block: Consent

Q1 Oklahoma State University
Fire and Emergency Management Program

CONSENT FORM
Fire Department Fitness/Wellness Program Implementation

Background Information
You are invited to be in a research study of fire department fitness/wellness program implementation. We ask that you read this form and ask any questions you may have before agreeing to be in the study. Your participation in this research is voluntary. There is no penalty for refusal to participate, and you are free to withdraw your consent and participation in this project at any time. You can skip any questions that make you uncomfortable and can stop the survey at any time. Your decision whether or not to participate in this study will not affect your employment at all. The purpose of this study is to understand firefighter's motivations toward fitness, how demographics affect responses and to gauge willingness in participating in a non-mandatory, non-punitive health promotion program.

This study is being conducted by: Ryan Devine, full time, union firefighter/paramedic in a neighboring community and also a PhD student at Oklahoma State University, under the direction of my adviser Dr Haley Murphy, College of Engineering and Technology, Oklahoma State University.

Procedures
If you agree to be in this study, we would ask you to do the following things: Provide honest answers to the following survey questions.

Participation in the study involves the following time commitment: Estimated survey time required 12-13 minutes.

Compensation

If you are one of the first 250 participants to complete the survey, the final question will ask if you'd like to receive a free $5 Dunkin Donuts gift card. If you would like to, you must click a separate link to enter your name and contact information in order to receive.

Confidentiality

The information your give in the study will be anonymous. This means that your name will not be collected or linked to the data in any way. The researchers will not be able to remove your data from the dataset once your participation is complete. We will collect your information through the online survey in Qualtrics and will be further analyzed using SPSS Statistical Software. The data will be stored on my personal computer and again, there will be no way to link data to any specific participant. This data will be used to aid career fire departments in implementing health promotion programs that are based on member's feedback and have the best chance in lasting long-term. The research team works to ensure confidentiality to the degree permitted by technology. It is possible, although unlikely, that unauthorized individuals could gain access to your responses because you are responding online. However, your participation in this online survey involves risks similar to a person's everyday use of the internet. If you have concerns, you should consult the survey provider privacy policy at https://www.qualtrics.com/privacy-statement/.

Contacts and Questions

The Institutional Review Board (IRB) for the protection of human research participants at Oklahoma State University has reviewed and approved this study. If you have questions about the research study itself, please contact the Principal Investigator at 401-640-2867, ryan.devine@okstate.edu. If you have questions about your rights as a research volunteer or would simply like to speak with someone other than the research team about concerns regarding this study, please contact the IRB at (405) 744-3377 or irb@okstate.edu. All reports or correspondence will be kept confidential.

Statement of Consent

I have read the above information. I have had the opportunity to ask questions and have my questions answered. I consent to participate in the study.

If you agree to participate in this research, please choose "I consent"

- ○ I consent
- ○ I do not consent

Skip To: End of Survey If Oklahoma State University Fire and Emergency Management Program CONSENT FORM Fire Department Fitn... != I consent

End of Block: Consent

Start of Block: Demographics

Q2 What is your current age?

_____

Q3 What is your gender?

- ○ Male
- ○ Female

Q4 What is your race?

- ○ White
- ○ Black or African American
- ○ American Indian or Alaska Native
- ○ Asian
- ○ Native Hawaiian or Pacific Islander
- ○ Other

Q5 How many years have you been employed as a firefighter on a career department?

_____

Q6 What is your primary job assignment?

- ○ Firefighting
- ○ EMS

Q7 What is your highest education level?

- ○ Less than high school
- ○ High school graduate/GED
- ○ Some college
- ○ 2 year degree
- ○ 4 year degree
- ○ Graduate degree

Q8 In general, how would you rate your current health?

- ○ Excellent
- ○ Very Good
- ○ Good
- ○ Fair
- ○ Poor

Q9 In an average week, how often do you consume fast food?

- ○ Never
- ○ 1-2 times
- ○ 3-4 times
- ○ 5-6 times
- ○ 7 or more times

Q10 What is your height in inches? (ie. 5 feet 4 inches = 64)

- ○ Height: _____
- ○ I prefer not to answer

Q11 What is your current weight in pounds?

- ○ Weight: _____
- ○ I prefer not to answer

Q12 How would you rate your current weight?

- ○ 1 Underweight
- ○ 2
- ○ 3
- ○ 4
- ○ 5 Ideal weight
- ○ 6
- ○ 7
- ○ 8
- ○ 9 Overweight

Q13 In general, how would you rate your overall fitness level?

- ○ Excellent
- ○ Very Good
- ○ Good
- ○ Fair
- ○ Poor

Q14 What type(s) of physical activity do you perform?

CE = Aerobic exercise & sports (walking, biking, jogging, swimming, aerobics, basketball, softball, soccer, golf, table tennis, badminton, football, etc.)

RE = Muscular exercises (weight training, free weight training)

FE = Flexibility exercises (stretching, yoga, Pilates, calisthenics, etc.)

Arts & cultural activities (reading, writing, playing cards, dance & music, painting, etc.)

Sedentary activities (spectator sports, movies, television, etc.).

- ○ perform all types of CE, RE, FE
- ○ perform two types of physical activity among CE, RE, FE
- ○ perform one type of physical activity among CE, RE, FE
- ○ perform arts & crafts
- ○ sedentary activity

Q15 During an average week, how often do you participate in the activity?

- ○ almost every day
- ○ 4–5 days/week
- ○ 3 days/week
- ○ 1–2 days/week
- ○ sometimes

Q16 How intensely do you participate in the activity?

- ○ very hard
- ○ hard
- ○ moderate
- ○ light
- ○ very light

Q17 How long do you do the activity?

- ○ more than 150 minutes
- ○ 90–120 minutes
- ○ 60–90 minutes
- ○ 30–60 minutes
- ○ less than 30 minutes

Q18 How long have you been performing the activity?

- ○ more than 5 months
- ○ 5–6 months
- ○ 3–4 months
- ○ 1–2 months
- ○ less than 1 month

Q19 How important is it for firefighters to maintain a high level of fitness (both strength and cardiovascular)?

- ○ Extremely important
- ○ Very important
- ○ Moderately important
- ○ Slightly important
- ○ Not at all important

Q20 How important are annual health exams and screenings for firefighters?

- ○ Extremely important
- ○ Very important
- ○ Moderately important
- ○ Slightly important
- ○ Not at all important

Page Break

End of Block: Demographics

Start of Block: The Exercise Motivations Inventory - 2 (EMI-2)

Q21

On the following pages are a number of statements concerning the reasons people often give when asked why they exercise. Whether you currently exercise regularly or not, please read each statement carefully and indicate, by selecting the appropriate number, whether or not each statement is true for you personally, or would be true for you personally if you did exercise. If you do not consider a statement to be true for you at all, select the '0'. If you think that a statement is very true for you indeed, select the '5'. If you think that a statement is partly true for you, then select the '1', '2', '3' or '4', according to how strongly you feel that it reflects why you exercise or might exercise.

Remember, we want to know why you personally choose to exercise or might choose to exercise, not whether you think the statements are good reasons for anybody to exercise.

Q22 Personally, I exercise (or might exercise) ...

	0 (Not at all true for me)	1	2	3	4	5 (Very true for me)
To stay slim	○	○	○	○	○	○
To avoid ill-health	○	○	○	○	○	○
Because it makes me feel good	○	○	○	○	○	○
To help me look younger	○	○	○	○	○	○
To show my worth to others	○	○	○	○	○	○
To give me space to think	○	○	○	○	○	○
To have a healthy body	○	○	○	○	○	○
To build up my strength	○	○	○	○	○	○
Because I enjoy the feeling of exerting myself	○	○	○	○	○	○
To spend time with friends	○	○	○	○	○	○
Because my doctor advised me to exercise	○	○	○	○	○	○
Because I like trying to win in physical activities	○	○	○	○	○	○
To stay/become more agile	○	○	○	○	○	○
To give me goals to work towards	○	○	○	○	○	○

To lose weight	○	○	○	○	○	○
To prevent health problems	○	○	○	○	○	○
Because I find exercise invigorating	○	○	○	○	○	○
To have a good body	○	○	○	○	○	○
To compare my abilities with other peoples'	○	○	○	○	○	○
Because it helps to reduce tension	○	○	○	○	○	○
Because I want to maintain good health	○	○	○	○	○	○
To increase my endurance	○	○	○	○	○	○
Because I find exercising satisfying in and of itself	○	○	○	○	○	○
To enjoy the social aspects of exercising	○	○	○	○	○	○
To help prevent an illness that runs in my family	○	○	○	○	○	○
Because I enjoy competing	○	○	○	○	○	○
To maintain flexibility	○	○	○	○	○	○
To give me personal challenges to face	○	○	○	○	○	○

To help control my weight	○	○	○	○	○	○
To avoid heart disease	○	○	○	○	○	○
To recharge my batteries	○	○	○	○	○	○
To improve my appearance	○	○	○	○	○	○
To gain recognition for my accomplishments	○	○	○	○	○	○
To help manage stress	○	○	○	○	○	○
To feel more healthy	○	○	○	○	○	○
To get stronger	○	○	○	○	○	○
For enjoyment of the experience of exercising	○	○	○	○	○	○
To have fun being active with other people	○	○	○	○	○	○
To help recover from an illness/injury	○	○	○	○	○	○
Because I enjoy physical competition	○	○	○	○	○	○
To stay/become flexible	○	○	○	○	○	○
To develop personal skills	○	○	○	○	○	○
Because exercise helps me to burn calories	○	○	○	○	○	○

To look more attractive	○	○	○	○	○	○
To accomplish things that others are incapable of	○	○	○	○	○	○
To release tension	○	○	○	○	○	○
To develop my muscles	○	○	○	○	○	○
Because I feel at my best when exercising	○	○	○	○	○	○
To make new friends	○	○	○	○	○	○
Because I find physical activities fun, especially when competition is involved	○	○	○	○	○	○
To measure myself against personal standards	○	○	○	○	○	○

Page Break

End of Block: The Exercise Motivations Inventory - 2 (EMI-2)

Start of Block: The Exercise Causality Orientations Scale

Q23 Below are a series of situations that people can find themselves in with regard to exercising. Each situation is followed by three responses (a, b and c) that represent different ways in which people could react. Please imagine yourself in each situation and circle a number on the scale below EACH response (a, b AND c) to indicate the extent to which EACH response would be characteristic of you in that situation. There are no right or wrong answers and no trick questions. We simply want to know the extent to which you think you would react in these different ways to each situation.

Q24 You are beginning a new exercise program. You are likely to:

	1	2	3	4	5	6	7
Attend a structured exercise class where an exercise leader is telling you what to do.	○	○	○	○	○	○	○
Decide for yourself which type of exercise you would like to complete.	○	○	○	○	○	○	○
Tag along with your friends and do what they do.	○	○	○	○	○	○	○

Q25 You are asked to keep a record of all the weekly exercise you have completed in an exercise diary. You are likely to view the diary:

	1	2	3	4	5	6	7
As a reminder of how incapable you are at fulfilling the task.	○	○	○	○	○	○	○
As a way to measure your progress and to feel proud of your achievements.	○	○	○	○	○	○	○
As a way of pressuring yourself to exercise.	○	○	○	○	○	○	○

Q26 In order to monitor how well you are doing in an exercise program you are likely to want to:

	1	2	3	4	5	6	7
Be given a lot of praise and encouragement from others.	○	○	○	○	○	○	○
Evaluate your own performance and provide yourself with positive feedback.	○	○	○	○	○	○	○
Just hope that what you are doing is correct.	○	○	○	○	○	○	○

Q27 You have been exercising regularly for 6 months but recently you have been missing sessions and are finding it hard to get motivated to exercise. You are likely to:

	1	2	3	4	5	6	7
Approach someone to help motivate you.	○	○	○	○	○	○	○
Ignore the problem, nothing can be done to improve your motivation.	○	○	○	○	○	○	○
Employ your own strategies to motivate yourself.	○	○	○	○	○	○	○

Q28 You have been told that setting goals is a good way to motivate yourself to exercise. You would likely:

	1	2	3	4	5	6	7
Set your own realistic but challenging goals.	○	○	○	○	○	○	○
Make someone important to you set goals for you to aim for.	○	○	○	○	○	○	○
Not set goals because you may not be able to live up to them.	○	○	○	○	○	○	○

Q29 During a discussion with an exercise counsellor he/she presents many options on the best way for you to exercise to achieve fitness and health benefits. It is likely that your first thought would be:

	1	2	3	4	5	6	7
What do you (the exercise leader) think I should do?	○	○	○	○	○	○	○
What do I think is the best option for me?	○	○	○	○	○	○	○
What has everyone else done in the past?	○	○	○	○	○	○	○

Q30 During an exercise session how hard you are working out is likely to be governed by:

	1	2	3	4	5	6	7
The intensity you have been told to exercise at.	○	○	○	○	○	○	○
What everyone around you is doing.	○	○	○	○	○	○	○
How you are feeling whilst exercising at the intensity you choose.	○	○	○	○	○	○	○

Page Break

End of Block: The Exercise Causality Orientations Scale

Start of Block: Incentives

Q31 Please indicate whether your department offers the following incentive OR how likely you would be to support each health promotion program/incentive

	My Department already offers this program/incentive	Extremely likely	Somewhat likely	Neither likely nor unlikely	Somewhat unlikely	Extremely unlikely
If your department were to implement a comprehensive (non-punitive) health/wellness program, how likely would you be to support this?	○	○	○	○	○	○
If the city contributed towards an Athletic League or competitive fitness challenges, (such as a road race, stair climb, sports league, weight loss challenge or fitness challenge) how likely would you be to participate?	○	○	○	○	○	○
If the department agreed to purchase new equipment for each station, would you be willing to support?	○	○	○	○	○	○
If the department offered un-interrupted time for working out on duty (rotating trucks out-of-service for fitness	○	○	○	○	○	○

training, with the exception of a fire or major incident), would you be willing to support?						
If the department offered individualized health or fitness coaching, would you be willing to support?	○	○	○	○	○	○
If the department offered nutritional/dietician training or programs, would you be willing to support?	○	○	○	○	○	○
If the department offered a smoking cessation program, would you be willing to support?	○	○	○	○	○	○
If the department offered group fitness programs, would you be willing to support?	○	○	○	○	○	○
If the department offered gym membership reimbursement, would you be willing to support?	○	○	○	○	○	○
If the department offered a paid day off to attend an annual wellness check, would you be willing to support this?	○	○	○	○	○	○

If the department offered bonus vacation days based on fitness scores that are on a graduated scale from passing to excellent, would you be willing to support?	○	○	○	○	○	○
If the department offered a cash bonus for meeting a fitness goal or meeting a fitness standard (non-punitive), would you be willing to support?	○	○	○	○	○	○
If the department offered reduced medical co-pays based on a graduated scale from passing to excellent, would you be willing to support?	○	○	○	○	○	○
If the department offered a stress management program, would you be willing to support?	○	○	○	○	○	○
If the department offered a peer-based behavioral health assistance program, would you be willing to support?	○	○	○	○	○	○
If the department offered a dedicated Fire Department Chaplain that provided spiritual	○	○	○	○	○	○

guidance along with a non-peer based option for the behavioral health assistance program, would you be willing to support?	

Page Break

Q32 Finally, please rank the following incentives from most desirable (1) to least desirable (14):

_____ City contribution towards Fire Department Athletic League/Competitive fitness challenges, (such as a road race, stair climb, sports leagues, weight loss challenge or fitness challenge)
_____ New equipment for each station
_____ Un-interrupted time for working out on duty (rotating trucks out-of-service for fitness training, with the Exception of a fire or major incident)
_____ Individualized health or fitness coaching
_____ Nutritional/dietician training or programs
_____ Stress management program
_____ Smoking cessation program
_____ Group fitness programs
_____ Gym membership reimbursement
_____ 1 paid day off to attend an annual wellness check
_____ Bonus vacation days based on fitness scores that are on a graduated scale from passing to excellent
_____ Cash bonus for meeting a fitness goal or meeting a fitness standard (non-punitive)
_____ Reduced medical co-pays based on a graduated scale from passing to excellent
_____ Behavioral Health Program

End of Block: Incentives

Start of Block: Block 5

Q33 Congratulations on completing the Survey! Would you like to receive a $5 Dunkin Donuts gift card? If yes, you will be directed to a separate survey to enter your name and email address.

- ○ Yes
- ○ No

End of Block: Block 5

Oklahoma State University Institutional Review Board

Date:	05/01/2019
Application Number:	EN-19-5
Proposal Title:	FIRE DEPARTMENT FITNESS AND WELLNESS PROGRAM IMPLEMENTATION
Principal Investigator:	RYAN DEVINE
Co-Investigator(s):	
Faculty Adviser:	Haley Murphy
Project Coordinator:	
Research Assistant(s):	
Processed as:	Exempt
Exempt Category:	

Status Recommended by Reviewer(s): Approved

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in 45CFR46.

This study meets criteria in the Revised Common Rule, as well as, one or more of the circumstances for which continuing review is not required. As Principal Investigator of this research, you will be required to submit a status report to the IRB triennially.

The final versions of any recruitment, consent and assent documents bearing the IRB approval stamp are available for download from IRBManager. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any unanticipated and/or adverse events to the IRB Office promptly.
4. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 405-744-3377 or irb@okstate.edu.

Sincerely,
Oklahoma State University IRB

From: **minhaengcho** cho6447@hanmail.net
Subject: RE: five item physical activity questionaire
Date: January 30, 2019 at 8:36 AM
To: Devine, Ryan ryan.devine@okstate.edu

External Email - Please verify sender email address before responding.

Dear:

For each item (the type of physical activity, frequency, intensity, duration, and overall length of his/her participation), a 5-point Likert-type was used.

The types of physical activity were coded on five-
point scale (5 = performing all types of cardiovascular exercise, resistance exercise & flexibility exercise: 4 = performing two types of physical activity among cardiovascular exercise, resistance exercise & flexibility exercise: 3 =

It was calculated by:
score = type of physical activity x (frequency + intensity + duration + overall length)

Good luck for your research.
Sincerely yours,

---------- 원본 메일 ----------
보낸사람: Devine, Ryan <ryan.devine@okstate.edu>
받는사람: cho6447@hanmail.net <cho6447@hanmail.net>
날짜: 19.01.30 06:54 GMT +0900
제목: five item physical activity questionaire

Hello,

Could you tell me how to obtain the score 4-100 on this questionaire? How do you obtain the scaled score for each activity type? Am I able to use this scale in my research?

Thank You

Ryan Devine
</cho6447@hanmail.net></ryan.devine@okstate.edu>

TABLE 20

T-Test Group Statistics – Above and Below Median Age (36)

Survey Question	Median age	N	Mean	t	Sig. (2-tailed)
Q12 – Rate your current weight	Below	90	6.03	-2.022	.045
	Above	94	6.40	-2.024	.044
Q13 – Rate your overall fitness level	Below	90	2.49	-2.806	.006
	Above	94	2.86	-2.811	.005
Five-item questionnaire score	Below	90	63.9556	3.824	.000
	Above	93	52.5156	3.838	.000
Autonomy score (Causality scale)	Below	74	5.5772	2.978	.003
	Above	83	5.0947	3.012	.003
Control score (Causality scale)	Below	73	3.5323	2.571	.011
	Above	82	3.0505	2.580	.011
Q31_1_likert – Support for comprehensive health/wellness program	Below	67	1.3881	-2.568	.011
	Above	76	1.8158	-2.644	.009
Q31_2_likert – Participation in athletic league or competitive fitness challenges	Below	55	1.6545	-4.198	.000
	Above	71	2.5775	-4.363	.000
Q31_3_likert – Support for new equipment	Below	33	1.2424	-2.413	.018
	Above	41	1.8293	-2.619	.011
Q31_5_likert – Support for individualized health/fitness coaching	Below	70	1.5429	-2.415	.017
	Above	74	1.9865	-2.434	.016
Q31_6_likert – Support for nutritional/dietician training	Below	71	1.3099	-3.006	.003
	Above	80	1.7500	-3.125	.002
Q31_8_likert – Support for group fitness programs	Below	72	1.7639	-2.993	.003
	Above	75	2.3467	-3.011	.003
Q31_9_likert – Support for gym membership reimbursement	Below	71	1.0423	-3.599	.000
	Above	77	1.5325	-3.740	.000
Q31_10_likert – Support for paid day off for wellness check	Below	68	1.1324	-3.867	.000

	Above	76	1.7368	-4.050	.000
Q31_11_likert – Support for bonus vacation days for fitness scores	Below	72	1.4167	-4.125	.000
	Above	80	2.2625	-4.239	.000
Q31_12_likert – Support for cash bonus for meeting fitness goal or standard	Below	72	1.1528	-4.744	.000
	Above	80	2.0000	-4.959	.000
Q31_13_likert – Support for reduced medical co-pays for fitness scores	Below	72	1.2778	-3.310	.001
	Above	79	1.8481	-3.401	.001
Q31_14_likert – Support for behavioral health program	Below	68	1.4265	-2.180	.031
	Above	76	1.7895	-2.227	.028
Q32_6 – Incentive: Stress management program	Below	66	8.50	2.701	.008
	Above	77	6.87	2.685	.008
Q32_10 – Incentive: 1 Paid day off to attend an annual wellness check	Below	66	6.73	-1.996	.048
	Above	77	7.95	-2.011	.046
EMI-2 – Stress Management	Below	87	4.1753	2.141	.034
	Above	88	3.6648	2.139	.034
EMI-2 - Revitalization	Below	86	4.5039	2.682	.008
	Above	88	3.9470	2.683	.008
EMI-2 - Enjoyment	Below	85	4.3794	3.110	.002
	Above	88	3.6648	3.111	.002
EMI-2 - Challenge	Below	86	3.9738	4.042	.000
	Above	87	3.1178	4.038	.000
EMI-2 – Social Recognition	Below	86	2.6047	3.194	.002
	Above	88	2.0142	3.183	.002
EMI-2 – Affiliation	Below	87	2.8592	2.832	.005
	Above	88	2.2642	2.829	.005
EMI-2 - Competition	Below	87	3.5201	3.629	.000
	Above	88	2.6506	3.626	.000
EMI-2 – Positive Health	Below	88	5.2765	2.434	.016
	Above	89	4.8989	2.435	.016

EMI-2 – Weight Management	Below	86	4.5262	2.238	.027
	Above	87	4.0833	2.239	.026
EMI-2 - Appearance	Below	86	4.2762	2.851	.005
	Above	88	3.7102	2.855	.005
EMI-2 – Strength and Endurance	Below	87	5.3937	5.547	.000
	Above	86	4.5640	5.533	.000
EMI-2 - Nimbleness	Below	87	4.6475	2.206	.029
	Above	88	4.1894	2.208	.029

TABLE 21

T-Test – Mean Five Item Scores

	Five Item Mean Score	N	Mean	t	Sig. (2-tailed)
Q8 – Current health rating	Below Mean (low fitness)	89	2.70	6.387	.000
	Above Mean (high fitness)	96	2.03	6.394	.000
Q11 – Current weight (lbs.)	Below Mean (low fitness)	89	206.29	2.775	.006
	Above Mean (high fitness)	94	193.63	2.767	.006
Q12 – Current health rating	Below Mean (low fitness)	89	6.62	4.595	.000
	Above Mean (high fitness)	96	5.82	4.574	.000
Q13 – Current fitness level rating	Below Mean (low fitness)	89	3.20	9.193	.000
	Above Mean (high fitness)	96	2.19	9.187	.000
Five Item Score	Below Mean (low fitness)	89	40.7416	-18.146	.000
	Above Mean (high fitness)	96	74.4063	-17.931	.000
Five Item Category	Below Mean (low fitness)	89	2.6517	-15.132	.000
	Above Mean (high fitness)	96	3.8333	-14.841	.000
Q19 – Importance of maintaining a high level of fitness	Below Mean (low fitness)	89	1.39	2.428	.016
	Above Mean (high fitness)	96	1.22	2.419	.017
Autonomy Score (Causality scale)	Below Mean (low fitness)	77	5.0111	-3.795	.000
	Above Mean (high fitness)	81	5.6208	-3.785	.000
Impersonal Score (Causality scale)	Below Mean (low fitness)	77	2.8776	2.359	.020
	Above Mean (high fitness)	80	2.4911	2.361	.019
Q31_1_likert – Support for comprehensive health/wellness program	Below Mean (low fitness)	72	1.7917	2.120	.036
	Above Mean (high fitness)	71	1.4366	2.125	.035
Q31_3_likert – Support for new equipment purchase	Below Mean (low fitness)	45	1.8000	2.394	.019
	Above Mean (high fitness)	29	1.2069	2.773	.007

Q_31_10_likert – Support for paid day off for wellness check	Below Mean (low fitness)	73	1.6575	2.554	.012
	Above Mean (high fitness)	72	1.2500	2.564	.012
Q_31_11_likert – Support for bonus vacation days for fitness score	Below Mean (low fitness)	78	2.1026	2.381	.019
	Above Mean (high fitness)	75	1.6000	2.391	.018
Q_31_12_likert – Support for cash bonus for meeting fitness goal/standard	Below Mean (low fitness)	78	1.7949	2.180	.031
	Above Mean (high fitness)	75	1.3867	2.194	.030
Q_31_14_likert – Support for stress management program	Below Mean (low fitness)	74	1.8108	2.443	.016
	Above Mean (high fitness)	71	1.4085	2.462	.015
Q32_4 – Health or fitness coaching incentive	Below Mean (low fitness)	74	6.93	-3.241	.001
	Above Mean (high fitness)	70	8.76	-3.248	.001
BMI	Below Mean (low fitness)	89	29.7364	2.972	.003
	Above Mean (high fitness)	93	27.9027	2.961	.003
EMI-2 – Stress management	Below Mean (low fitness)	83	3.3765	-4.606	.000
	Above Mean (high fitness)	93	4.4274	-4.579	.000
EMI-2 – Revitalization	Below Mean (low fitness)	83	3.6386	-5.860	.000
	Above Mean (high fitness)	92	4.7717	-5.776	.000
EMI-2 – Enjoyment	Below Mean (low fitness)	82	3.2378	-7.138	.000
	Above Mean (high fitness)	92	4.7228	-7.070	.000
EMI-2 – Challenge	Below Mean (low fitness)	83	3.0452	-4.556	.000
	Above Mean (high fitness)	91	4.0000	-4.541	.000
EMI-2 – Affiliation	Below Mean (low fitness)	83	2.2048	-3.137	.002
	Above Mean (high fitness)	93	2.8602	-3.170	.002
EMI-2 – Competition	Below Mean (low fitness)	83	2.7470	-2.615	.010
	Above Mean (high fitness)	93	3.3844	-2.622	.010
EMI-2 – Ill health avoidance	Below Mean (low fitness)	83	4.6466	-3.628	.000
	Above Mean (high fitness)	93	5.2258	-3.569	.000
EMI-2 – Positive health	Below Mean (low fitness)	85	4.6784	-5.395	.000
	Above Mean (high fitness)	93	5.4659	-5.302	.000
EMI-2 – Appearance	Below Mean (low fitness)	83	3.7711	-2.050	.042

	Above Mean (high fitness)	92	4.1821	-2.042	.043
EMI-2 – Strength & Endurance	Below Mean (low fitness)	83	4.5723	-5.200	.000
	Above Mean (high fitness)	91	5.3571	-5.082	.000
EMI-2 – Nimbleness	Below Mean (low fitness)	83	4.0201	-3.723	.000
	Above Mean (high fitness)	93	4.7706	-3.706	.000

TABLE 22

Correlation Matrix

		Q2 - Age	Q5 - Years	Q7 – Education	Q11 – Weight (lbs.)	Five Item Score	BMI
Q2 – Current Age	Pearson Correlation Sig. (2-tailed) N	1 184	.884** .000 184	-.115 .120 184	.104 .163 182	-.230** .002 183	.059 .430 181
Q5 – Years on the job	Pearson Correlation Sig. (2-tailed) N	.884** .000 184	1 186	-.152* .038 186	.150* .042 184	-.266** .000 185	.123 .098 183
Q7 – Education level	Pearson Correlation Sig. (2-tailed) N	-.115 .120 184	-.152* .038 186	1 186	-.111 .135 184	.071 .337 185	-.049 .510 183
Q11 – Current weight (lbs.)	Pearson Correlation Sig. (2-tailed) N	.104 .163 182	.150* .042 184	-.111 .135 184	1 184	-.273** .000 183	.793** .000 183
Five Item Questionnaire (Fitness score)	Pearson Correlation Sig. (2-tailed) N	-.230** .002 183	-.266** .000 185	.071 .337 185	-.273** .000 183	1 185	-.255** .001 182
BMI	Pearson Correlation Sig. (2-tailed) N	.059 .430 181	.123 .098 183	-.049 .510 183	.793** .000 183	-.255** .001 182	1 183
Q13 – Rated fitness level	Pearson Correlation Sig. (2-tailed) N	.167* .023 184	.202** .006 186	-.013 .859 186	.438** .000 184	-.698** .000 185	.426** .000 183
Q19 – Importance of	Pearson	.019	.041	-.035	.184*	-	.111

maintaining high level of fitness	Correlation Sig. (2-tailed) N	.795 184	.580 186	.636 186	.012 184	.229** .002 185	.133 183
Q20 – Importance of annual health exams/screenings	Pearson Correlation Sig. (2-tailed) N	-.080 .282 184	-.108 .144 186	.014 .850 186	.166* .024 184	-.033 .654 185	.110 .138 183
Autonomy (causality score)	Pearson Correlation Sig. (2-tailed) N	-.220** .006 157	-.234** .003 159	.066 .411 159	-.144 .073 157	.443** .000 158	-.132 .100 156
Control (causality score)	Pearson Correlation Sig. (2-tailed) N	-.206** .010 155	-.165* .039 157	.074 .354 157	.026 .752 155	-.050 .538 156	.109 .178 154
Impersonal (causality score)	Pearson Correlation Sig. (2-tailed) N	-.032 .694 156	.042 .599 158	.062 .440 158	.154 .055 156	-.233** .003 157	.113 .162 155
Q31_1_likert – Support of comprehensive health/wellness program	Pearson Correlation Sig. (2-tailed) N	.200* .017 143	.183* .028 144	-.047 .575 144	.133 .112 144	-.181* .030 143	.149 .076 143
Q31_2_likert – Support of athletic league or fitness challenges	Pearson Correlation Sig. (2-tailed) N	.335** .000 126	.349** .000 128	.004 .966 128	.134 .133 127	-.157 .078 127	.159 .076 126
Q31_3_likert – Support of new equipment	Pearson Correlation Sig. (2-tailed) N	.271* .019 74	.306** .008 75	.157 .177 75	.104 .374 75	-.345** .003 74	.099 .399 75
Q31_5_likert – Support of health/fitness coaching	Pearson Correlation	.234** .005	.272** .001	-.027 .745	.052 .531	-.016 .850	-.033 .690

	Sig. (2-tailed) N	144	146	146	145	145	144
Q31_6_likert - Support of nutritional/dietician	Pearson Correlation Sig. (2-tailed) N	.269** .001 151	.308** .000 153	-.043 .597 153	.148 .068 152	-.004 .961 152	.095 .248 151
Q31_7_likert – Support of smoking cessation program	Pearson Correlation Sig. (2-tailed) N	.097 .236 150	.176* .030 152	-.084 .302 152	.091 .268 151	-.084 .307 151	.035 .668 150
Q31_8_likert – Support of group fitness programs	Pearson Correlation Sig. (2-tailed) N	.265** .001 147	.272** .001 149	.019 .814 149	.074 .373 148	-.059 .474 148	.028 .740 147
Q31_9_likert – Support of gym membership reimbursement	Pearson Correlation Sig. (2-tailed) N	.281** .001 148	.316** .000 150	.007 .929 150	.092 .264 149	-.125 .128 149	.089 .283 148
Q31_10_likert – Support of paid day off for wellness check	Pearson Correlation Sig. (2-tailed) N	.281** .001 144	.284** .001 146	-.052 .536 146	.094 .262 145	-.167* .045 145	.077 .357 144
Q31_11_likert – Support of bonus vacation days for fitness scores	Pearson Correlation Sig. (2-tailed) N	.423** .000 152	.400** .000 154	-.190* .018 154	.126 .121 153	-.265** .001 153	.116 .155 152
Q31_12_likert – Support of cash bonus for fitness goal	Pearson Correlation Sig. (2-tailed) N	.423** .000 152	.362** .000 154	-.088 .277 154	.092 .259 153	-.295** .000 153	.103 .208 152
Q31_13_likert – Support of reduced medical co-pays for fitness score	Pearson Correlation Sig. (2-tailed)	.249** .002 151	.233** .004 153	.004 .962 153	.142 .080 152	-.233** .006	.159 .051 151

	N					153	
Q31_14_likert – Support of stress management program	Pearson Correlation Sig. (2-tailed) N	.222** .007 144	.205* .013 146	.003 .968 146	.141 .092 145	-.219** .008 145	.132 .116 144
Q31_15_likert – Support of behavioral assistance program	Pearson Correlation Sig. (2-tailed) N	.205* .019 130	.261** .003 132	-.075 .392 132	.171 .051 131	-.178 .041 131	.053 .552 130
Q32_3 – Uninterrupted workout time incentive	Pearson Correlation Sig. (2-tailed) N	-.135 .107 143	-.175* .035 145	.000 .999 145	-.075 .374 144	.114 .174 144	-.120 .155 143
Q32_4 – Health/fitness coaching incentive	Pearson Correlation Sig. (2-tailed) N	.062 .459 143	.079 .347 145	-.171* .039 145	.059 .483 144	.171* .040 144	.013 .880 143
Q32_6 – Stress management program incentive	Pearson Correlation Sig. (2-tailed) N	-.262** .002 143	-.249** .003 145	.313** .000 145	-.081 .334 144	.029 .727 144	-.058 .490 143
Q32_7 – Smoking cessation program incentive	Pearson Correlation Sig. (2-tailed) N	-.004 .958 143	.110 .186 145	.106 .204 145	-.110 .191 144	.167* .046 144	-.144 .085 143
Q32_9 – Gym membership incentive	Pearson Correlation Sig. (2-tailed) N	.111 .187 143	.095 .257 145	-.037 .657 145	.057 .497 144	-.203* .015 144	.030 .719 143
Q32_13 – Reduced medical co-pays for fitness incentive	Pearson Correlation Sig. (2-tailed) N	-.056 .503 143	-.054 .521 145	-.176* .034 145	.103 .220 144	-.148 .076 144	.167* .046 143

Q32_14 – Behavioral health incentive	Pearson Correlation Sig. (2-tailed) N	-.040 .631 143	-.032 .701 145	.177* .034 145	-.051 .545 144	.053 .531 144	-.036 .671 143
EMI-2 – Stress management	Pearson Correlation Sig. (2-tailed) N	-.152* .044 175	-.221** .003 177	.009 .907 177	-.202** .007 175	.365** .000 176	-.123 .106 174
EMI-2 – Revitalization	Pearson Correlation Sig. (2-tailed) N	-.209** .006 174	-.299** .002 176	.040 .598 176	-.230** .002 174	.508** .000 175	-.141 .065 173
EMI-2 – Enjoyment	Pearson Correlation Sig. (2-tailed) N	-.253** .001 173	-.298** .000 175	.006 .938 175	-.227** .003 173	.550** .000 174	-.149 .051 173
EMI-2 – Challenge	Pearson Correlation Sig. (2-tailed) N	-.257** .001 173	-.293** .000 175	-.030 .696 175	-.170* .025 173	.412** .000 174	-.087 .257 172
EMI-2 – Social recognition	Pearson Correlation Sig. (2-tailed) N	-.193* .011 174	-.180* .017 176	.003 .970 176	-.060 .435 174	.188* .013 175	-.052 .498 173
EMI-2 – Affiliation	Pearson Correlation Sig. (2-tailed) N	-.163* .031 175	-.192* .010 177	-.042 .574 177	-.154* .041 175	.277** .000 176	-.127 .094 174
EMI-2 – Competition	Pearson Correlation Sig. (2-tailed) N	-.257** .001 175	-.269** .000 177	-.026 .732 177	.026 .731 175	.249** .001 176	.029 .703 174
EMI-2 – Health pressures	Pearson Correlation	.159*	.045	-.168*	.177*	-.033	.133

	Sig. (2-tailed)	.036	.548	.025	.019	.661	.081
	N	175	177	177	175	176	174
EMI-2 – Ill health avoidance	Pearson Correlation	-.101	-.134	-.014	-.008	.346**	.048
	Sig. (2-tailed)	.184	.075	.858	.911	.000	.531
	N	175	177	177	175	176	174
EMI-2 – Positive health	Pearson Correlation	-.212**	-.239**	.038	-.178*	.481**	-.104
	Sig. (2-tailed)	.005	.001	.616	.018	.000	.168
	N	177	179	179	177	178	176
EMI-2 – Weight management	Pearson Correlation	-.090	.002	-.056	.220**	.021	.221**
	Sig. (2-tailed)	.240	.979	.460	.004	.788	.004
	N	173	175	175	173	174	172
EMI-2 – Appearance	Pearson Correlation	-.219**	-.170*	.054	-.190*	.295**	-.147
	Sig. (2-tailed)	.004	.024	.477	.012	.000	.054
	N	174	176	176	174	175	173
EMI-2 – Strength & Endurance	Pearson Correlation	-.410**	-.378**	.046	-.187*	.483**	-.128
	Sig. (2-tailed)	.000	.000	.545	.014	.000	.093
	N	173	175	175	173	174	172
EMI-2 – Nimbleness	Pearson Correlation	-.144	-.209**	.003	-.208**	.326**	-.165*
	Sig. (2-tailed)	.057	.005	.973	.006	.000	.029
	N	175	177	177	175	176	174

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

VITA

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